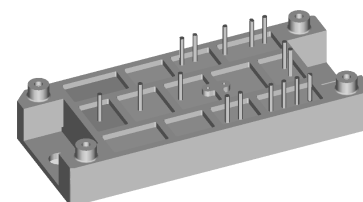
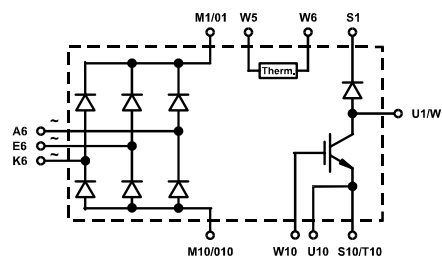


Three Phase Rectifier Bridge with IGBT and Fast Recovery Diode for Braking System

$V_{RRM} = 1200/1600 \text{ V}$
 $I_{dAVM} = 121/157 \text{ A}$

Preliminary Data

V_{RRM}	Type	V_{RRM}	Type
V		V	
1200	VUB 120-12 NO1	1600	VUB 120-16 NO1
1200	VUB 160-12 NO1	1600	VUB 160-16 NO1



Symbol	Test Conditions	Maximum Ratings		
		VUB 120	VUB160	
V_{RRM}		1200/1600	1200/1600 V	
I_{dAVM}		121	157 A	
I_{FSM}	Rectifier Diodes	$T_C = 75^\circ\text{C}$, sinusoidal 120°		
		$T_C = 75^\circ\text{C}$, sinusoidal 120°		
	$T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	650	850 A	
	$T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	580	760 A	
I^2t	Rectifier Diodes	$T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	2110	3610 A
		$T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	1680	2880 A
P_{tot}	Rectifier Diodes	$T_C = 25^\circ\text{C}$ per diode	130	160 W
V_{CES}	IGBT	$T_{VJ} = 25^\circ\text{C}$ to 150°C	1200	1200 V
V_{GE}		Continuous	± 20	± 20 V
I_{C25}	IGBT	$T_C = 25^\circ\text{C}$, DC	100	150 A
I_{C75}		$T_C = 75^\circ\text{C}$, DC	71	106 A
		$T_C = 75^\circ\text{C}$, $d = 0.5$	56	85 A
I_{CM}	IGBT	$t_p = \text{Pulse width limited by } T_{VJM}$	200	300 A
P_{tot}	IGBT	$T_C = 25^\circ\text{C}$	400	600 W
V_{RRM}	Fast Recovery Diode		1200	V
I_{FAV}		$T_C = 75^\circ\text{C}$, rectangular $d = 0.5$	25	A
I_{FRMS}		$T_C = 75^\circ\text{C}$, rectangular $d = 0.5$	39	A
I_{FRM}		$T_C = 75^\circ\text{C}$, $t_p = 10 \mu\text{s}$, $f = 5 \text{ kHz}$	tbid	A
I_{FSM}	Fast Recovery Diode	$T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$	200	A
		$T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$	180	A
P_{tot}	Fast Recovery Diode	$T_C = 25^\circ\text{C}$	100	W
T_{VJ}	Module		-40...+150	$^\circ\text{C}$
T_{VJM}			150	$^\circ\text{C}$
T_{stg}			-40...+125	$^\circ\text{C}$
V_{ISOL}	Module	50/60 Hz $t = 1 \text{ min}$	3000	V~
		$I_{ISOL} \leq 1 \text{ mA}$ $t = 1 \text{ s}$	3600	V~
M_d	Module	Mounting torque (M5) (10-32 unf)	2-2.5 18-22	Nm lb.in.
d_s	Module	Creep distance on surface	12.7	mm
d_A		Strike distance in air	9.4	mm
a		Maximum allowable acceleration	50	m/s^2
Weight	Module	typ.	80	g

