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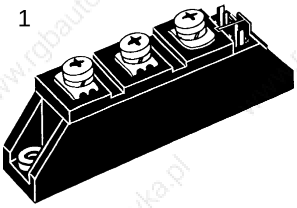
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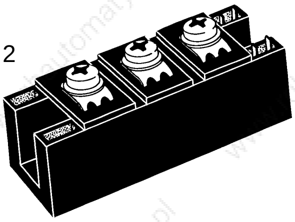
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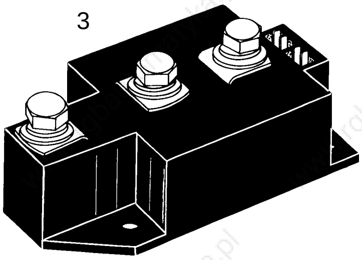
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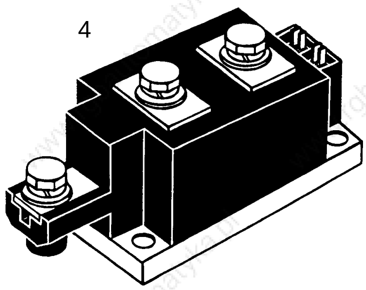
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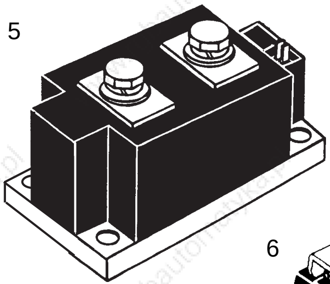
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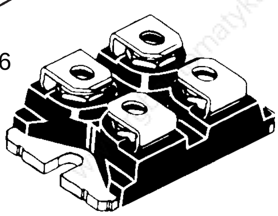


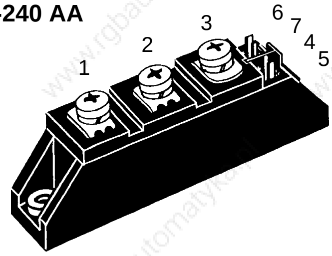
See also *section E1*
page 1 Discrete Thyristors

Thyristor Modules

I_{TRMS} = 2x 40 A
I_{TAVM} = 2x 25 A
V_{RRM} = 800-1600 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type Version 1 B	Version 8 B
900	800	MCC 19-08io1 B	MCC 19-08io8 B
1300	1200	MCC 19-12io1 B	MCC 19-12io8 B
1500	1400	MCC 19-14io1 B	MCC 19-14io8 B
1700	1600	MCC 19-16io1 B	MCC 19-16io8 B

TO-240 AA



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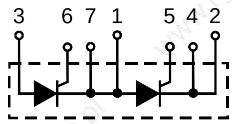

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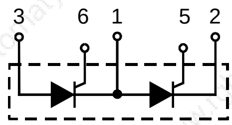


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		40	A
I_{TAVM}	T_C = 58°C; 180° sine		25	A
	T_C = 85°C; 180° sine		18	A
I_{TSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	400	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	420	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	350	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	370	A
$\int i^2dt$	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	800	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	730	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	600	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	570	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 45 A	150	A/µs
	f =50 Hz, t_P =200 µs			
	$V_D = 2/3\ V_{DRM}$			
	I_G = 0.45 A	non repetitive, $I_T = I_{TAVM}$	500	A/µs
	di_G/dt = 0.45 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$;	$V_{DR} = 2/3\ V_{DRM}$	1000	V/µs
	$R_{GK} = \infty$; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		3	mA
V_T	I_T = 80 A; T_{VJ} = 25°C		2.05	V
V_{T0} r_T	For power-loss calculations only (T_{VJ} = 125°C)		0.85 18	V mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	1.5 1.6	V V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	100 200	mA mA
V_{GD} I_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.2 10	V mA
I_L	T_{VJ} = 25°C; t_P = 10 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 0.45 A; di_G/dt = 0.45 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 20 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; V_D = 2/3 V_{DRM}	typ.	150	µs
Q_S I_{RM}	$T_{VJ} = T_{VJM}$; I_T = 25 A, -di/dt = 0.64 A/µs		50 6	µC A
R_{thJC}	per thyristor; DC current per module	other values see Fig. 8/9	1.3 0.65	K/W K/W
R_{thJK}	per thyristor; DC current per module	other values see Fig. 8/9	1.5 0.75	K/W K/W
d_S d_A a	Creepage distance on surface Strike distance through air Maximum allowable acceleration		12.7 9.6 50	mm mm m/s^2

Optional accessories for module-type MCC 19 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

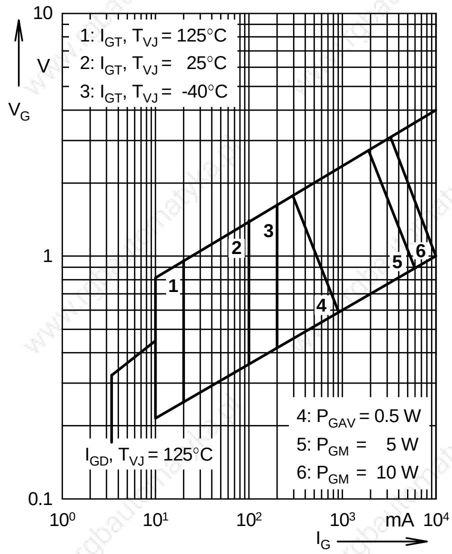


Fig. 1 Gate trigger characteristics

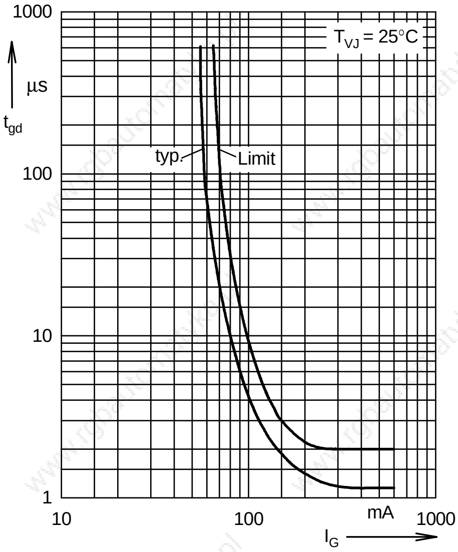
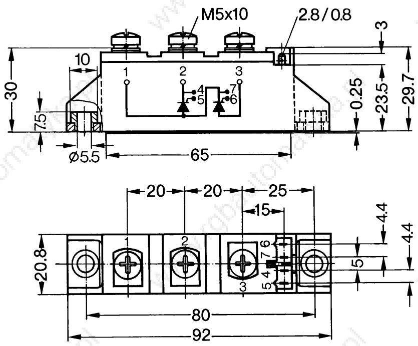


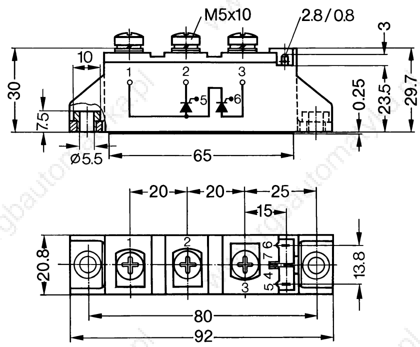
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

Version 1 B



Version 8 B



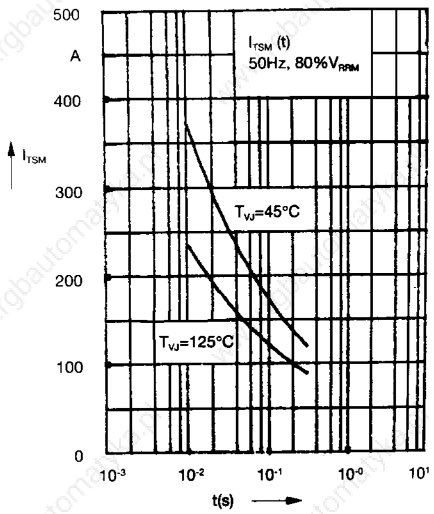


Fig. 3 Surge overload current
I_{TSM}: Crest value, t: duration

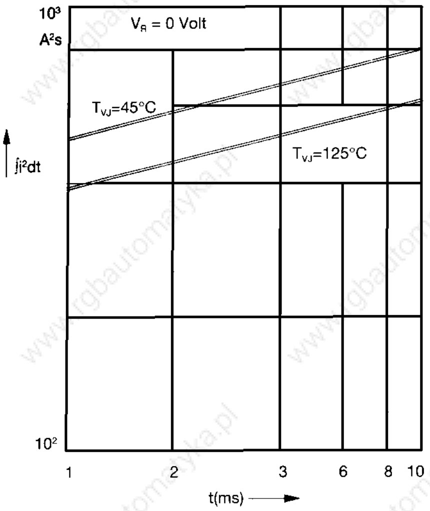


Fig. 4 ∫i²dt versus time (1-10 ms)

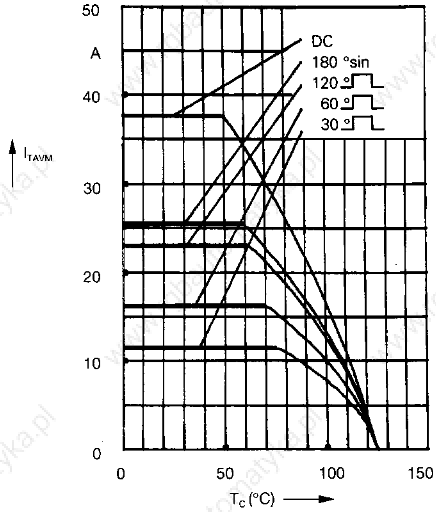


Fig. 4a Maximum forward current at case temperature

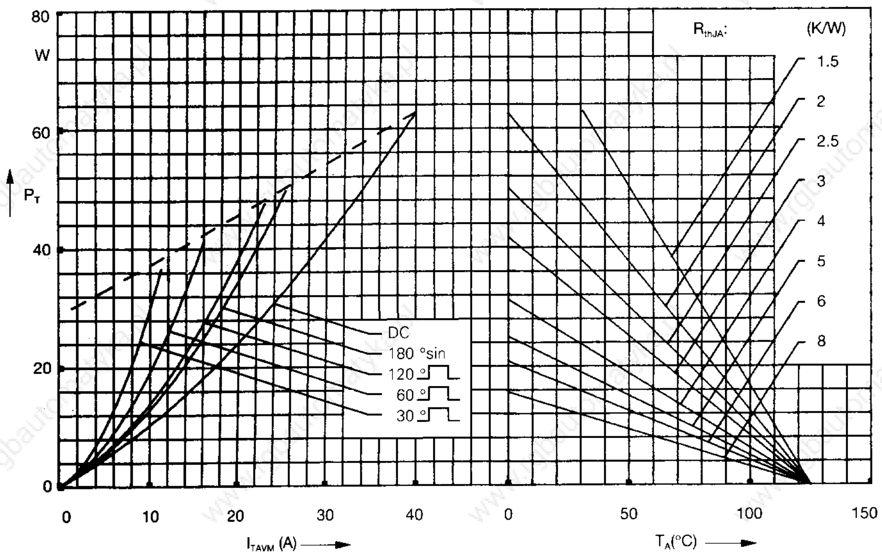


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor)

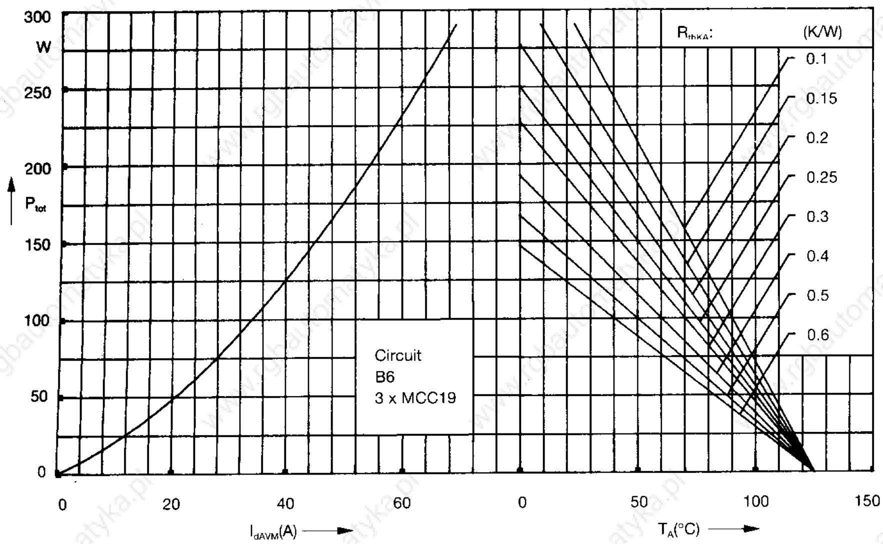


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

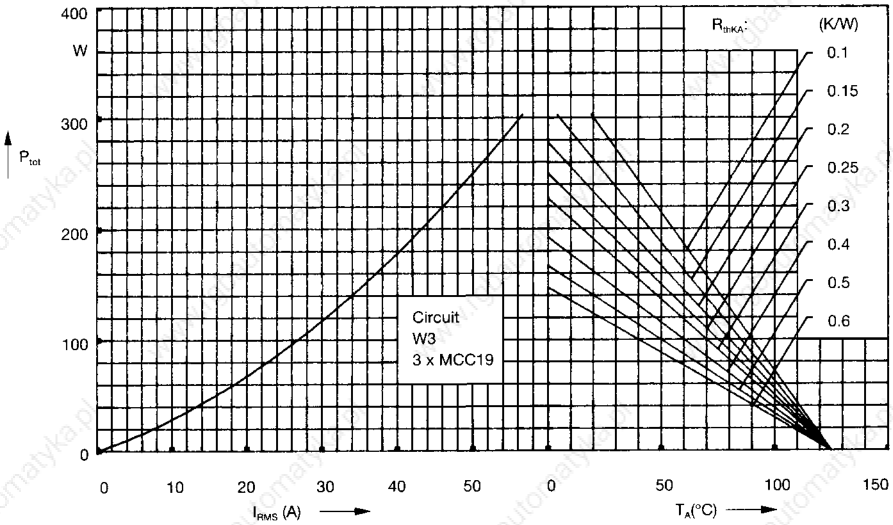


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

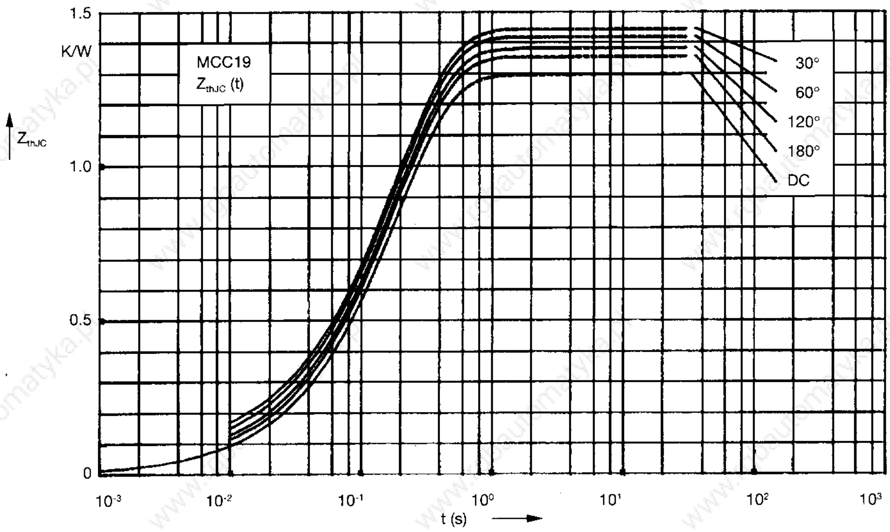


Fig. 8 Transient thermal impedance junction to case (per thyristor)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	1.3
180°	1.35
120°	1.39
60°	1.42
30°	1.45

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.018	0.0033
2	0.041	0.0216
3	1.241	0.191

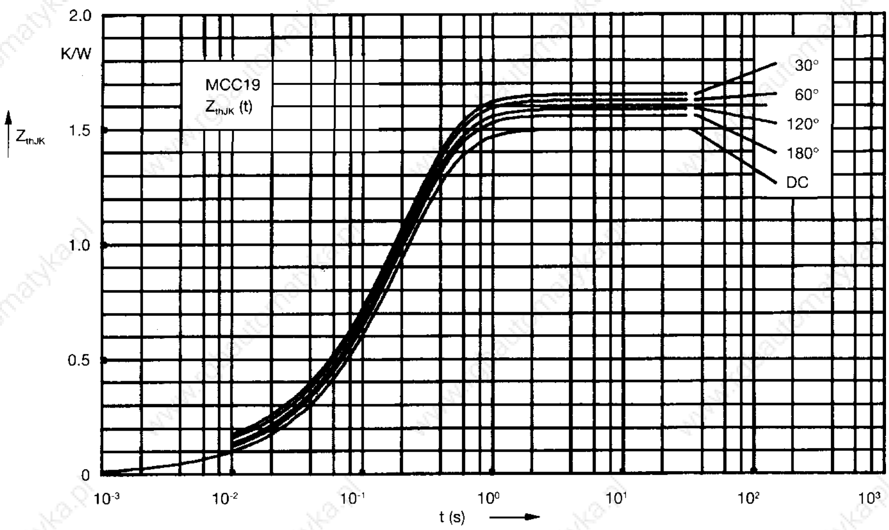


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

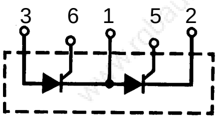
d	R_{thJK} (K/W)
DC	1.5
180°	1.55
120°	1.59
60°	1.62
30°	1.65

Constants for Z_{thJK} calculation:

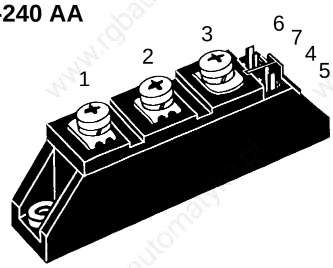
i	R_{thi} (K/W)	t_i (s)
1	0.018	0.0033
2	0.041	0.0216
3	1.241	0.191
4	0.2	0.46

Thyristor Modules

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
900	800	MCC 21-08io8 B
1300	1200	MCC 21-12io8 B
1500	1400	MCC 21-14io8 B
1700	1600	MCC 21-16io8 B



TO-240 AA



Symbol	Conditions		Maximum Ratings	
I_{TRMS} I_{TAVM}	$T_{VJ} = T_{VJM}$ T_C = 85°C; 180° sine		33 21	A A
I_{TSM}	T_{VJ} = 45°C; V_R = 0	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	320 350	A A
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	280 310	A A
I^2dt	T_{VJ} = 45°C V_R = 0	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	500 520	A^2s A^2s
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	390 400	A^2s A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50Hz, t_P = 200µs	repetitive, I_T = 45 A	150	A/µs
	$V_D = {}^2/_3\,V_{DRM}$ I_G = 0.45 A di_G/dt = 0.45 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_{DR} = {}^2/_3\,V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$ $I_T = I_{TAVM}$	t_P = 30 µs t_P = 300 µs	10 5	W W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ} T_{VJM} T_{stg}			-40...+125 125 -40...+125	°C °C °C
V_{ISOL}	50/60 Hz, RMS $I_{ISOL} \leq$ 1 mA	t = 1 min t = 1 s	3000 3600	V~ V~
M_d	Mounting torque (M5) Terminal connection torque (M5)		2.5-4.0/22-35 2.5-4.0/22-35	Nm/lb.in. Nm/lb.in.
Weight	Typical including screws		90	g

Data according to DIN/IEC 747 and refer to a single thyristor unless otherwise stated.

Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

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Symbol	Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		5	mA
V_T	I_T = 45 A; T_{VJ} = 25°C		1.6	V
V_{T0} r_T	For power-loss calculations only (T_{VJ} = 125°C)		0.85 15	V mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	1.0 1.2	V V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	65 80	mA mA
V_{GD} I_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = {}^2/_3\ V_{DRM}$	0.2 5	V mA
I_L	T_{VJ} = 25°C; t_P = 10 µs; V_D = 6 V I_G = 0.3 A; di_G/dt = 0.3 A/µs		150	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		100	mA
t_{gd}	T_{VJ} = 25°C; V_D = ½ V_{DRM} I_G = 0.3 A; di_G/dt = 0.3 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 15 A, t_P = 300 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; $V_D = {}^2/_3\ V_{DRM}$	typ.	150	µs
I_{RM}	$T_{VJ} = T_{VJM}$; I_T = 30 A, -di/dt = 0.3 A/µs		4	A
R_{thJC} R_{thJK}	per thyristor; DC current per module per thyristor; DC current per module	other values see Fig. 8/9	1.1 0.55 1.3 0.65	K/W K/W K/W K/W
d_S d_A a	Creepage distance on surface Strike distance through air Maximum allowable acceleration		12.7 9.6 50	mm mm m/s²

Optional accessories for module-type MCC 23 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

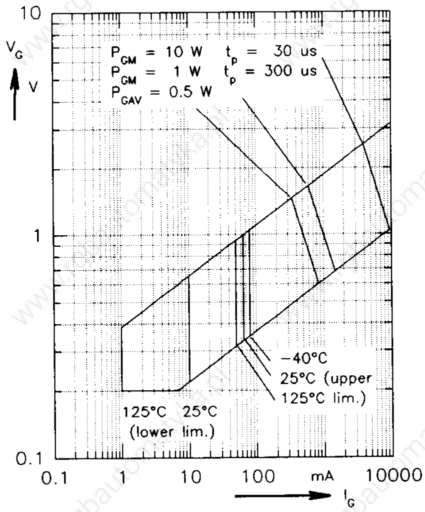


Fig. 1 Gate trigger characteristics

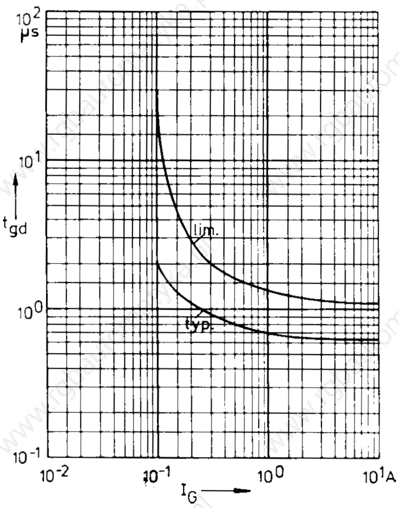
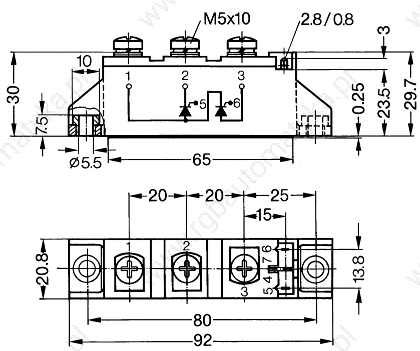


Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

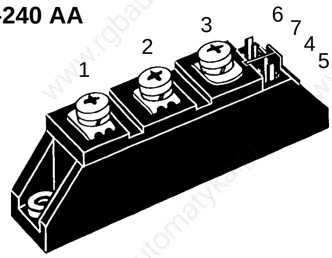


Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 50 A
I_{TAVM} = 2x 32 A
V_{RRM} = 800-1600 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type Version 1 B	Version 8 B	Version 8 B
900	800	MCC 26-08io1 B	MCC 26-08io8 B	MCD 26-08io8 B
1300	1200	MCC 26-12io1 B	MCC 26-12io8 B	MCD 26-12io8 B
1500	1400	MCC 26-14io1 B	MCC 26-14io8 B	MCD 26-14io8 B
1700	1600	MCC 26-16io1 B	MCC 26-16io8 B	MCD 26-16io8 B

TO-240 AA



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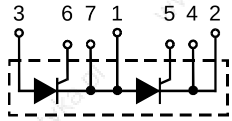
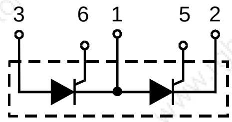


MCC Version 8 B



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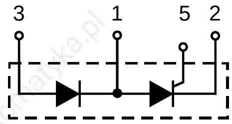


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		50	A
I_{TAVM}, I_{FAVM}	T_C = 75°C; 180° sine		32	A
	T_C = 85°C; 180° sine		27	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	520	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	560	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	460	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	500	A
$\int i^2dt$	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	1350	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	1300	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	1050	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	1030	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 45 A	150	A/µs
	f =50 Hz, t_P =200 µs			
	V_D = 2/3 V_{DRM}			
	I_G = 0.45 A	non repetitive, $I_T = I_{TAVM}$	500	A/µs
	di_G/dt = 0.45 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$;	V_{DR} = 2/3 V_{DRM}	1000	V/µs
	R_{GK} = ∞; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		3	mA
V_T, V_F	I_T, I_F = 80 A; T_{VJ} = 25°C		1.64	V
V_{T0}	For power-loss calculations only (T_{VJ} = 125°C)		0.85	V
r_T			11.0	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	1.5	V
		T_{VJ} = -40°C	1.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	100	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = 2/3\ V_{DRM}$	0.2	V
I_{GD}			10	mA
I_L	T_{VJ} = 25°C; t_P = 10 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; $V_D = 1/2\ V_{DRM}$ I_G = 0.45 A; di_G/dt = 0.45 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 20 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; $V_D = 2/3\ V_{DRM}$	typ.	150	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 25 A, -di/dt = 0.64 A/µs		50	µC
I_{RM}			6	A
R_{thJC}	per thyristor/diode; DC current	other values see Fig. 8/9	0.88	K/W
	per module		0.44	K/W
R_{thJK}	per thyristor/diode; DC current		1.08	K/W
	per module		0.54	K/W
d_S	Creepage distance on surface		12.7	mm
d_A	Strike distance through air		9.6	mm
a	Maximum allowable acceleration		50	m/s^2

Optional accessories for module-type MCC 26 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

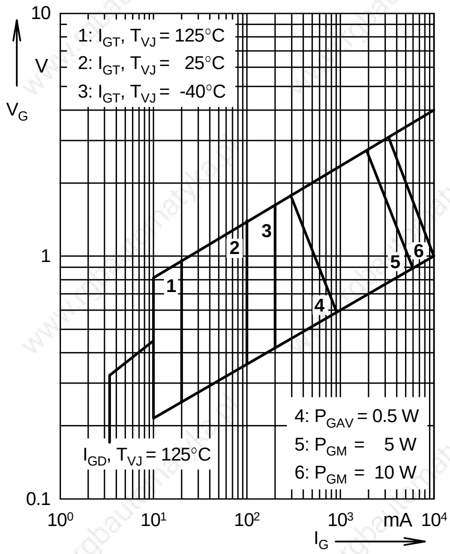


Fig. 1 Gate trigger characteristics

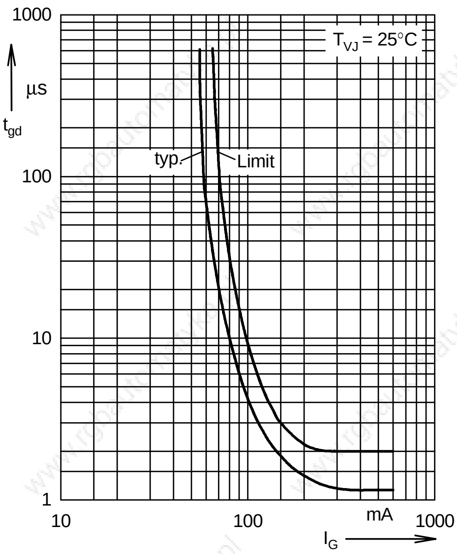
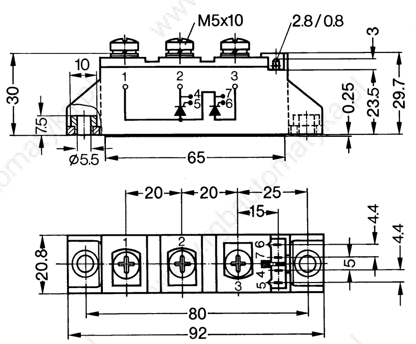


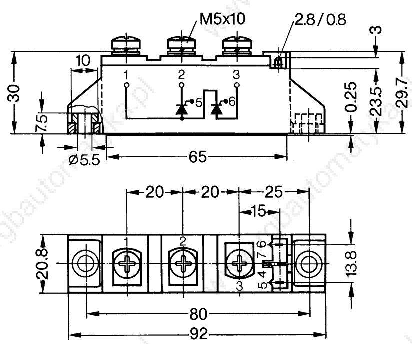
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC Version 1 B



MCC Version 8 B



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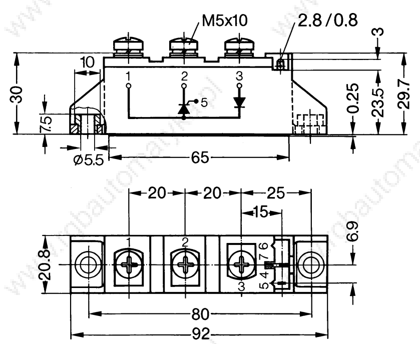


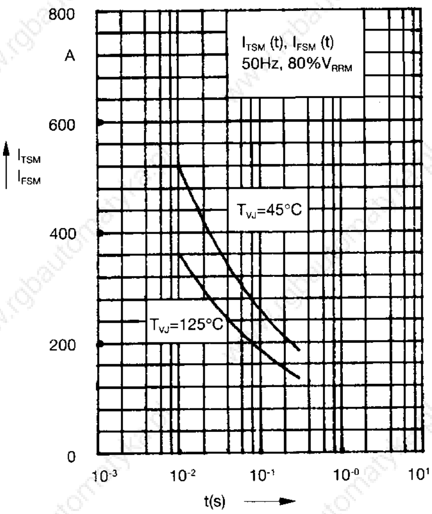


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

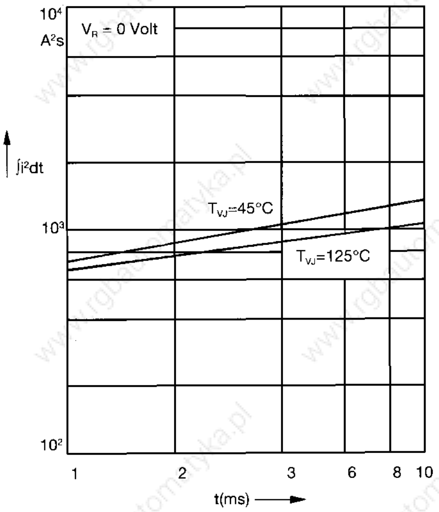


Fig. 4 ∫i²dt versus time (1-10 ms)

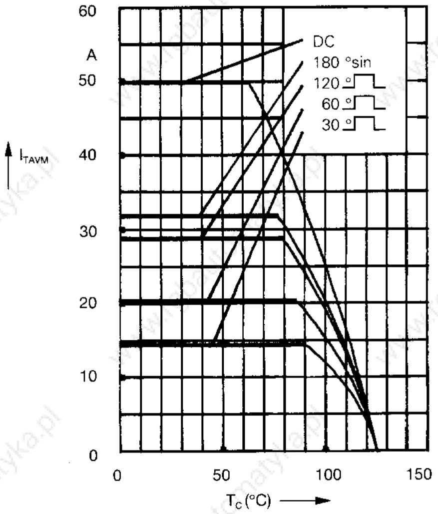


Fig. 4a Maximum forward current at case temperature

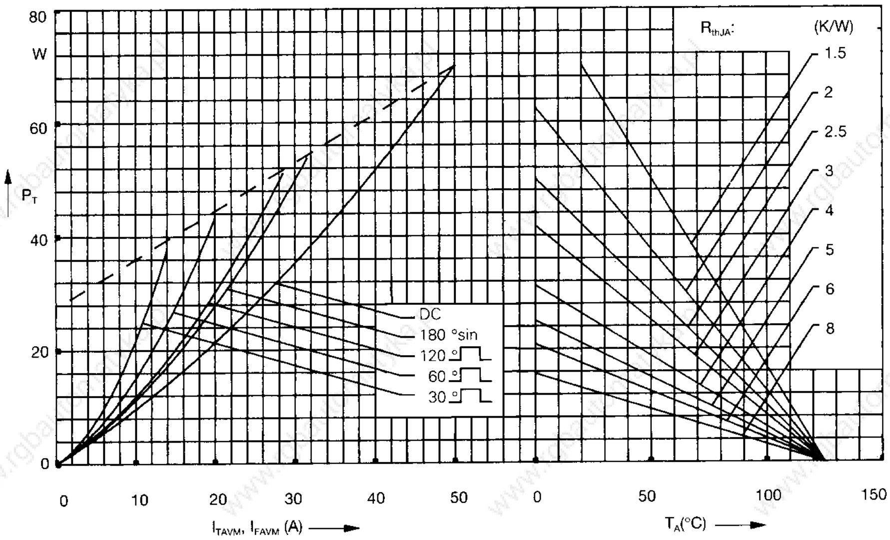


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

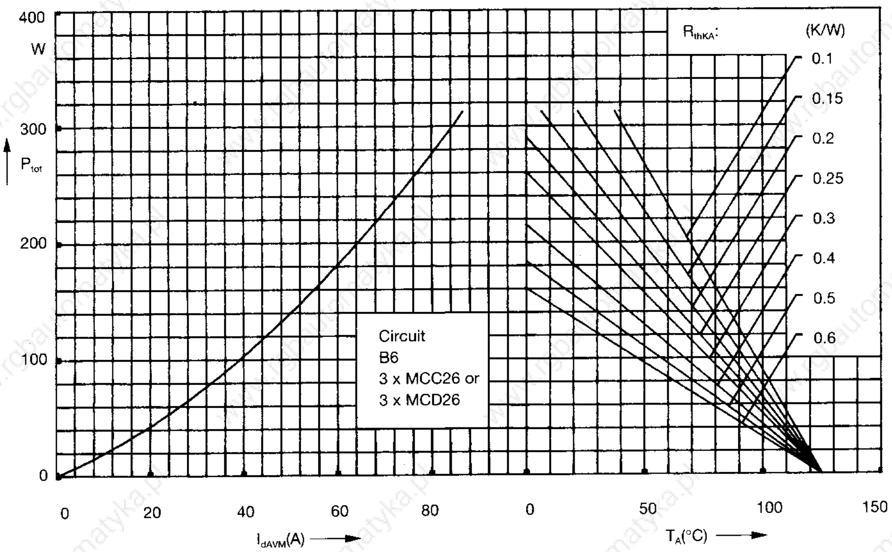


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

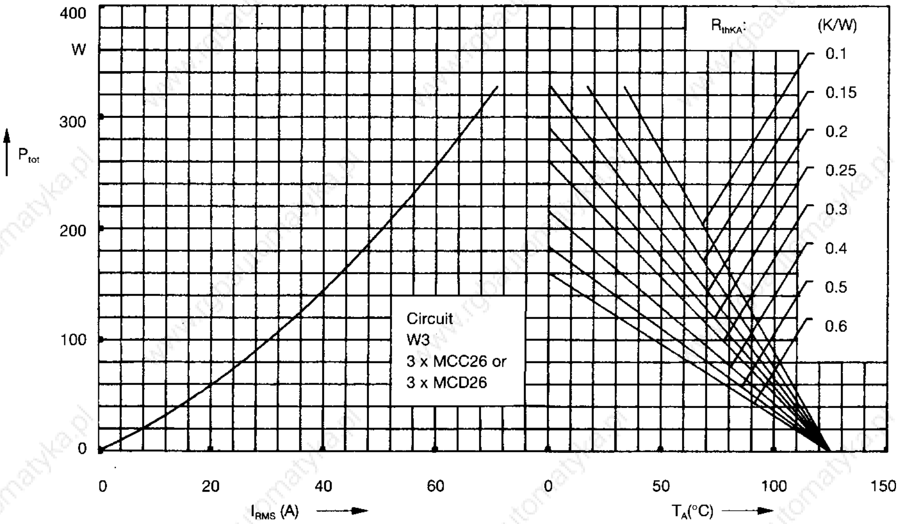


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

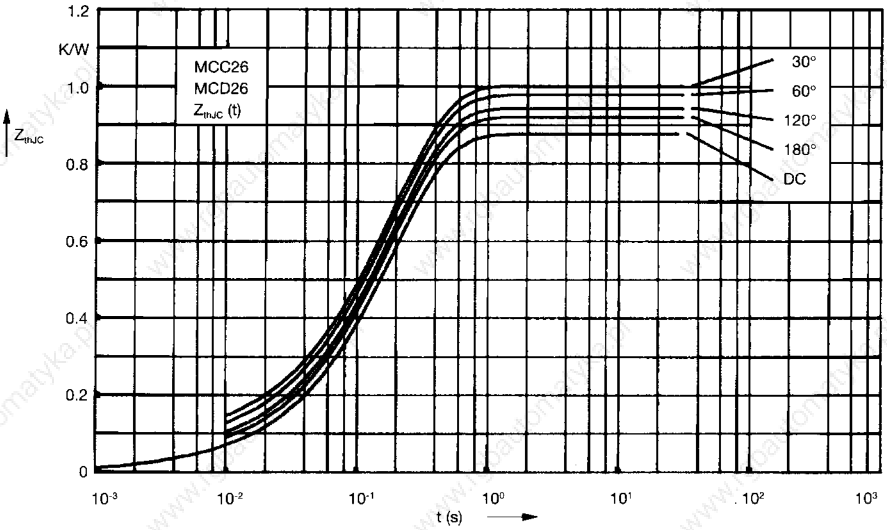


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.88
180°	0.92
120°	0.95
60°	0.98
30°	1.01

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.191

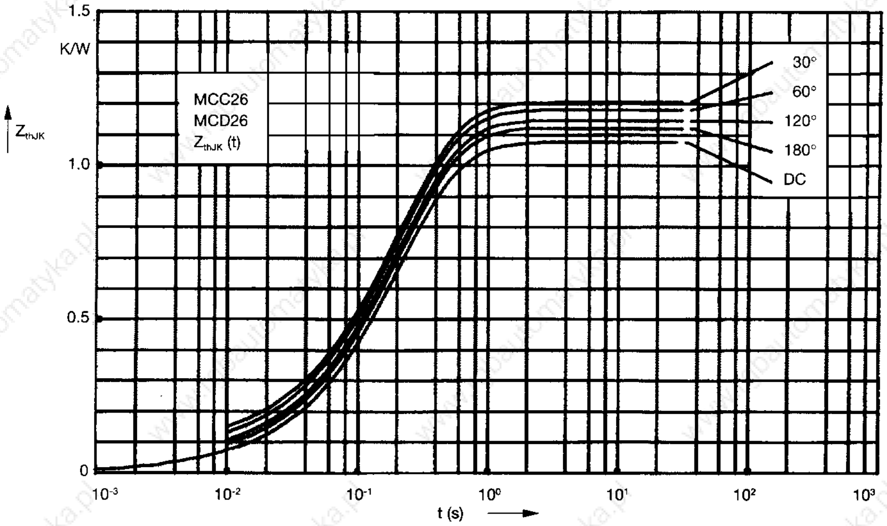


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	1.08
180°	1.12
120°	1.15
60°	1.18
30°	1.21

Constants for Z_{thJK} calculation:

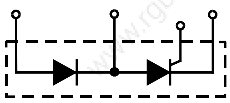
i	R_{thi} (K/W)	t_i (s)
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.191
4	0.2	0.45

Thyristor/Diode Module

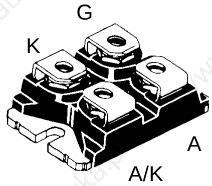
I_{TRMS} = 2x 60 A
I_{TAVM} = 2x 38 A
V_{RRM} = 1200-1600 V

Preliminary data

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
1300	1200	MCD 40-12io6
1700	1600	MCD 40-16io6



SOT-227 B, miniBLOC



K = Cathode, A = Anode, G = Gate, A/K = Common output

Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$; T_C = 85°C		60	A
I_{TAVM}, I_{FAVM}	$T_{VJ} = T_{VJM}$; T_C = 85°C; 180° sine		38	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	500	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	440	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	450	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	490	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	1250	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	1220	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	1010	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	1010	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$; f = 50 Hz, t_P =200 µs; V_D = 2/3 V_{DRM}; I_G = 0.45 A; di_G/dt = 0.45 A/µs	repetitive, I_T = 45 A	100	A/µs
		non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; R_{GK} = ∞; method 1 (linear voltage rise)	V_{DR} = 2/3 V_{DRM}	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	I_{ISOL} ≤ 1 mA	2500	V~
M_d	Mounting torque (M4)		1.5/13	Nm/lb.in.
	Terminal connection torque (M4)		1.5/13	Nm/lb.in.
Weight	Typical including screws		30	g

Features

- International standard package miniBLOC, SOT-227 B
- Planar passivated chips

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control
- Half controlled rectifier bridge

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

Data according to IEC 60747 refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

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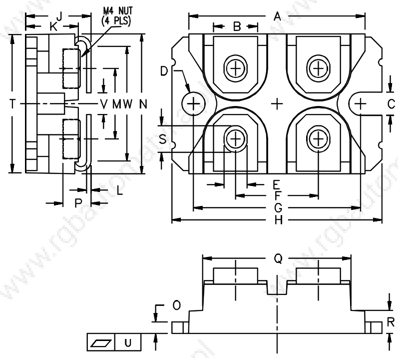
Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		5	mA
V_T, V_F	I_T, I_F = 80 A; T_{VJ} = 25°C		1.68	V
V_{T0}	For power-loss calculations only (T_{VJ} = 125°C)		0.85	V
r_T			9.5	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	1.5	V
		T_{VJ} = -40°C	1.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	100	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = 2/3\ V_{DRM}$	0.2	V
I_{GD}			5	mA
I_L	T_{VJ} = 25°C; t_P = 10 µs, V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; $V_D = 1/2\ V_{DRM}$ I_G = 0.45 A; di_G/dt = 0.45 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 120 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; $V_D = 2/3\ V_{DRM}$		typ.150	µs
R_{thJC}	per thyristor/diode; DC current		0.6	K/W
R_{thCH}			0.1	K/W
d_S	Creepage distance on surface		8	mm
d_A	Strike distance through air		4	mm
a	Maximum allowable acceleration		50	m/s^2

miniBLOC, SOT-227 B



M4 screws (4x) supplied

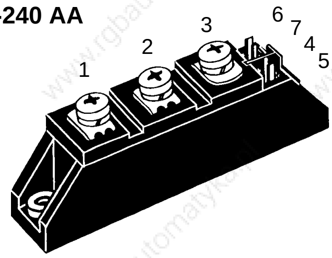
Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.20	1.489	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.76	0.84	0.030	0.033
M	12.60	12.85	0.496	0.506
N	25.15	25.42	0.990	1.001
O	1.98	2.13	0.078	0.084
P	4.95	5.97	0.195	0.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.72	4.85	0.186	0.191
T	24.59	25.07	0.968	0.987
U	-0.05	0.1	-0.002	0.004
V	3.30	4.57	0.130	0.180
W	0.780	0.830	19.81	21.08