Features

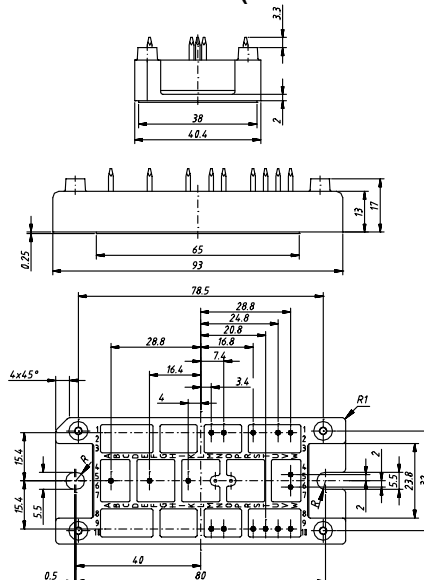
- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast diode
- Convenient package outline
- UL registered E 72873
- Case and potting UL94 V-0
- Thermistor

Applications

- Drive Inverters with brake system

Advantages

- 2 functions in one package
- Easy to mount with two screws
- Suitable for wave soldering
- High temperature and power cycling capability

Dimensions in mm (1 mm = 0.0394")


Data according to IEC 60747
 IXYS reserves the right to change limits, test conditions and dimensions.

Symbol	Test Conditions	Characteristic Values			
		(T _{VJ} = 25°C, unless otherwise specified)			
		min.	typ.	max.	
Rectifier Diodes	I_R	$V_R = V_{RRM}, T_{VJ} = 25^\circ\text{C}$ $V_R = V_{RRM}, T_{VJ} = 150^\circ\text{C}$		0.3 mA 5 mA	
	V_F	$I_F = 150\text{ A}, T_{VJ} = 25^\circ\text{C}$	VUB 120 VUB 160	1.59 V 1.49 V	
	V_{T0}	For power-loss calculations only	VUB 120 VUB 160	0.80 V 0.75 V	
	r_T	$T_{VJ} = 150^\circ\text{C}$	VUB 120 VUB 160	6.1 mΩ 4.6 mΩ	
	R_{thJC}	per diode	VUB 120 VUB 160	1.0 K/W 0.8 K/W	
	R_{thJH}		VUB 120 VUB 160	1.3 K/W 1.1 K/W	
	$V_{BR(CES)}$ $V_{GE(th)}$	$V_{GS} = 0\text{ V}, I_C = 3\text{ mA}$	1200		V
		$I_C = 20\text{ mA}$ $I_C = 30\text{ mA}$	VUB 120 VUB 160	5 5	8 V 8 V
	I_{CES}	$T_{VJ} = 25^\circ\text{C}, V_{CE} = 1200\text{ V}$	VUB 120 VUB 160		0.8 mA 1.2 mA
		$T_{VJ} = 125^\circ\text{C}, V_{CE} = 0,8 \cdot V_{CES}$	VUB 120 VUB 160		3 mA 4.5 mA
V_{CEsat}	$V_{GE} = 15\text{ V}, I_C = 50\text{ A}$	VUB 120		2.9 V	
	$V_{GE} = 15\text{ V}, I_C = 75\text{ A}$	VUB 160		2.9 V	
t_{sc} (SCSOA)	$V_{GE} = 15\text{ V}, V_{CE} = 720\text{ V}, T_{VJ} = 125^\circ\text{C},$ $R_G = 11\ \Omega, \text{ non repetitive}$	VUB 120		10 μs	
	$R_G = 7\ \Omega, \text{ non repetitive}$	VUB 160		10 μs	
RBSOA	$V_{GE} = 15\text{ V}, V_{CE} = 960\text{ V}, T_{VJ} = 125^\circ\text{C},$ Clamped Inductive load, L = 100 μH	$R_G = 11\ \Omega$	VUB 120	100 A	
		$R_G = 7\ \Omega$	VUB 160	150 A	
C_{ies}	$V_{CE} = 25\text{ V}, f = 1\text{ MHz}, V_{GE} = 0\text{ V}$	VUB 120 VUB 160	9 13.5	nF nF	
$t_{d(on)}$ $t_{d(off)}$ E_{on} E_{off}	} $V_{CE} = 720\text{ V}, I_C = 50/75\text{ A}$ $V_{GE} = 15\text{ V}, R_G = 11/7\ \Omega$ Inductive load; L = 100 μH $T_{VJ} = 125^\circ\text{C}$			300 ns 350 ns 12 mJ 18 mJ 16 mJ 24 mJ	
R_{thJC}		VUB 120 VUB 160		0.32 K/W 0.21 K/W	
		VUB 120 VUB 160		0.45 K/W 0.30 K/W	
Fast Recovery Diode	I_R	$V_R = V_{RRM}, T_{VJ} = 25^\circ\text{C}$ $V_R = 0,8 \cdot V_{CES}, T_{VJ} = 125^\circ\text{C}$	4	0.75 mA 7 mA	
	V_F	$I_F = 30\text{ A}, T_{VJ} = 25^\circ\text{C}$		2.55 V	
	V_{T0}	For power-loss calculations only		1.65 V	
	r_T	$T_{VJ} = 150^\circ\text{C}$		18.2 mΩ	
	I_{RM}	$I_F = 30\text{ A}, -di_F/dt = 240\text{ A}/\mu\text{s}, V_R = 540\text{ V}$	16	18 A	
	t_{rr}	$I_F = 1\text{ A}, -di_F/dt = 100\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	40	60 ns	
R_{thJC} R_{thJH}				1.2 K/W 1.6 K/W	
R_{25}	NTC Siemens S 891/2,2/+9			2.2 kΩ	