Thyristor Modules
Thyristor/Diode Modules

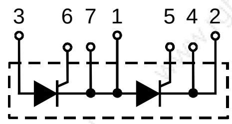
I_{TRMS} = 2x 80 A
I_{TAVM} = 2x 51 A
V_{RRM} = 800-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type Version 1 B	Version 8 B	Version 8 B
900	800	MCC 44-08io1 B	MCC 44-08io8 B	MCD 44-08io8 B
1300	1200	MCC 44-12io1 B	MCC 44-12io8 B	MCD 44-12io8 B
1500	1400	MCC 44-14io1 B	MCC 44-14io8 B	MCD 44-14io8 B
1700	1600	MCC 44-16io1 B	MCC 44-16io8 B	MCD 44-16io8 B
1900	1800	MCC 44-18io1 B	MCC 44-18io8 B	MCD 44-18io8 B

TO-240 AA



MCC Version 1 B



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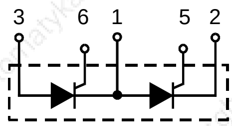
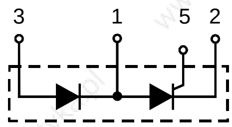


MCD Version 8 B



Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		80	A
I_{TAVM}, I_{FAVM}	T_C = 83°C; 180° sine		51	A
	T_C = 85°C; 180° sine		49	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	1150	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	1230	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	1000	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	1070	A
$\int i^2dt$	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	6600	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	6280	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	5000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	4750	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 150 A	150	A/µs
	f =50 Hz, t_P =200 µs			
	$V_D = 2/3\ V_{DRM}$			
	I_G = 0.45 A	non repetitive, $I_T = I_{TAVM}$	500	A/µs
	di_G/dt = 0.45 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$;	$V_{DR} = 2/3\ V_{DRM}$	1000	V/µs
	$R_{GK} = \infty$; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	$I_{ISOL} \leq$ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		5	mA
V_T, V_F	I_T, I_F = 200 A; T_{VJ} = 25°C		1.75	V
V_{T0}	For power-loss calculations only (T_{VJ} = 125°C)		0.85	V
r_T			5.3	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	1.5	V
		T_{VJ} = -40°C	1.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	100	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.2	V
I_{GD}			10	mA
I_L	T_{VJ} = 25°C; t_P = 10 µs, V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 0.45 A; di_G/dt = 0.45 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 120 A, t_P = 200 µs; -di/dt = 10 A/µs typ. V_R = 100 V; dv/dt = 20 V/µs; V_D = 2/3 V_{DRM}		150	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 50 A, -di/dt = 0.64 A/µs		90	µC
I_{RM}			11	A
R_{thJC}	per thyristor/diode; DC current	other values see Fig. 8/9	0.53	K/W
	per module		0.265	K/W
R_{thJK}	per thyristor/diode; DC current		0.73	K/W
	per module		0.365	K/W
d_S	Creepage distance on surface		12.7	mm
d_A	Strike distance through air		9.6	mm
a	Maximum allowable acceleration		50	m/s²

Optional accessories for module-type MCC 44 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

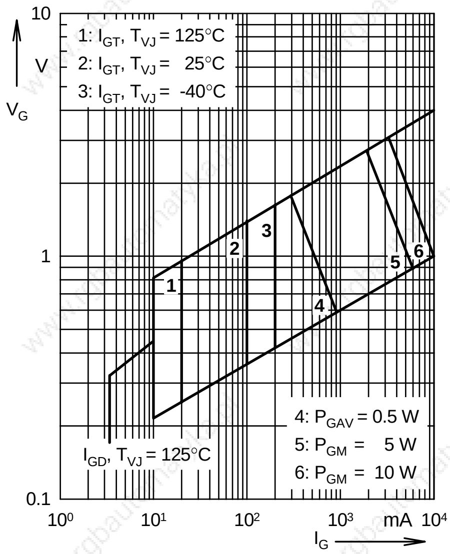


Fig. 1 Gate trigger characteristics

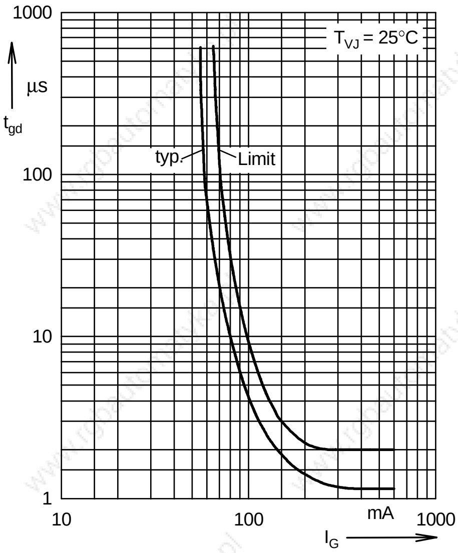
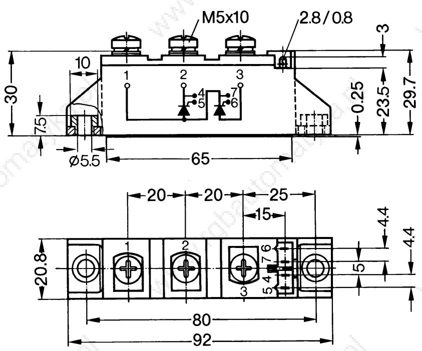


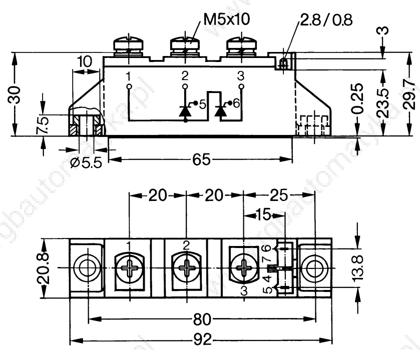
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

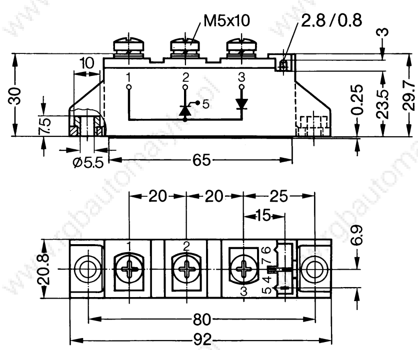
MCC Version 1 B



MCC Version 8 B



MCD Version 8 B



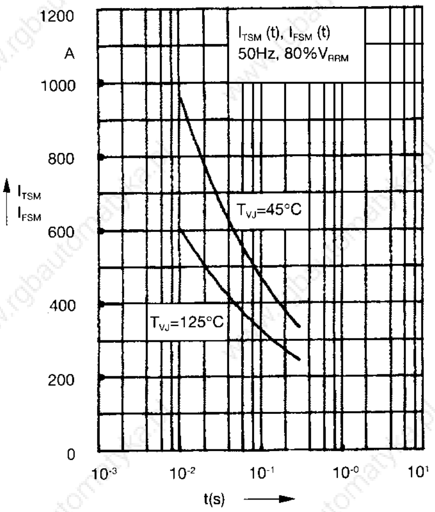


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

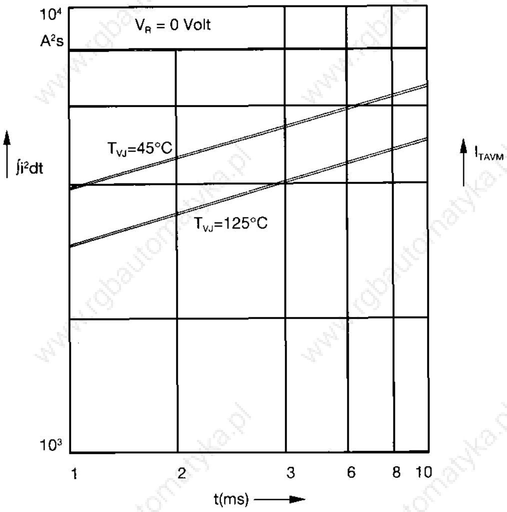


Fig. 4 ∫i²dt versus time (1-10 ms)

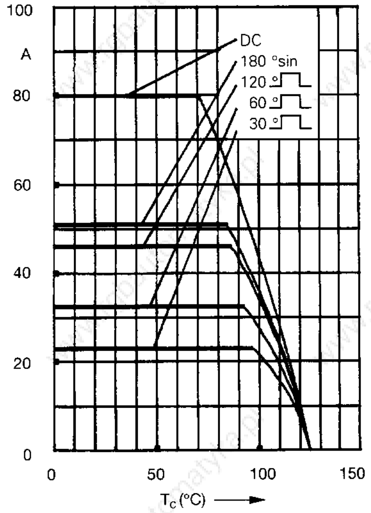


Fig. 4a Maximum forward current
at case temperature

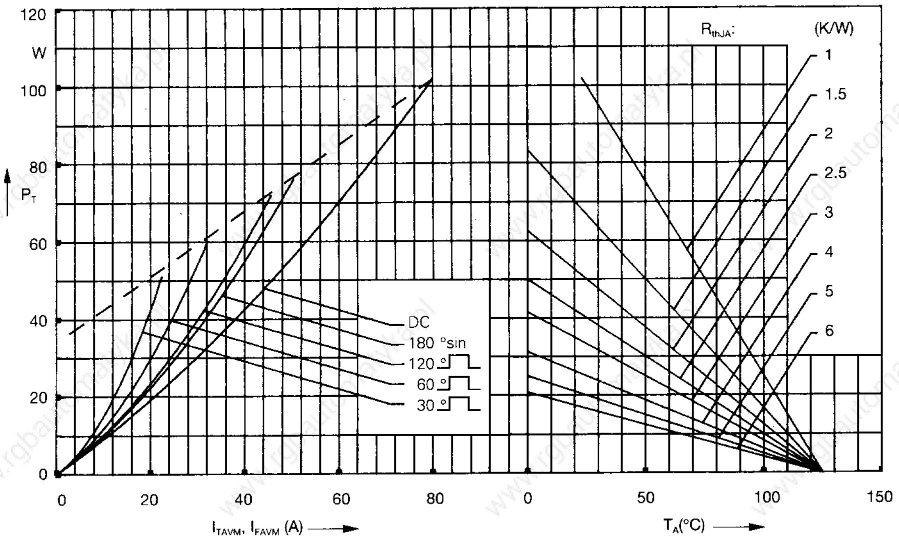


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

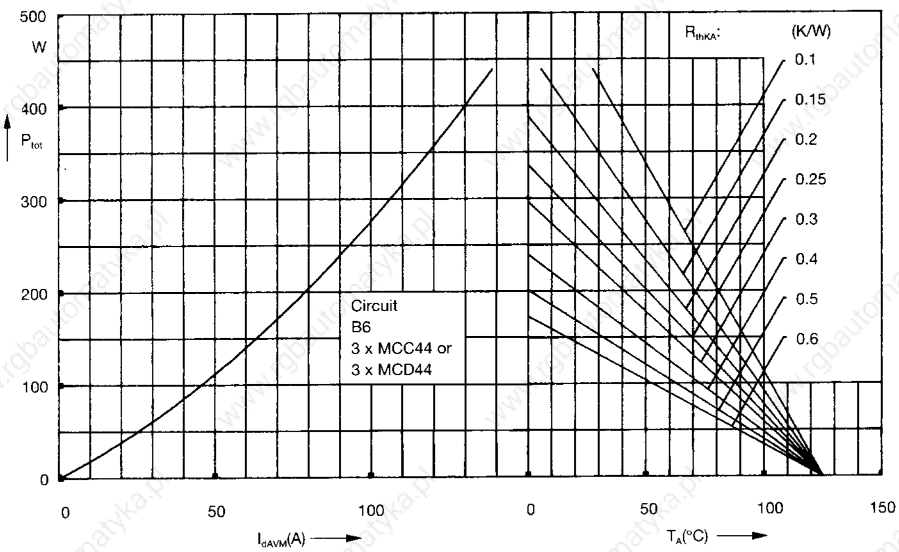


Fig. 6 Three phase rectifier bridge:
Power dissipation versus direct output current and ambient temperature

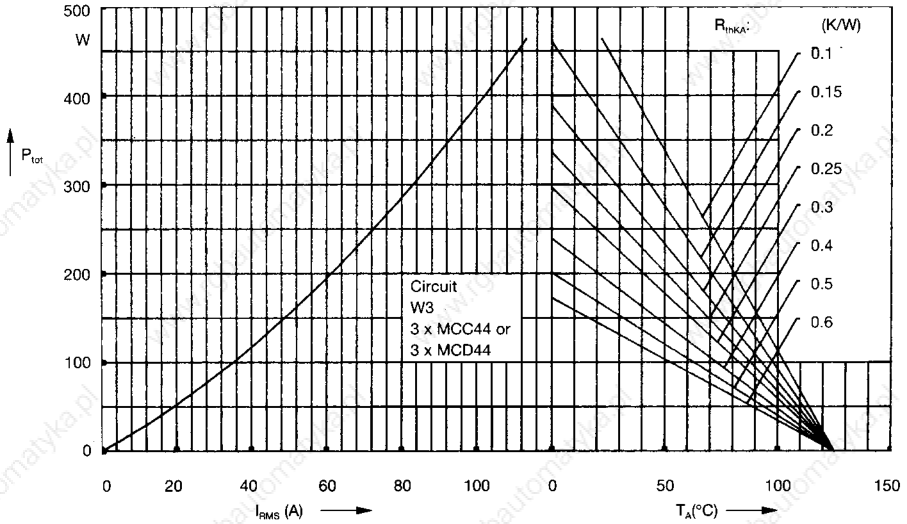


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

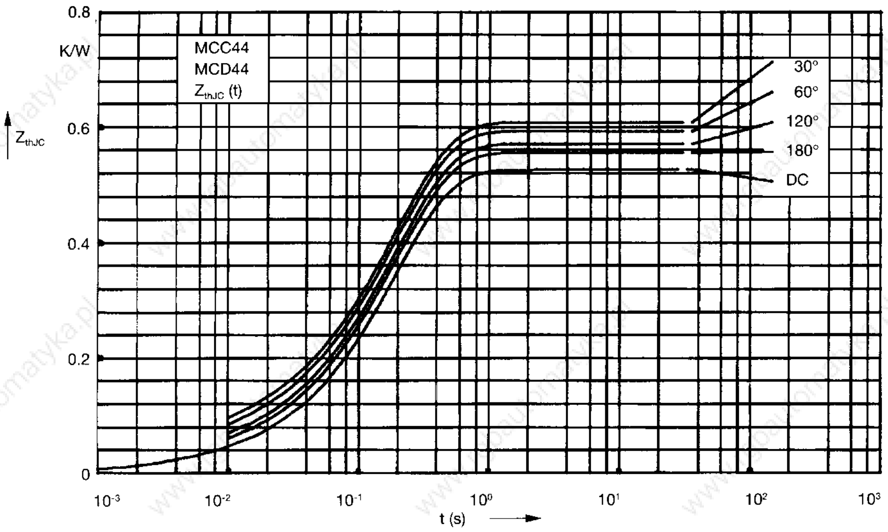


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.53
180°	0.55
120°	0.58
60°	0.6
30°	0.62

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.015	0.0035
2	0.026	0.02
3	0.489	0.195

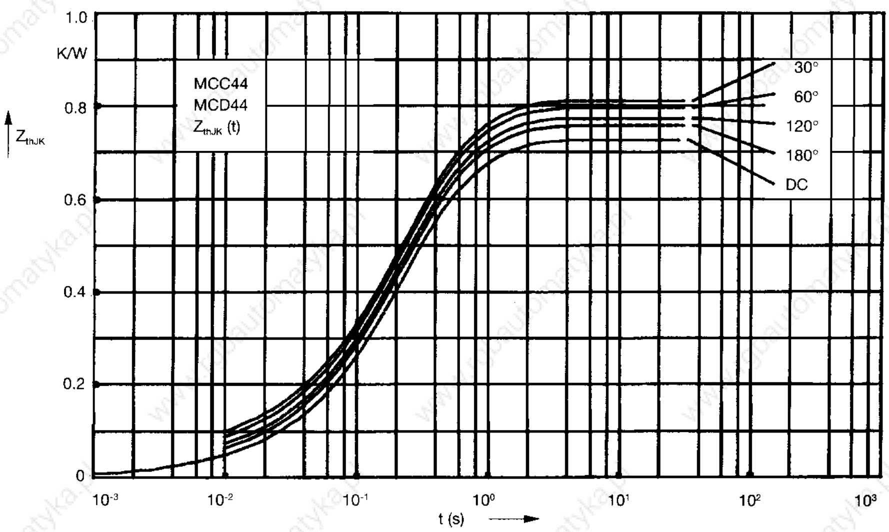


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.73
180°	0.75
120°	0.78
60°	0.8
30°	0.82

Constants for Z_{thJK} calculation:

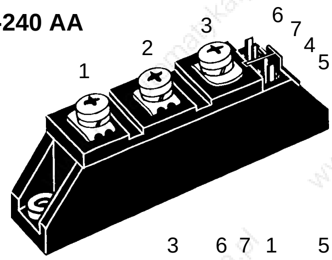
i	R_{thi} (K/W)	t_i (s)
1	0.015	0.0035
2	0.026	0.02
3	0.489	0.195
4	0.2	0.68

Thyristor Modules
Thyristor/Diode Modules

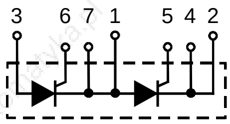
I_{TRMS} = 2x 100 A
I_{TAVM} = 2x 64 A
V_{RRM} = 800-1800 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type			
V	V	Version 1		Version 8	
900	800	MCC 56-08io1 B	MCD 56-08io1 B	MCC 56-08io8 B	MCD 56-08io8 B
1300	1200	MCC 56-12io1 B	MCD 56-12io1 B	MCC 56-12io8 B	MCD 56-12io8 B
1500	1400	MCC 56-14io1 B	--	MCC 56-14io8 B	MCD 56-14io8 B
1700	1600	MCC 56-16io1 B	MCD 56-16io1 B	MCC 56-16io8 B	MCD 56-16io8 B
1900	1800	MCC 56-18io1 B	--	MCC 56-18io8 B	MCD 56-18io8 B
1500	1400	MCC 56-14io1			
1700	1600	MCC 56-16io1			
700	600	MDC 56-06io1 B			

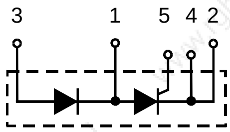
TO-240 AA



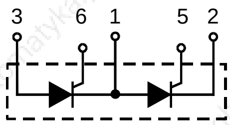
MCC Version 1



MCD Version 1



MCC Version 8



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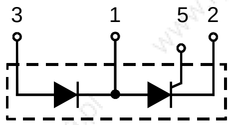
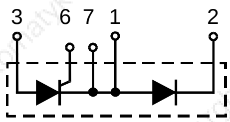


MDC Version 1



Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		100	A
I_{TAVM}, I_{FAVM}	T_C = 83°C; 180° sine		64	A
	T_C = 85°C; 180° sine		60	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	1500	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	1600	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	1350	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	1450	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	11 200	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	10 750	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	9100	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	8830	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs $V_D = 2/3\ V_{DRM}$	repetitive, I_T = 150 A	150	A/µs
	I_G = 0.45 A di_G/dt = 0.45 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; R_{GK} = ∞; method 1 (linear voltage rise)	$V_{DR} = 2/3\ V_{DRM}$	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

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Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		5	mA
V_T, V_F	I_T, I_F = 200 A; T_{VJ} = 25°C		1.57	V
V_{T0}	For power-loss calculations only (T_{VJ} = 125°C)		0.85	V
r_T			3.7	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	1.5	V
		T_{VJ} = -40°C	1.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	100	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = 2/3\ V_{DRM}$	0.2	V
I_{GD}			10	mA
I_L	T_{VJ} = 25°C; t_P = 10 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; $V_D = 1/2\ V_{DRM}$ I_G = 0.45 A; di_G/dt = 0.45 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 150 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; $V_D = 2/3\ V_{DRM}$	typ.	150	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 50 A, -di/dt = 3 A/µs		100	µC
I_{RM}			24	A
R_{thJC}	per thyristor/diode; DC current	other values see Fig. 8/9	0.45	K/W
	per module		0.225	K/W
R_{thJK}	per thyristor/diode; DC current		0.65	K/W
	per module		0.325	K/W
d_S	Creepage distance on surface		12.7	mm
d_A	Strike distance through air		9.6	mm
a	Maximum allowable acceleration		50	m/s^2

Optional accessories for module-type MCC 56 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

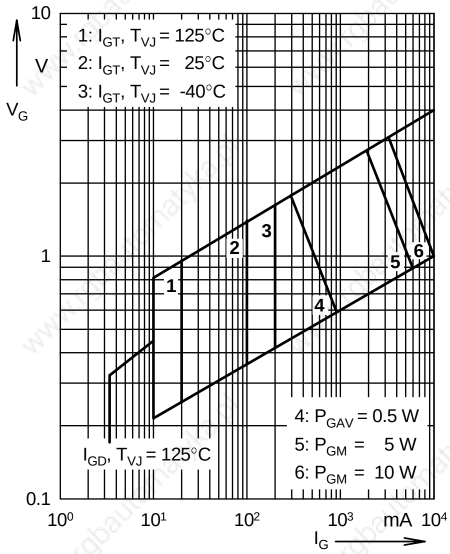


Fig. 1 Gate trigger characteristics

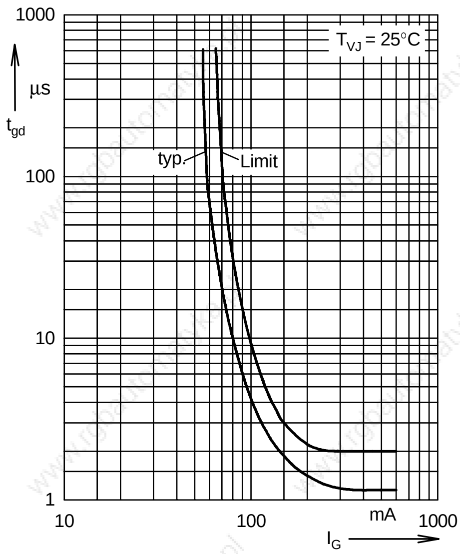
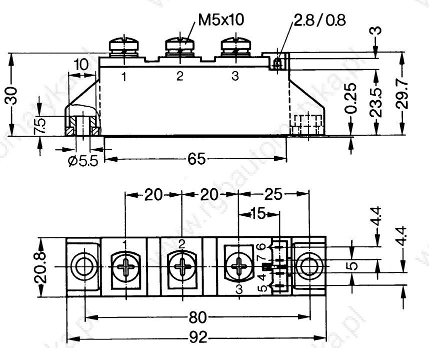


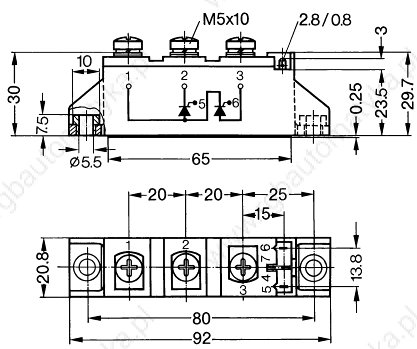
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC / MCD / MDC Version 1 B



MCC Version 8 B



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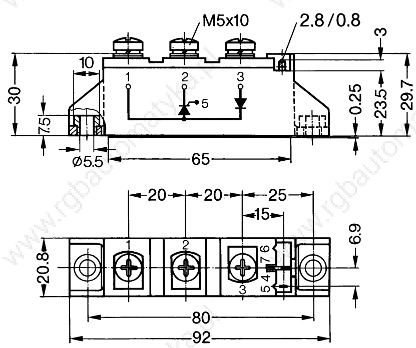


Version 1 or 8 without B in typ designation = without insert in mountig holes

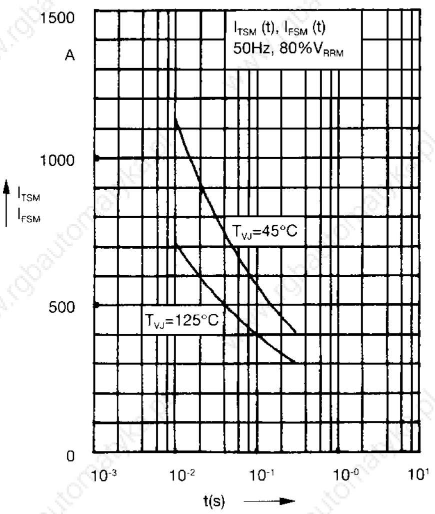


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

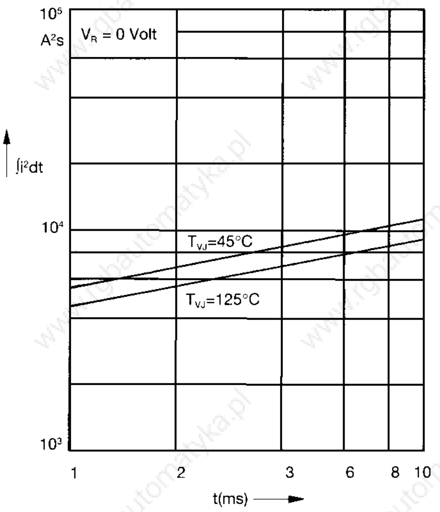


Fig. 4 ∫i²dt versus time (1-10 ms)

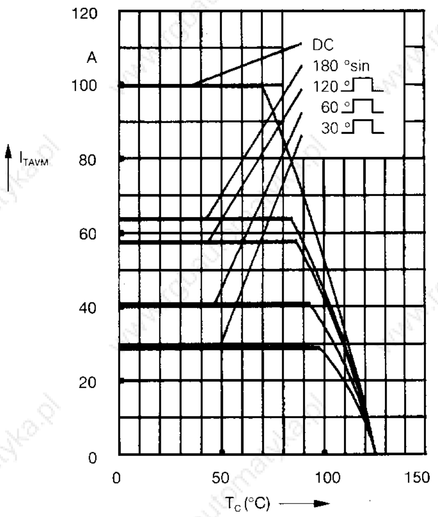


Fig. 4a Maximum forward current at case temperature

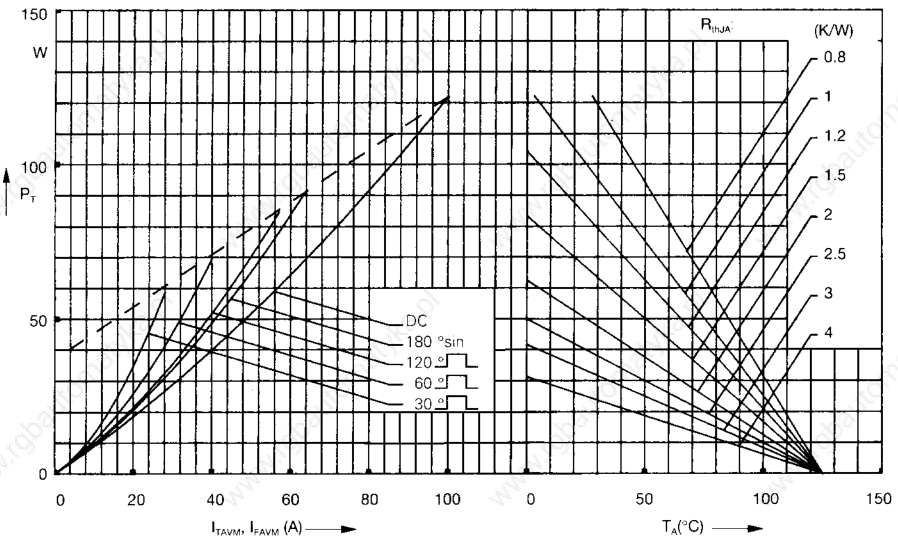


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

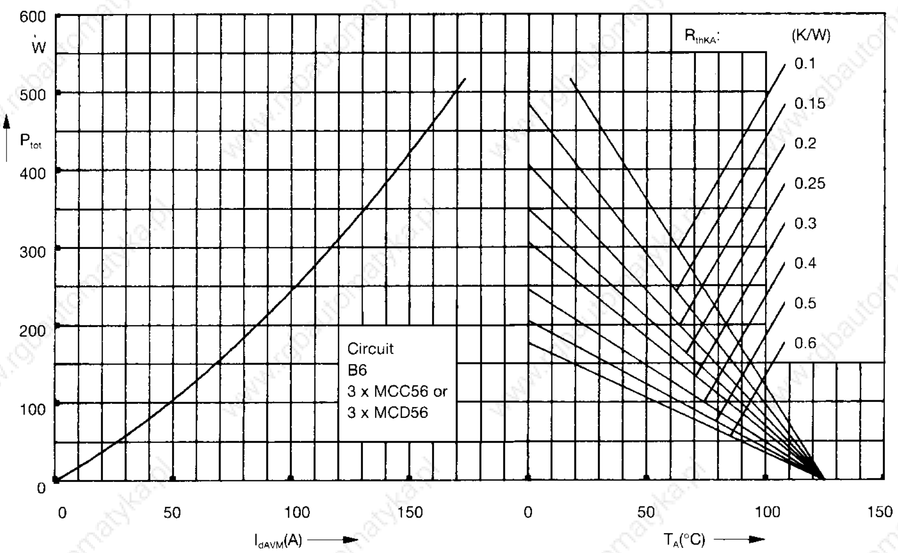


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

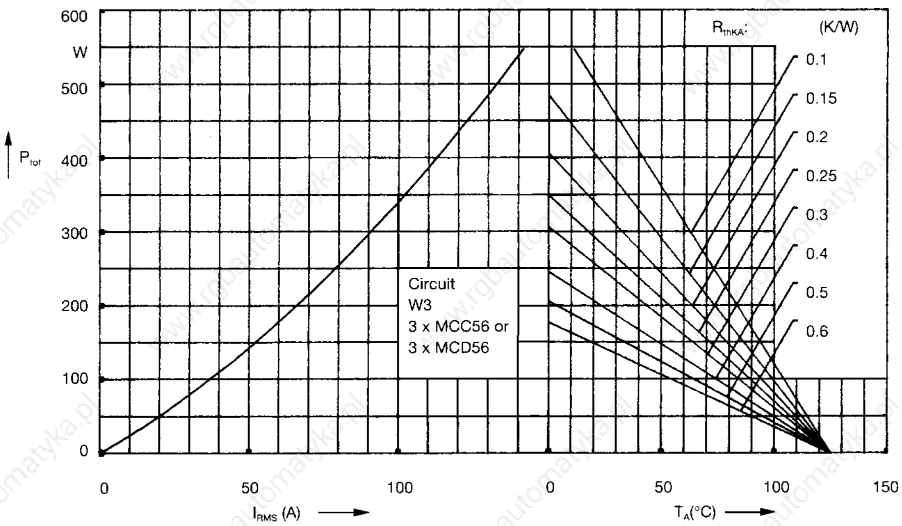


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

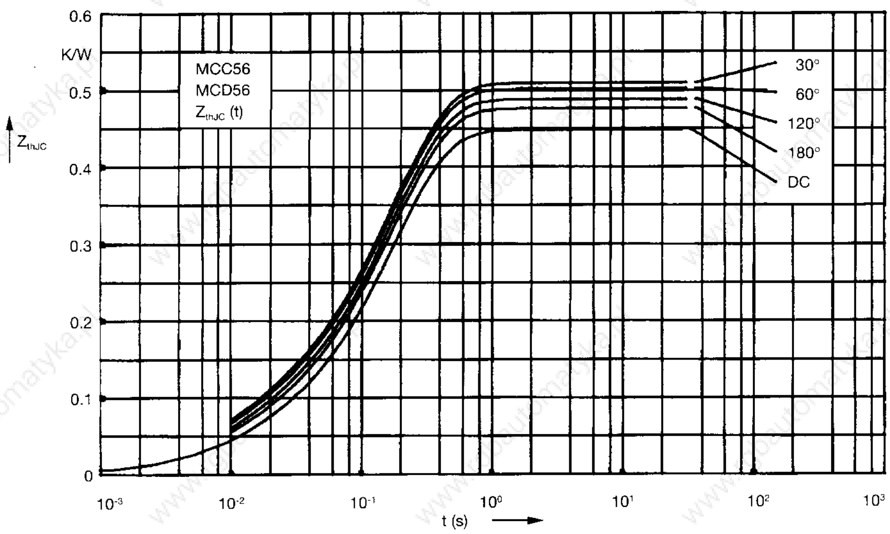


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.45
180°	0.47
120°	0.49
60°	0.505
30°	0.52

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.014	0.015
2	0.026	0.0095
3	0.41	0.175

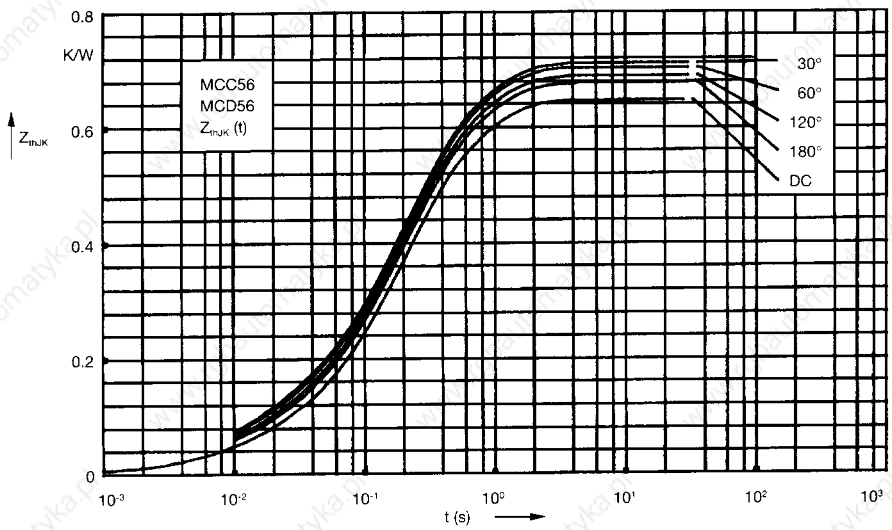


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.65
180°	0.67
120°	0.69
60°	0.705
30°	0.72

Constants for Z_{thJK} calculation:

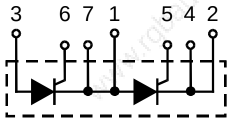
i	R_{thi} (K/W)	t_i (s)
1	0.014	0.015
2	0.026	0.0095
3	0.41	0.175
4	0.2	0.67

Thyristor Module

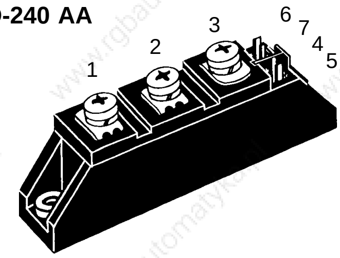
Preliminary data

I_{TRMS} = 2x 100 A
I_{TAVM} = 2x 64 A
$V_{RRM, DRM}$ = 1600 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
1700	1600	MCC 60-16io1 B



TO-240 AA



Symbol	Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		100	A
I_{TAVM}	T_C = 85°C; 180° sine		64	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	1150	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	1230	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	1000	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	1070	A
I^2dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	6610	A^2s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	6350	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	5000	A^2s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	4810	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50Hz, t_P = 200µs	repetitive, I_T = 150 A	150	A/µs
	$V_D = {}^2/_3 V_{DRM}$ I_G = 0.45 A di_G/dt = 0.45 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $R_{GK} = \infty$; method 1 (linear voltage rise)	$V_{DR} = {}^2/_3 V_{DRM}$	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+140	°C
T_{VJM}			140	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	$I_{ISOL} \leq 1$ mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package
- Direct copper bonded Al_2O_3-ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- Gate-cathode twin pins

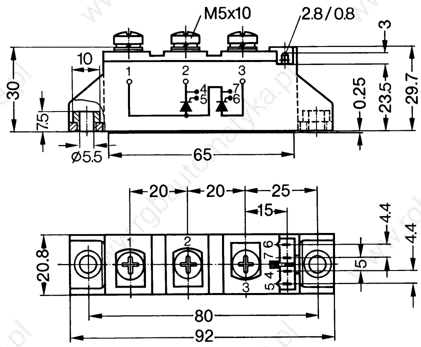
Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

Dimensions in mm (1 mm = 0.0394")



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Symbol	Conditions			Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$			20	mA
V_T, V_F	I_T, I_F = 200 A; T_{VJ} = 25°C			1.70	V
V_{T0}	T_{VJ} = 125°C; For power-loss calculations only			0.85	V
r_T	$T_{VJ} = T_{VJM}$			4.8	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C		1.4	V
		T_{VJ} = -40°C		1.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C		100	mA
		T_{VJ} = -40°C		200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = {}^2/_3\ V_{DRM}$		0.2	V
I_{GD}				10	mA
I_L	T_{VJ} = 25°C; t_P = 10 µs, V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs			450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$			200	mA
t_{gd}	T_{VJ} = 25°C; V_D = ½ V_{DRM} I_G = 0.45 A; di_G/dt = 0.45 A/µs			2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 120 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; $V_D = {}^2/_3\ V_{DRM}$		typ.	150	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 50 A, -di/dt = 0.64 A/µs			110	µC
I_{RM}				12	A
R_{thJC}	per thyristor/diode; DC current			0.5	K/W
	per module			0.25	K/W
R_{thCH}	per thyristor/diode; DC current		typ.	0.1	K/W
d_S	Creepage distance on surface			12.7	mm
d_A	Strike distance through air			9.6	mm
a	Maximum allowable acceleration			50	m/s^2

Optional accessories for module-type MCC 60 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

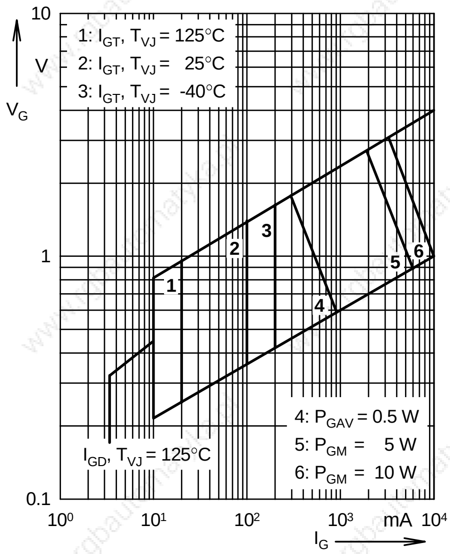


Fig. 1 Gate trigger characteristics

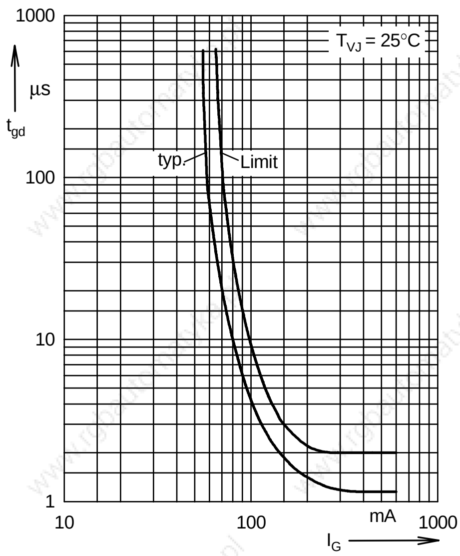


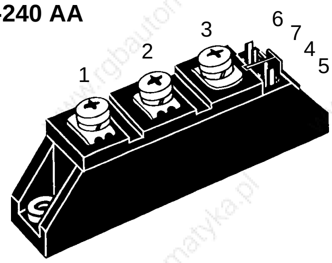
Fig. 2 Gate trigger delay time

Thyristor Modules
Thyristor/Diode Modules

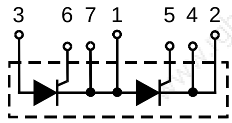
I_{TRMS} = 2x 180 A
I_{TAVM} = 2x 115 A
V_{RRM} = 800-1800 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type			
V	V	Version 1 B		Version 8 B	
900	800	MCC 72-08io1 B	--	MCC 72-08io8 B	MCD 72-08io8 B
1300	1200	MCC 72-12io1 B	MCD 72-12io1B	MCC 72-12io8 B	MCD 72-12io8 B
1500	1400	MCC 72-14io1 B	--	MCC 72-14io8 B	MCD 72-14io8 B
1700	1600	MCC 72-16io1 B	MCD 72-16io1B	MCC 72-16io8 B	MCD 72-16io8 B
1900	1800	MCC 72-18io1 B	--	MCC 72-18io8 B	MCD 72-18io8 B

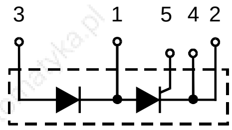
TO-240 AA



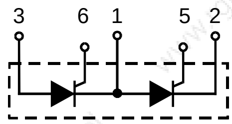
MCC
Version 1 B



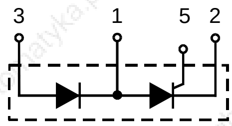
MCD
Version 1 B



MCC
Version 8 B



MCD
Version 8 B



Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		180	A
I_{TAVM}, I_{FAVM}	T_C = 63°C; 180° sine		115	A
	T_C = 85°C; 180° sine		85	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	1700	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	1800	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	1540	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	1640	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	14 450	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	13 500	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	11 850	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	11 300	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 250 A	150	A/µs
	f =50 Hz, t_P =200 µs			
	V_D = 2/3 V_{DRM}			
	I_G = 0.45 A	non repetitive, $I_T = I_{TAVM}$	500	A/µs
	di_G/dt = 0.45 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$;	V_{DR} = 2/3 V_{DRM}	1000	V/µs
	R_{GK} = ∞; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