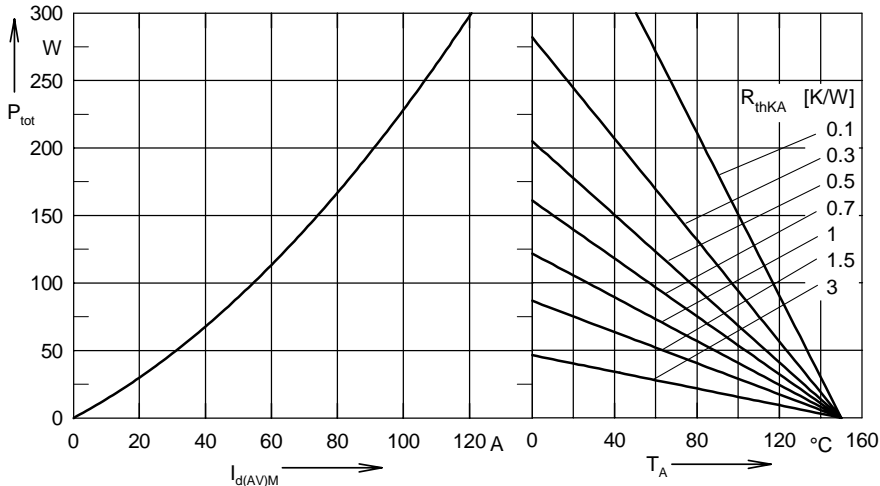


Fig. 1 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

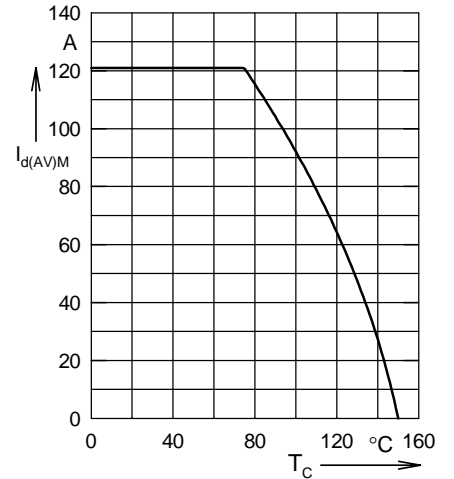


Fig. 2 Maximum forward current versus case temperature (Rectifier bridge)