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Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		5	mA
V_T, V_F	I_T, I_F = 300 A; T_{VJ} = 25°C		1.74	V
V_{T0}	For power-loss calculations only (T_{VJ} = 125°C)		0.85	V
r_T			3.2	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	2.5	V
		T_{VJ} = -40°C	2.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	150	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.2	V
I_{GD}			10	mA
I_L	T_{VJ} = 25°C; t_P = 10 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 0.45 A; di_G/dt = 0.45 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 150 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; V_D = 2/3 V_{DRM}	typ.	185	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 50 A, -di/dt = 6 A/µs		170	µC
I_{RM}			45	A
R_{thJC}	per thyristor/diode; DC current	other values see Fig. 8/9	0.3	K/W
	per module		0.15	K/W
R_{thJK}	per thyristor/diode; DC current		0.5	K/W
	per module		0.25	K/W
d_S	Creepage distance on surface		12.7	mm
d_A	Strike distance through air		9.6	mm
a	Maximum allowable acceleration		50	m/s^2

Optional accessories for module-type MCC 72 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

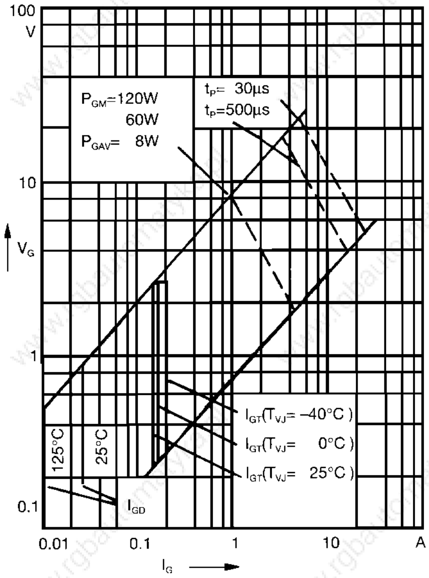


Fig. 1 Gate trigger characteristics

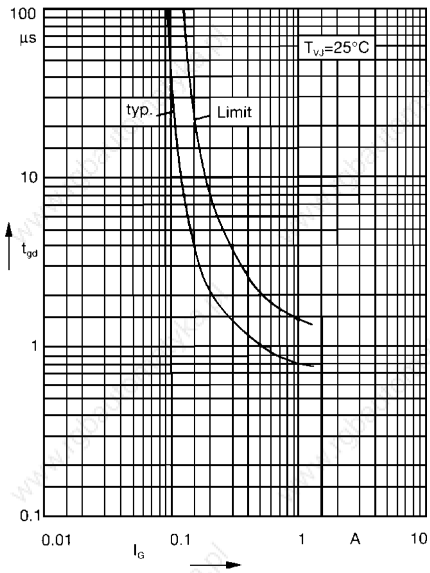
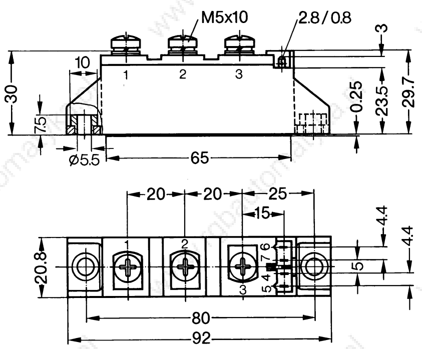


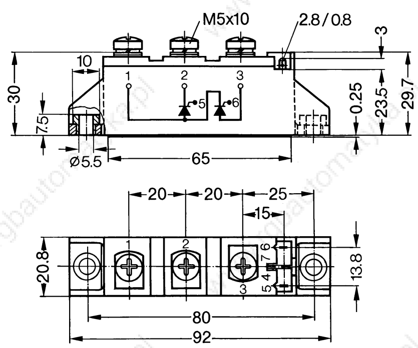
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC / MCD Version 1 B



MCC Version 8 B



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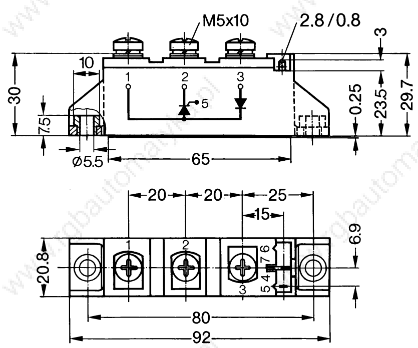


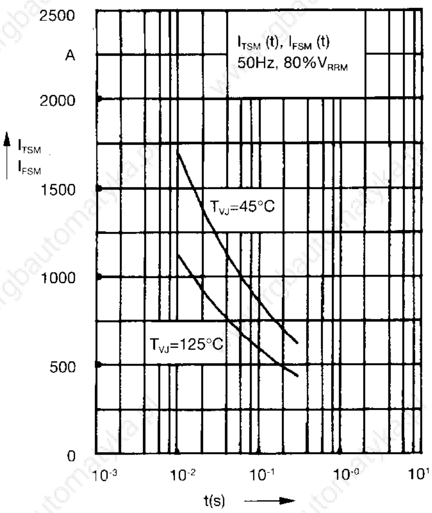


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

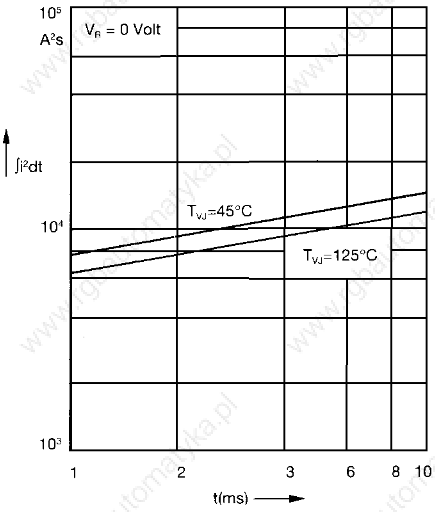


Fig. 4 ∫i²dt versus time (1-10 ms)

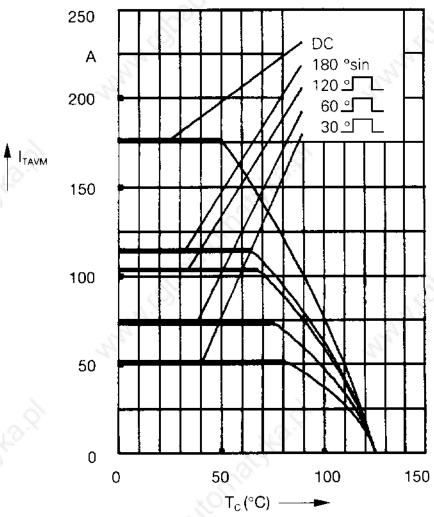


Fig. 4a Maximum forward current at case temperature

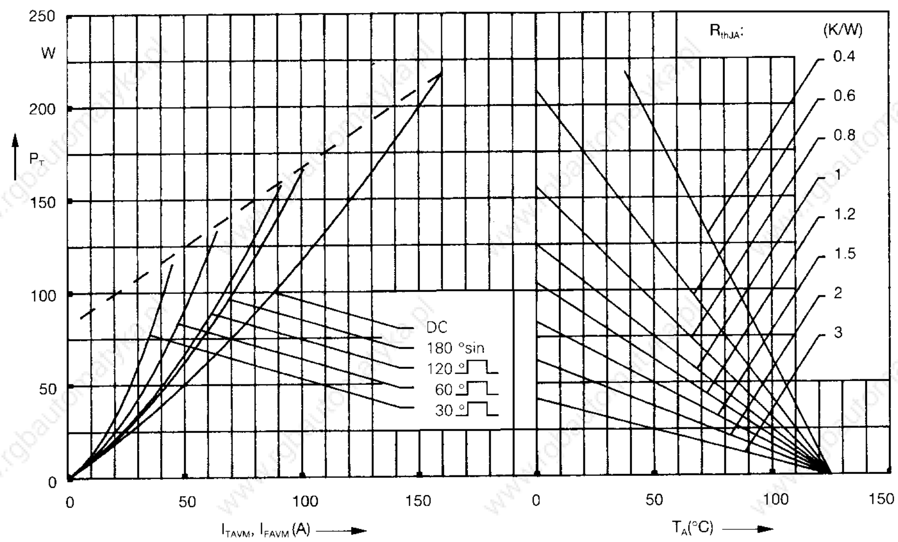


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

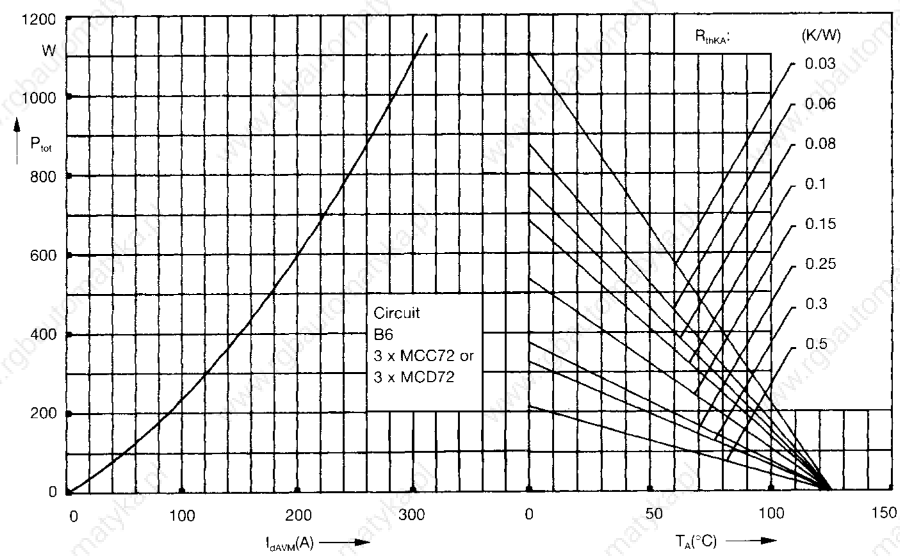


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

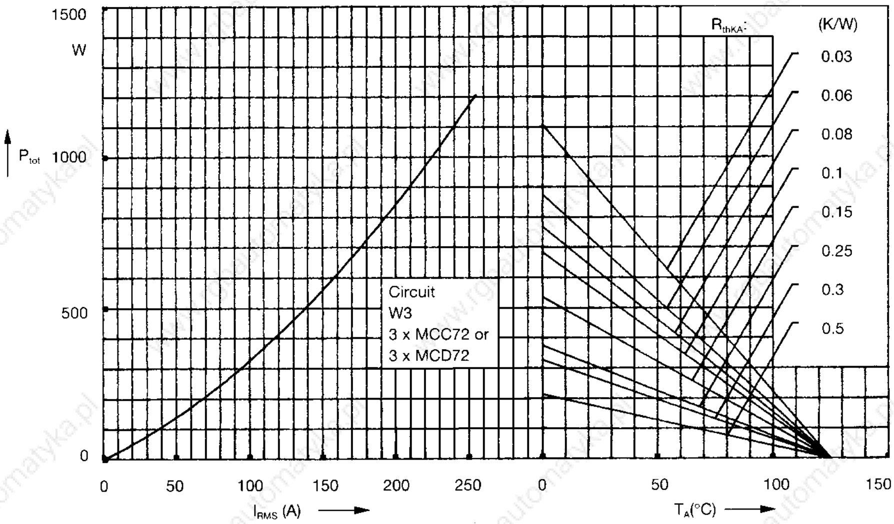


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

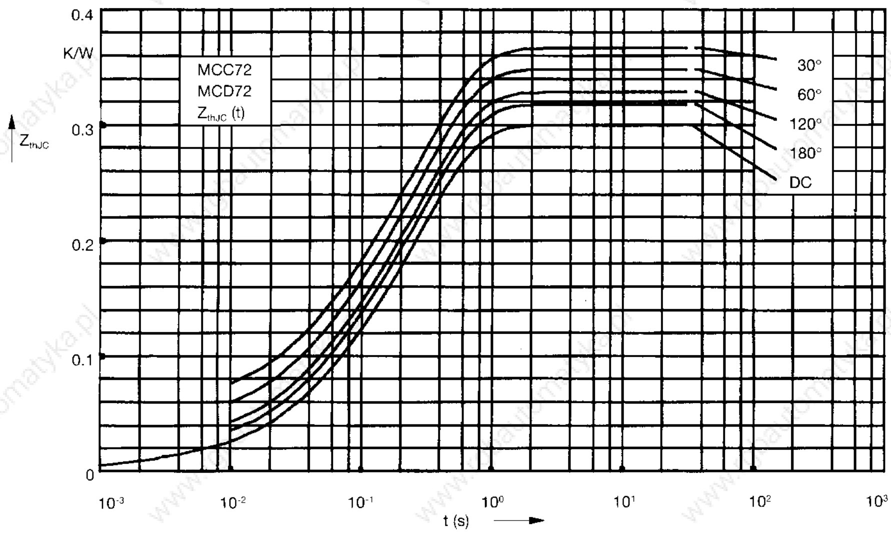


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.3
180°	0.31
120°	0.33
60°	0.35
30°	0.37

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.008	0.0019
2	0.054	0.047
3	0.238	0.3

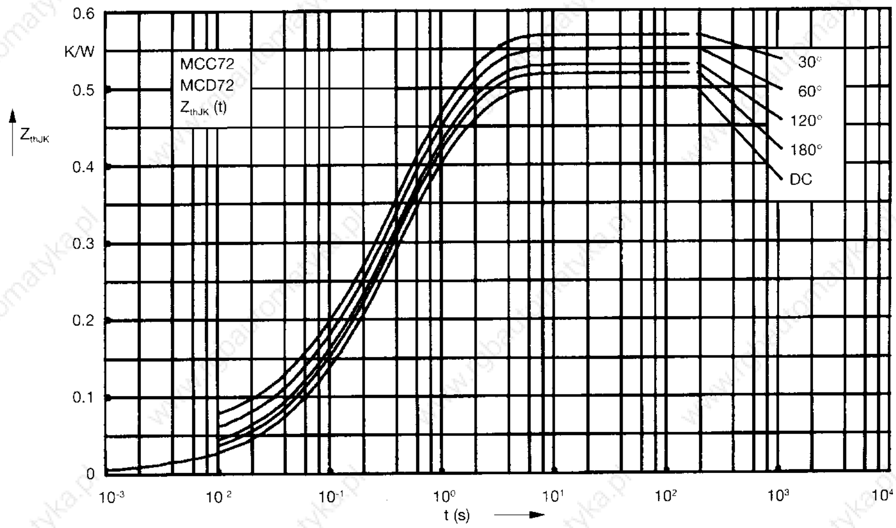


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.5
180°	0.51
120°	0.53
60°	0.55
30°	0.57

Constants for Z_{thJK} calculation:

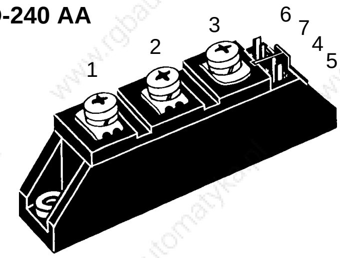
i	R_{thi} (K/W)	t_i (s)
1	0.008	0.0019
2	0.054	0.047
3	0.238	0.3
4	0.2	1.25

High Voltage Thyristor Module
High Voltage Thyristor/Diode Modules

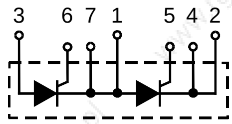
I_{TRMS} = 2x 180 A
I_{TAVM} = 2x 104 A
V_{RRM} = 2000-2200 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
2100	2000	MCC 94-20io1 B	MCD 94-20io1 B
2300	2200	MCC 94-22io1 B	MCD 94-22io1 B

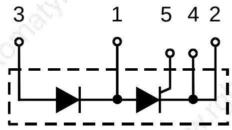
TO-240 AA



MCC



MCD



Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		180	A
I_{TAVM}	T_C = 85°C; 180° sine		104	A
I_{TSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz)	1700	A
	V_R = 0	t = 8.3 ms (60 Hz)	1800	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	1540	A
	V_R = 0	t = 8.3 ms (60 Hz)	1640	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz)	14450	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	13500	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	11850	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	11300	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz, t_P = 200 µs $V_D = 2/3\ V_{DRM}$	repetitive, I_T = 250 A	150	A/µs
	I_G = 0.45 A, di_G/dt = 0.45 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_{DR} = 2/3\ V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40 ...125	°C
T_{VJM}			125	°C
T_{stg}			-40 ...125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package, JEDEC TO-240 AA
- **D**irect **C**opper **B**onded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

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Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	T_{VJ} = T_{VJM}; V_R = V_{RRM}		15	mA
V_T	I_T = 300 A; T_{VJ} = 25°C		1.74	V
V_{T0}	For power-loss calculations only (T_{VJ} = T_{VJM})		0.85	V
r_T			3.2	mΩ
V_{GT}	V_D = 6 V; T_{VJ} = 25°C		1.5	V
	T_{VJ} = -40°C		1.6	V
I_{GT}	V_D = 6 V; T_{VJ} = 25°C		100	mA
	T_{VJ} = -40°C		200	mA
V_{GD}	T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}		0.25	V
I_{GD}	T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}		10	mA
I_L	T_{VJ} = 25°C; V_D = 6 V; t_P = 30 µs di_G/dt = 0.45 A/µs; I_G = 0.45 A		200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; R_{GK} = ∞		150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} di_G/dt = 0.45 A/µs; I_G = 0.45 A		2	µs
t_q	T_{VJ} = T_{VJM}; V_R = 100 V; V_D = 2/3 V_{DRM}; t_P = 200 µs dv/dt = 20 V/µs; I_T = 150 A; -di/dt = 10 A/µs	typ.	185	µs
Q_S	T_{VJ} = T_{VJM}		170	µC
I_{RM}	-di/dt = 6 A/µs; I_T = 50 A		45	A
R_{thJC}	per thyristor; DC current		0.22	K/W
	per module		0.11	K/W
R_{thJK}	per thyristor; DC current		0.42	K/W
	per module		0.21	K/W
d_S	Creeping distance on surface		12.7	mm
d_A	Creepage distance in air		9.6	mm
a	Maximum allowable acceleration		50	m/s²

Optional accessories for module-type MCC 94 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

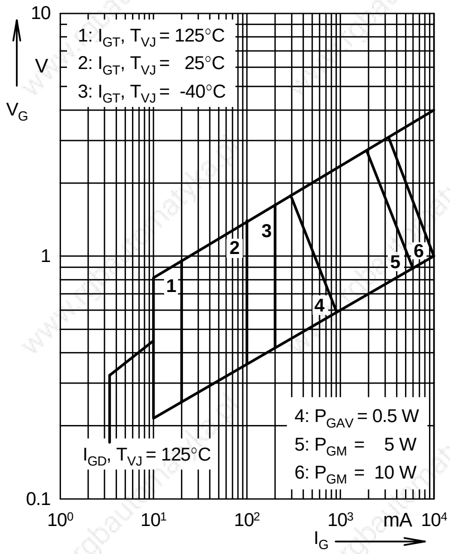


Fig. 1 Gate trigger characteristics

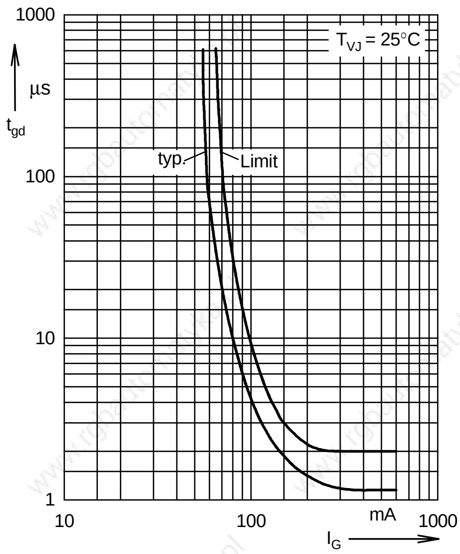
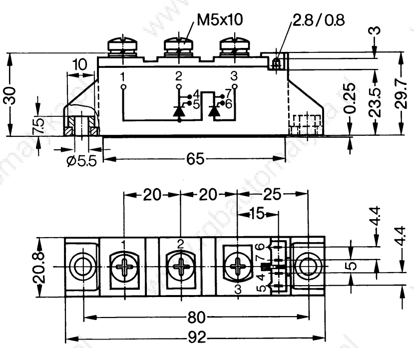


Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")



R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.22
180°	0.23
120°	0.25
60°	0.27
30°	0.28

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0066	0.0019
2	0.0678	0.0477
3	0.1456	0.344

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.42
180°	0.43
120°	0.45
60°	0.47
30°	0.48

Constants for Z_{thJK} calculation:

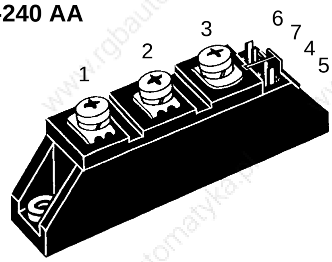
i	R_{thi} (K/W)	t_i (s)
1	0.0066	0.0019
2	0.0678	0.0477
3	0.1456	0.344
4	0.2	1.32

Thyristor Modules
Thyristor/Diode Modules

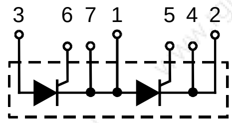
I_{TRMS} = 2x 180 A
I_{TAVM} = 2x 116 A
V_{RRM} = 800-1800 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type			
V	V	Version 1		Version 8	
900	800	MCC 95-08io1 B	--	MCC 95-08io8 B	MCD 95-08io8 B
1300	1200	MCC 95-12io1 B	MCD 95-12io1 B	MCC 95-12io8 B	MCD 95-12io8 B
1500	1400	MCC 95-14io1 B	--	MCC 95-14io8 B	MCD 95-14io8 B
1700	1600	MCC 95-16io1 B	MCD 95-16io1 B	MCC 95-16io8 B	MCD 95-16io8 B
1900	1800	MCC 95-18io1 B	--	MCC 95-18io8 B	MCD 95-18io8 B
1500	1400	MCC 95-16io1			
1700	1600	MCC 95-18io1			

TO-240 AA



MCC
Version 1



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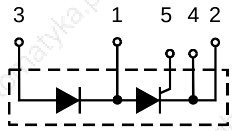
Version 1



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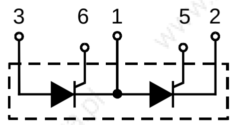
Version 8



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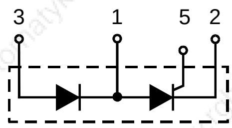
Version 8



Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		180	A
I_{TAVM}, I_{FAVM}	T_C = 85°C; 180° sine		116	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	2250	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	2400	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	2000	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	2150	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	25 300	A²s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	23 900	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	20 000	A²s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	19 100	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs $V_D = 2/3\ V_{DRM}$	repetitive, I_T = 250 A	150	A/µs
	I_G = 0.45 A di_G/dt = 0.45 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $R_{GK} = \infty$; method 1 (linear voltage rise)	$V_{DR} = 2/3\ V_{DRM}$	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
	$I_T = I_{TAVM}$	t_P = 300 µs	5	W
P_{GAV}			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		2.5-4.0/22-35	Nm/lb.in.
Weight	Typical including screws		90	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1

Applications

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

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Symbol	Test Conditions	Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$	5	mA
V_T, V_F	I_T, I_F = 300 A; T_{VJ} = 25°C	1.5	V
V_{T0} r_T	For power-loss calculations only (T_{VJ} = 125°C)	0.8 2.4	V mΩ
V_{GT}	V_D = 6 V; T_{VJ} = 25°C T_{VJ} = -40°C	2.5 2.6	V V
I_{GT}	V_D = 6 V; T_{VJ} = 25°C T_{VJ} = -40°C	150 200	mA mA
V_{GD} I_{GD}	$T_{VJ} = T_{VJM}$; $V_D = 2/3\ V_{DRM}$	0.2 10	V mA
I_L	T_{VJ} = 25°C; t_P = 10 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs	450	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$	200	mA
t_{gd}	T_{VJ} = 25°C; $V_D = 1/2\ V_{DRM}$ I_G = 0.45 A; di_G/dt = 0.45 A/µs	2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 150 A, t_P = 200 µs; -di/dt = 10 A/µs typ. V_R = 100 V; dv/dt = 20 V/µs; $V_D = 2/3\ V_{DRM}$	185	µs
Q_S I_{RM}	$T_{VJ} = T_{VJM}$; I_T, I_F = 50 A, -di/dt = 6 A/µs	170 45	µC A
R_{thJC}	per thyristor/diode; DC current per module (other values see Fig. 8/9)	0.22 0.11	K/W K/W
R_{thJK}	per thyristor/diode; DC current per module (other values see Fig. 8/9)	0.42 0.21	K/W K/W
d_S d_A a	Creepage distance on surface Strike distance through air Maximum allowable acceleration	12.7 9.6 50	mm mm m/s^2

Optional accessories for module-type MCC 95 version 1 B
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

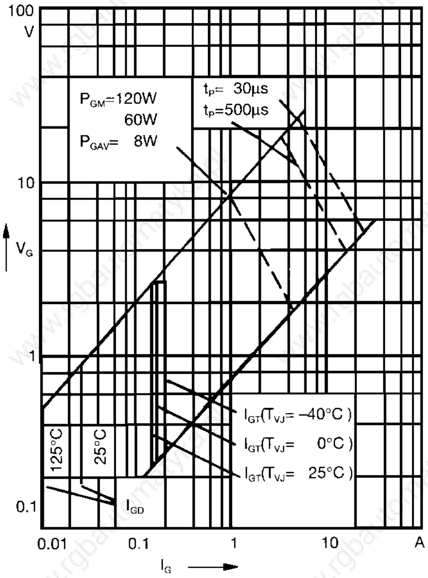


Fig. 1 Gate trigger characteristics

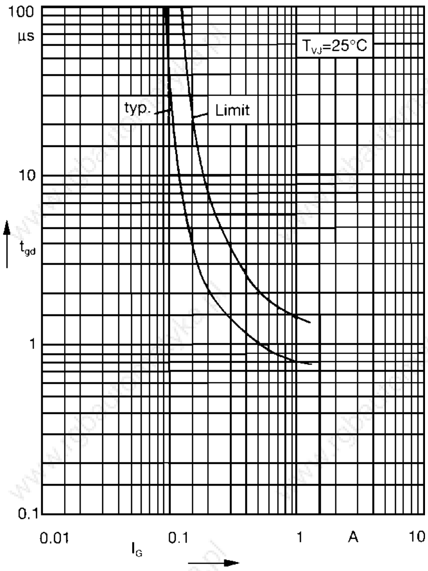
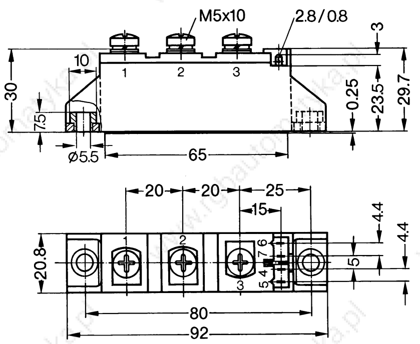


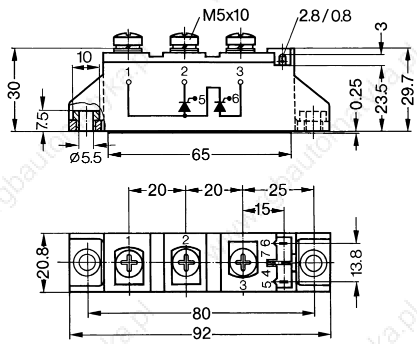
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

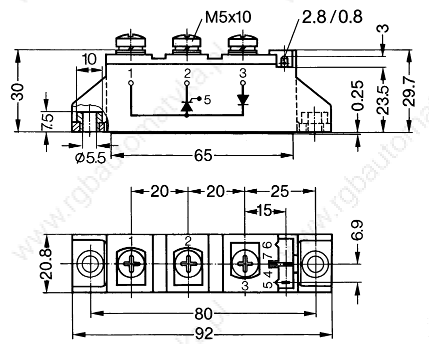
MCC / MCD Version 1 B



MCC Version 8 B



MCD Version 8 B



Version 1 or 8 without B in typ designation = without insert in mountig holes

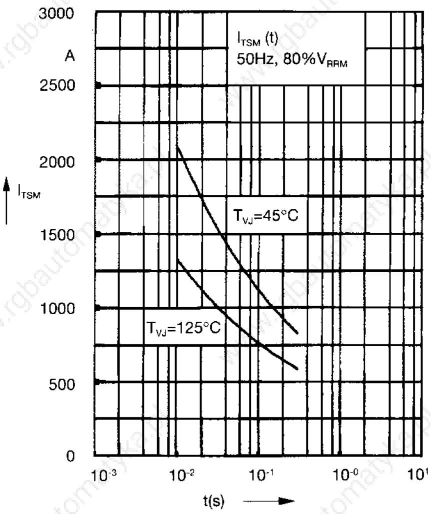


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

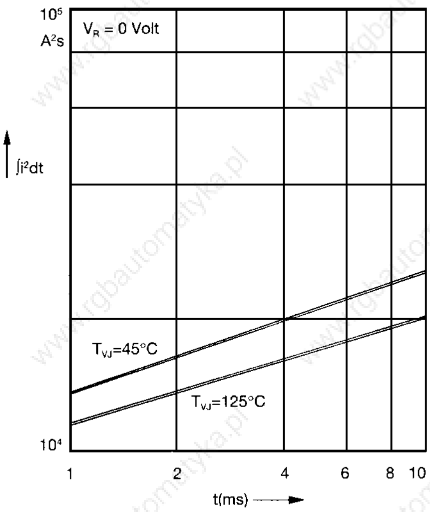


Fig. 4 ∫i²dt versus time (1-10 ms)

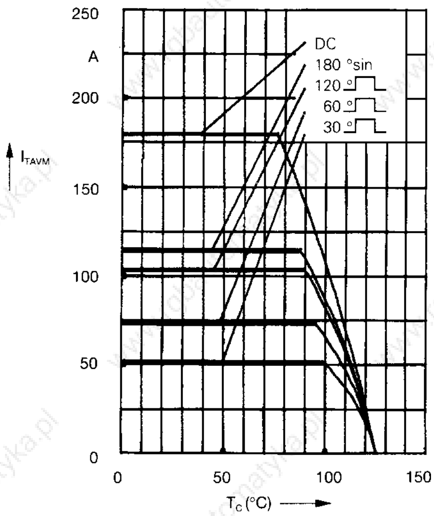


Fig. 4a Maximum forward current
at case temperature

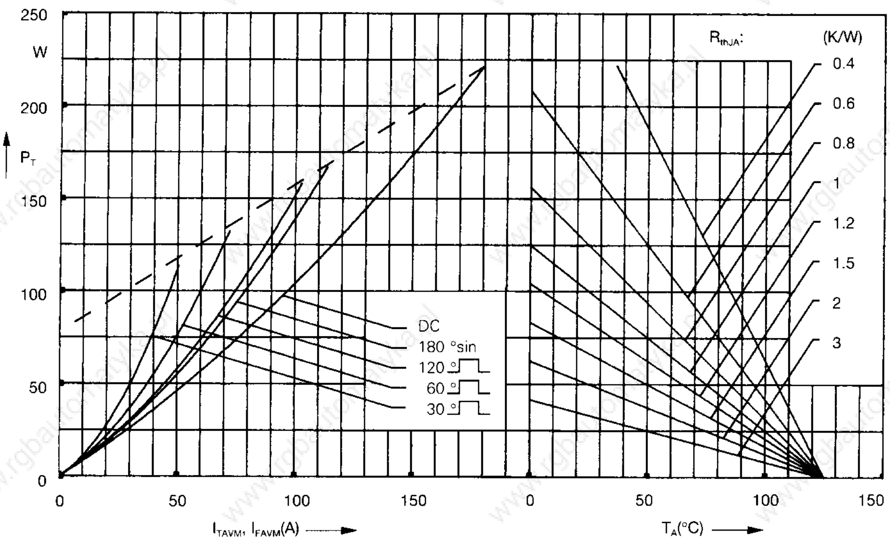


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

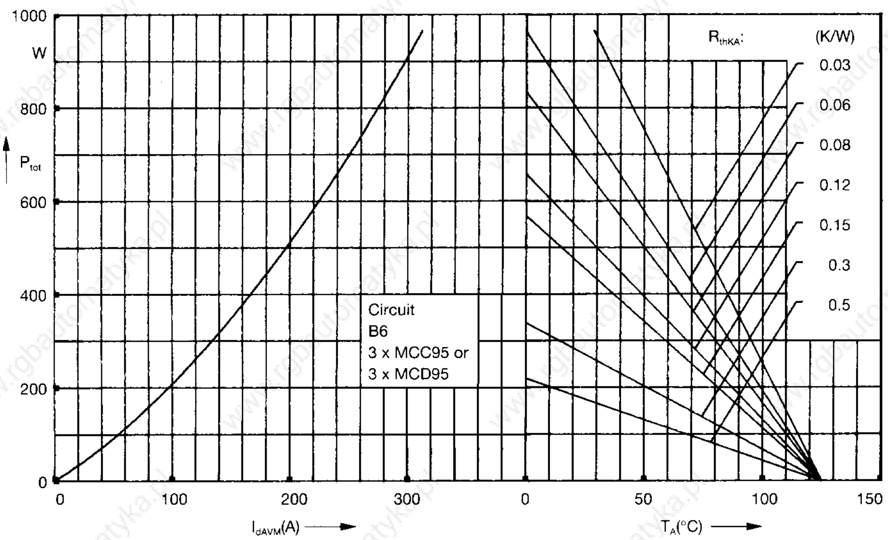


Fig. 6 Three phase rectifier bridge:
Power dissipation versus direct output current and ambient temperature

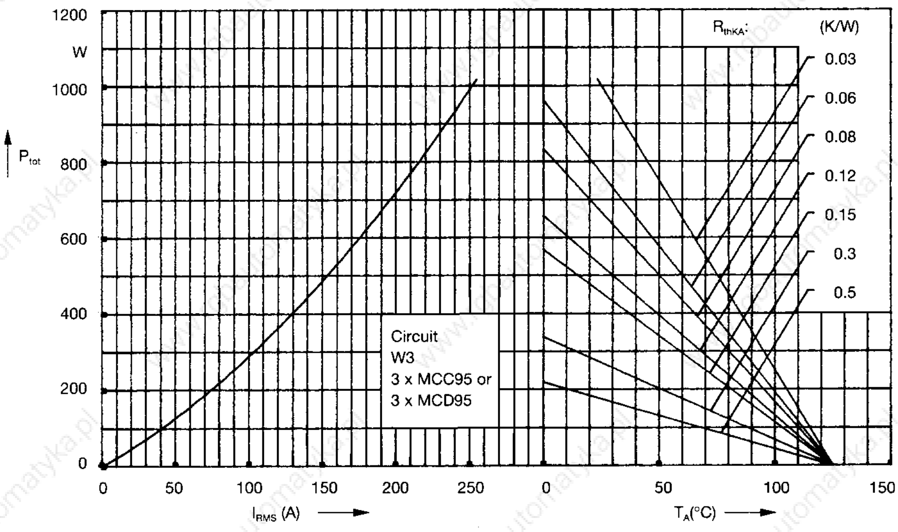


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

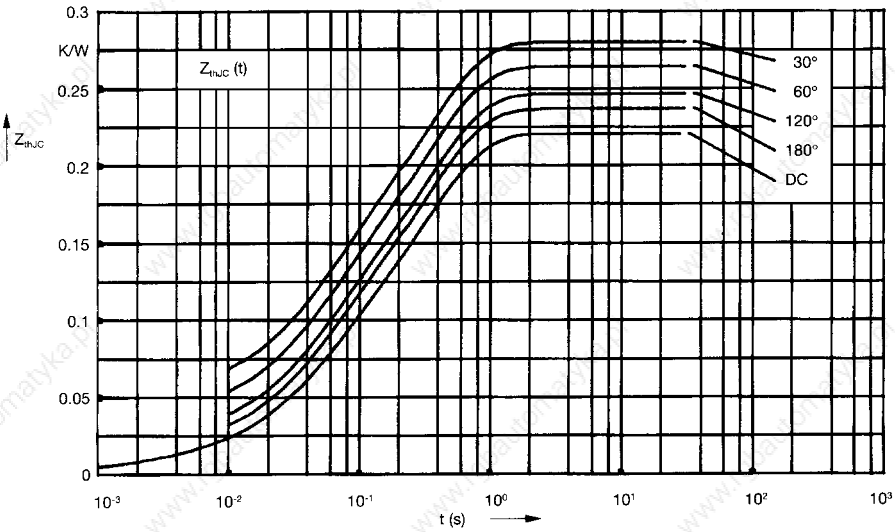


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.22
180°	0.23
120°	0.25
60°	0.27
30°	0.28

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0066	0.0019
2	0.0678	0.0477
3	0.1456	0.344

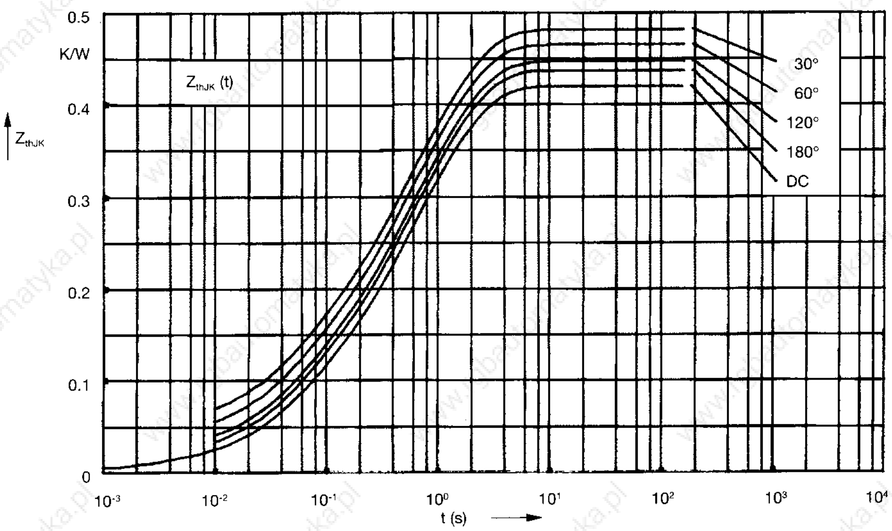


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.42
180°	0.43
120°	0.45
60°	0.47
30°	0.48

Constants for Z_{thJK} calculation:

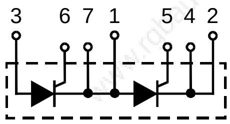
i	R_{thi} (K/W)	t_i (s)
1	0.0066	0.0019
2	0.0678	0.0477
3	0.1456	0.344
4	0.2	1.32

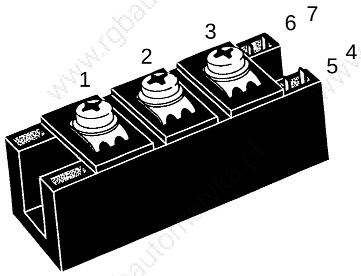
Thyristor Module

Preliminary data

I_{TRMS} = 2x300 A
I_{TAVM} = 2x128 A
$V_{RRM, DRM}$ = 800-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
900	800	MCC 122-08io1
1300	1200	MCC 122-12io1
1500	1400	MCC 122-14io1
1700	1600	MCC 122-16io1
1900	1800	MCC 122-18io1





Symbol	Conditions		Maximum Ratings	
I_{TRMS}			300	A
I_{TAVM}	T_C = 85°C; 180° sine		128	A
I_{TSM}	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	3600	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	3850	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	3200	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	3420	A
I^2dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	64800	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	62300	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	51200	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	49100	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50Hz, t_P = 200µs	repetitive, I_T = 500 A	150	A/µs
	$V_D = {}^2/_3\ V_{DRM}$ I_G = 0.5 A di_G/dt = 0.5 A/µs	non repetitive, I_T = 500 A	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $R_{GK} = \infty$; method 1 (linear voltage rise)	$V_{DR} = {}^2/_3\ V_{DRM}$	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			8	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	$I_{ISOL} \leq$ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		2.25-2.75/20-25	Nm/lb.in.
	Terminal connection torque (M6)		4.5-5.5/40-48	Nm/lb.in.
Weight	Typical including screws		125	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.

Features

- International standard package
- Direct copper bonded Al_2O_3-ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

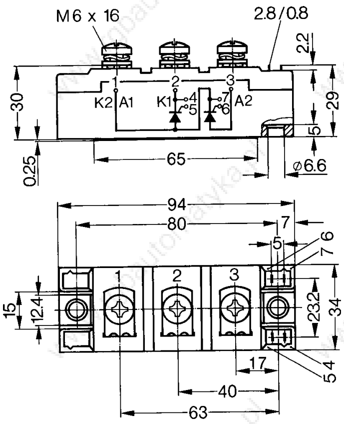
Applications

- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

Advantages

- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Dimensions in mm (1 mm = 0.0394")



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Symbol	Conditions			Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$			10	mA
V_T, V_F	I_T, I_F = 120 A; T_{VJ} = 25°C			1.13	V
V_{T0}	T_{VJ} = 125°C; For power-loss calculations only			0.85	V
r_T	$T_{VJ} = T_{VJM}$			2	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C		1.4	V
		T_{VJ} = -40°C		1.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C		150	mA
		T_{VJ} = -40°C		200	mA
V_{GD}	$T_{VJ} = T_{VJM}$; V_D = $^2/_3$ V_{DRM}			0.2	V
I_{GD}				10	mA
I_L	T_{VJ} = 25°C; t_P = 10 µs, V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs			300	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; R_{GK} = ∞			200	mA
t_{gd}	T_{VJ} = 25°C; V_D = ½ V_{DRM} I_G = 0.45 A; di_G/dt = 0.45 A/µs			2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 120 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; V_D = $^2/_3$ V_{DRM}		typ.	150	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 200 A, -di/dt = 50 A/µs			330	µC
I_{RM}				180	A
R_{thJC}	per thyristor/diode; DC current			0.2	K/W
	per module			0.1	K/W
R_{thCH}	per thyristor/diode; DC current		typ.	0.1	K/W
d_S	Creepage distance on surface			12.7	mm
d_A	Strike distance through air			9.6	mm
a	Maximum allowable acceleration			50	m/s^2

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L** (L = Left for pin pair 4/5) } UL Styles 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA Class 5851, File 41234

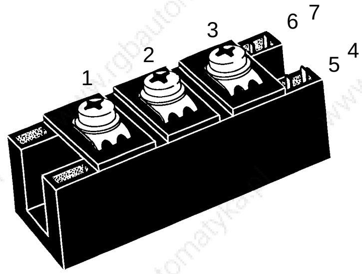
IXYS

MCC 132
MCD 132

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 300 A
I_{TAVM} = 2x 130 A
V_{RRM} = 800-1800 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type	
V	V	Version 1	Version 1
900	800	MCC 132-08io1	MCD 132-08io1
1300	1200	MCC 132-12io1	MCD 132-12io1
1500	1400	MCC 132-14io1	MCD 132-14io1
1700	1600	MCC 132-16io1	MCD 132-16io1
1900	1800	MCC 132-18io1	MCD 132-18io1



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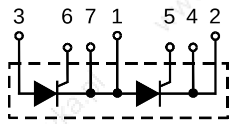

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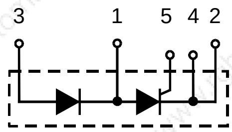


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		300	A
I_{TAVM}, I_{FAVM}	T_C = 85°C; 180° sine		130	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	4750	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	5080	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	4230	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	4530	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	113 000	A²s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	108 000	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	89 500	A²s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	86 200	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs $V_D = 2/3\ V_{DRM}$	repetitive, I_T = 500 A	150	A/µs
	I_G = 0.5 A di_G/dt = 0.5 A/µs	non repetitive, I_T = 500 A	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $R_{GK} = \infty$; method 1 (linear voltage rise)	$V_{DR} = 2/3\ V_{DRM}$	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			8	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		2.25-2.75/20-25	Nm/lb.in.
	Terminal connection torque (M6)		4.5-5.5/40-48	Nm/lb.in.
Weight	Typical including screws		125	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

Advantages
- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

032

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		10	mA
V_T, V_F	I_T, I_F = 300 A; T_{VJ} = 25°C		1.36	V
V_{T0}	For power-loss calculations only (T_{VJ} = 125°C)		0.8	V
r_T			1.5	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	2.5	V
		T_{VJ} = -40°C	2.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	150	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.2	V
I_{GD}			10	mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.5 A; di_G/dt = 0.5 A/µs		300	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 0.5 A; di_G/dt = 0.5 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 160 A, t_P = 200 µs; -di/dt = 10 A/µs typ. V_R = 100 V; dv/dt = 20 V/µs; V_D = 2/3 V_{DRM}		150	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 300 A, -di/dt = 50 A/µs		550	µC
I_{RM}			235	A
R_{thJC}	per thyristor/diode; DC current	other values see Fig. 8/9	0.23	K/W
	per module		0.115	K/W
R_{thJK}	per thyristor/diode; DC current		0.33	K/W
	per module		0.165	K/W
d_S	Creepage distance on surface		12.7	mm
d_A	Strike distance through air		9.6	mm
a	Maximum allowable acceleration		50	m/s^2

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

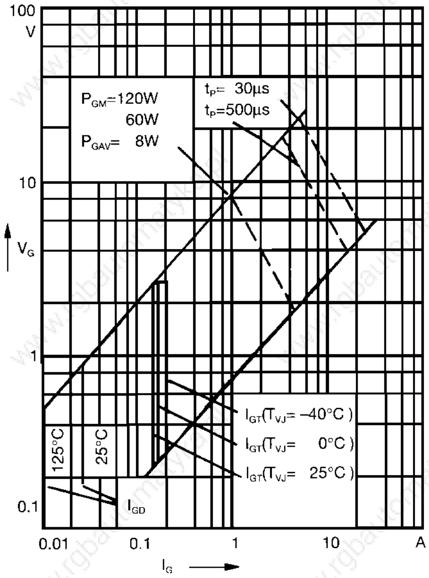


Fig. 1 Gate trigger characteristics

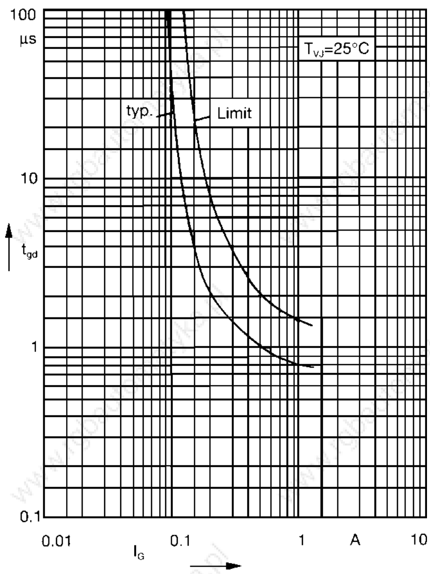
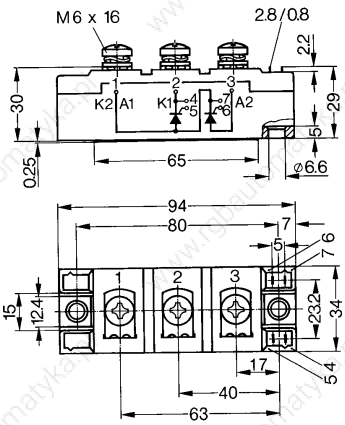


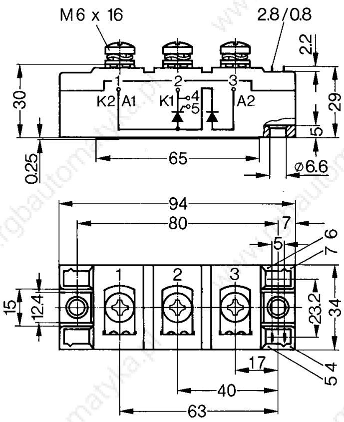
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC



MCD



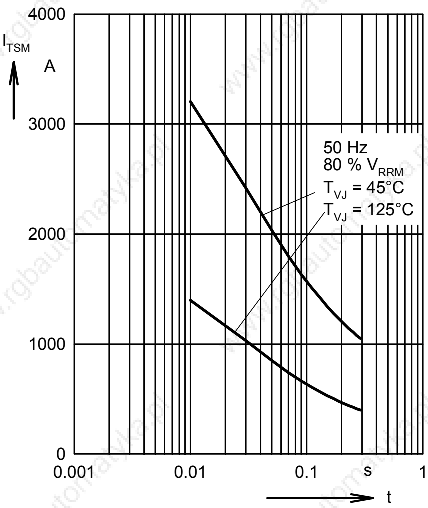


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

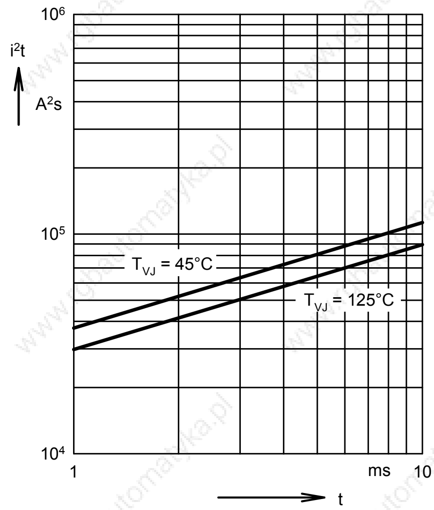


Fig. 4 i^2t versus time (1-10 ms)

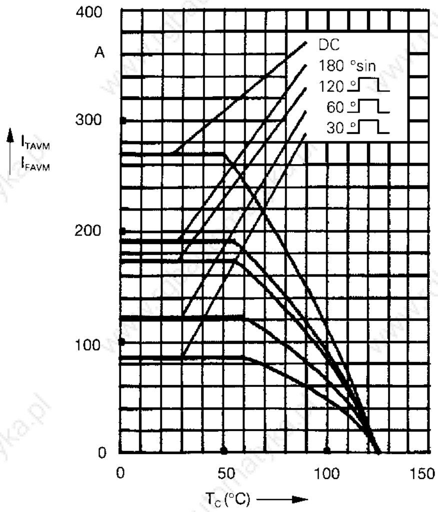


Fig. 4a Maximum forward current at case temperature

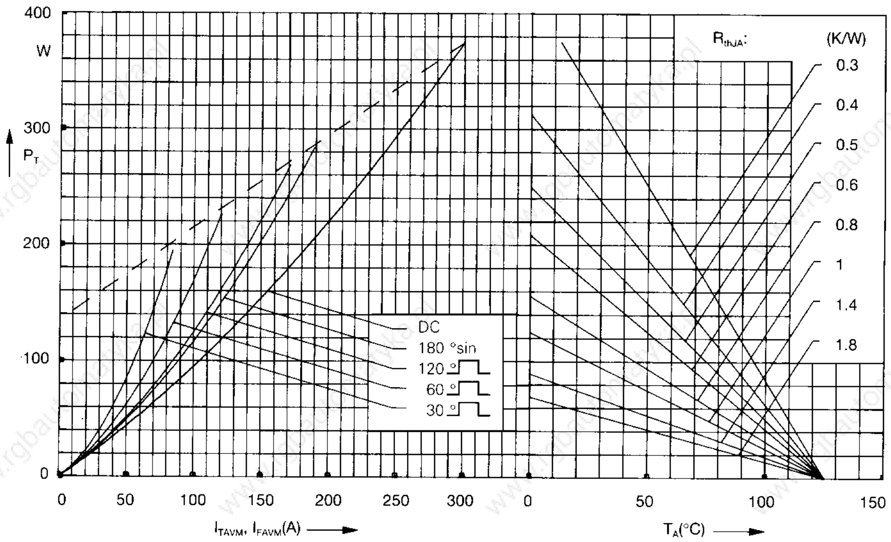


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

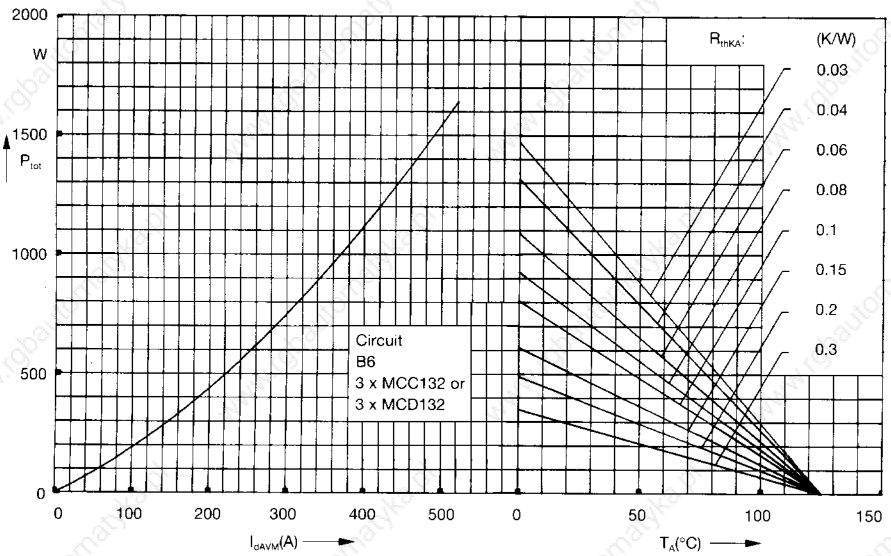


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

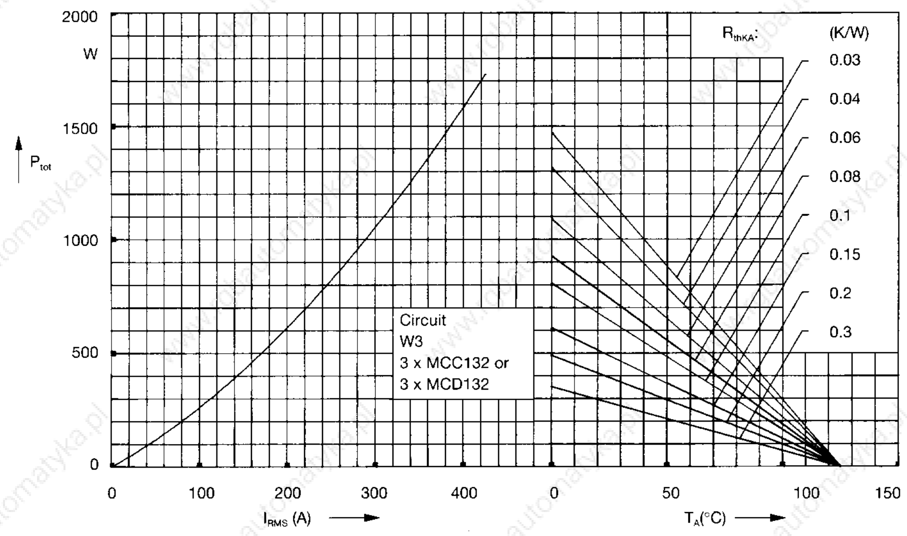


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

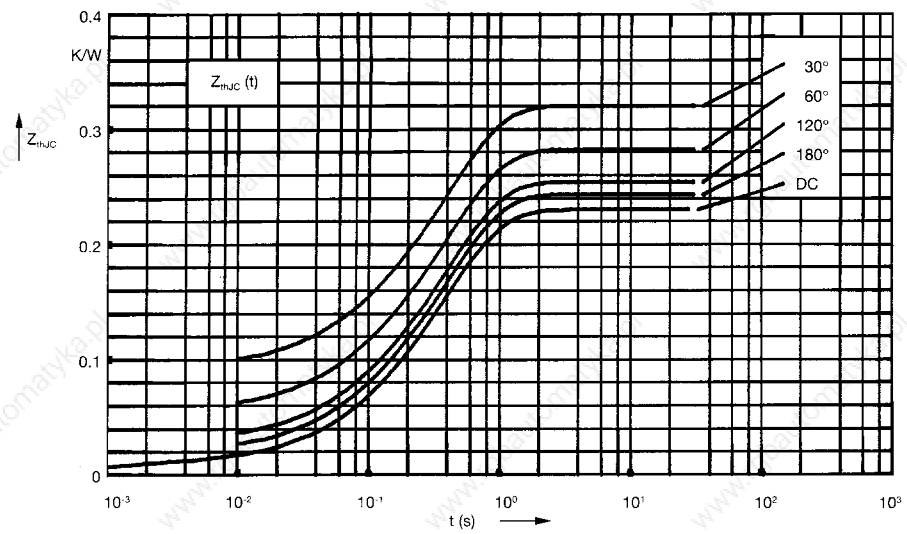


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.230
180°	0.244
120°	0.255
60°	0.283
30°	0.321

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0095	0.001
2	0.0175	0.065
3	0.203	0.4

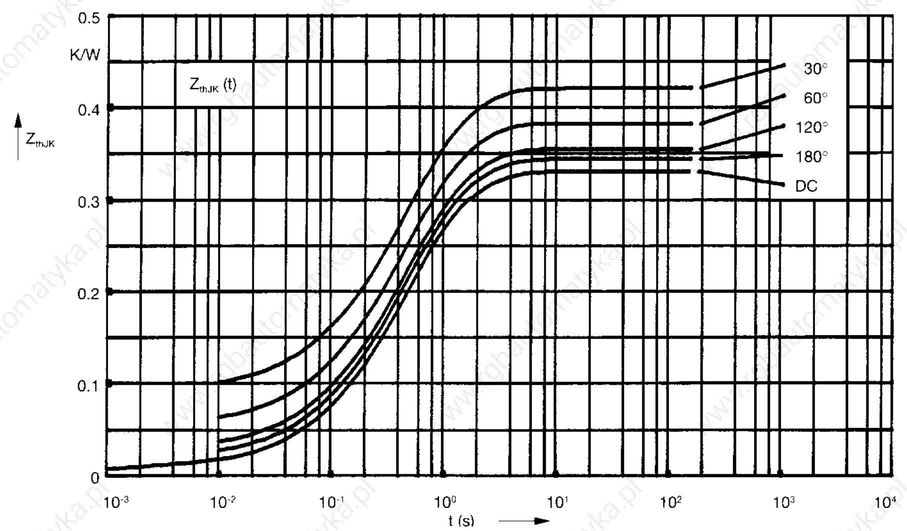


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.330
180°	0.344
120°	0.355
60°	0.383
30°	0.421

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0095	0.001
2	0.0175	0.065
3	0.203	0.4
4	0.1	1.29

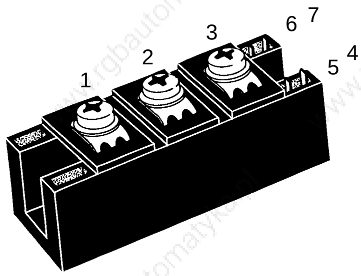
IXYS

MCC 161
MCD 161

High Voltage Thyristor Module
High Voltage High Voltage

I_{TRMS} = 2x 300 A
I_{TAVM} = 2x 165 A
V_{RRM} = 2000-2200 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
2100	2000	MCC 161-20io1	MCD 161-20io1
2300	2200	MCC 161-22io1	MCD 161-22io1



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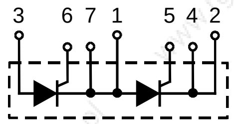
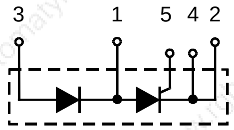


MCD



Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		300	A
I_{TAVM}	T_C = 85°C; 180° sine		165	A
I_{TSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz)	6000	A
	V_R = 0	t = 8.3 ms (60 Hz)	6400	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	5250	A
	V_R = 0	t = 8.3 ms (60 Hz)	5600	A
$\int i^2dt$	T_{VJ} = 45°C	t = 10 ms (50 Hz)	180000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	170000	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	137000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	128000	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 500 A	150	A/µs
	f = 50 Hz, t_P = 200 µs			
	$V_D = 2/3\ V_{DRM}$			
	I_G = 0.5 A,	non repetitive, $I_T = I_{TAVM}$	500	A/µs
	di_G/dt = 0.5 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_{DR} = 2/3\ V_{DRM}$		1000	V/µs
	$R_{GK} = \infty$; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			8	W
V_{RGM}			10	V
T_{VJ}			-40 ...125	°C
T_{VJM}			125	°C
T_{stg}			-40 ...125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	$I_{ISOL} \leq$ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		2.25-2.75/20-25	Nm/lb.in.
	Terminal connection torque (M6)		4.5-5.5/40-48	Nm/lb.in.
Weight	Typical including screws		125	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package
- **D**irect **C**opper **B**onded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

Applications

- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

Advantages

- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions	Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$	40	mA
V_T	I_T = 300 A; T_{VJ} = 25°C	1.36	V
V_{T0}	For power-loss calculations only ($T_{VJ} = T_{VJM}$)	0.8	V
r_T		1.6	mΩ
V_{GT}	V_D = 6 V; T_{VJ} = 25°C	2	V
	T_{VJ} = -40°C	2.6	V
I_{GT}	V_D = 6 V; T_{VJ} = 25°C	150	mA
	T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$; V_D = 2/3 V_{DRM}	0.25	V
I_{GD}	$T_{VJ} = T_{VJM}$; V_D = 2/3 V_{DRM}	10	mA
I_L	T_{VJ} = 25°C; V_D = 6 V; t_P = 30 µs di_G/dt = 0.45A/µs; I_G = 0.45 A	200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$	150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} di_G/dt = 0.5 A/µs; I_G = 0.5 A	2	µs
t_q	$T_{VJ} = T_{VJM}$; V_R = 100 V; V_D = 2/3 V_{DRM}; t_P = 200 µs dv/dt = 20 V/µs; I_T = 160 A; -di/dt = 10A/µs	typ. 150	µs
Q_S	$T_{VJ} = T_{VJM}$	550	µC
I_{RM}	-di/dt = 50 A/µs; I_T = 300 A	235	A
R_{thJC}	per thyristor; DC current	0.155	K/W
	per module	0.078	K/W
R_{thJK}	per thyristor; DC current	0.225	K/W
	per module	0.113	K/W
d_S	Creeping distance on surface	12.7	mm
d_A	Creepage distance in air	9.6	mm
a	Maximum allowable acceleration	50	m/s^2

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

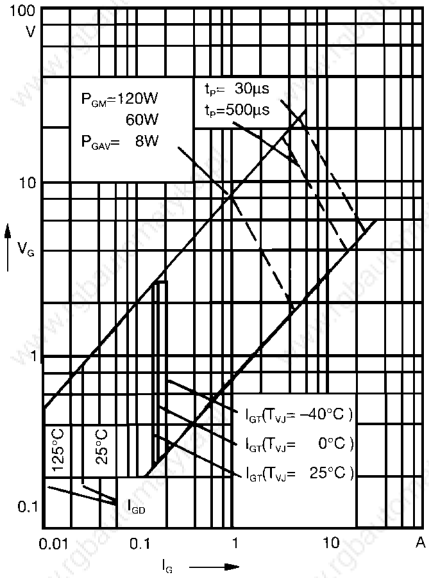


Fig. 1 Gate trigger characteristics

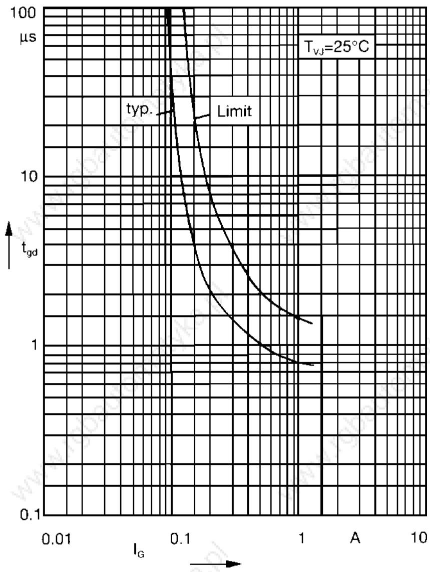
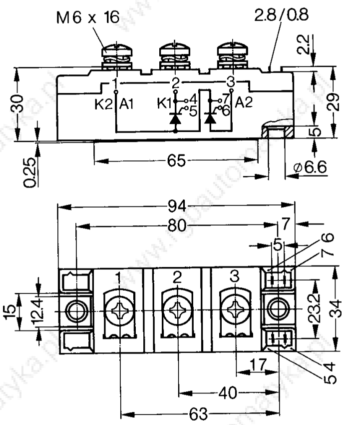


Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")



R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.155
180°	0.167
120°	0.175
60°	0.197
30°	0.226

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0072	0.001
2	0.0188	0.08
3	0.129	0.2

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.225
180°	0.237
120°	0.245
60°	0.262
30°	0.296

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0072	0.001
2	0.0188	0.08
3	0.129	0.2
4	0.07	1.0

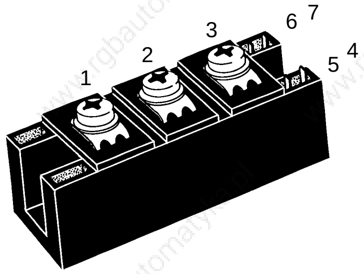
IXYS

MCC 162
MCD 162

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 300 A
I_{TAVM} = 2x 190 A
V_{RRM} = 800-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type Version 1	Version 1
900	800	MCC 162-08io1	MCD 162-08io1
1300	1200	MCC 162-12io1	MCD 162-12io1
1500	1400	MCC 162-14io1	MCD 162-14io1
1700	1600	MCC 162-16io1	MCD 162-16io1
1900	1800	MCC 162-18io1	MCD 162-18io1



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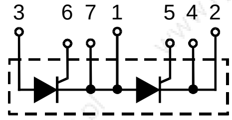

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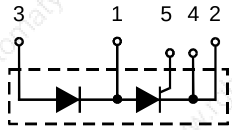


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		300	A
I_{TAVM}, I_{FAVM}	T_C = 80°C; 180° sine		190	A
	T_C = 85°C; 180° sine		181	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	6000	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	6400	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	5250	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	5600	A
$\int i^2dt$	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	180 000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	170 000	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	137 000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz), sine	128 000	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs V_D = 2/3 V_{DRM}	repetitive, I_T = 500 A	150	A/µs
	I_G = 0.5 A di_G/dt = 0.5 A/µs	non repetitive, I_T = 500 A	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; R_{GK} = ∞; method 1 (linear voltage rise)	V_{DR} = 2/3 V_{DRM}	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			8	W
V_{RGM}			10	V
T_{VJ}			-40...+125	°C
T_{VJM}			125	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		2.25-2.75/20-25	Nm/lb.in.
	Terminal connection torque (M6)		4.5-5.5/40-48	Nm/lb.in.
Weight	Typical including screws		125	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

Advantages
- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		10	mA
V_T, V_F	I_T, I_F = 300 A; T_{VJ} = 25°C		1.25	V
V_{T0}	For power-loss calculations only (T_{VJ} = 125°C)		0.88	V
r_T			1.15	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	2.5	V
		T_{VJ} = -40°C	2.6	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	150	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.2	V
I_{GD}			10	mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.5 A; di_G/dt = 0.5 A/µs		300	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		200	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 0.5 A; di_G/dt = 0.5 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 20 V/µs; V_D = 2/3 V_{DRM}	typ.	150	µs
Q_S	$T_{VJ} = T_{VJM}$; I_T, I_F = 300 A, -di/dt = 50 A/µs		550	µC
I_{RM}			235	A
R_{thJC}	per thyristor/diode; DC current	other values see Fig. 8/9	0.155	K/W
	per module		0.0775	K/W
R_{thJK}	per thyristor/diode; DC current		0.225	K/W
	per module		0.1125	K/W
d_S	Creepage distance on surface		12.7	mm
d_A	Strike distance through air		9.6	mm
a	Maximum allowable acceleration		50	m/s²

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

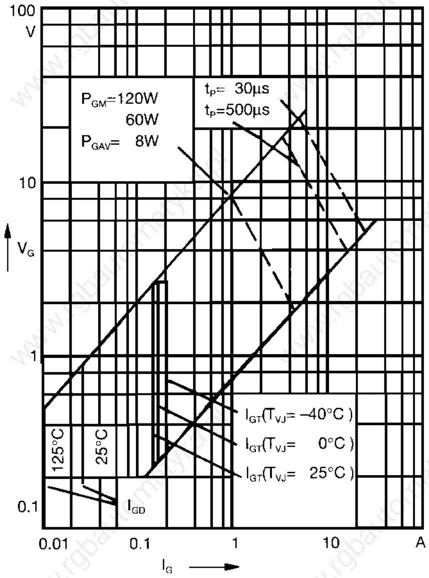


Fig. 1 Gate trigger characteristics

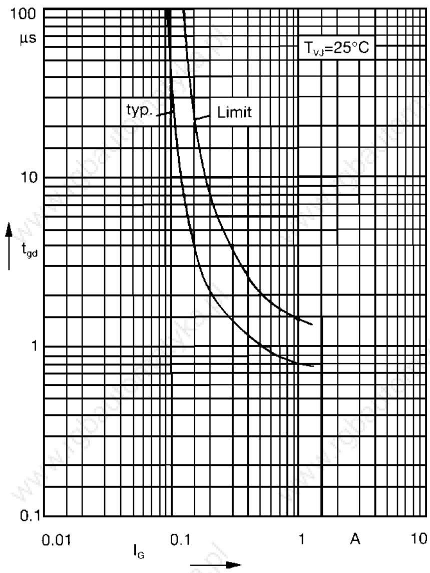
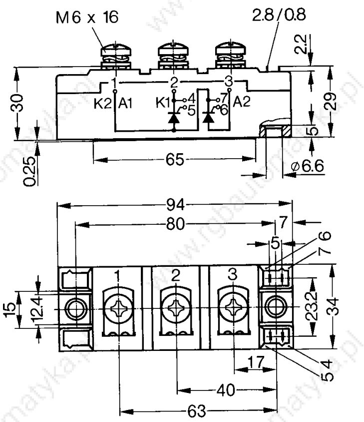


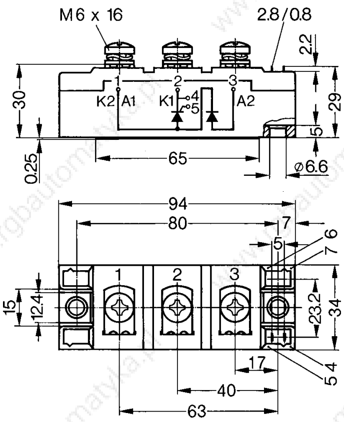
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC Version 1



MCD Version 1



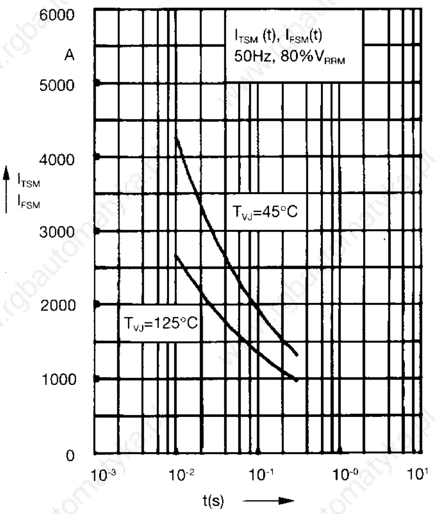


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

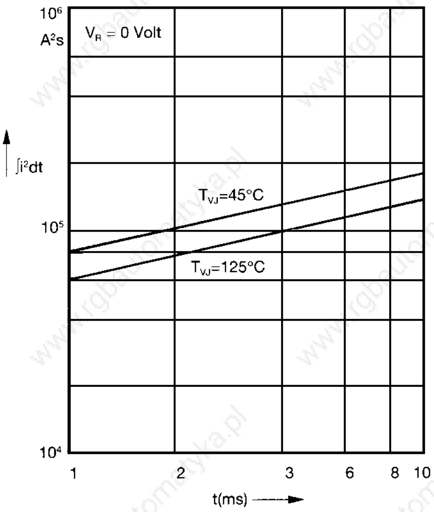


Fig. 4 $\int i^2dt$ versus time (1-10 ms)

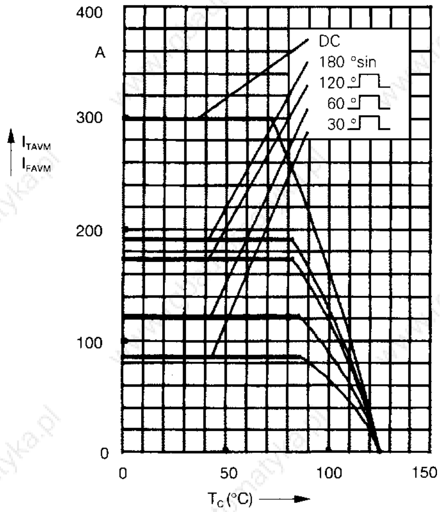


Fig. 4a Maximum forward current at case temperature

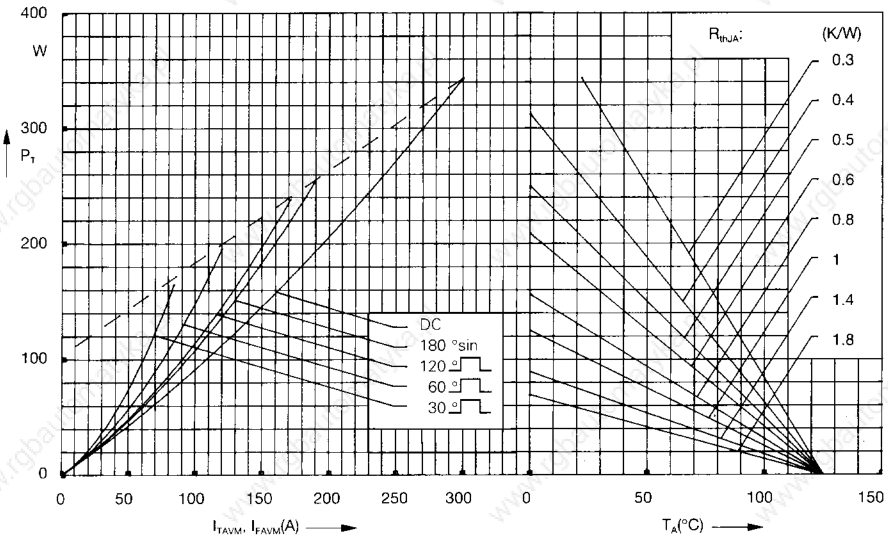


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

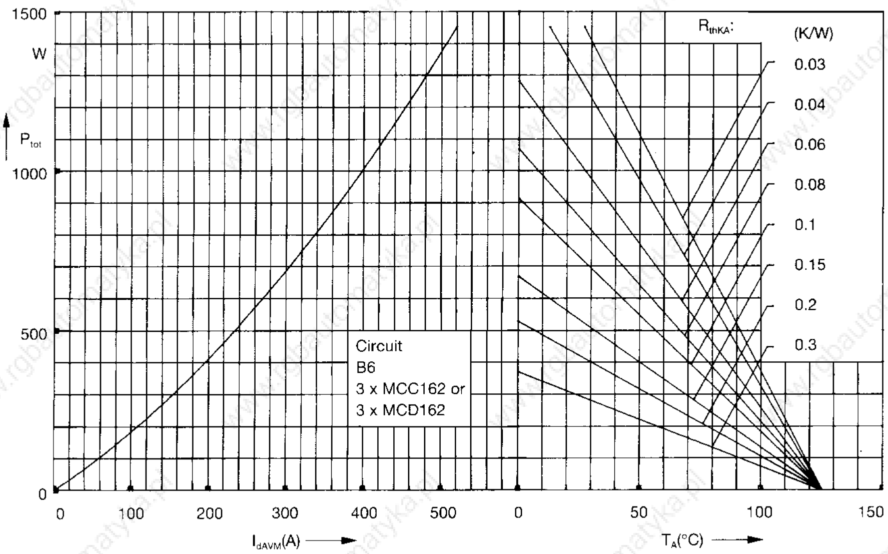


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

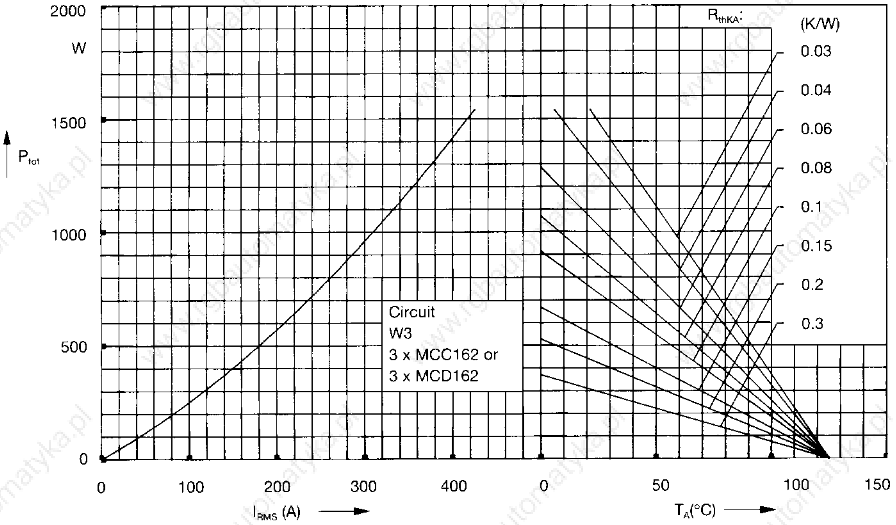


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

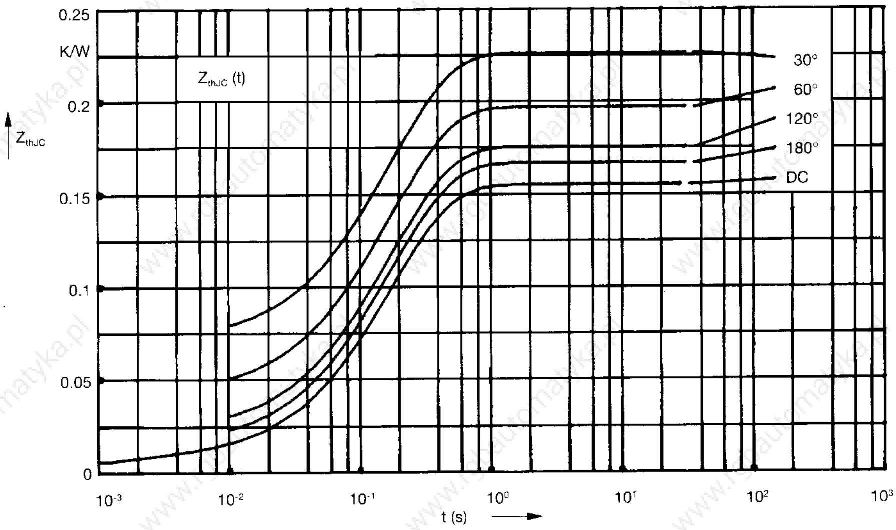


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.155
180°	0.167
120°	0.176
60°	0.197
30°	0.227

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0072	0.001
2	0.0188	0.08
3	0.129	0.2

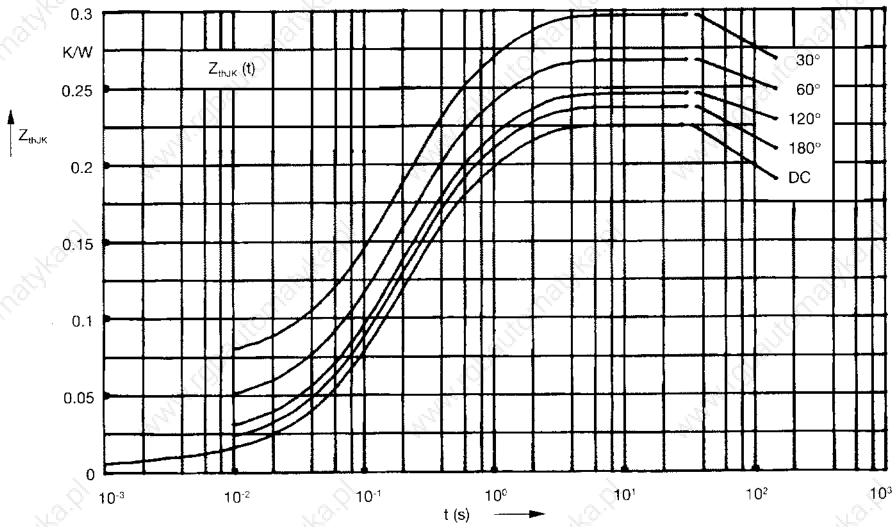


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.225
180°	0.237
120°	0.246
60°	0.267
30°	0.297

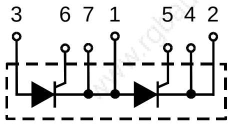
Constants for Z_{thJK} calculation:

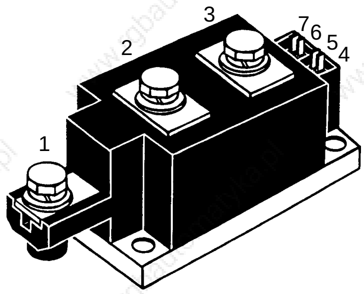
i	R_{thi} (K/W)	t_i (s)
1	0.0072	0.001
2	0.0188	0.08
3	0.129	0.2
4	0.07	1.0

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 350 A
I_{TAVM} = 2x 203 A
V_{RRM} = 1200-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
1300	1200	MCC 170-12io1
1500	1400	MCC 170-14io1
1700	1600	MCC 170-16io1
1900	1800	MCC 170-18io1





Symbol	Test Conditions		Maximum Ratings	
I_{TRMS} I_{TAVM}	$T_{VJ} = T_{VJM}$ T_C = 85°C; 180° sine		350 203	A A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C; V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	5400 5800	A A
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	5000 5500	A A
∫i²dt	T_{VJ} = 45°C V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	146 000 140 000	A²s A²s
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	125 000 126 000	A²s A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs V_D = 2/3 V_{DRM} I_G = 1 A, di_G/dt = 1 A/µs	repetitive, I_T = 660 A	100	A/µs
		non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; V_{DR} = 2/3 V_{DRM} R_{GK} = ∞; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$ $I_T = I_{TAVM}$	t_P = 30 µs t_P = 500 µs	120 60	W W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+130	°C
T_{VJM}			130	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS I_{ISOL} ≤ 1 mA	t = 1 min t = 1 s	3000 3600	V~ V~
M_d	Mounting torque (M6) Terminal connection torque (M8)		4.5-7/40-62 11-13/97-115	Nm/lb.in. Nm/lb.in.
Weight	Typical including screws		750	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3-ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		40	mA
V_T, V_F	I_T, I_F = 600 A; T_{VJ} = 25°C		1.65	V
V_{T0}	For power-loss calculations only (T_{VJ} = 130°C)		0.8	V
r_T			1	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	2	V
		T_{VJ} = -40°C	3	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	150	mA
		T_{VJ} = -40°C	220	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.25	V
I_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	10	mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 1 A; di_G/dt = 1 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 50 V/µs; V_D = 2/3 V_{DRM}	typ.	200	µs
Q_S	T_{VJ} = 125°C; I_T, I_F = 300 A; -di/dt = 50 A/µs		550	µC
I_{RM}			235	A
R_{thJC}	per thyristor (diode); DC current	other values see Fig. 8/9	0.164	K/W
	per module		0.082	K/W
R_{thJK}	per thyristor (diode); DC current		0.204	K/W
	per module		0.102	K/W
d_S	Creeping distance on surface		12.7	mm
d_A	Creepage distance in air		9.6	mm
a	Maximum allowable acceleration		50	m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180 R** (R = Right for pin pair 6/7) } CSA class 5851, guide 460-1-1