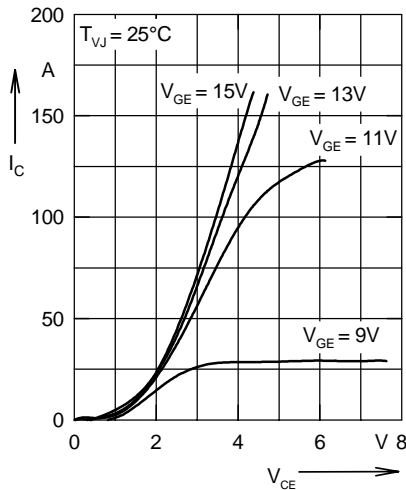


Fig. 3 Output characteristics for braking (IGBT)

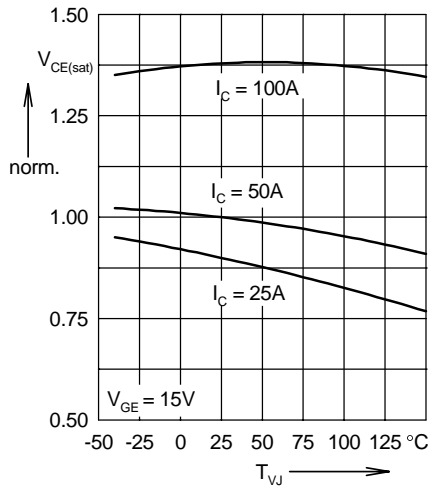


Fig. 4 Temperature dependence of output saturation voltage, normalized (IGBT)

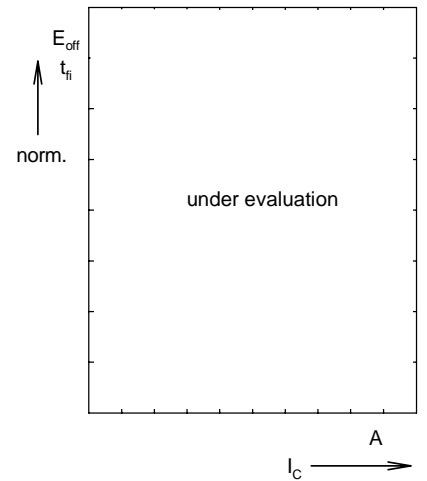


Fig. 5 Turn-off energy per pulse and fall time in collector current, normalized (IGBT)

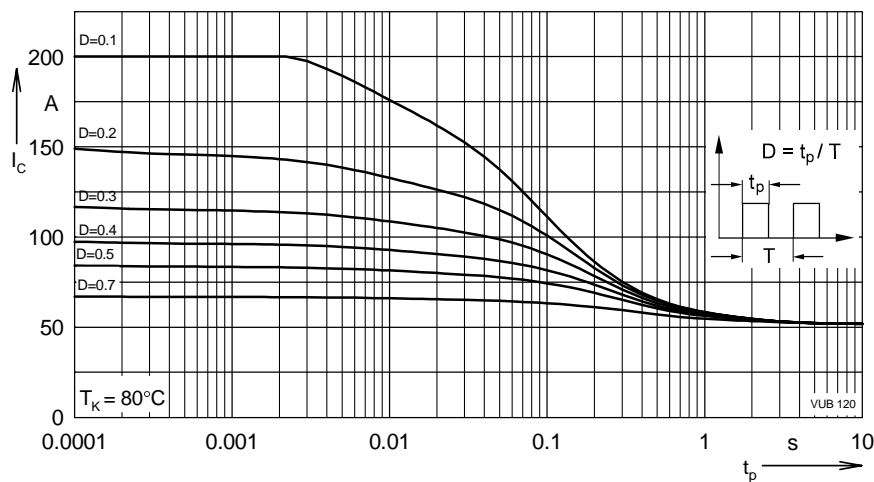


Fig. 6 Collector current dependence on pulse width and duty cycle (IGBT)