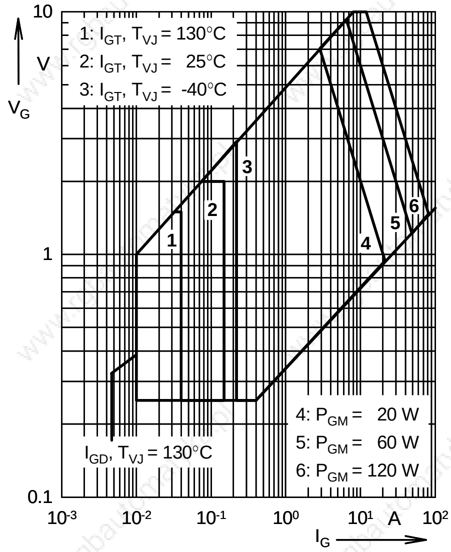


Fig. 1 Gate trigger characteristics

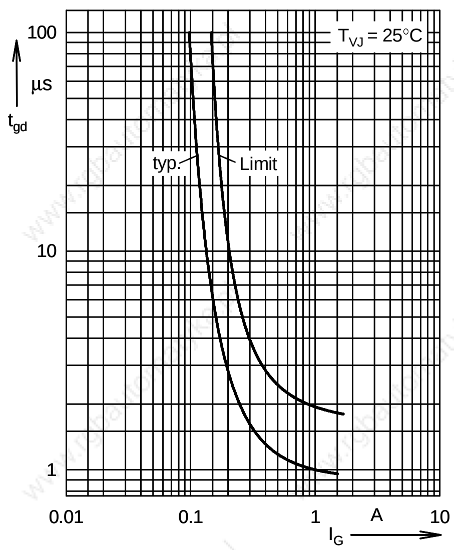
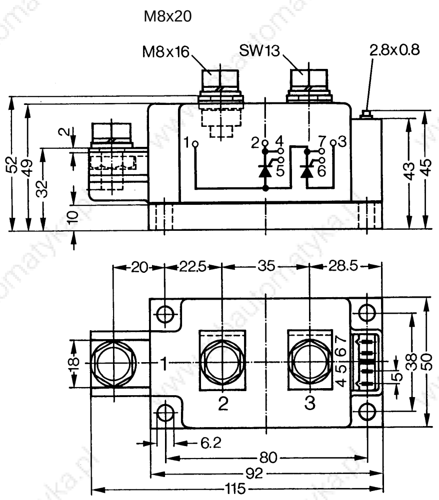


Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")



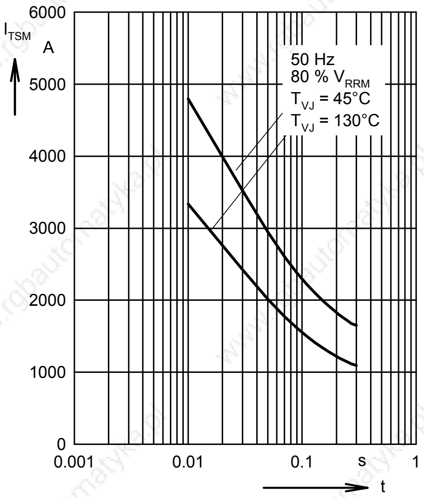


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

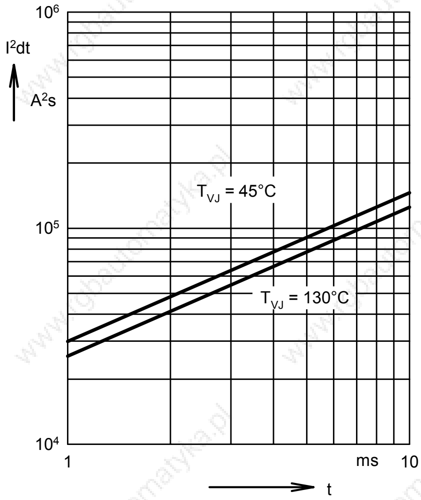


Fig. 4 ∫i²dt versus time (1-10 ms)

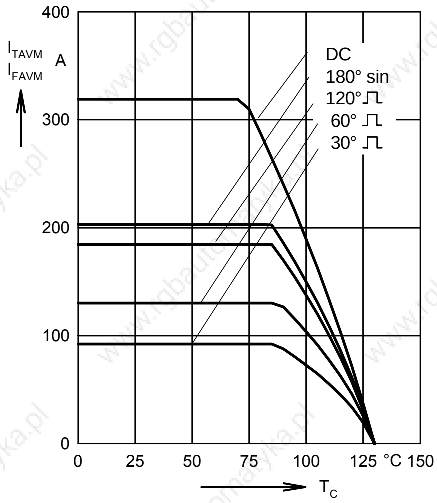


Fig. 4a Maximum forward current at case temperature

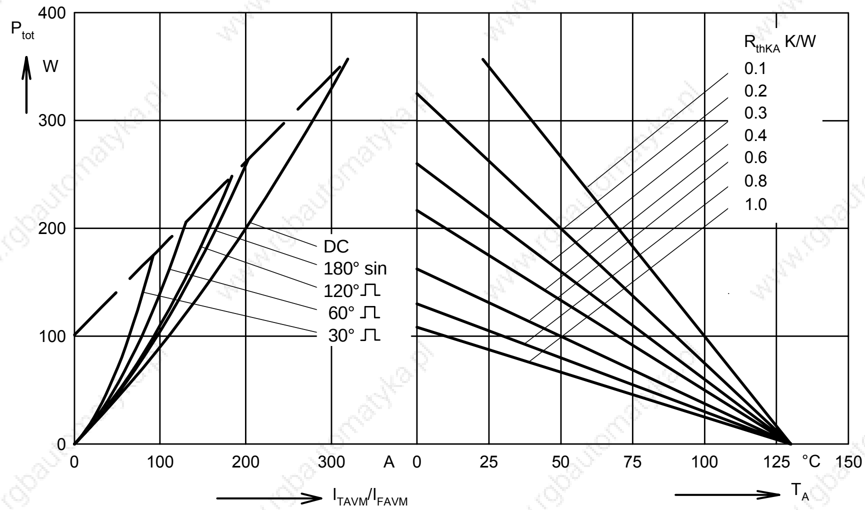


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

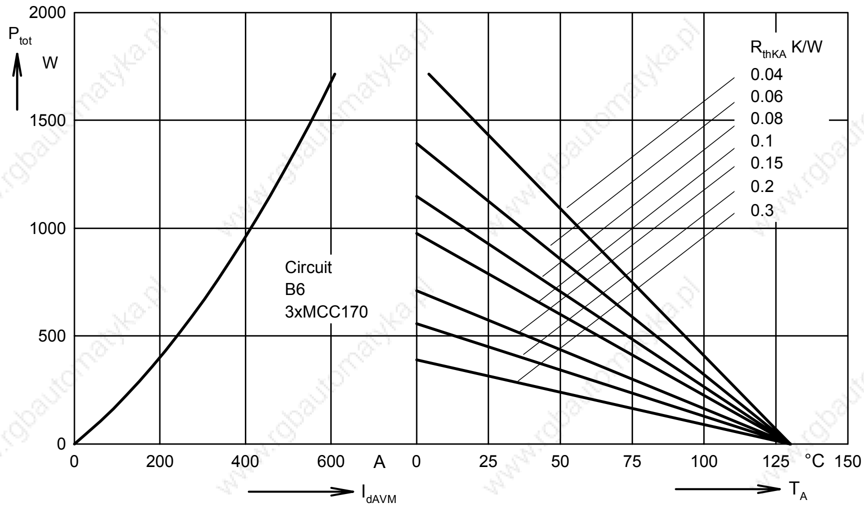


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

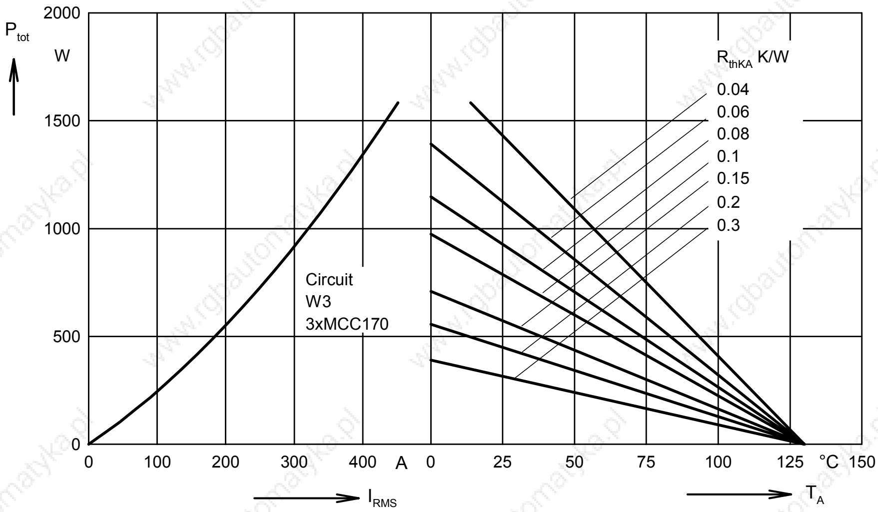


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

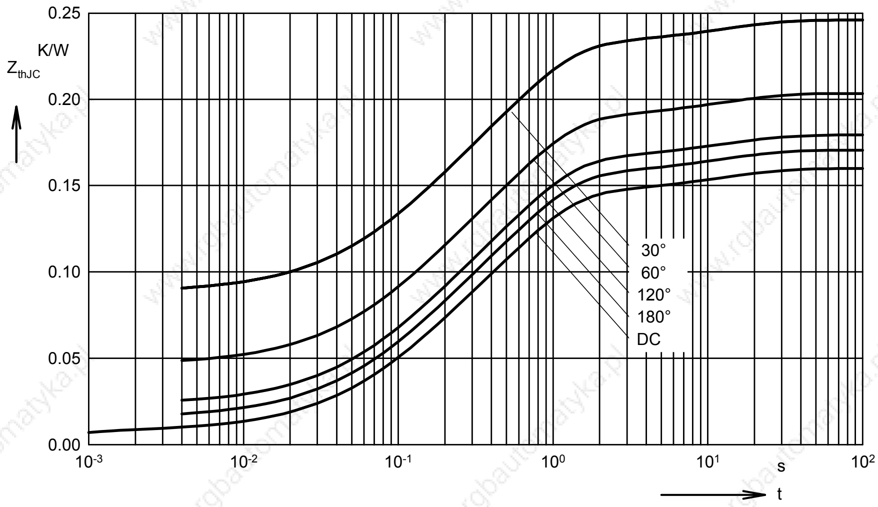


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.160
180°	0.171
120°	0.180
60°	0.203
30°	0.247

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0077	0.00054
2	0.0413	0.098
3	0.096	0.54
4	0.0149	12

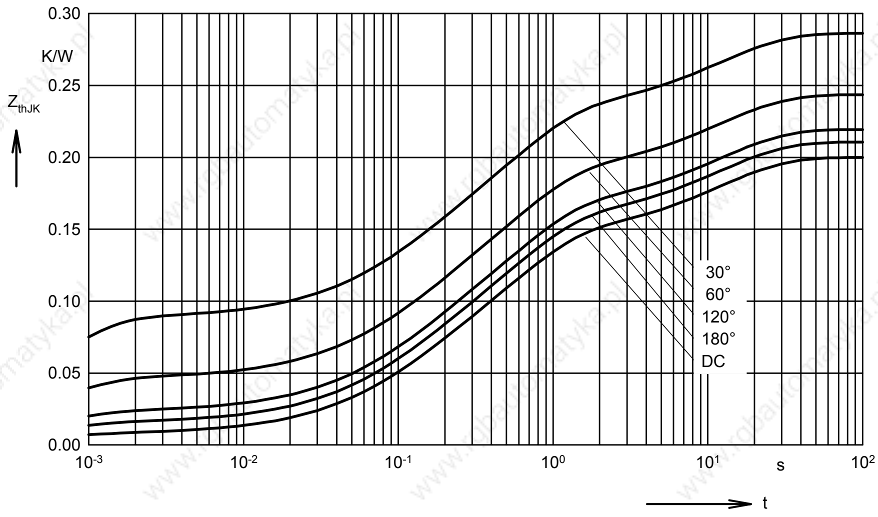


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.200
180°	0.211
120°	0.220
60°	0.243
30°	0.287

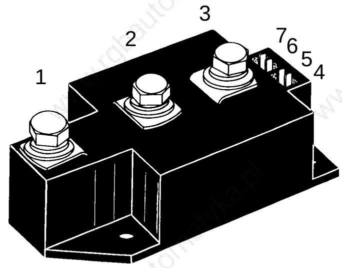
Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0077	0.00054
2	0.0413	0.098
3	0.096	0.54
4	0.0149	12
5	0.04	12

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 400 A
I_{TAVM} = 2x 250 A
V_{RRM} = 800-1600 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type	
V	V	Version 1	Version 1
900	800	MCC 220-08io1	MCD 220-08io1
1300	1200	MCC 220-12io1	MCD 220-12io1
1500	1400	MCC 220-14io1	MCD 220-14io1
1700	1600	MCC 220-16io1	MCD 220-16io1



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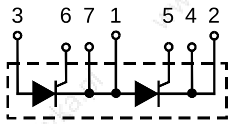

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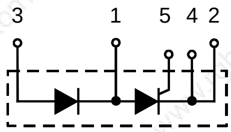


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		400	A
I_{TAVM}, I_{FAVM}	T_C = 85°C; 180° sine		250	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	8500	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	9000	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	7000	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	7600	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	360 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	336 000	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	245 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	240 000	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 750 A	100	A/µs
	f =50 Hz, t_P =200 µs			
	V_D = 2/3 V_{DRM}			
	I_G = 1 A	non repetitive, I_T = 250 A	800	A/µs
	di_G/dt = 1 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$;	V_{DR} = 2/3 V_{DRM}	1000	V/µs
	R_{GK} = ∞; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+140	°C
T_{VJM}			140	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-5/22-44	Nm/lb.in.
	Terminal connection torque (M8)		12-15/106-132	Nm/lb.in.
Weight	Typical including screws		320	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

Advantages
- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM} I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		70 40	mA mA
V_T, V_F	I_T, I_F = 600 A; T_{VJ} = 25°C		1.53	V
V_{T0} r_T	For power-loss calculations only (T_{VJ} = 140°C)		0.9 1.0	V mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	2 3	V V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	150 200	mA mA
V_{GD} I_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.25 10	V mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 1 A; di_G/dt = 1 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 50 V/µs; V_D = 2/3 V_{DRM}	typ.	200	µs
Q_S I_{RM}	T_{VJ} = 125°C; I_T, I_F = 400 A, -di/dt = 50 A/µs		760 275	µC A
R_{thJC}	per thyristor/diode; DC current per module	other values see Fig. 8/9	0.139 0.0695	K/W K/W
R_{thJK}	per thyristor/diode; DC current per module	other values see Fig. 8/9	0.179 0.0895	K/W K/W
d_S d_A a	Creepage distance on surface Strike distance through air Maximum allowable acceleration		12.7 9.6 50	mm mm m/s^2

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

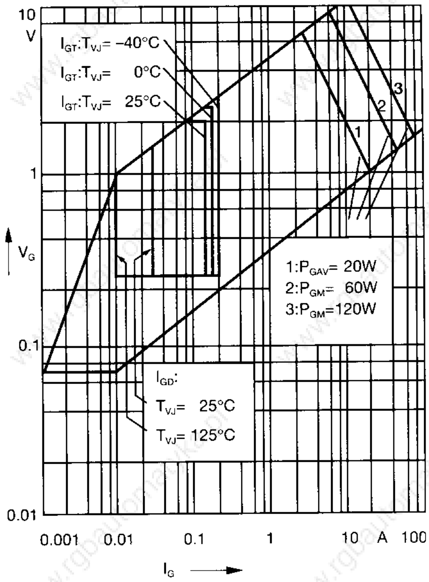


Fig. 1 Gate trigger characteristics

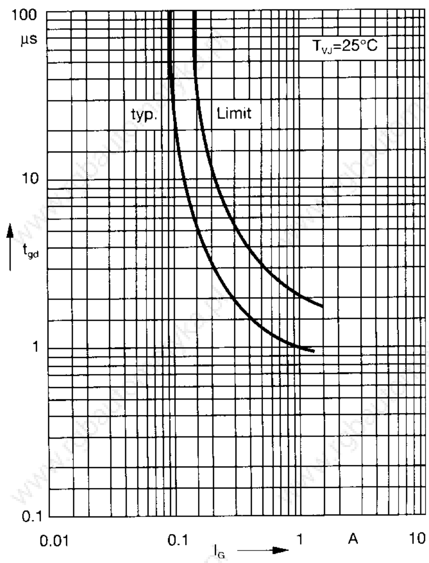
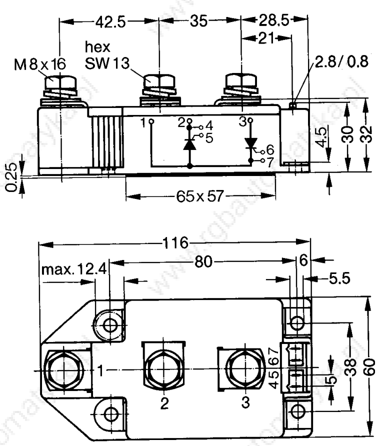


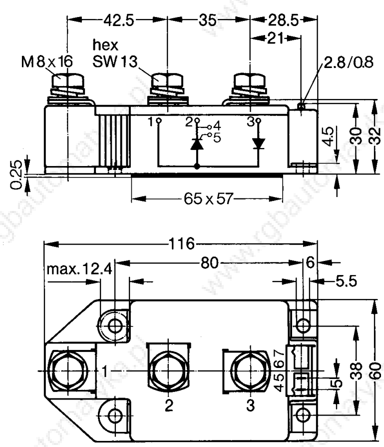
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

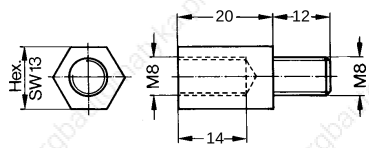
MCC



MCD



Threaded spacer for higher Anode/
Cathode construction:
Type **ZY 250**, material brass



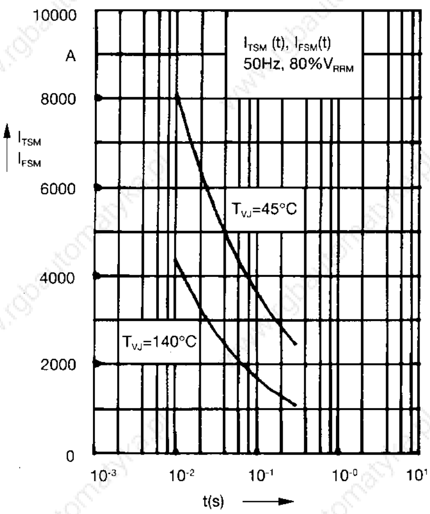


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

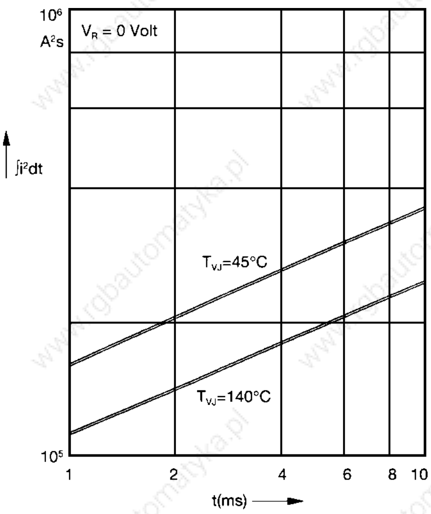


Fig. 4 ∫i²dt versus time (1-10 ms)

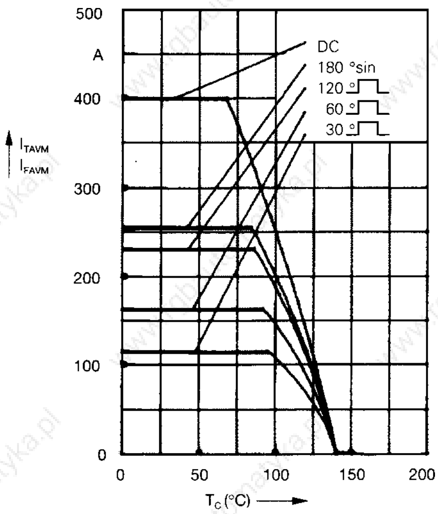


Fig. 4a Maximum forward current at case temperature

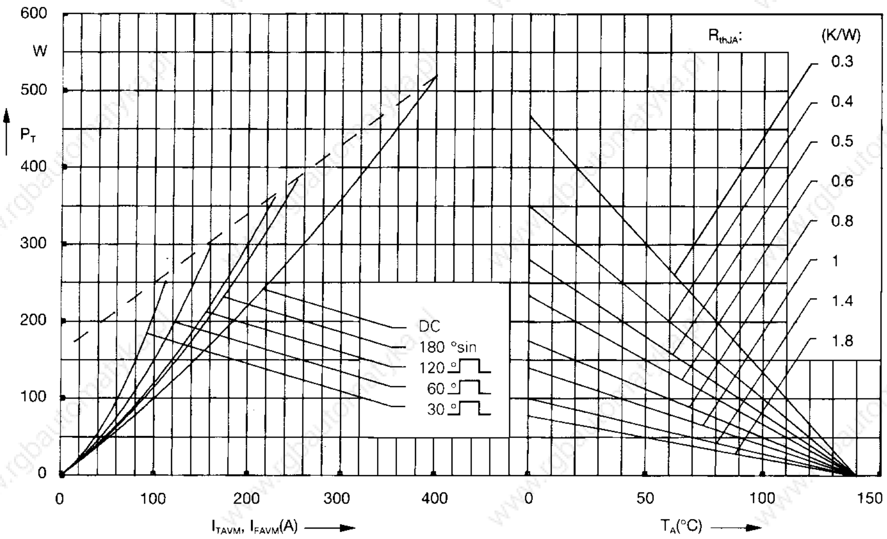


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

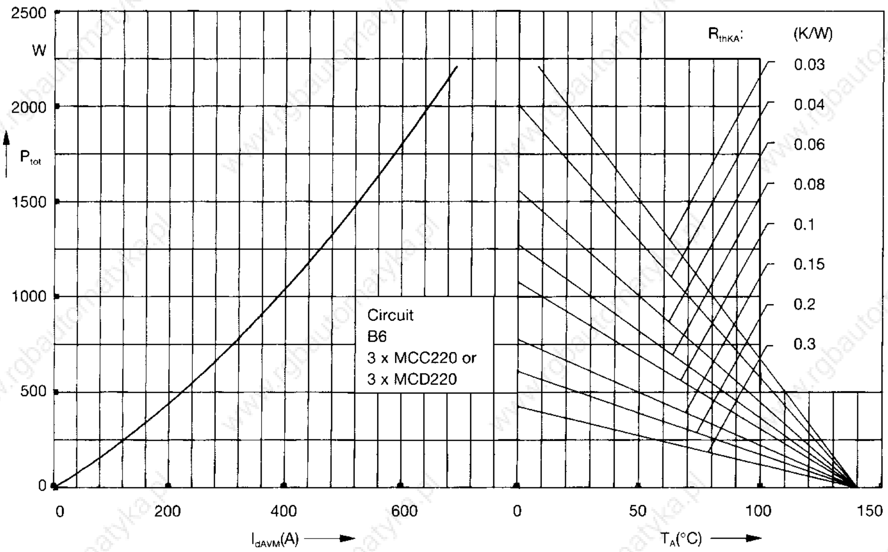


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

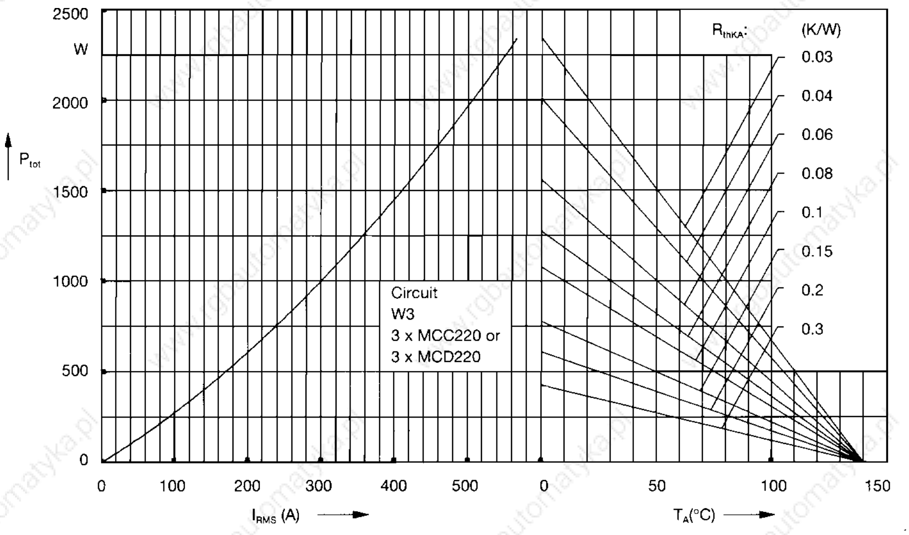


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

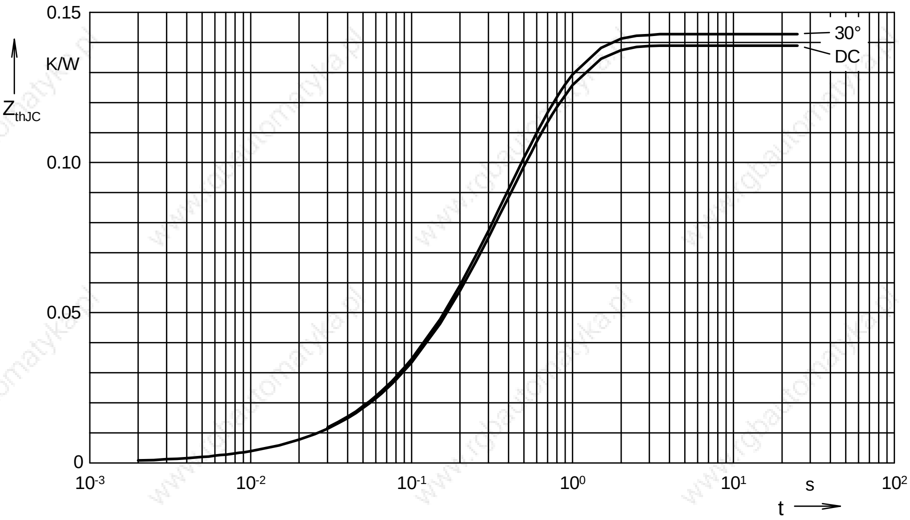


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.139
180°C	0.141
120°C	0.142
60°C	0.142
30°C	0.143

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0037	0.0099
2	0.0177	0.168
3	0.1175	0.456

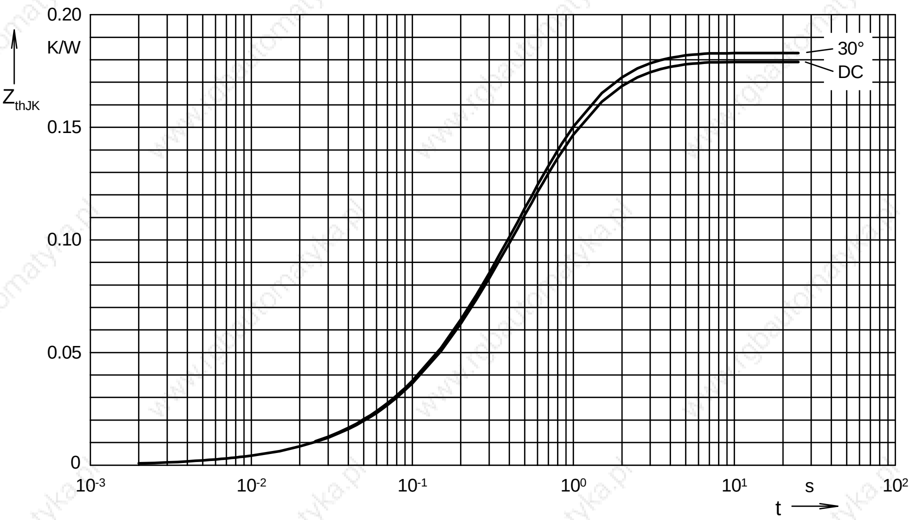


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.179
180°C	0.181
120°C	0.182
60°C	0.183
30°C	0.183

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0037	0.0099
2	0.0177	0.168
3	0.1175	0.456
4	0.04	1.36

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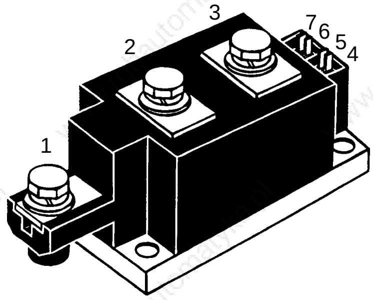
Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 400 A
I_{TAVM} = 2x 240 A
V_{RRM} = 2000-2200 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
2100	**2000**	**MCC 224-20io1**	**MCD 224-20io1**
2300	**2200**	**MCC 224-22io1**	**MCD 224-22io1**



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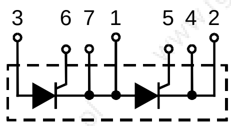

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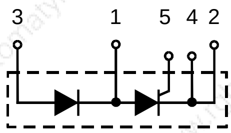

Symbol	Test Conditions		Maximum Ratings	
I_{TRMS} I_{TAVM}	$T_{VJ} = T_{VJM}$ T_C = 85°C; 180° sine		400 240	A A
I_{TSM}	T_{VJ} = 45°C; V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	8000 8500	A A
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	7000 7500	A A
∫i²dt	T_{VJ} = 45°C V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	320000 303000	A^2s A^2s
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	245000 240000	A^2s A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz, t_P = 200 µs	repetitive, I_T = 750 A	100	A/µs
	V_D = 2/3 V_{DRM} I_G = 1 A di_G/dt = 1 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; V_{DR} = 2/3 V_{DRM} R_{GK} = ∞; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$ $I_T = I_{TAVM}$	t_P = 30 µs t_P = 500 µs	120 60	W W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ} T_{VJM} T_{stg}			-40 ...130 130 -40 ...125	°C °C °C
V_{ISOL}	50/60 Hz, RMS I_{ISOL} ≤ 1 mA	t = 1 min t = 1 s	3000 3600	V~ V~
M_d	Mounting torque (M6) Terminal connection torque (M8)		4.5-7/40-62 11-13/97-115	Nm/lb.in. Nm/lb.in.
Weight	Typical including screws		750	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package
- **D**irect **C**opper **B**onded Al_2O_3-ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered E 72873
- Keyed gate/cathode twin pins

Applications

- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages

- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

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Symbol	Test Conditions	Characteristic Values	
I_{RRM}, I_{DRM}	T_{VJ} = T_{VJM}; V_R = V_{RRM}	40	mA
V_T	I_T = 600 A; T_{VJ} = 25°C	1.4	V
V_{T0}	For power-loss calculations only (T_{VJ} = T_{VJM})	0.8	V
r_T		0.76	mΩ
V_{GT}	V_D = 6 V; T_{VJ} = 25°C	2	V
	T_{VJ} = -40°C	3	V
I_{GT}	V_D = 6 V; T_{VJ} = 25°C	150	mA
	T_{VJ} = -40°C	220	mA
V_{GD}	T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}	0.25	V
I_{GD}	T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}	10	mA
I_L	T_{VJ} = 25°C; V_D = 6 V; t_p = 30 µs di_G/dt = 0.45 A/µs; I_G = 0.45 A	200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; R_{GK} = ∞	150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} di_G/dt = 1 A/µs; I_G = 1 A	2	µs
t_q	T_{VJ} = T_{VJM}; V_R = 100 V; V_D = 2/3 V_{DRM}; t_P = 200 µs dv/dt = 50 V/µs; I_T = 300 A; -di/dt = 10 A/µs	typ. 200	µs
Q_S	T_{VJ} = T_{VJM}	760	µC
I_{RM}	-di/dt = 50 A/µs; I_T = 400 A	275	A
R_{thJC}	per thyristor; DC current	0.139	K/W
	per module	0.069	K/W
R_{thJK}	per thyristor; DC current	0.179	K/W
	per module	0.089	K/W
d_S	Creeping distance on surface	12.7	mm
d_A	Creepage distance in air	9.6	mm
a	Maximum allowable acceleration	50	m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180 R** (R = Right for pin pair 6/7) } CSA class 5851, guide 460-1-1

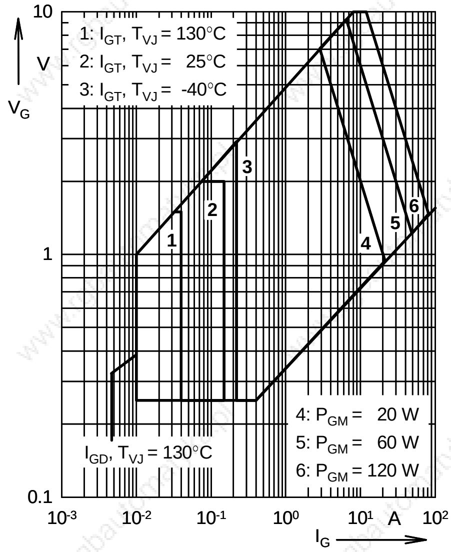

Fig. 1 Gate trigger characteristics

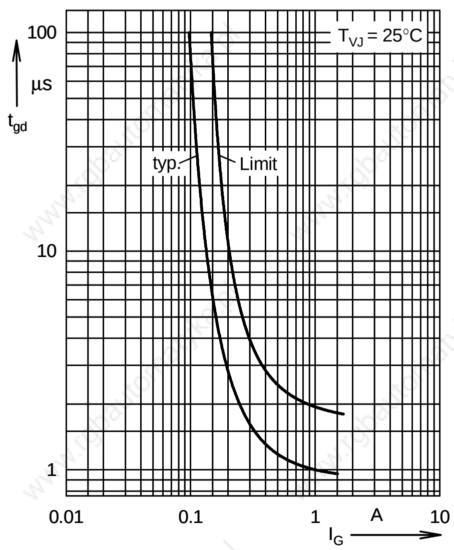

Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

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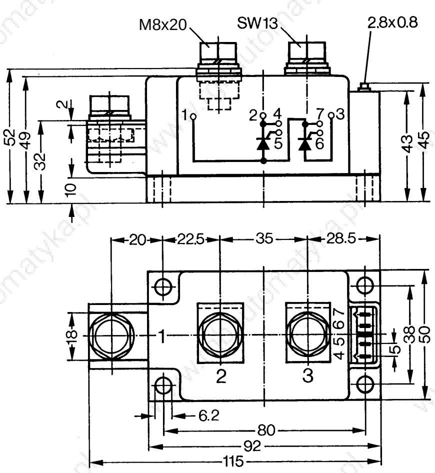

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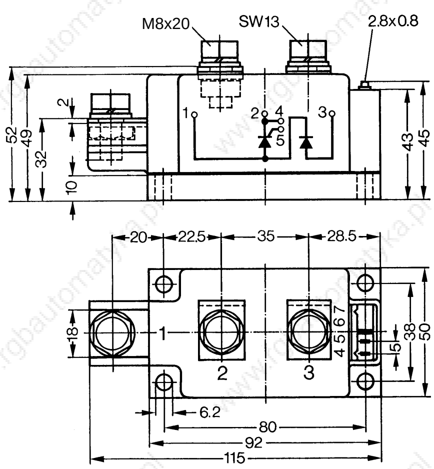


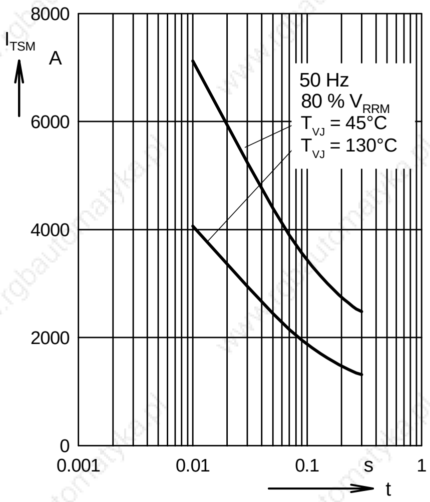


Fig. 3 Surge overload current
I_{TSM}: Crest value, t: duration

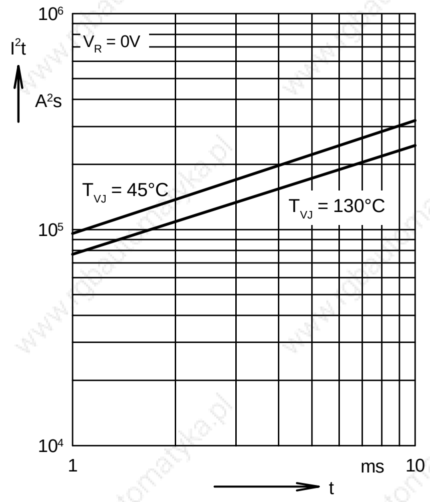


Fig. 4 I^2t versus time (1-10 ms)

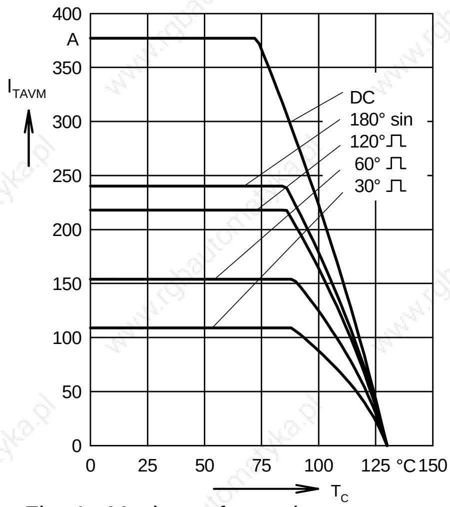


Fig. 4a Maximum forward current at case temperature

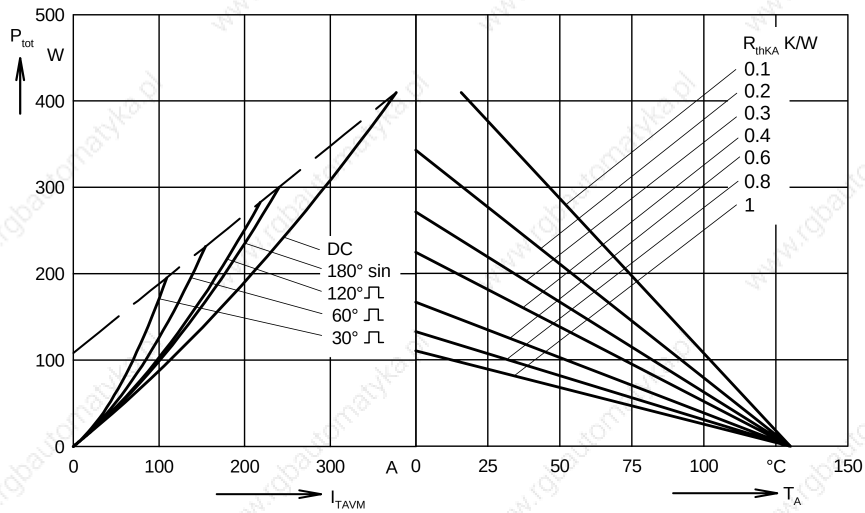


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

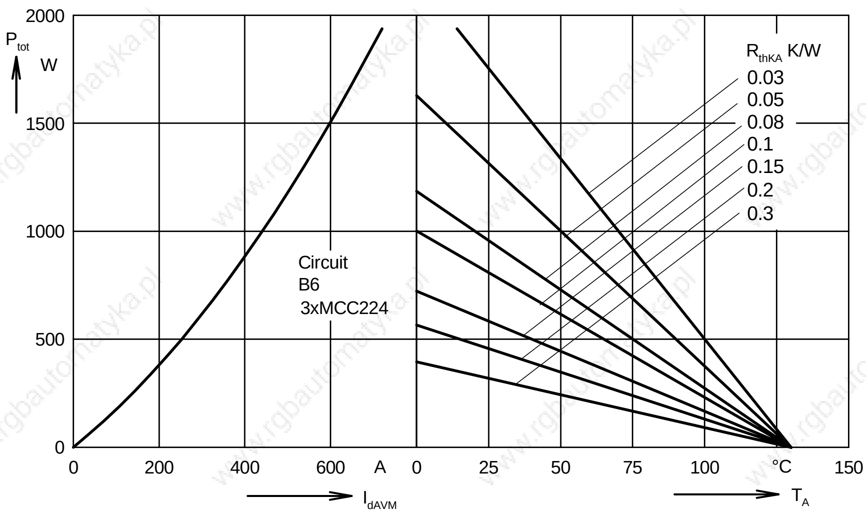


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

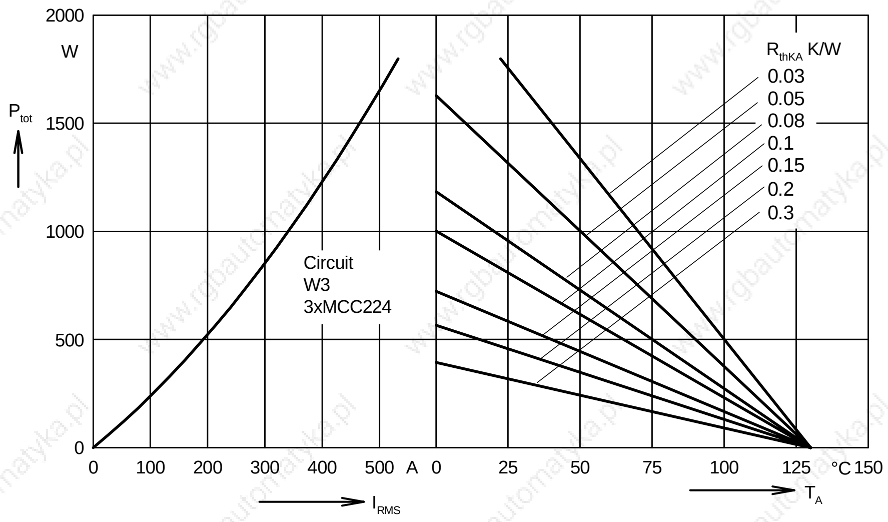


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

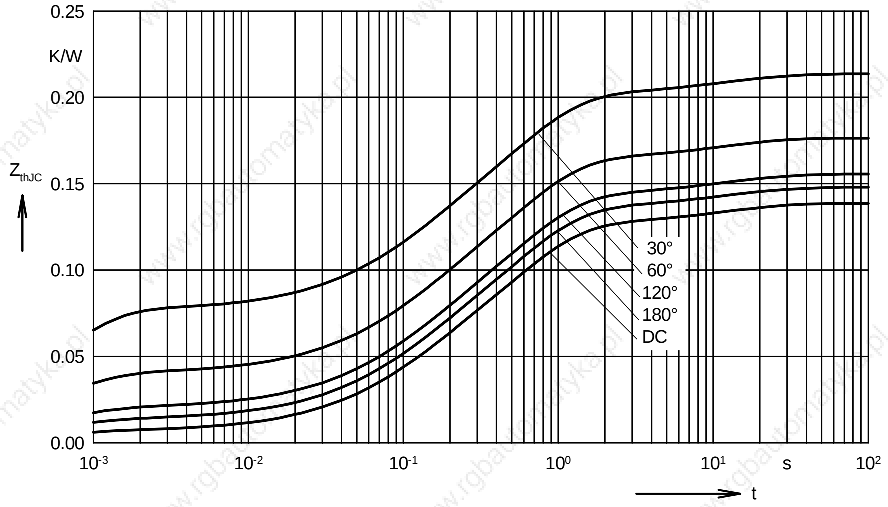


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.139
180°	0.148
120°	0.156
60°	0.176
30°	0.214

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0067	0.00054
2	0.0358	0.098
3	0.0832	0.54
4	0.0129	12

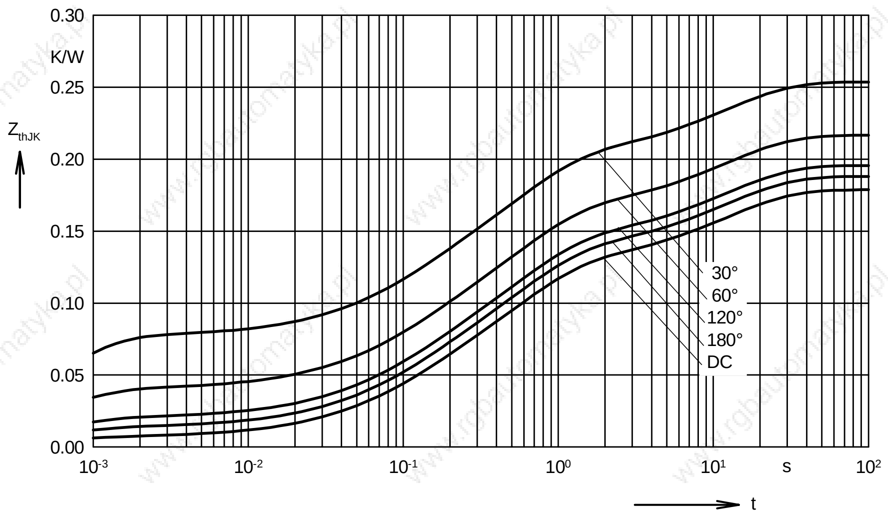


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.179
180°	0.188
120°	0.196
60°	0.216
30°	0.256

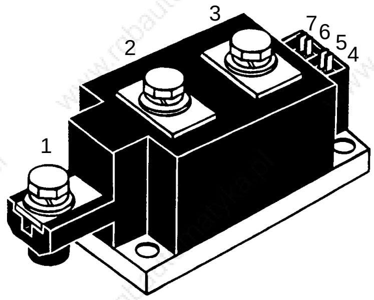
Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0067	0.00054
2	0.0358	0.098
3	0.0832	0.54
4	0.0129	12
5	0.04	12

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 400 A
I_{TAVM} = 2x 221 A
V_{RRM} = 1200-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
1300	1200	MCC 225-12io1	MCD 225-12io1
1500	1400	MCC 225-14io1	MCD 225-14io1
1700	1600	MCC 225-16io1	MCD 225-16io1
1900	1800	MCC 225-18io1	MCD 225-18io1



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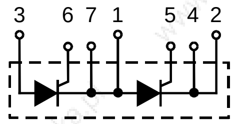

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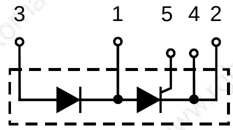

Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		400	A
I_{TAVM}	T_C = 85°C; 180° sine		221	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz)	8000	A
	V_R = 0	t = 8.3 ms (60 Hz)	8500	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	7000	A
	V_R = 0	t = 8.3 ms (60 Hz)	7700	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz)	320 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz)	300 000	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	245 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz)	246 000	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs	repetitive, I_T = 750 A	100	A/µs
	V_D = 2/3 V_{DRM} I_G = 1 A, di_G/dt = 1 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; V_{DR} = 2/3 V_{DRM} R_{GK} = ∞; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+130	°C
T_{VJM}			130	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		4.5-7/40-62	Nm/lb.in.
	Terminal connection torque (M8)		11-13/97-115	Nm/lb.in.
Weight	Typical including screws		750	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3-ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions			Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$			40	mA
V_T, V_F	I_T, I_F = 600 A; T_{VJ} = 25°C			1.40	V
V_{T0}	For power-loss calculations only (T_{VJ} = 130°C)			0.8	V
r_T				0.76	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C		2	V
		T_{VJ} = -40°C		3	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C		150	mA
		T_{VJ} = -40°C		220	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = 2/3\ V_{DRM}$		0.25	V
I_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = 2/3\ V_{DRM}$		10	mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs			200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$			150	mA
t_{gd}	T_{VJ} = 25°C; $V_D = 1/2\ V_{DRM}$ I_G = 1 A; di_G/dt = 1 A/µs			2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; $-di/dt$ = 10 A/µs V_R = 100 V; dv/dt = 50 V/µs; $V_D = 2/3\ V_{DRM}$		typ.	200	µs
Q_S	T_{VJ} = 125°C; I_T, I_F = 300 A; $-di/dt$ = 50 A/µs			550	µC
I_{RM}				235	A
R_{thJC}	per thyristor (diode); DC current			0.157	K/W
	per module	other values		0.08	K/W
R_{thJK}	per thyristor (diode); DC current	see Fig. 8/9		0.197	K/W
	per module			0.1	K/W
d_S	Creeping distance on surface			12.7	mm
d_A	Creepage distance in air			9.6	mm
a	Maximum allowable acceleration			50	m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) UL 758, style 1385,
Type **ZY 180 R** (R = Right for pin pair 6/7) CSA class 5851, guide 460-1-1

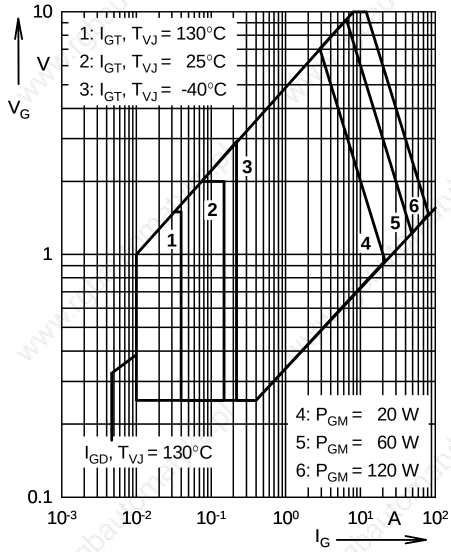

Fig. 1 Gate trigger characteristics

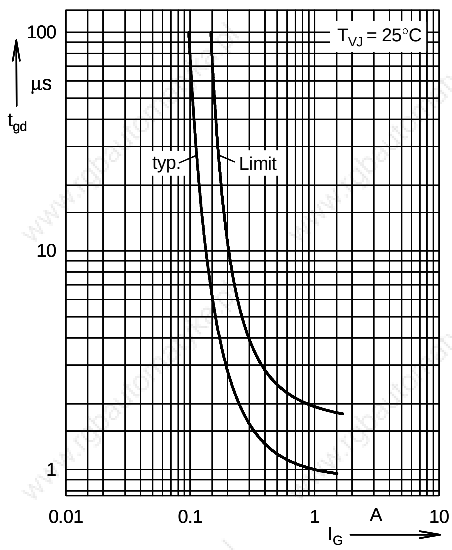

Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

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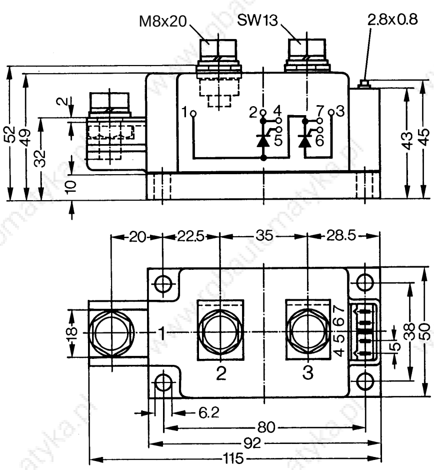

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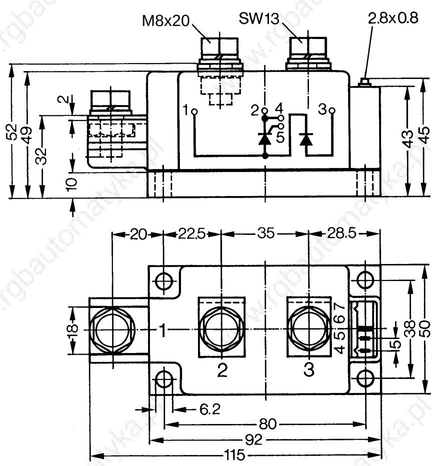


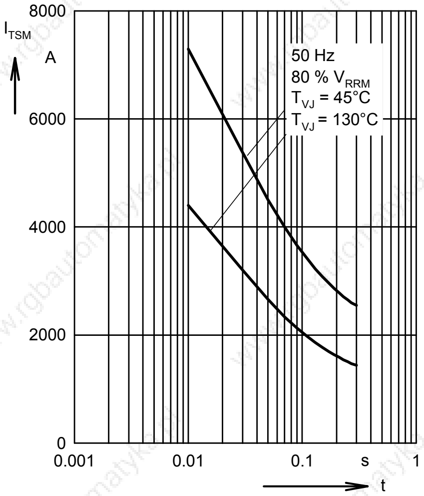


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

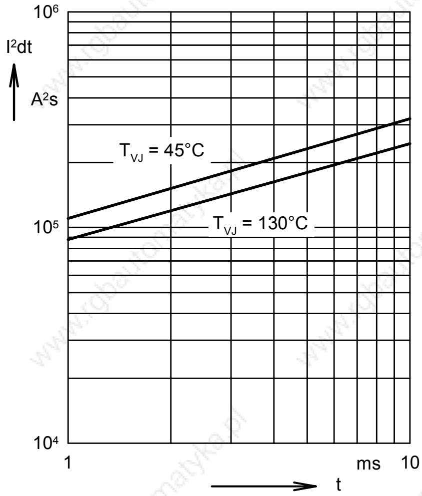


Fig. 4 $\int i^2dt$ versus time (1-10 ms)

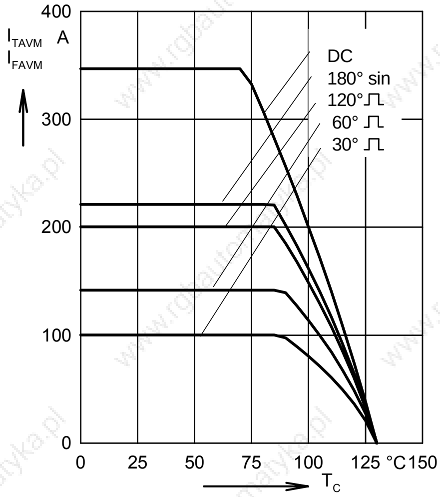


Fig. 4a Maximum forward current at case temperature

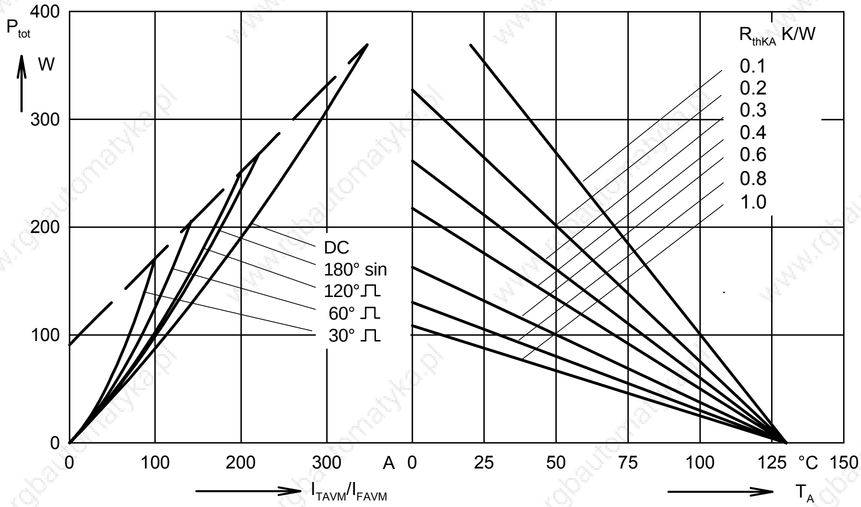


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

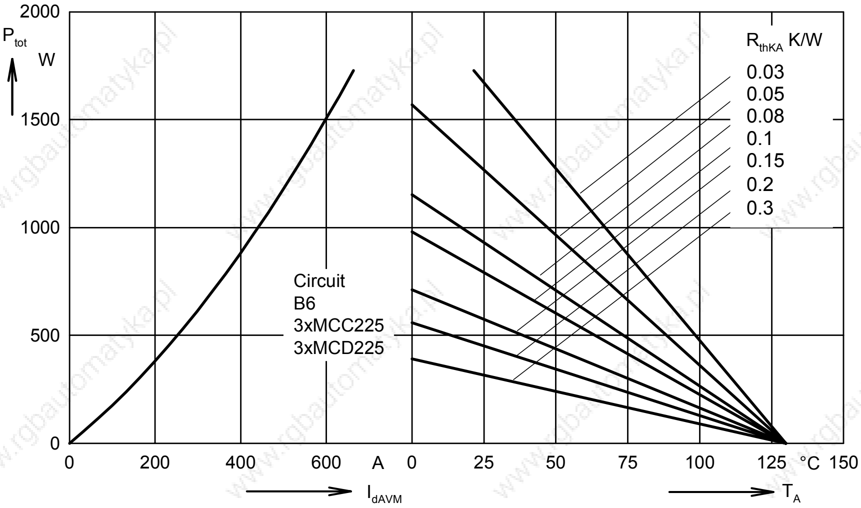


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

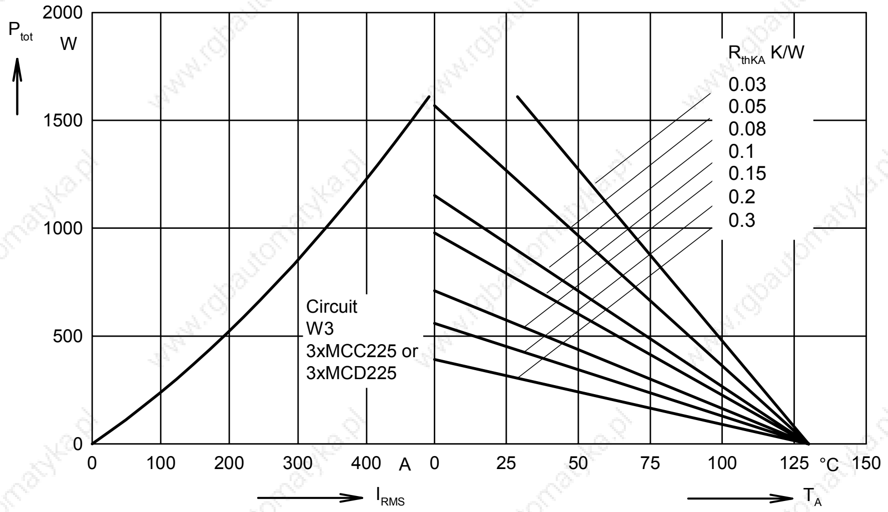


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

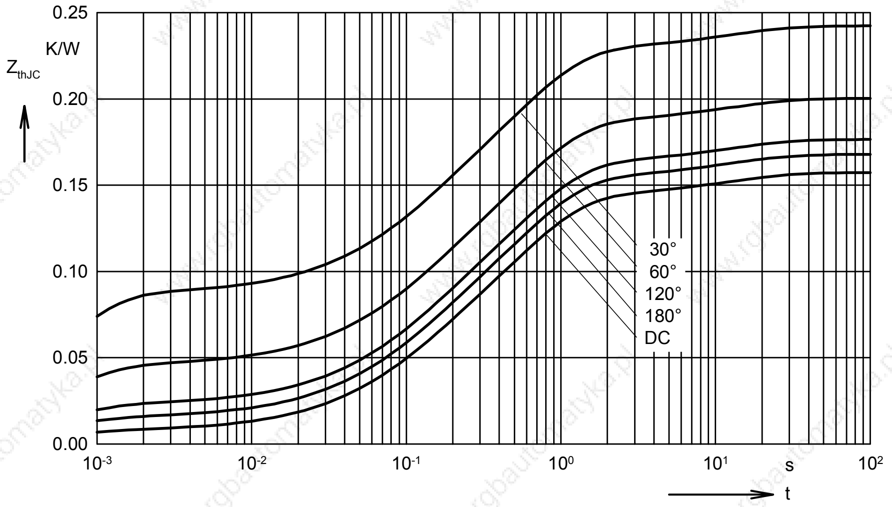


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.157
180°	0.168
120°	0.177
60°	0.200
30°	0.243

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0076	0.00054
2	0.0406	0.098
3	0.0944	0.54
4	0.0147	12

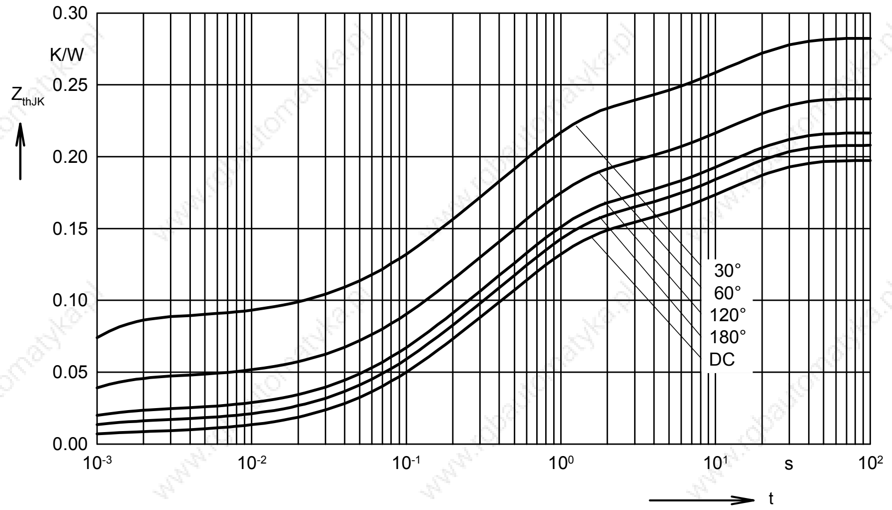


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.197
180°	0.208
120°	0.217
60°	0.240
30°	0.283

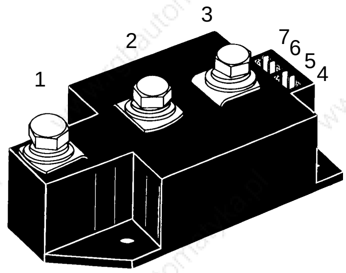
Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0076	0.00054
2	0.0406	0.098
3	0.0944	0.54
4	0.0147	12
5	0.04	12

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 450 A
I_{TAVM} = 2x 287 A
V_{RRM} = 800-1800 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type	
V	V	Version 1	Version 1
900	800	MCC 250-08io1	MCD 250-08io1
1300	1200	MCC 250-12io1	MCD 250-12io1
1500	1400	MCC 250-14io1	MCD 250-14io1
1700	1600	MCC 250-16io1	MCD 250-16io1
1900	1800	MCC 250-18io1	



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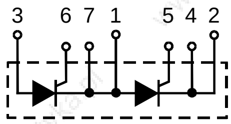

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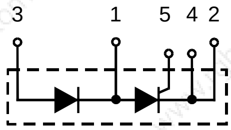


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		450	A
I_{TAVM}, I_{FAVM}	T_C = 85°C; 180° sine		287	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	9000	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	9600	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	7800	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	8500	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	405 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	380 000	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	304 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	300 000	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs V_D = 2/3 V_{DRM}	repetitive, I_T = 860 A	100	A/µs
	I_G = 1 A di_G/dt = 1 A/µs	non repetitive, I_T = 290 A	800	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; R_{GK} = ∞; method 1 (linear voltage rise)	V_{DR} = 2/3 V_{DRM}	1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+140	°C
T_{VJM}			140	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-5/22-44	Nm/lb.in.
	Terminal connection torque (M8)		12-15/106-132	Nm/lb.in.
Weight	Typical including screws		320	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

Advantages
- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM} I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		70 40	mA mA
V_T, V_F	I_T, I_F = 600 A; T_{VJ} = 25°C		1.36	V
V_{T0} r_T	For power-loss calculations only (T_{VJ} = 140°C)		0.85 0.82	V mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	2 3	V V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C T_{VJ} = -40°C	150 200	mA mA
V_{GD} I_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.25 10	V mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 1 A; di_G/dt = 1 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 50 V/µs; V_D = 2/3 V_{DRM}	typ.	200	µs
Q_S I_{RM}	T_{VJ} = 125°C; I_T, I_F = 400 A, -di/dt = 50 A/µs		760 275	µC A
R_{thJC}	per thyristor/diode; DC current per module	other values see Fig. 8/9	0.129 0.0645	K/W K/W
R_{thJK}	per thyristor/diode; DC current per module		0.169 0.0845	K/W K/W
d_S d_A a	Creepage distance on surface Strike distance through air Maximum allowable acceleration		12.7 9.6 50	mm mm m/s^2

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

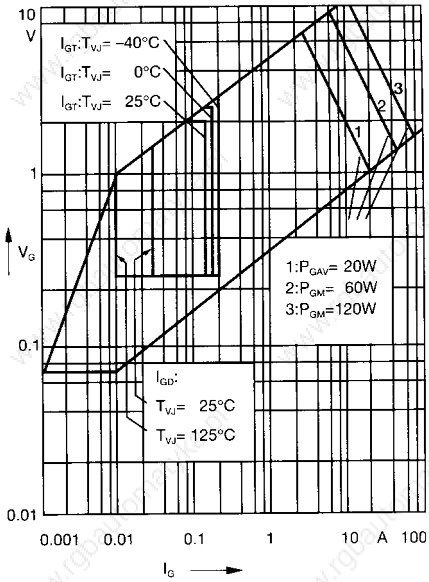


Fig. 1 Gate trigger characteristics

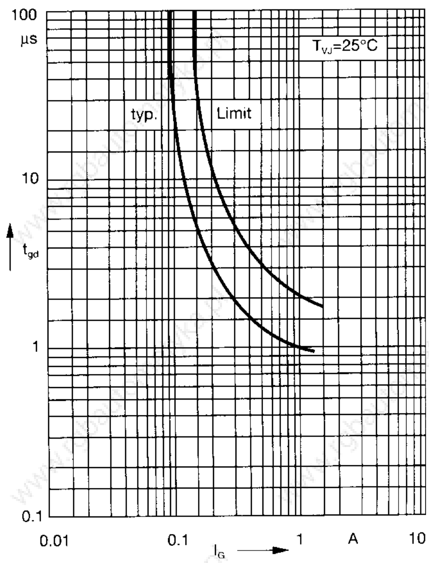
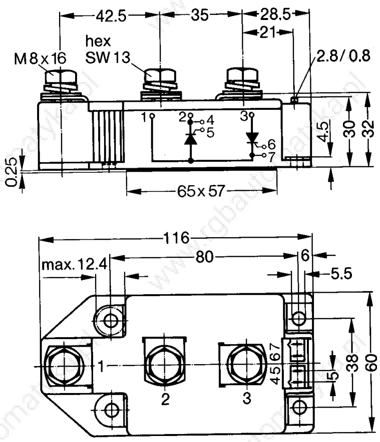


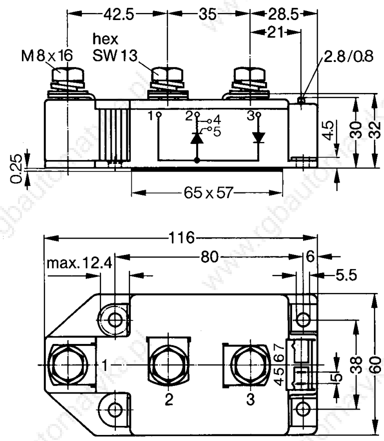
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

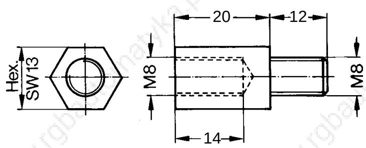
MCC



MCD



Threaded spacer for higher Anode/
Cathode construction:
Type **ZY 250**, material brass



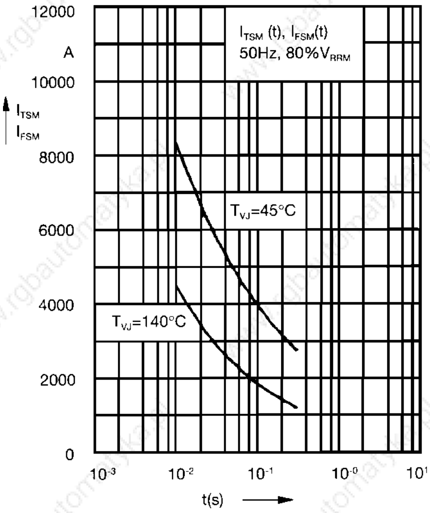


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

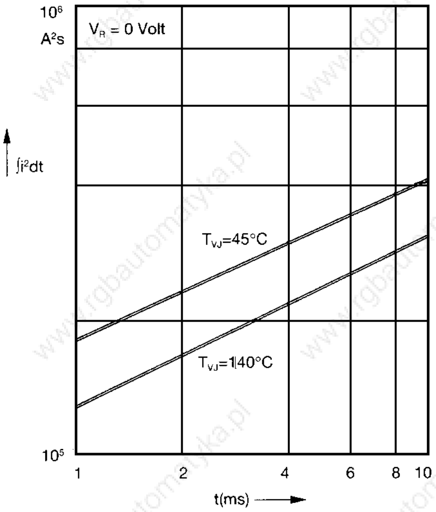


Fig. 4 ∫i²dt versus time (1-10 ms)

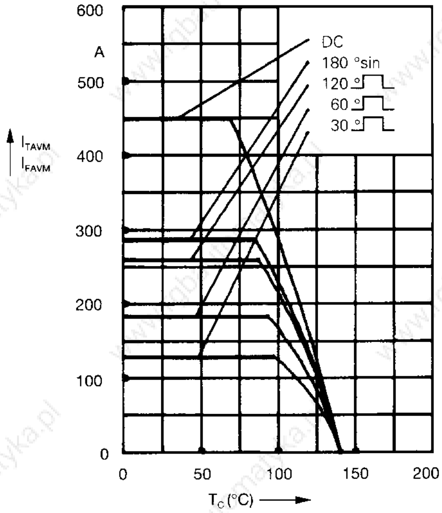


Fig. 4a Maximum forward current at case temperature

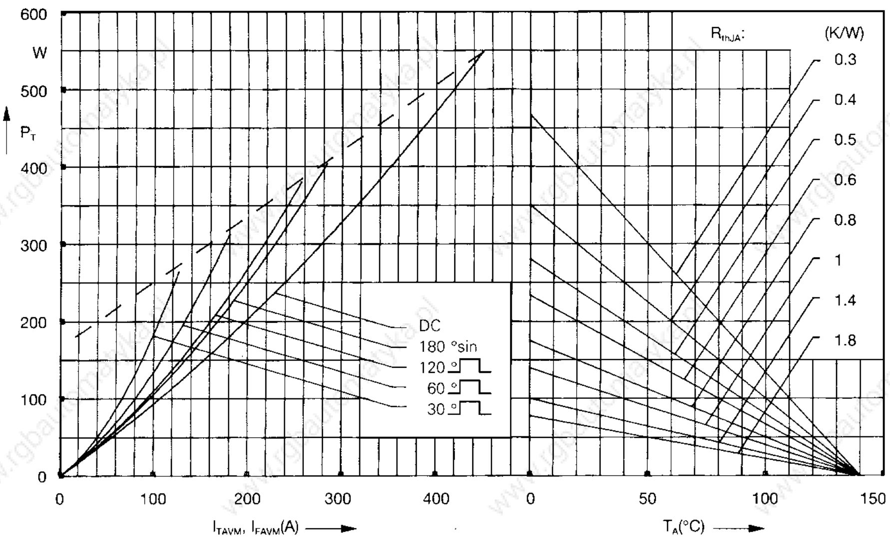


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

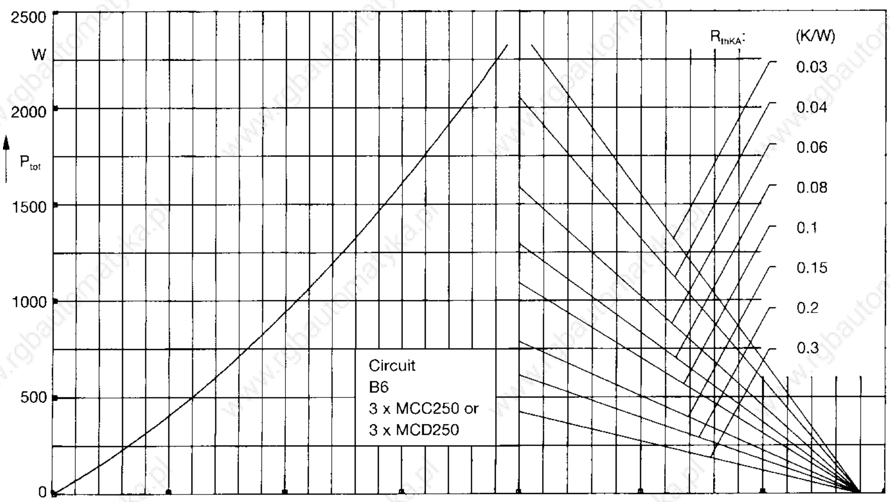


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

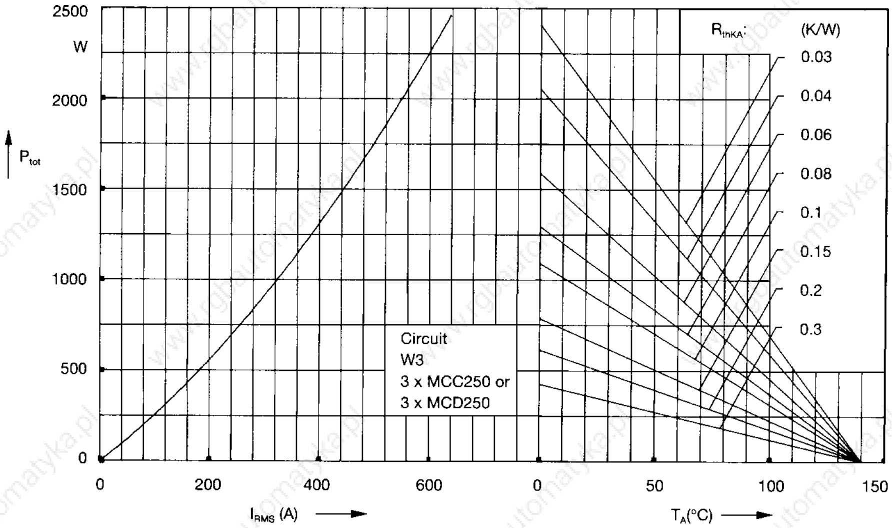


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

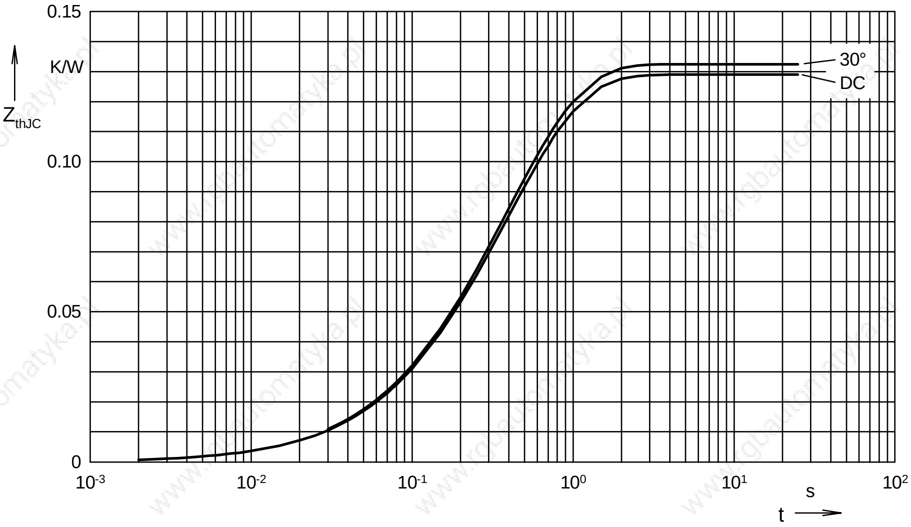


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.129
180°C	0.131
120°C	0.131
60°C	0.132
30°C	0.132

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.099
2	0.0165	0.168
3	0.1091	0.456

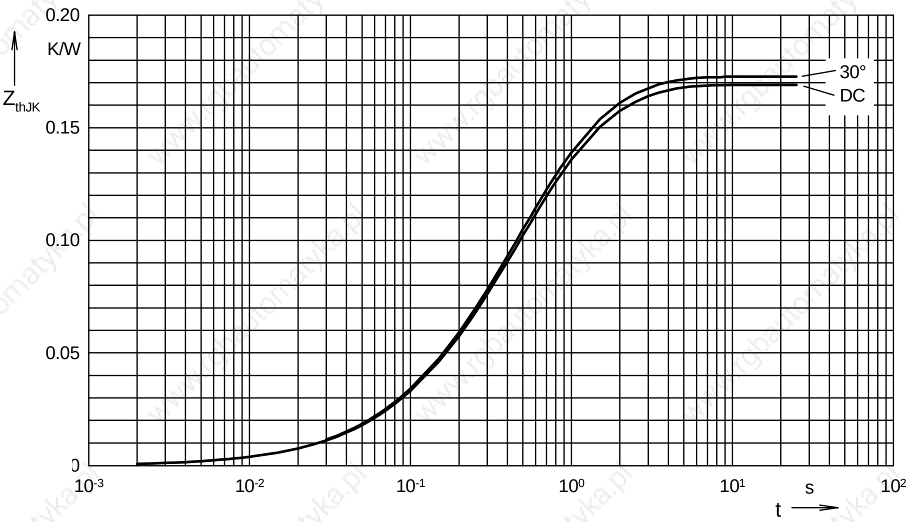


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.169
180°C	0.171
120°C	0.172
60°C	0.172
30°C	0.173

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0033	0.099
2	0.0159	0.168
3	0.1053	0.456
4	0.04	1.36

835

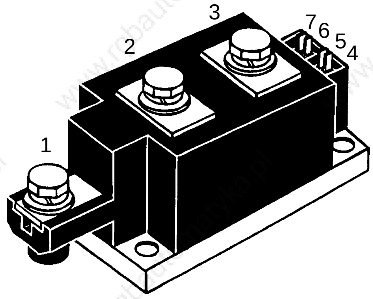
IXYS

MCC 255
MCD 255

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 450 A
I_{TAVM} = 2x 250 A
V_{RRM} = 1200-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
1300	1200	MCC 255-12io1	MCD 255-12io1
1500	1400	MCC 255-14io1	MCD 255-14io1
1700	1600	MCC 255-16io1	MCD 255-16io1
1900	1800	MCC 255-18io1	MCD 255-18io1



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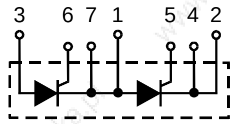

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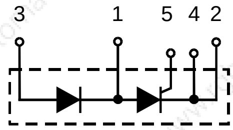


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		450	A
I_{TAVM}, I_{FAVM}	T_C = 85°C; 180° sine		250	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz)	9000	A
	$V_R = 0$	t = 8.3 ms (60 Hz)	9600	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	7800	A
	$V_R = 0$	t = 8.3 ms (60 Hz)	8600	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz)	405 000	A²s
	$V_R = 0$	t = 8.3 ms (60 Hz)	382 000	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	304 000	A²s
	$V_R = 0$	t = 8.3 ms (60 Hz)	307 000	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs $V_D = 2/3\ V_{DRM}$	repetitive, I_T = 860 A	100	A/µs
	I_G = 1 A, di_G/dt = 1 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_{DR} = 2/3\ V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+130	°C
T_{VJM}			130	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	$I_{ISOL} \leq 1$ mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		4.5-7/40-62	Nm/lb.in.
	Terminal connection torque (M8)		11-13/97-115	Nm/lb.in.
Weight	Typical including screws		750	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3-ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		40	mA
V_T, V_F	I_T, I_F = 600 A; T_{VJ} = 25°C		1.36	V
V_{T0}	For power-loss calculations only (T_{VJ} = 130°C)		0.8	V
r_T			0.68	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	2	V
		T_{VJ} = -40°C	3	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	150	mA
		T_{VJ} = -40°C	220	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.25	V
I_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	10	mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 1 A; di_G/dt = 1 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 50 V/µs; V_D = 2/3 V_{DRM}	typ.	200	µs
Q_S	T_{VJ} = 125°C; I_T, I_F = 300 A; -di/dt = 50 A/µs		760	µC
I_{RM}			275	A
R_{thJC}	per thyristor (diode); DC current	other values see Fig. 8/9	0.140	K/W
	per module		0.07	K/W
R_{thJK}	per thyristor (diode); DC current		0.18	K/W
	per module		0.09	K/W
d_S	Creeping distance on surface		12.7	mm
d_A	Creepage distance in air		9.6	mm
a	Maximum allowable acceleration		50	m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180 R** (R = Right for pin pair 6/7) } CSA class 5851, guide 460-1-1

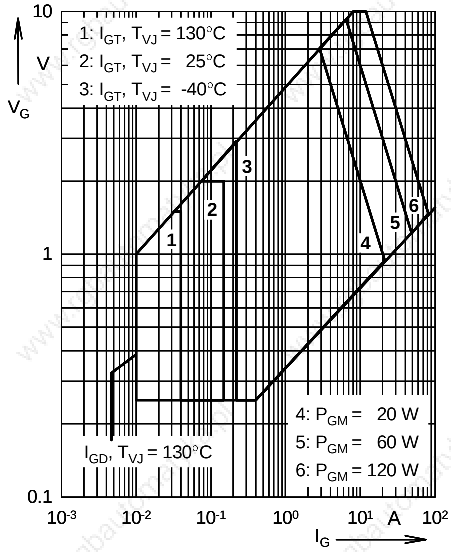


Fig. 1 Gate trigger characteristics

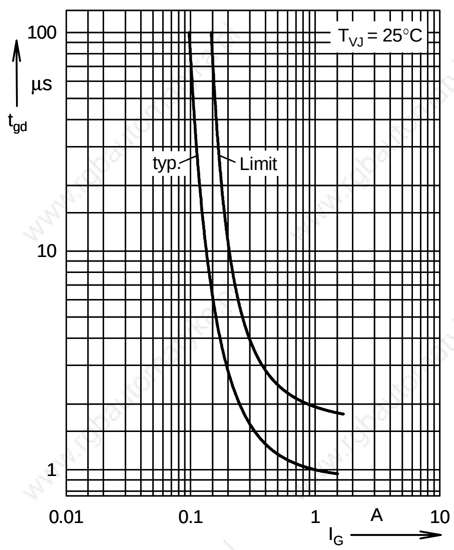
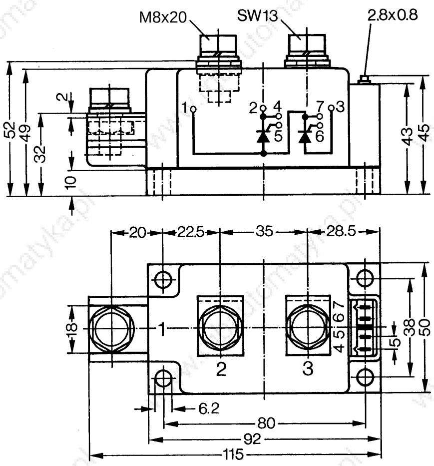


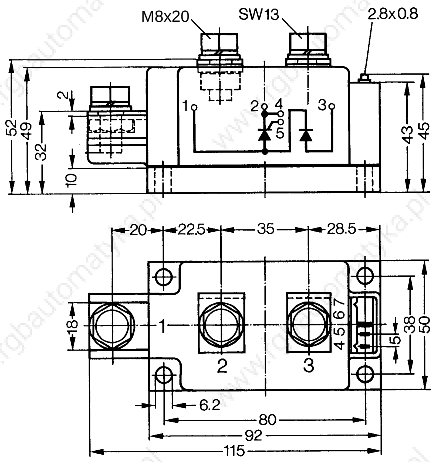
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC 255