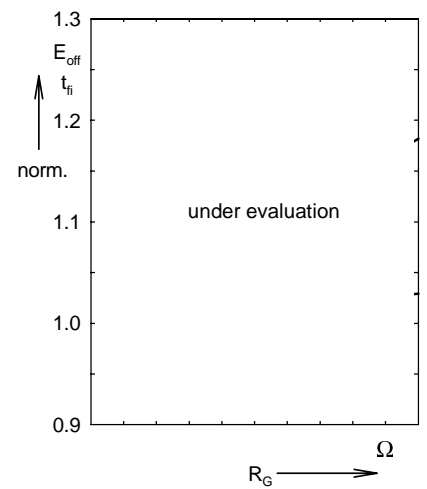


Fig. 7 Turn-off energy per pulse and fall time on R_G (IGBT)

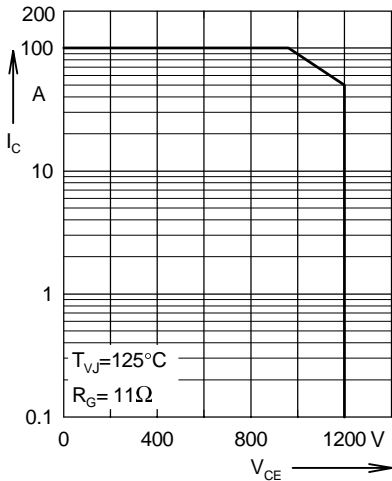


Fig. 8 Reverse biased safe operation area (IGBT)

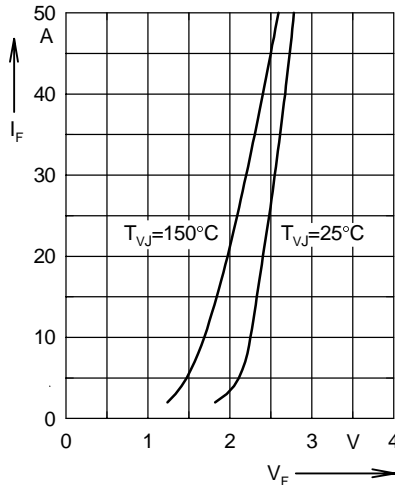


Fig. 9 Forward current versus voltage drop (Fast Diode)

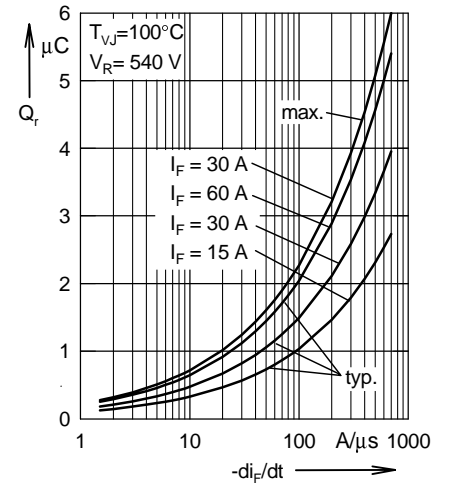


Fig. 10 Recovery charge versus $-di_F/dt$ (Fast Diode)