MCD 255



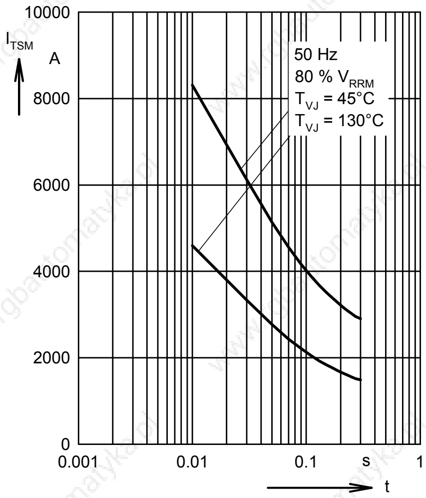


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

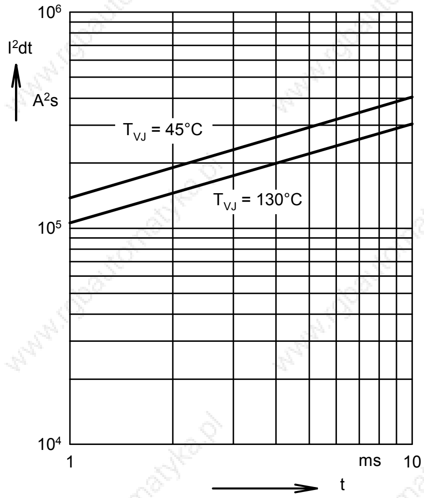


Fig. 4 ∫i²dt versus time (1-10 ms)

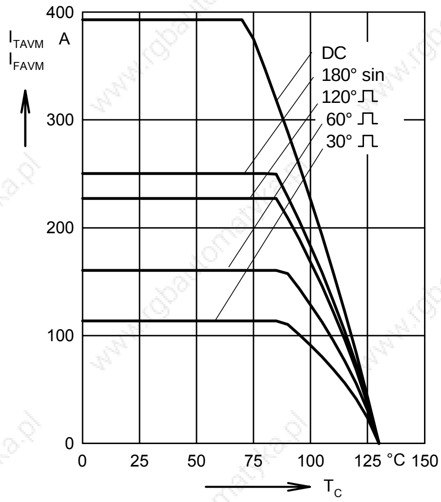


Fig. 4a Maximum forward current at case temperature

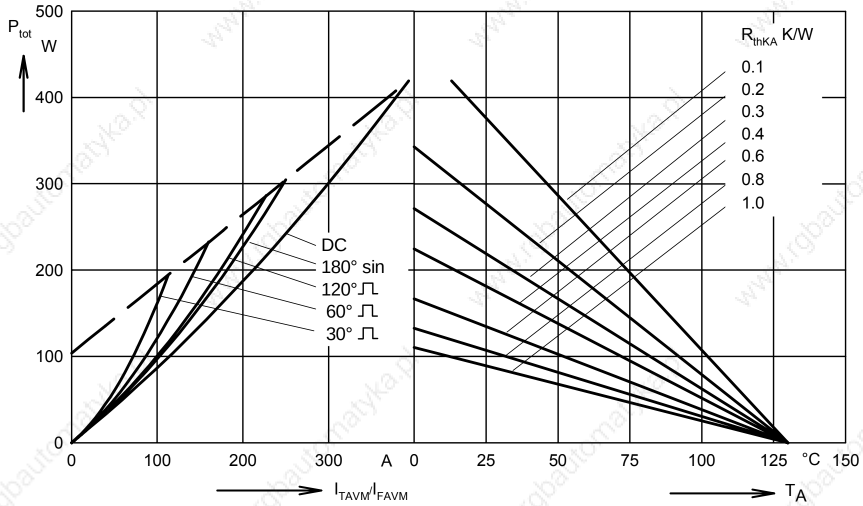


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

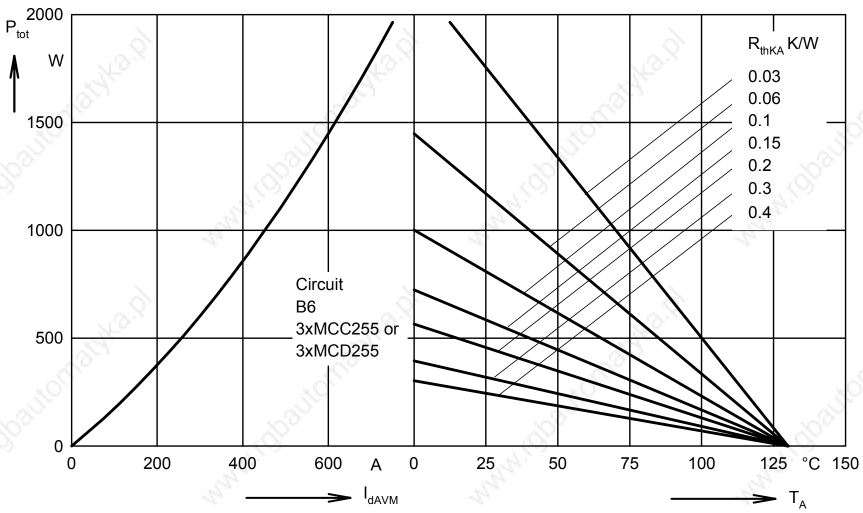


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

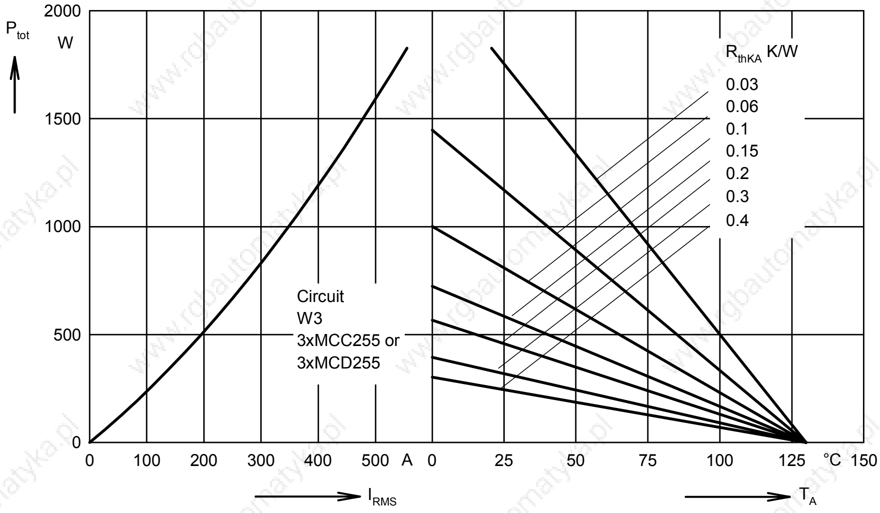


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

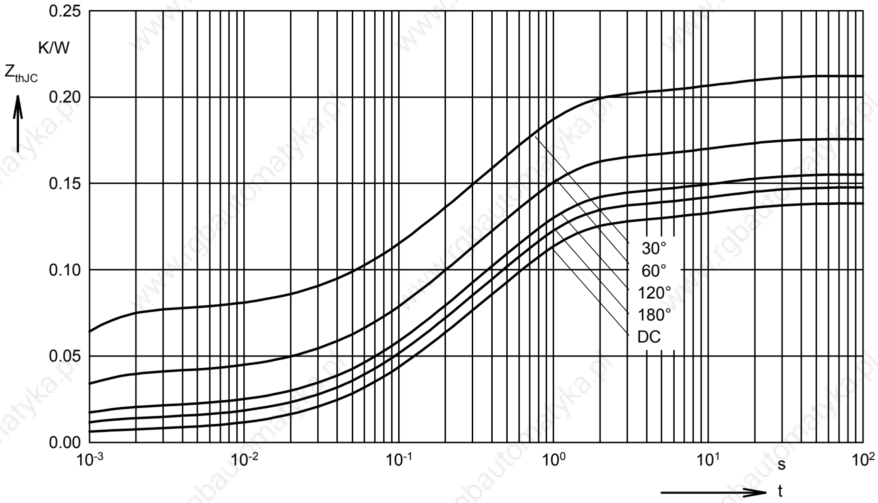


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.139
180°	0.148
120°	0.156
60°	0.176
30°	0.214

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0066	0.00054
2	0.0358	0.098
3	0.0831	0.54
4	0.0129	12

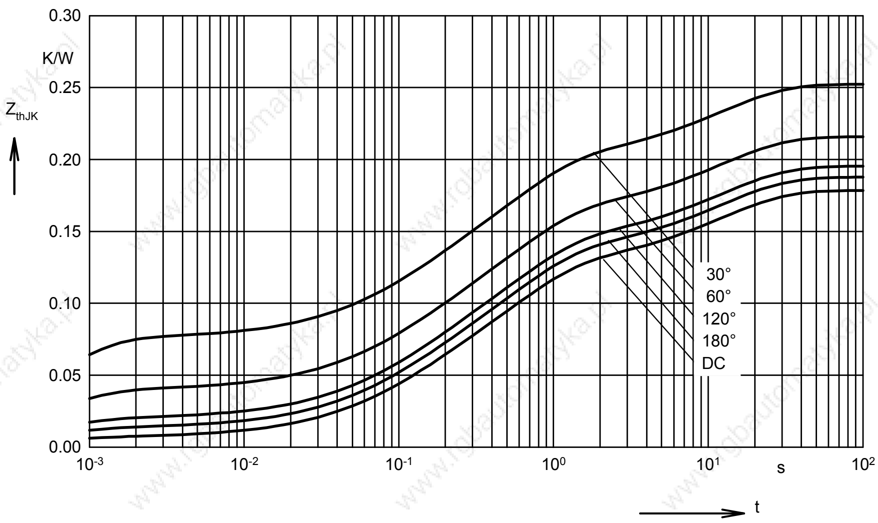


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.179
180°	0.188
120°	0.196
60°	0.216
30°	0.254

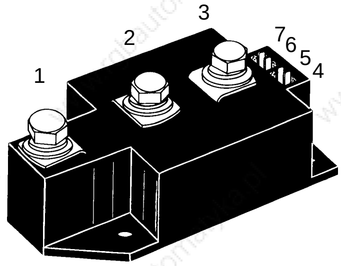
Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0066	0.00054
2	0.0358	0.098
3	0.0831	0.54
4	0.0129	12
5	0.04	12

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 500 A
I_{TAVM} = 2x 320 A
V_{RRM} = 800-2200 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type Version 1	Version 1
900	800	MCC 310-08io1	MCD 310-08io1
1300	1200	MCC 310-12io1	MCD 310-12io1
1500	1400	MCC 310-14io1	MCD 310-14io1
1700	1600	MCC 310-16io1	MCD 310-16io1
1900	1800	MCC 310-18io1	MCD 310-18io1



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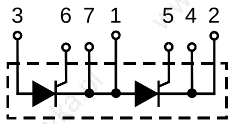

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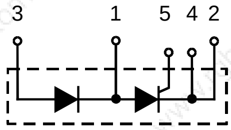

Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		500	A
I_{TAVM}, I_{FAVM}	T_C = 85°C; 180° sine		320	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz), sine	9200	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	9800	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	8000	A
	V_R = 0	t = 8.3 ms (60 Hz), sine	8600	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz), sine	420 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	400 000	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	320 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz), sine	306 000	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 960 A	100	A/µs
	f =50 Hz, t_P =200 µs			
	V_D = 2/3 V_{DRM}			
	I_G = 1 A	non repetitive, I_T = 320 A	500	A/µs
	di_G/dt = 1 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$;	V_{DR} = 2/3 V_{DRM}	1000	V/µs
	R_{GK} = ∞; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+140	°C
T_{VJM}			140	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-5/22-44	Nm/lb.in.
	Terminal connection torque (M8)		12-15/106-132	Nm/lb.in.
Weight	Typical including screws		320	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

Advantages
- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

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Symbol	Test Conditions		Characteristic Values	
I_{RRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		70	mA
I_{DRM}			40	mA
V_T, V_F	I_T, I_F = 600 A; T_{VJ} = 25°C		1.32	V
V_{T0}	For power-loss calculations only (T_{VJ} = 140°C)		0.8	V
r_T			0.82	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	2	V
		T_{VJ} = -40°C	3	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	150	mA
		T_{VJ} = -40°C	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = 2/3\ V_{DRM}$	0.25	V
I_{GD}			10	mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		150	mA
t_{gd}	T_{VJ} = 25°C; $V_D = 1/2\ V_{DRM}$ I_G = 1 A; di_G/dt = 1 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; -di/dt = 10 A/µs V_R = 100 V; dv/dt = 50 V/µs; $V_D = 2/3\ V_{DRM}$	typ.	200	µs
Q_S	T_{VJ} = 125°C; I_T, I_F = 400 A, -di/dt = 50 A/µs		760	µC
I_{RM}			275	A
R_{thJC}	per thyristor/diode; DC current	other values see Fig. 8/9	0.112	K/W
	per module		0.056	K/W
R_{thJK}	per thyristor/diode; DC current		0.152	K/W
	per module		0.076	K/W
d_S	Creepage distance on surface		12.7	mm
d_A	Strike distance through air		9.6	mm
a	Maximum allowable acceleration		50	m/s²

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

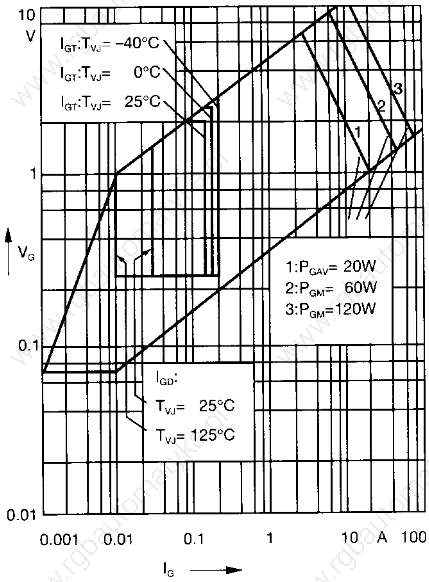

Fig. 1 Gate trigger characteristics

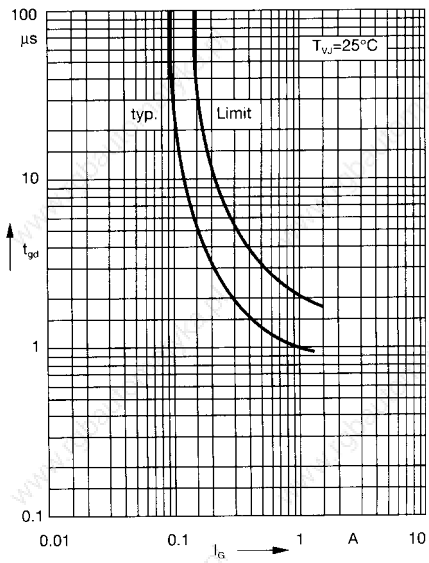

Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

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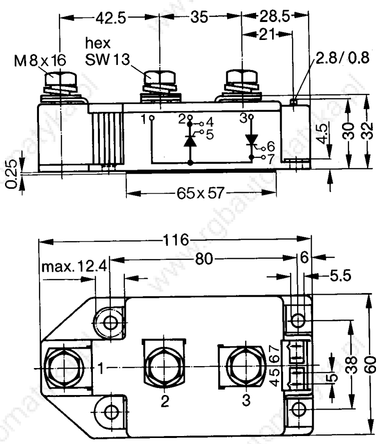

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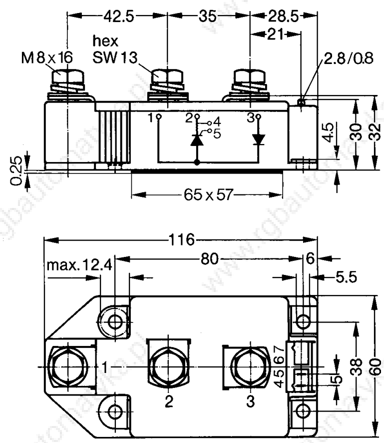
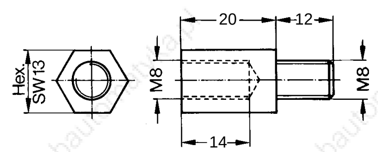


Threaded spacer for higher Anode/ Cathode construction:
Type **ZY 250**, material brass



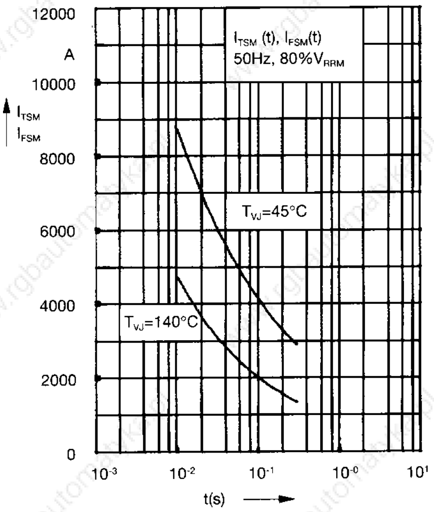


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

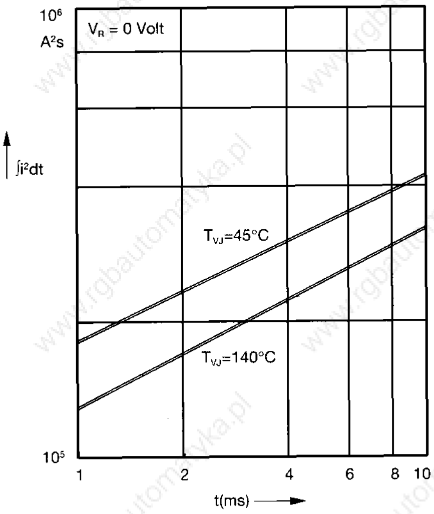


Fig. 4 ∫i²dt versus time (1-10 ms)

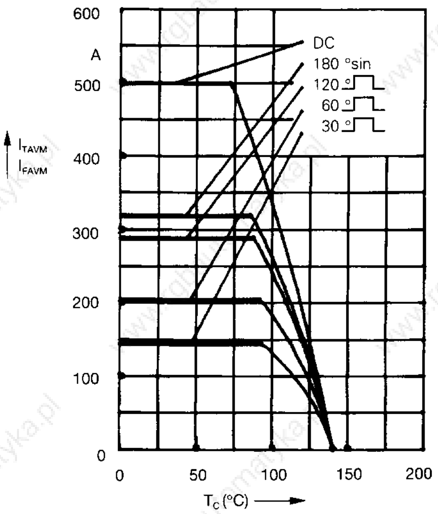


Fig. 4a Maximum forward current at case temperature

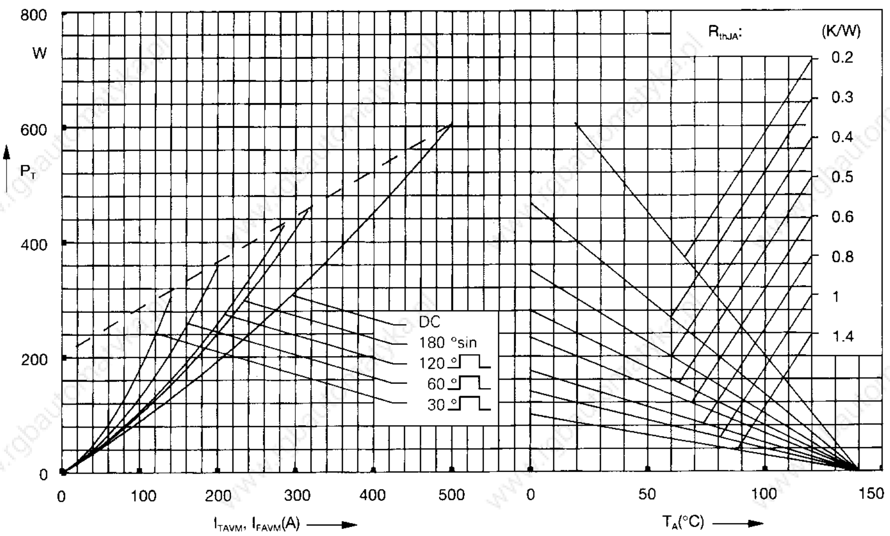


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

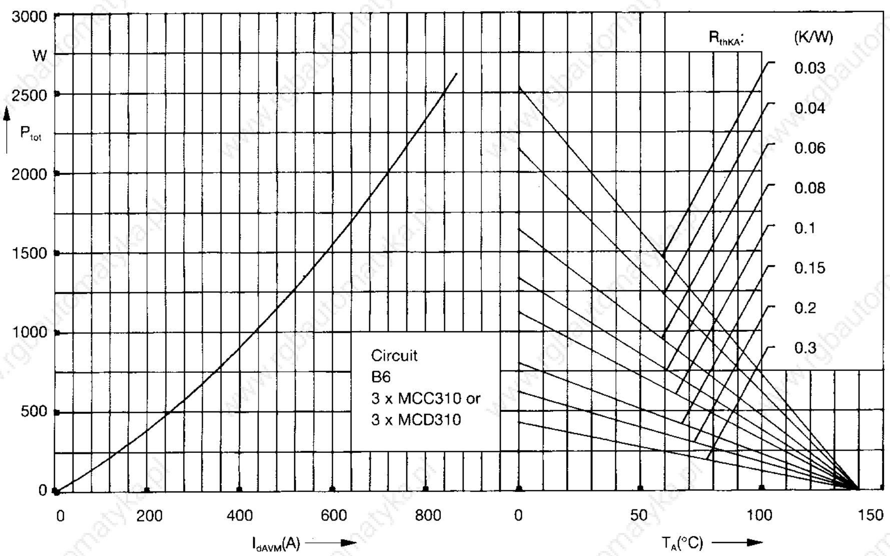


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

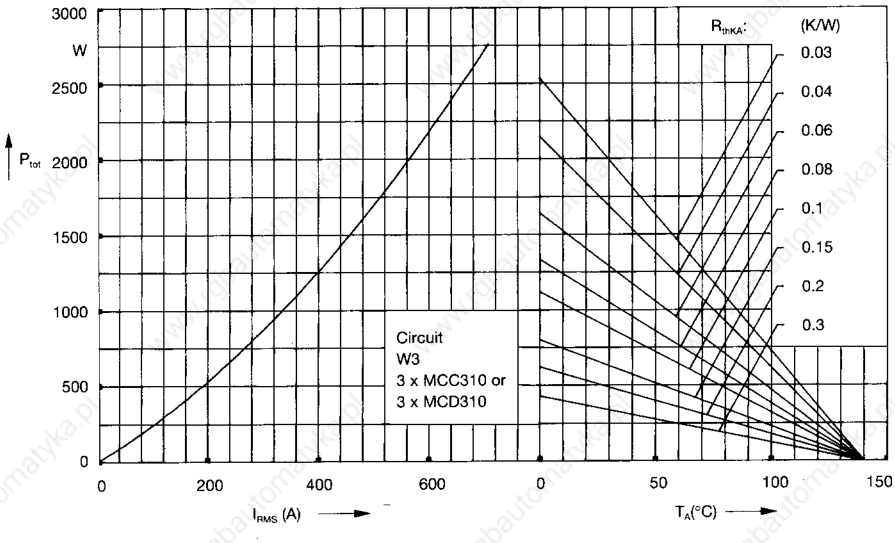


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

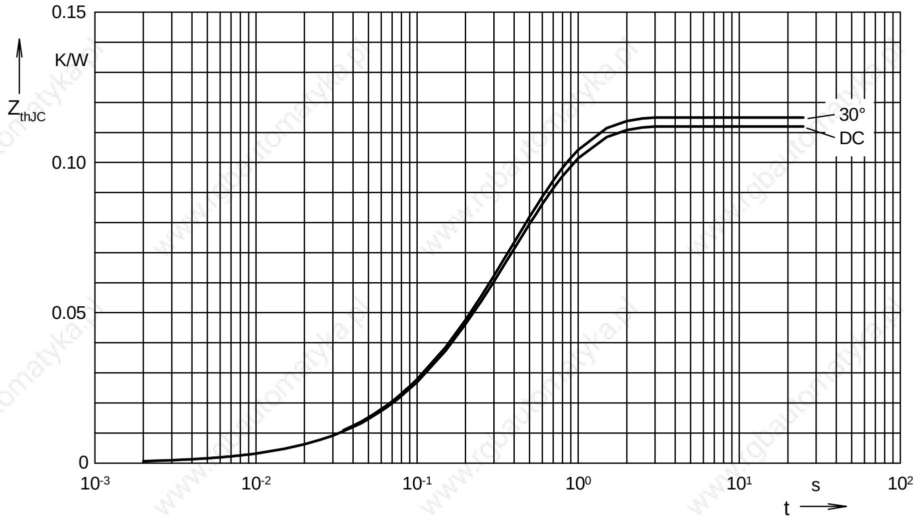


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.112
180°C	0.113
120°C	0.114
60°C	0.115
30°C	0.115

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.003	0.099
2	0.0143	0.168
3	0.0947	0.456

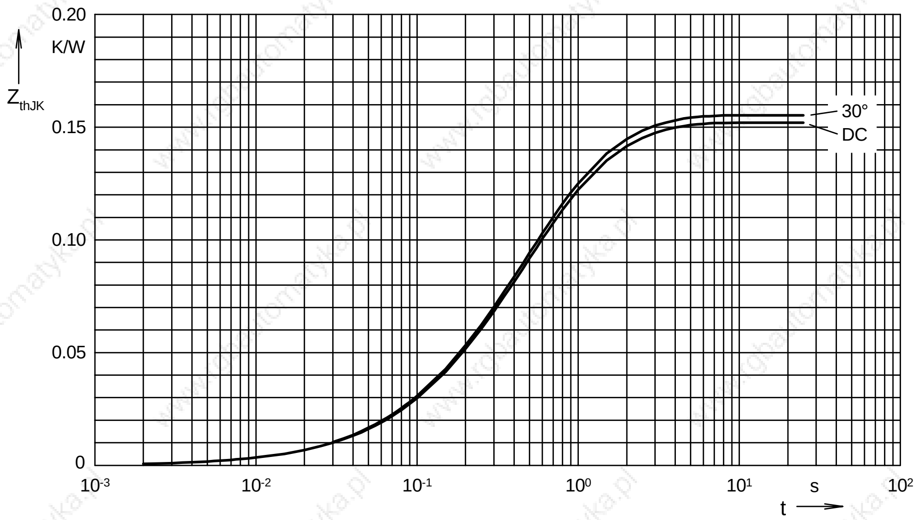


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.152
180°C	0.154
120°C	0.154
60°C	0.155
30°C	0.155

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.003	0.099
2	0.0143	0.168
3	0.0947	0.456
4	0.04	1.36

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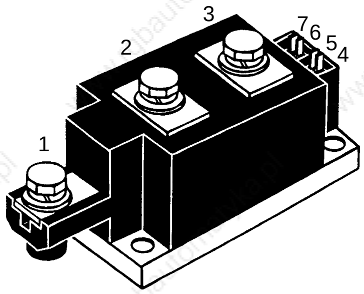
Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 520 A
I_{TAVM} = 2x 320 A
V_{RRM} = 1200-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
1300	1200	MCC 312-12io1	MCD 312-12io1
1500	1400	MCC 312-14io1	MCD 312-14io1
1700	1600	MCC 312-16io1	MCD 312-16io1
1900	1800	MCC 312-18io1	MCD 312-18io1



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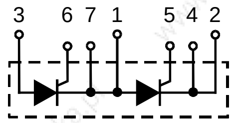

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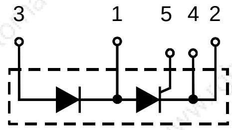


Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS}	$T_{VJ} = T_{VJM}$		520	A
I_{TAVM}, I_{FAVM}	T_C = 85°C; 180° sine		320	A
I_{TSM}, I_{FSM}	T_{VJ} = 45°C;	t = 10 ms (50 Hz)	9200	A
	V_R = 0	t = 8.3 ms (60 Hz)	10100	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	8000	A
	V_R = 0	t = 8.3 ms (60 Hz)	8800	A
∫i²dt	T_{VJ} = 45°C	t = 10 ms (50 Hz)	423 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz)	423 000	A²s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	320 000	A²s
	V_R = 0	t = 8.3 ms (60 Hz)	321 000	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f =50 Hz, t_P =200 µs	repetitive, I_T = 960 A	100	A/µs
	V_D = 2/3 V_{DRM} I_G = 1 A, di_G/dt = 1 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; V_{DR} = 2/3 V_{DRM} R_{GK} = ∞; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+140	°C
T_{VJM}			140	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		4.5-7/40-62	Nm/lb.in.
	Terminal connection torque (M8)		11-13/97-115	Nm/lb.in.
Weight	Typical including screws		750	g

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features
- International standard package
- Direct copper bonded Al_2O_3-ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered E 72873
- Keyed gate/cathode twin pins

Applications
- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

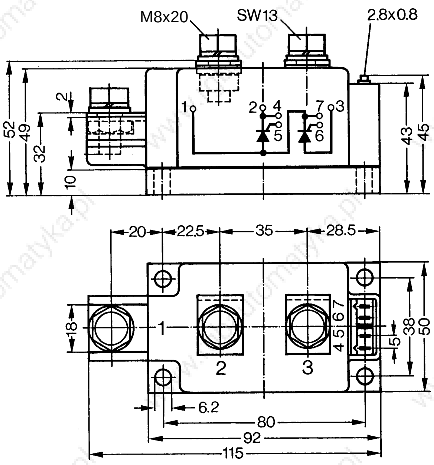
Advantages
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Test Conditions		Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		40	mA
V_T, V_F	I_T, I_F = 600 A; T_{VJ} = 25°C		1.32	V
V_{T0}	For power-loss calculations only (T_{VJ} = 140°C)		0.8	V
r_T			0.68	mΩ
V_{GT}	V_D = 6 V;	T_{VJ} = 25°C	2	V
		T_{VJ} = -40°C	3	V
I_{GT}	V_D = 6 V;	T_{VJ} = 25°C	150	mA
		T_{VJ} = -40°C	220	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	0.25	V
I_{GD}	$T_{VJ} = T_{VJM}$;	V_D = 2/3 V_{DRM}	10	mA
I_L	T_{VJ} = 25°C; t_P = 30 µs; V_D = 6 V I_G = 0.45 A; di_G/dt = 0.45 A/µs		200	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$		150	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} I_G = 1 A; di_G/dt = 1 A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; I_T = 300 A, t_P = 200 µs; -di/dt = 10 A/µs typ. V_R = 100 V; dv/dt = 50 V/µs; V_D = 2/3 V_{DRM}		200	µs
Q_S	T_{VJ} = 125°C; I_T, I_F = 300 A; -di/dt = 50 A/µs		760	µC
I_{RM}			275	A
R_{thJC}	per thyristor (diode); DC current	other values	0.12	K/W
	per module	other values	0.06	K/W
R_{thJK}	per thyristor (diode); DC current	see Fig. 8/9	0.16	K/W
	per module	see Fig. 8/9	0.08	K/W
d_S	Creeping distance on surface		12.7	mm
d_A	Creepage distance in air		9.6	mm
a	Maximum allowable acceleration		50	m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180 R** (R = Right for pin pair 6/7) } CSA class 5851, guide 460-1-1

Dimensions in mm (1 mm = 0.0394")

MCC



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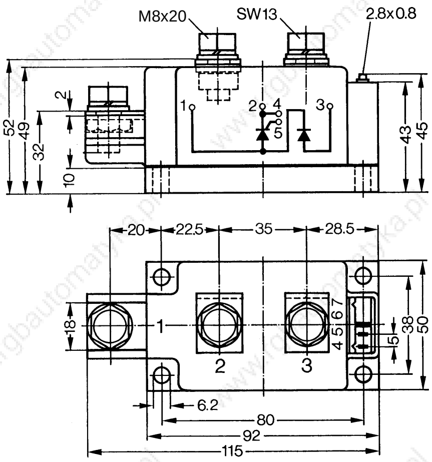


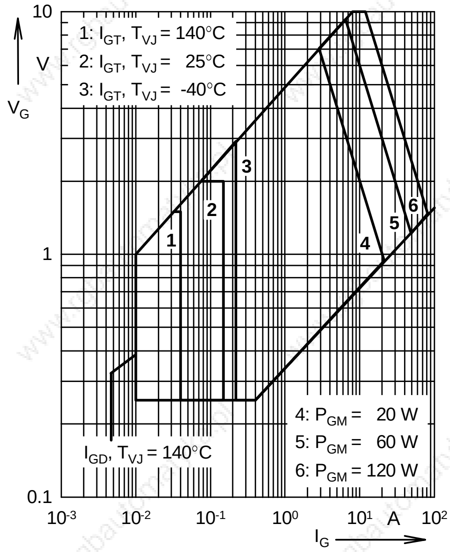


Fig. 1 Gate trigger characteristics

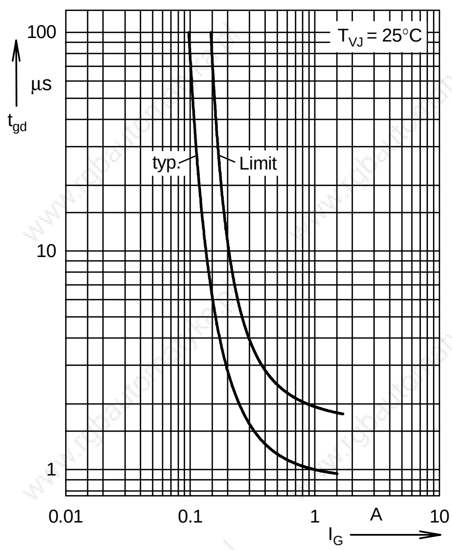


Fig. 2 Gate trigger delay time

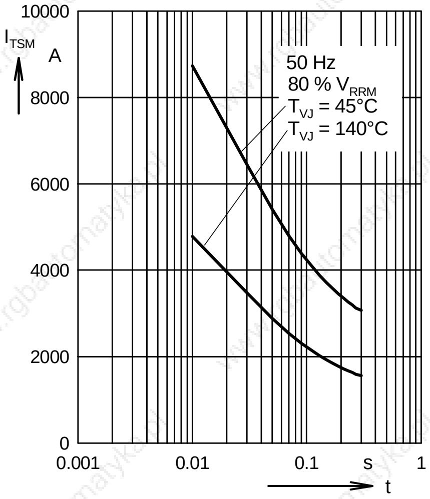


Fig. 3 Surge overload current I_{TSM}, I_{FSM}: Crest value, t: duration

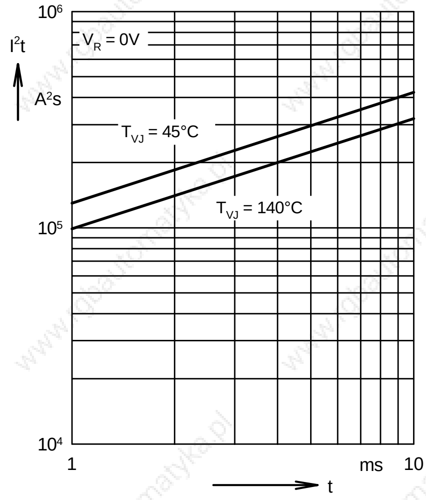


Fig. 4 I^2t versus time (1-10 ms)

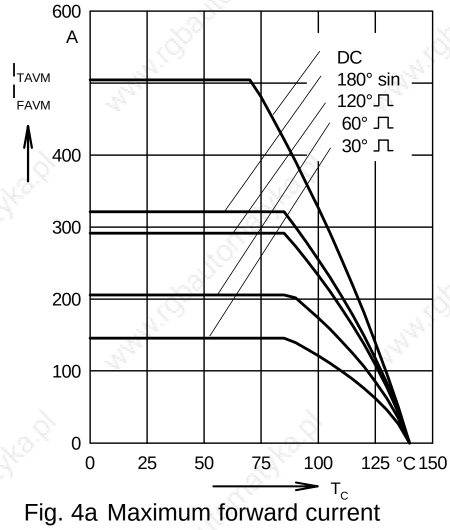


Fig. 4a Maximum forward current at case temperature

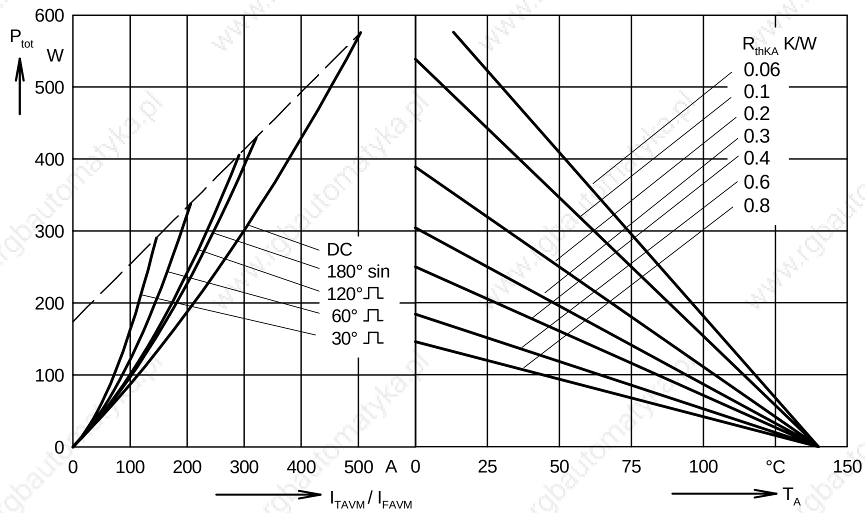


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

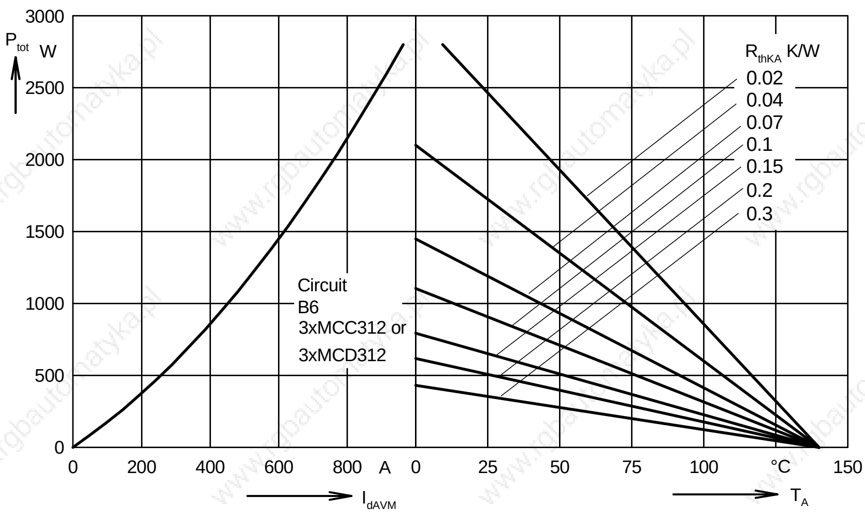


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

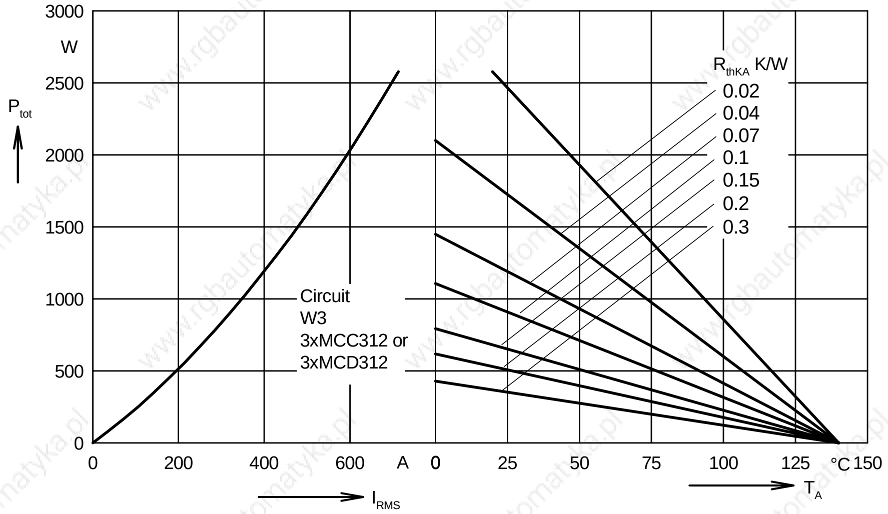


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

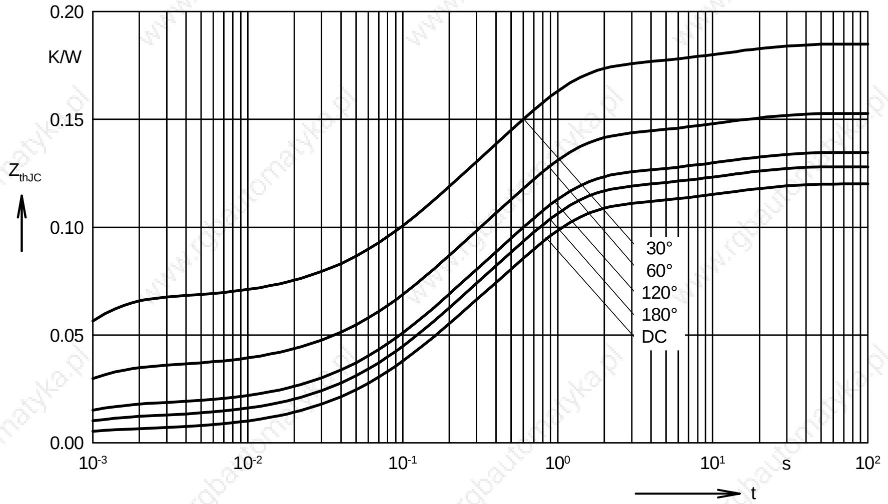


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.120
180°	0.128
120°	0.135
60°	0.153
30°	0.185

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0058	0.00054
2	0.031	0.098
3	0.072	0.54
4	0.0112	12

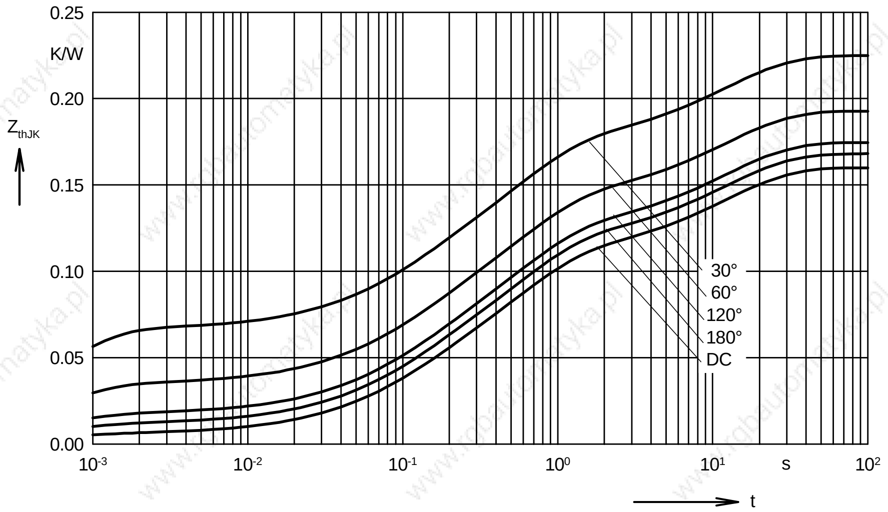


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.160
180°	0.168
120°	0.175
60°	0.193
30°	0.225