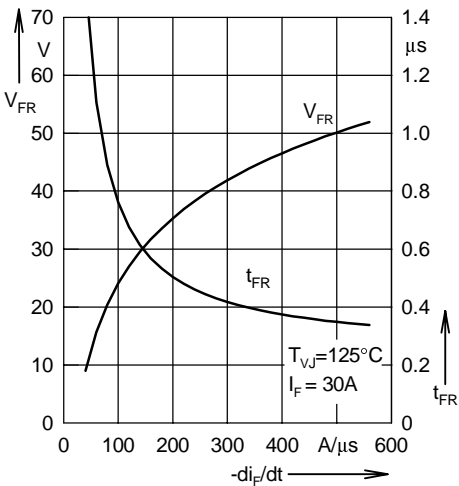


Fig. 11 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

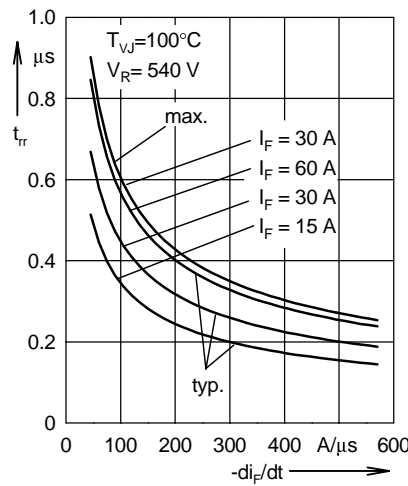


Fig. 12 Recovery time versus $-di_F/dt$ (Fast Diode)

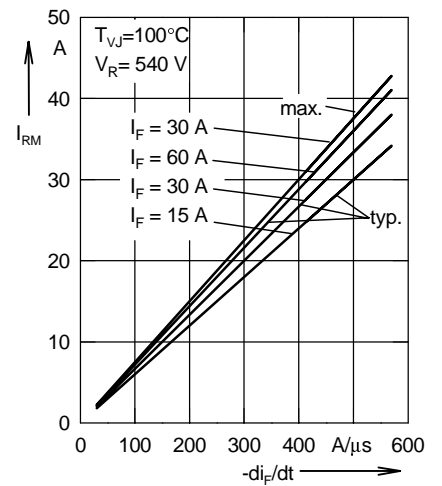


Fig. 13 Peak reverse current versus $-di_F/dt$ (Fast Diode)

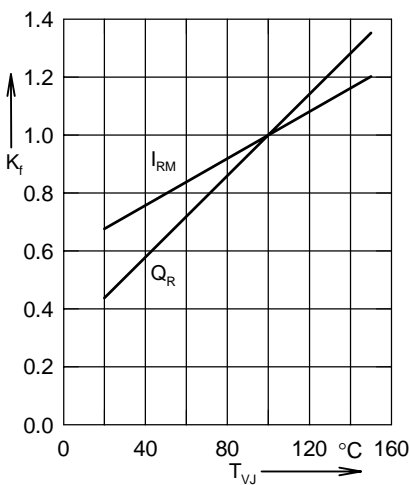


Fig. 14 Dynamic parameters versus junction temperature (Fast Diode)

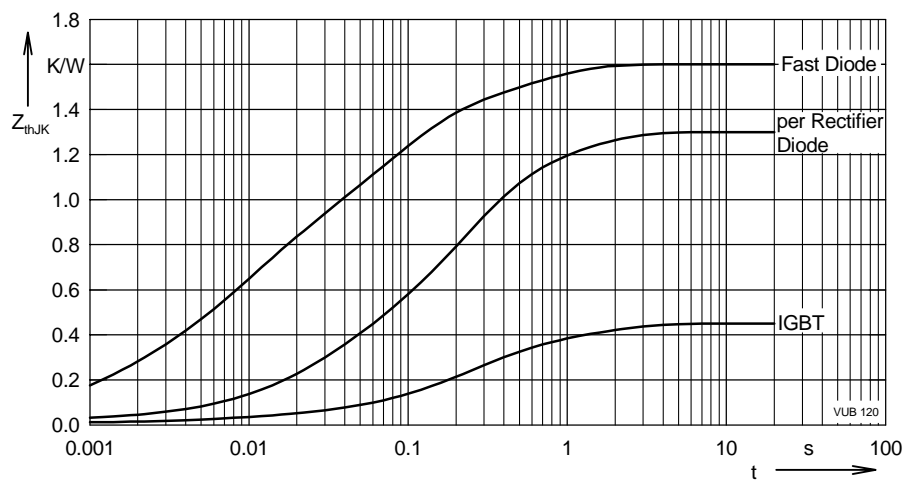


Fig. 15 Transient thermal impedance junction to heatsink Z_{thjK}