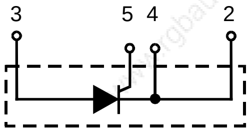
Constants for Z_{thJK} calculation:

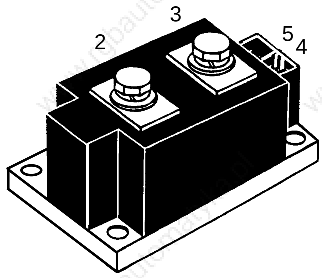
i	R_{thi} (K/W)	t_i (s)
1	0.0058	0.00054
2	0.031	0.098
3	0.072	0.54
4	0.0112	12
5	0.04	12

High Power Single Thyristor Module

I_{TRMS} = 750 A
I_{TAV} = 464 A
V_{RRM} = 2000-2200 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
2100	**2000**	**MCO 450-20io1**
2300	**2200**	**MCO 450-22io1**





Symbol	Test Conditions		Maximum Ratings	
I_{TRMS} I_{TAV}	$T_{VJ} = T_{VJM}$ T_C = 85°C; 180° sine		750 464	A A
I_{TSM}	T_{VJ} = 45°C V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	15000 16000	A A
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	13000 14400	A A
I^2t	T_{VJ} = 45°C V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	1125000 1062000	A^2s A^2s
	$T_{VJ} = T_{VJM}$ V_R = 0	t = 10 ms (50 Hz) t = 8.3 ms (60 Hz)	845000 813000	A^2s A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz, t_P = 200 µs V_D = 2/3 V_{DRM}	repetitive, I_T = 960 A	100	A/µs
	I_G = 1 A, di_G/dt = 1 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; V_{DR} = 2/3 V_{DRM} R_{GK} = ∞; method 1 (linear voltage rise)		1000	V/µs
P_{GM} P_{GAV} V_{RGM}	$T_{VJ} = T_{VJM}$ $I_T = I_{TAVM}$	t_P = 30 µs t_P = 500 µs	120 60 30 10	W W W V
T_{VJ} T_{VJM} T_{stg}			-40...130 130 -40...125	°C °C °C
V_{ISOL}	50/60 Hz, RMS I_{ISOL} ≤ 1 mA	t = 1 min t = 1 s	3000 3600	V~ V~
M_d	Mounting torque (M6) Terminal connection torque (M8)		4.5-7/40-62 11-13/97-115	Nm/lb.in. Nm/lb.in.
Weight	Typical including screws		650	g

Features

- Direct copper bonded Al_2O_3 -ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL applied
- Keyed gate/cathode twin pins

Applications

- Motor control, soft starter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages

- Improved temperature and power cycling
- Reduced protection circuits

Data according to IEC 60747 refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

030

Symbol	Test Conditions	Characteristic Values	
I_{RRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$	40	mA
V_T	I_T = 600 A; T_{VJ} = 25°C	1.15	V
V_{T0}	For power-loss calculations only ($T_{VJ} = T_{VJM}$)	0.77	V
r_T		0.42	mΩ
V_{GT}	V_D = 6 V; T_{VJ} = 25°C	2	V
	T_{VJ} = -40°C	3	V
I_{GT}	V_D = 6 V; T_{VJ} = 25°C	300	mA
	T_{VJ} = -40°C	400	mA
V_{GD}	$T_{VJ} = T_{VJM}$; V_D = 2/3 V_{DRM}	0.25	V
I_{GD}	$T_{VJ} = T_{VJM}$; V_D = 2/3 V_{DRM}	10	mA
I_L	T_{VJ} = 25°C; V_D = 6 V; t_P = 30 µs di_G/dt = 1 A/µs; I_G = 1 A	400	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; R_{GK} = ∞	300	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} di_G/dt = 1 A/µs; I_G = 1 A	2	µs
t_q	$T_{VJ} = T_{VJM}$; V_R = 100 V; V_D = 2/3 V_{DRM}; t_P = 200 µs dv/dt = 50 V/µs; I_T = 500 A; -di/dt = 10 A/µs	typ. 350	µs
R_{thJC}	DC current	0.072	K/W
R_{thJK}	DC current	0.096	K/W
d_S	Creep distance on surface	12.7	mm
d_A	Strike distance in air	9.6	mm
a	Maximum allowable acceleration	50	m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) { UL 758, style 1385, File E 38136, CSA class 5851, guide 460-1-1, appl. 41234

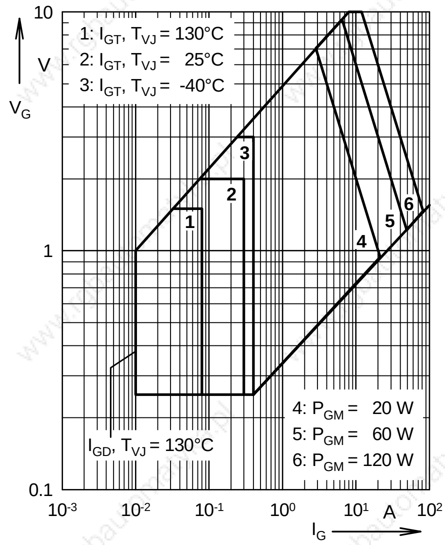


Fig. 1 Gate trigger characteristics

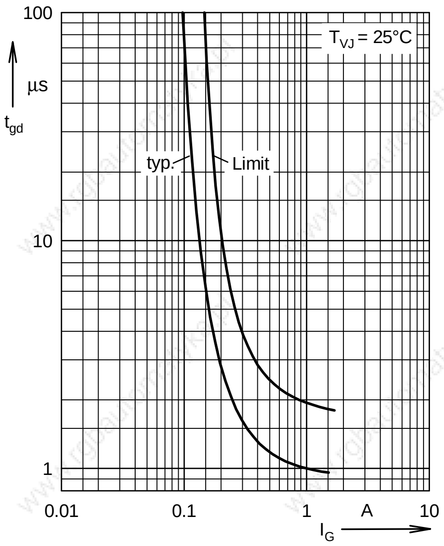
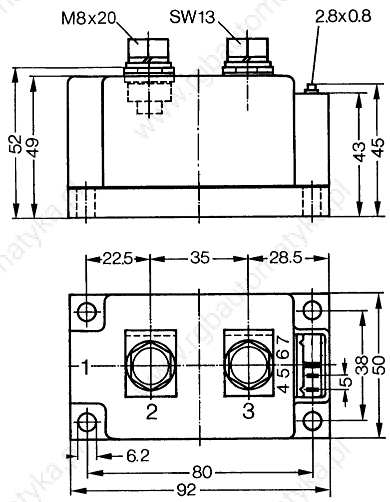


Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")



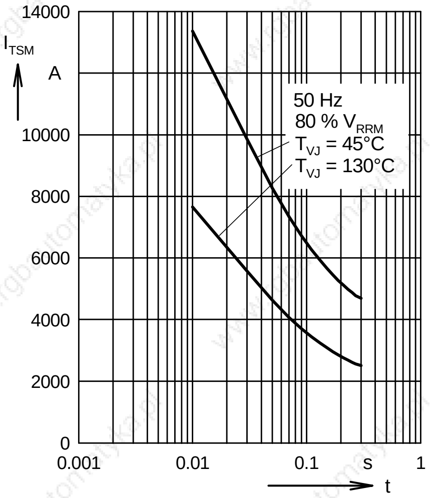


Fig. 3 Surge overload current
I_{TSM}: Crest value, t: duration

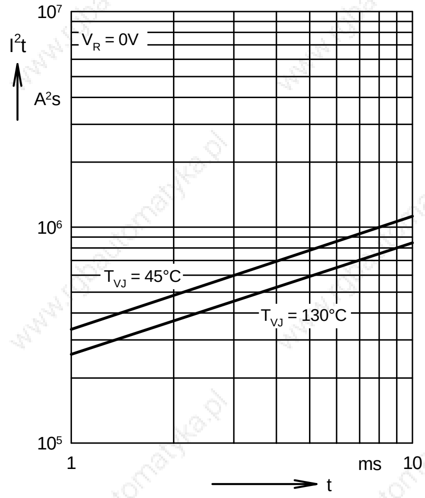


Fig. 4 I^2t versus time (1-10 ms)

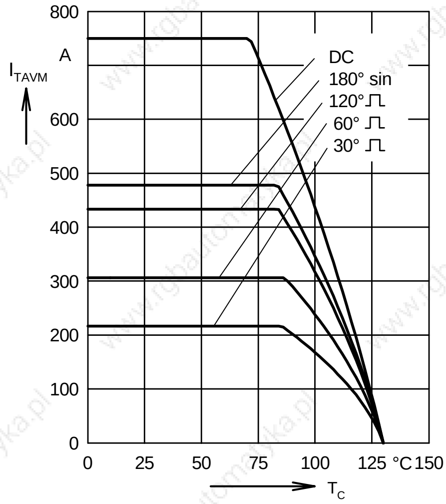


Fig. 5 Maximum forward current at case temperature

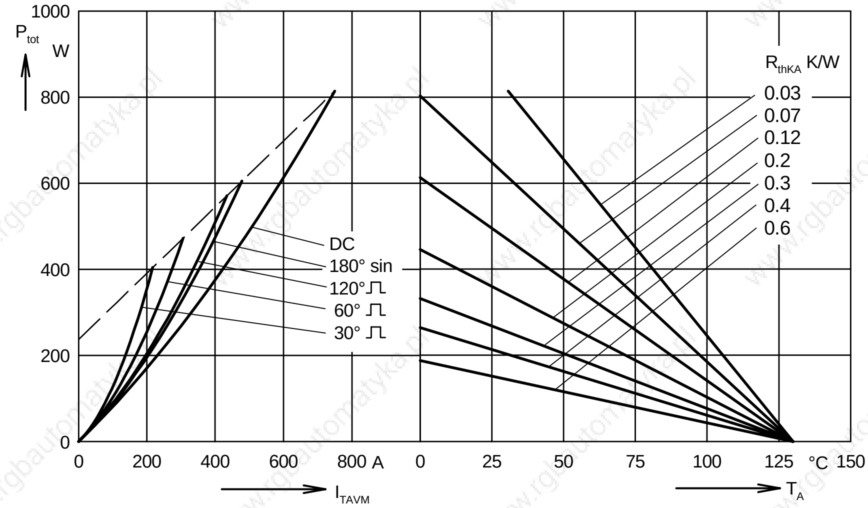


Fig. 6 Power dissipation versus on-state current and ambient temperature

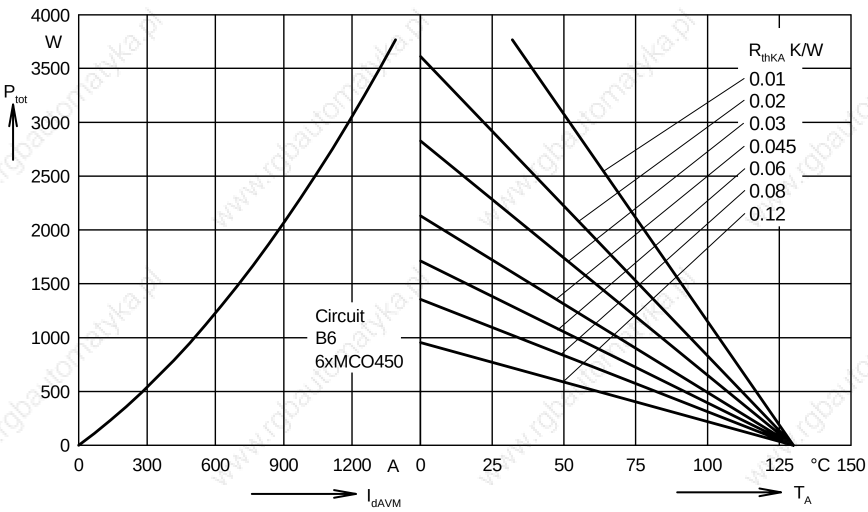


Fig. 7 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

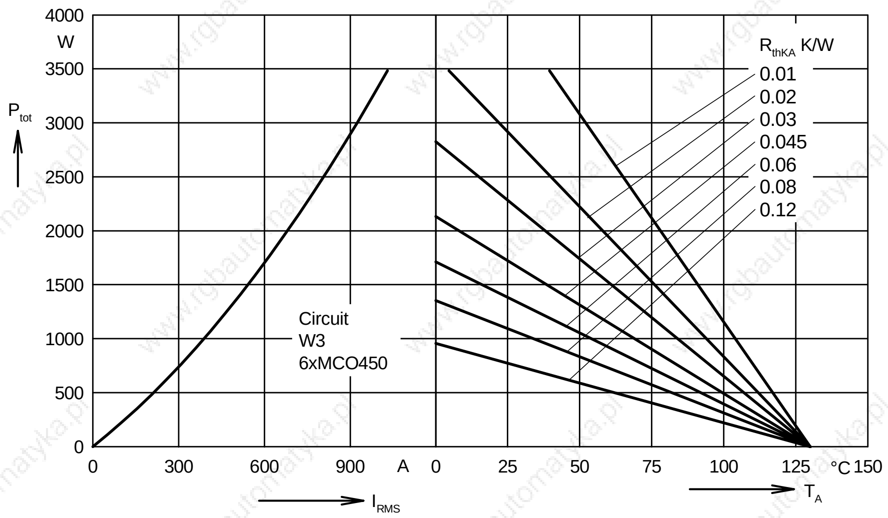


Fig. 8 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

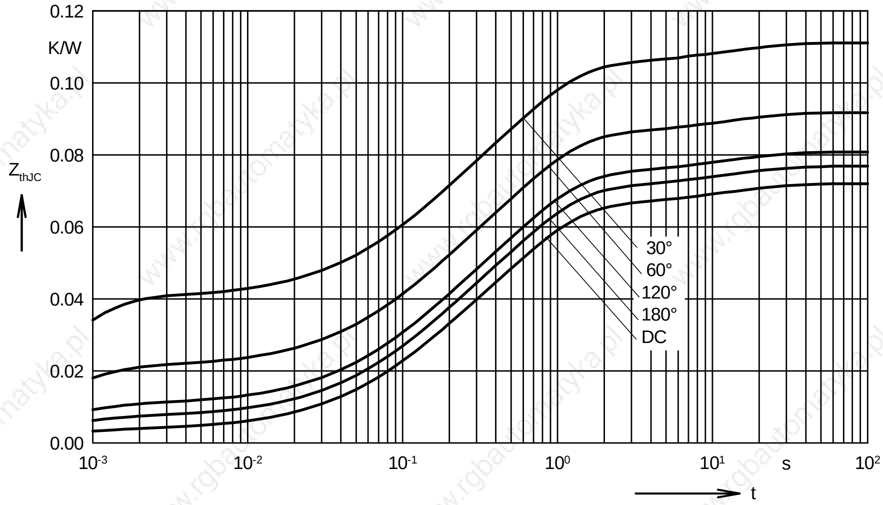


Fig. 9 Transient thermal impedance junction to case

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.072
180°	0.0768
120°	0.081
60°	0.092
30°	0.111

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.0067	12

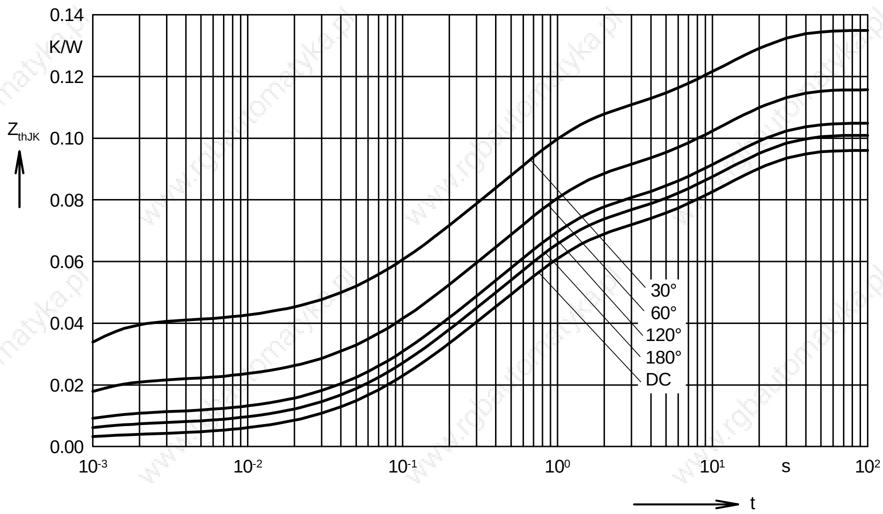


Fig.10 Transient thermal impedance junction to heatsink

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.096
180°	0.1
120°	0.105
60°	0.116
30°	0.135

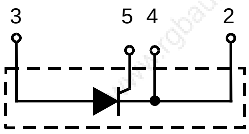
Constants for Z_{thJK} calculation:

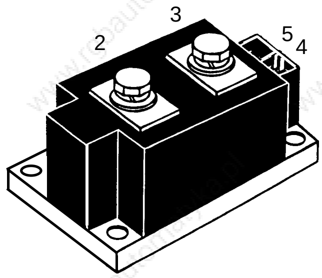
i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.0067	12
5	0.024	12

High Power Thyristor Modules

I_{TRMS} = 880 A
$I_{T(AV)M}$ = 560 A
V_{RRM} = 1200-1800 V

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
1300	1200	MCO 500-12io1
1500	1400	MCO 500-14io1
1700	1600	MCO 500-16io1
1900	1800	MCO 500-18io1





Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		880	A
$I_{T(AV)M}$	T_C = 85°C; 180° sine		560	A
I_{TSM}	T_{VJ} = 45°C	t = 10 ms (50 Hz)	17000	A
	V_R = 0	t = 8.3 ms (60 Hz)	16000	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	13000	A
	V_R = 0	t = 8.3 ms (60 Hz)	14400	A
I^2t	T_{VJ} = 45°C	t = 10 ms (50 Hz)	1445000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	1062000	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	845000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	813000	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 960 A	100	A/µs
	f = 50 Hz, t_P = 200 µs			
	V_D = 2/3 V_{DRM}			
	I_G = 1 A,	non repetitive, $I_T = I_{T(AV)M}$	500	A/µs
	di_G/dt = 1 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; V_{DR} = 2/3 V_{DRM}		1000	V/µs
	R_{GK} = ∞; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{T(AV)M}$	t_P = 500 µs	60	W
P_{GAV}			30	W
V_{RGM}			10	V
T_{VJ}			-40...140	°C
T_{VJM}			140	°C
T_{stg}			-40...125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		4.5-7/40-62	Nm/lb.in.
	Terminal connection torque (M8)		11-13/97-115	Nm/lb.in.
Weight	Typical including screws		650	g

Data according to IEC 60747 refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

Features

- International standard package
- Direct copper bonded Al_2O_3-ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered E 72873
- Keyed gate/cathode twin pins

Applications

- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages

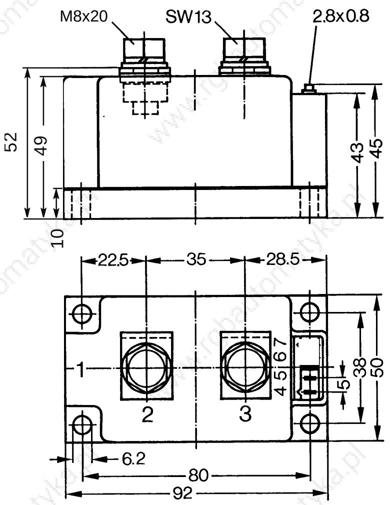
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

030

Symbol	Test Conditions	Characteristic Values	
I_{RRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$	40	mA
V_T	$I_T = 1200$ A; $T_{VJ} = 25°C$	1.3	V
V_{T0}	For power-loss calculations only ($T_{VJ} = T_{VJM}$)	0.8	V
r_T		0.38	mΩ
V_{GT}	$V_D = 6$ V; $T_{VJ} = 25°C$	2	V
	$T_{VJ} = -40°C$	3	V
I_{GT}	$V_D = 6$ V; $T_{VJ} = 25°C$	300	mA
	$T_{VJ} = -40°C$	400	mA
V_{GD}	$T_{VJ} = T_{VJM}$; $V_D = 2/3\ V_{DRM}$	0.25	V
I_{GD}	$T_{VJ} = T_{VJM}$; $V_D = 2/3\ V_{DRM}$	10	mA
I_L	$T_{VJ} = 25°C$; $V_D = 6$ V; $t_P = 30$ µs $di_G/dt = 1$ A/µs; $I_G = 1$ A	400	mA
I_H	$T_{VJ} = 25°C$; $V_D = 6$ V; $R_{GK} = \infty$	300	mA
t_{gd}	$T_{VJ} = 25°C$; $V_D = 1/2\ V_{DRM}$ $di_G/dt = 1$ A/µs; $I_G = 1$ A	2	µs
t_q	$T_{VJ} = T_{VJM}$; $V_R = 100$ V; $V_D = 2/3\ V_{DRM}$; $t_P = 200$ µs $dv/dt = 50$ V/µs; $I_T = 500$ A; $-di/dt = 10$ A/µs	typ. 350	µs
R_{thJC}	DC current	0.072	K/W
R_{thJK}	DC current	0.096	K/W
d_S	Creeping distance on surface	12.7	mm
d_A	Creepage distance in air	9.6	mm
a	Maximum allowable acceleration	50	m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) { UL 758, style 1385, CSA class 5851, guide 460-1-1

Dimensions in mm (1 mm = 0.0394")



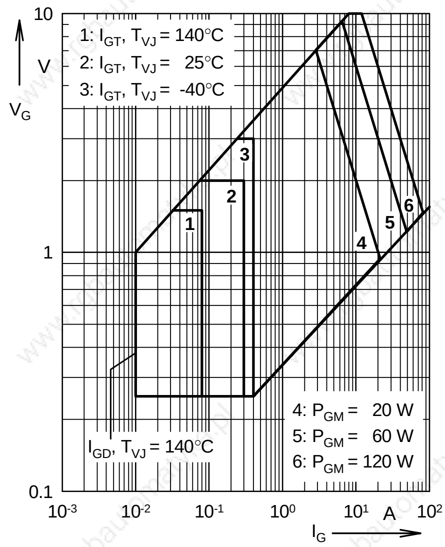


Fig. 1 Gate trigger characteristics

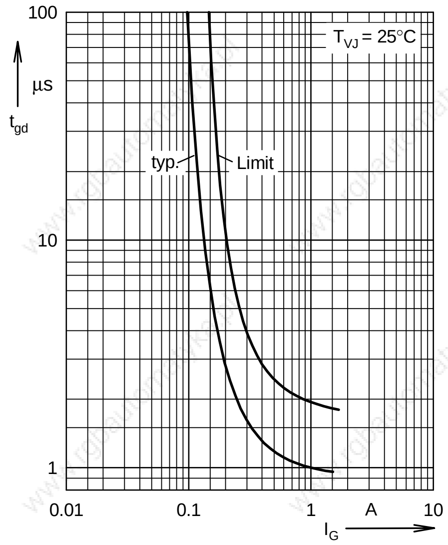


Fig. 2 Gate trigger delay time

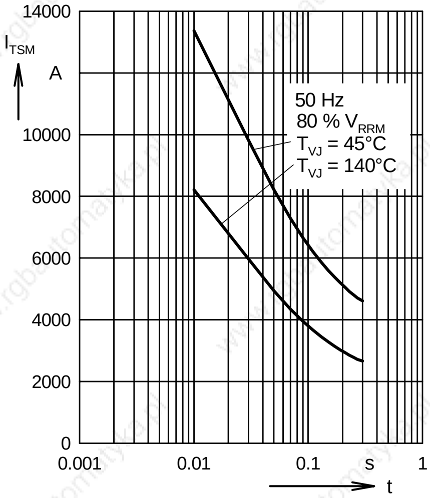


Fig. 3 Surge overload current
I_{TSM}, I_{FSM}: Crest value, t: duration

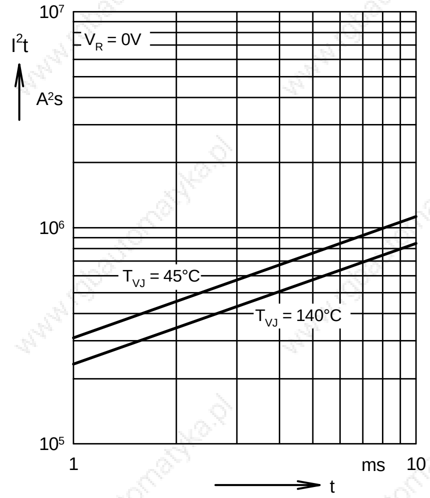


Fig. 4 ∫i²dt versus time (1-10 ms)

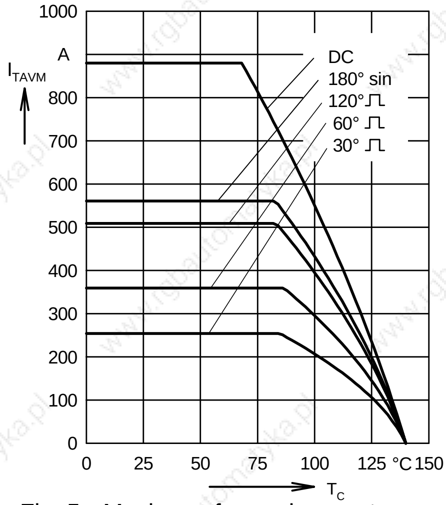


Fig. 5 Maximum forward current at case temperature

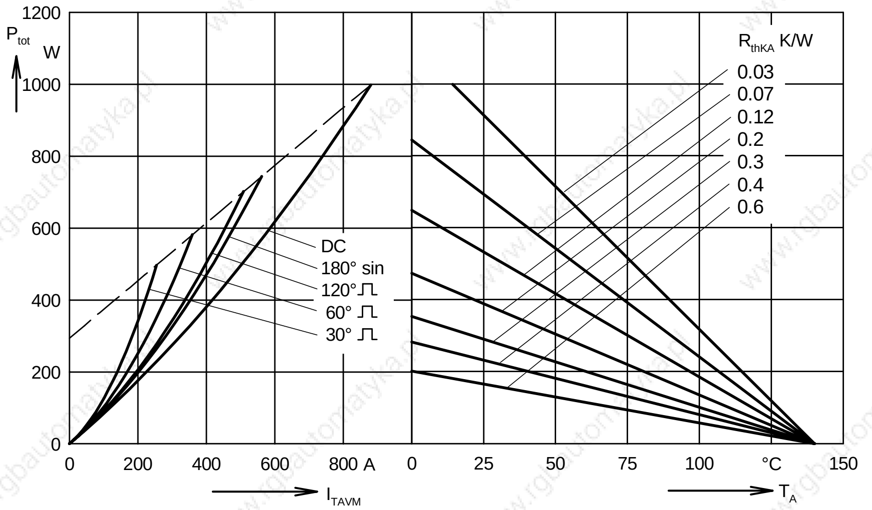


Fig. 6 Power dissipation versus on-state current and ambient temperature

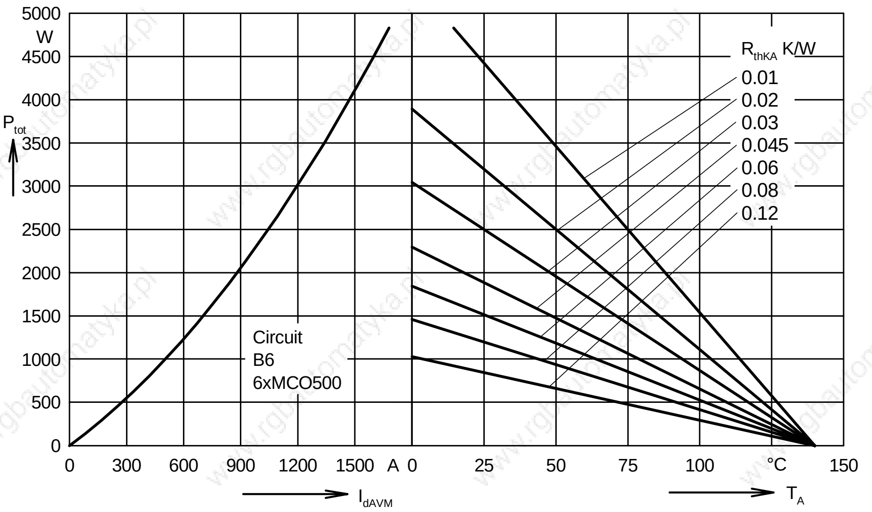


Fig. 7 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

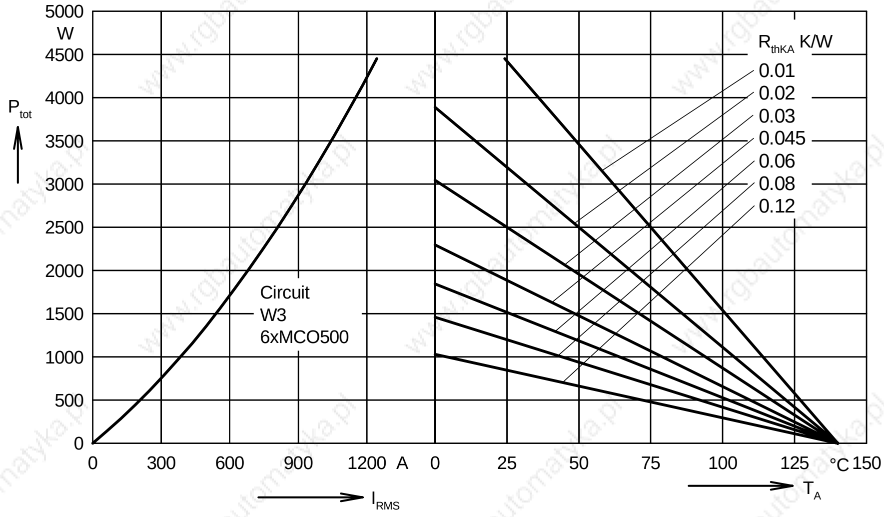


Fig. 8 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

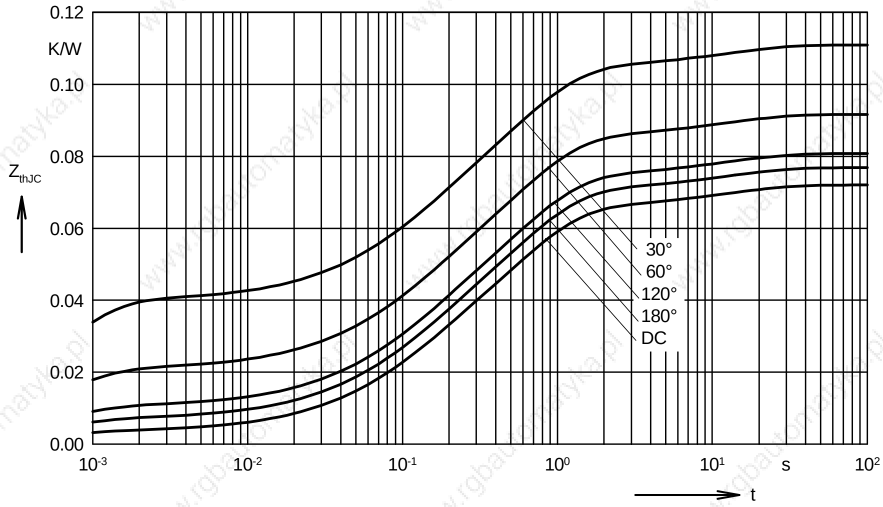


Fig. 9 Transient thermal impedance junction to case (per thyristor)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.072
180°	0.0768
120°	0.081
60°	0.092
30°	0.111

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.0067	12

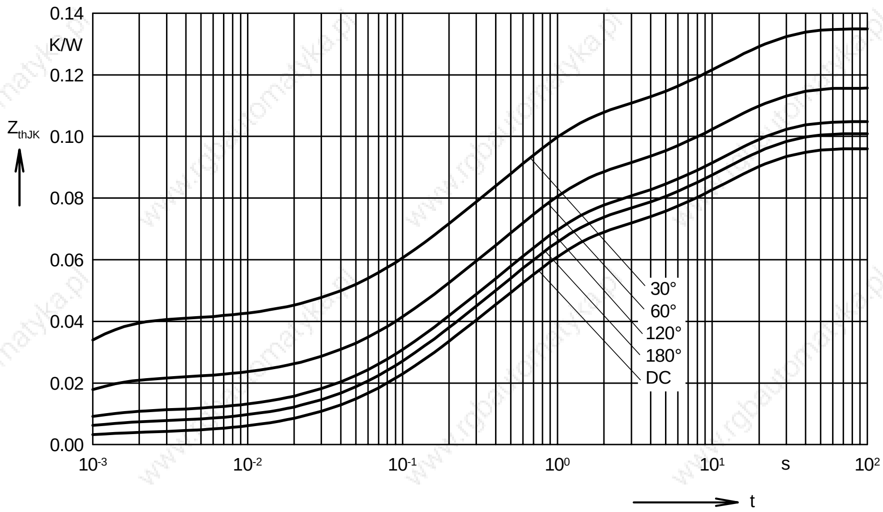


Fig.10 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.096
180°	0.1
120°	0.105
60°	0.116
30°	0.135

Constants for Z_{thJK} calculation:

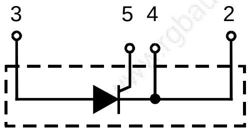
i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.0067	12
5	0.024	12

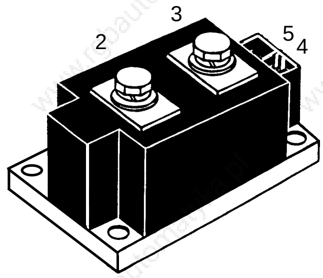
High Power Single Thyristor Module

I_{TRMS} = 928 A
I_{TAV} = 600 A
V_{RRM} = 2000-2200 V

Preliminary data

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type
2100	**2000**	**MCO 600-20io1**
2300	**2200**	**MCO 600-22io1**





Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		928	A
I_{TAV}	T_C = 85°C; 180° sine		600	A
I_{TSM}	T_{VJ} = 45°C	t = 10 ms (50 Hz)	15000	A
	V_R = 0	t = 8.3 ms (60 Hz)	16000	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	13000	A
	V_R = 0	t = 8.3 ms (60 Hz)	14400	A
I^2t	T_{VJ} = 45°C	t = 10 ms (50 Hz)	1125000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	1062000	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	845000	A^2s
	V_R = 0	t = 8.3 ms (60 Hz)	813000	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz, t_P = 200 µs V_D = 2/3 V_{DRM}	repetitive, I_T = 960 A	100	A/µs
	I_G = 1 A, di_G/dt = 1 A/µs	non repetitive, $I_T = I_{TAVM}$	500	A/µs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; V_{DR} = 2/3 V_{DRM} $R_{GK} = \infty$; method 1 (linear voltage rise)		1000	V/µs
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{TAVM}$	t_P = 500 µs	60	W
P_{GAV}			30	W
V_{RGM}			10	V
T_{VJ}			-40...140	°C
T_{VJM}			140	°C
T_{stg}			-40...125	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 min	3000	V~
	$I_{ISOL} \leq$ 1 mA	t = 1 s	3600	V~
M_d	Mounting torque (M6)		4.5-7/40-62	Nm/lb.in.
	Terminal connection torque (M8)		11-13/97-115	Nm/lb.in.
Weight	Typical including screws		650	g

Features

- Direct copper bonded Al_2O_3 -ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL applied
- Keyed gate/cathode twin pins

Applications

- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages

- Improved temperature and power cycling
- Reduced protection circuits

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions

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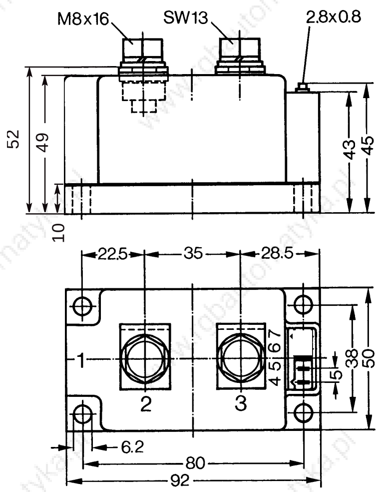
Symbol	Test Conditions	Characteristic Values	
I_{RRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$	60	mA
V_T	I_T = 600 A; T_{VJ} = 25°C	1.15	V
V_{T0} r_T	For power-loss calculations only ($T_{VJ} = T_{VJM}$)	0.77 0.42	V mΩ
V_{GT}	V_D = 6 V; T_{VJ} = 25°C T_{VJ} = -40°C	2 3	V V
I_{GT}	V_D = 6 V; T_{VJ} = 25°C T_{VJ} = -40°C	300 400	mA mA
V_{GD} I_{GD}	$T_{VJ} = T_{VJM}$; V_D = 2/3 V_{DRM} $T_{VJ} = T_{VJM}$; V_D = 2/3 V_{DRM}	0.25 10	V mA
I_L	T_{VJ} = 25°C; V_D = 6 V; t_P = 30 µs di_G/dt = 1 A/µs; I_G = 1 A	400	mA
I_H	T_{VJ} = 25°C; V_D = 6 V; $R_{GK} = \infty$	300	mA
t_{gd}	T_{VJ} = 25°C; V_D = 1/2 V_{DRM} di_G/dt = 1 A/µs; I_G = 1 A	2	µs
t_q	$T_{VJ} = T_{VJM}$; V_R = 100 V; V_D = 2/3 V_{DRM}; t_P = 200 µs dv/dt = 50 V/µs; I_T = 500 A; -di/dt = 10 A/µs	typ. 350	µs
R_{thJC} R_{thJK}	DC current DC current	0.065 0.085	K/W K/W
d_S d_A a	Creep distance on surface Strike distance in air Maximum allowable acceleration	12.7 9.6 50	mm mm m/s^2

Optional accessories for modules
Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180 L** (L = Left for pin pair 4/5) { UL 758, style 1385, File E 38136, CSA class 5851, guide 460-1-1, appl. 41234

Dimensions in mm (1 mm = 0.0394")



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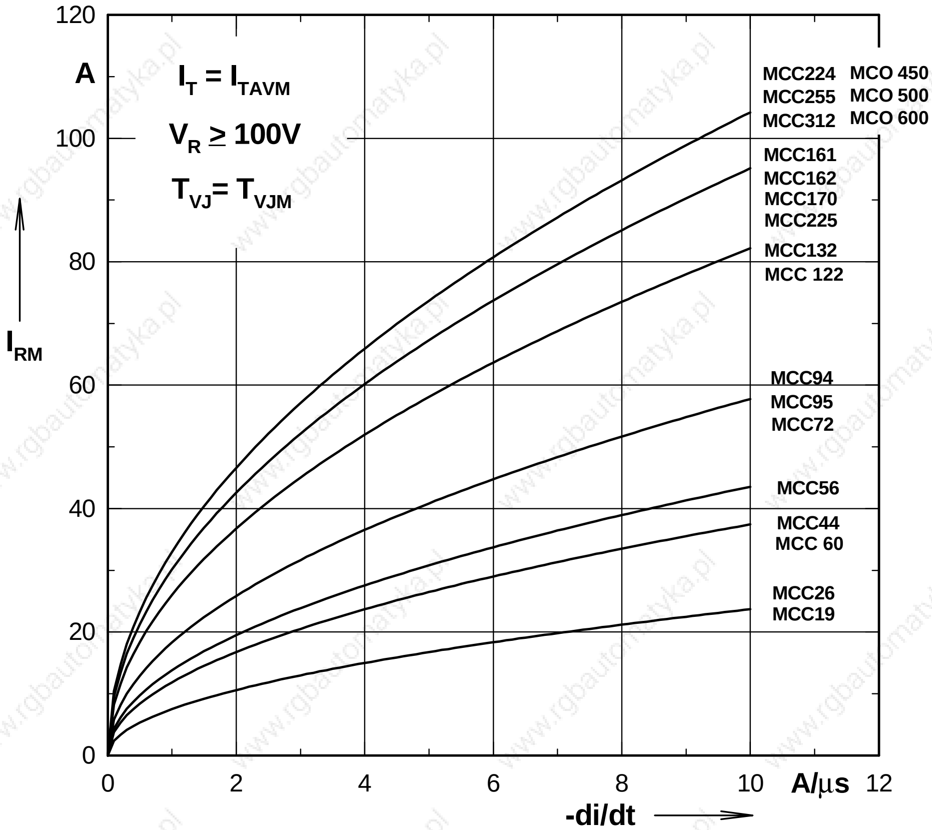
Peak reverse recovery current versus -di/dt



Recommended RC snubber network against hole storage effect overvoltage

Type	Supply Voltage V_{vRMS}		
	≤ 250 V	≤ 400 V	≤ 575 V
MCC/MCD/MDD 19/26	R = 68 Ω/6 W C = 0.22 µF	R = 68 Ω/6 W C = 0.22 µF	R = 100 Ω/10 W C = 0.1 µF
MCC/MCD/MDD 44/56/60/72/94/95	R = 33 Ω/10 W C = 0.22 µF	R = 47 Ω/10 W C = 0.22 µF	R = 68 Ω/10 W C = 0.1 µF
MCC/MCD/MDD/MCO/MDO 122/132/142/161/162/170/ 172/220/225/250/255/310/ 312/450/500/600	R = 33 Ω/25 W C = 0.47 µF	R = 33 Ω/25 W C = 0.47 µF	R = 47 Ω/25 W C = 0.1 µF

Conditions

f = 40 - 60 Hz
Short circuit voltage 4-6 %
Voltage safety factor 2.5