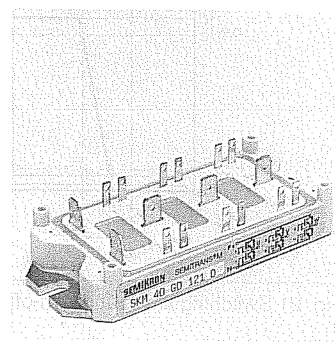
Absolute Maximum Ratings		Values		
Symbol	Conditions [1]	... 101 D	... 121 D	Units
V_{CES}		1000	1200	V
V_{CGR}	R_{GE} = 20 kΩ	1000	1200	V
I_C	T_{case} = 25/80 °C	40/25		A
I_{CM}	T_{case} = 25/80 °C	80/50		A
V_{GES}		± 20		V
P_{tot}	per IGBT, T_{case} = 25 °C	300		W
T_j, T_{stg}		– 55 . . .+150		°C
V_{isol}	AC, 1 min	2 500		V
humidity	DIN 40 040	Class F		
climate	DIN IEC 68 T.1	55/150/56		
Inverse Diode				
I_F= – I_C		40		A
I_{FM}= – I_{CM}		80		A

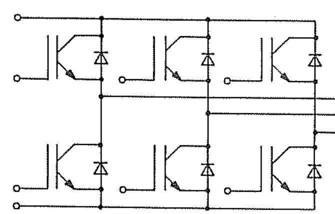
Characteristics					
Symbol	Conditions [1]	min.	typ.	max.	Units
$V_{(BR)CES}$	V_{GE} = 0, I_C = 0,75 mA	≥ V_{CES}	–	–	V
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 2 mA	4,5	5,5	6,5	V
I_{CES}	V_{GE} = 0, V_{CE} = V_{CES}; T_j = 25 °C	–	–	0,75	mA
	T_j = 125 °C	–	–	3	mA
I_{GES}	V_{GE} = 20 V, V_{CE} = 0	–	–	100	nA
V_{CEsat}	V_{GE} = 15 V, I_C = 40 A; T_j = 25 °C	–	3,4	3,8	V
	T_j = 150 °C	–	4,6	5	V
g_{fs}	V_{CE} = 20 V, I_C = 40 A	11	17	–	S
C_{CHC}	per IGBT	–	–	60	pF
C_{ies}	V_{GE} = 0, V_{CE} = 25 V, f = 1 MHz	–	4	–	nF
C_{oes}		–	320	–	pF
C_{res}		–	130	–	pF
L_{CE}		–	–	20	nH
$t_{d(on)}$	V_{CC} = 600 V, I_C = 40 A [3], V_{GE} = 15 V, R_{Gon} = R_{Goff} = 47 Ω, T_j = 125 °C	–	50 [3]	–	ns
t_r		–	110 [3]	–	ns
$t_{d(off)}$		–	200 [3]/200 [4]	–	ns
t_f		–	500 [3]/100 [4]	–	ns
W_{off12} [5]		–	2,4 [4]	–	mWs
W_{off23} [5]		–	1,2 [4]	–	mWs
Inverse Diode SKM 40 GD 101 D					
V_F = V_{EC}	I_F= 40 A, V_{GE} = 0; (T_j=125 °C)	–	2,2 (1,8)	2,6	V
t_{rr}	T_j = 25 °C [2]	–	70	–	ns
	T_j = 125 °C [2]	–	150	–	ns
Q_{rr}	T_j = 25/125 °C [2]	–	1,3/5	–	µC
f_s	f_s = t_f / (t_{rr} – t_f)	–	1 [2]	–	
Inverse Diode SKM 40 GD 121 D					
V_F = V_{EC}	I_F= 40 A, V_{GE} = 0; (T_j=125 °C)	–	2,5 (1,9)	3	V
t_{rr}	T_j = 25 °C [2]	–	–	–	ns
	T_j = 125 °C [2]	–	170	–	ns
Q_{rr}	T_j = 25/125 °C [2]	–	1,5/6	–	µC
f_s	f_s = t_f / (t_{rr} – t_f)	–	1 [2]	–	
Thermal Characteristics					
R_{thjc}	per IGBT	–	–	0,4	°C/W
R_{thjc}	per diode	–	–	1,0	°C/W
R_{thch}	per module	–	–	0,05	°C/W

Cases and mechanical data see page B 6 – 94

1) T_{case} = 25 °C, unless otherwise specified
2) I_F = – I_C, V_R = 600 V, – di_F/dt = 800 A/µs, V_{GE} = 0
3) resistive load
4) inductive load
5) see fig. 21; R_{Goff} = 9,5 Ω

SEMITRANS® M
IGBT Modules
SKM 40 GD 101 D
SKM 40 GD 121 D



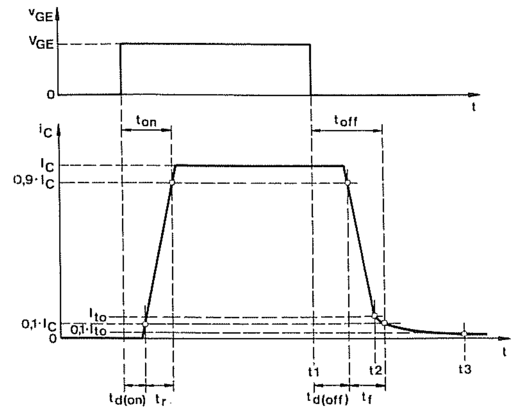


Features

- MOS input (voltage controlled)
- N channel
- Short internal connections avoid oscillations
- Low saturation voltage
- Very low tail current
- Low temperature sensitivity
- High short circuit capability
- No latch-up
- Fast inverse diodes
- Isolated copper baseplate
- Large clearances and creepage distances
- UL recognized, file no. E 63 532

Typical Applications

- DC servo and robot drives
- Self-commutated inverters
- AC motor speed control
- Uninterruptible power supplies
- General power switching applications
- Pulse frequencies above 15 kHz



$$W_{off\ 12} = \int_{t_1}^{t_2} i_C \cdot V_{CE} \cdot dt$$

$$W_{off\ 23} = \int_{t_2}^{t_3} i_C \cdot V_{CE} \cdot dt$$

Fig. 21 Switching times and turn-off energies

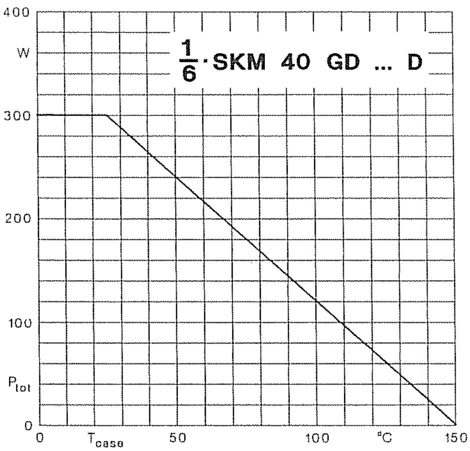


Fig. 22 Rated power dissipation vs. temperature

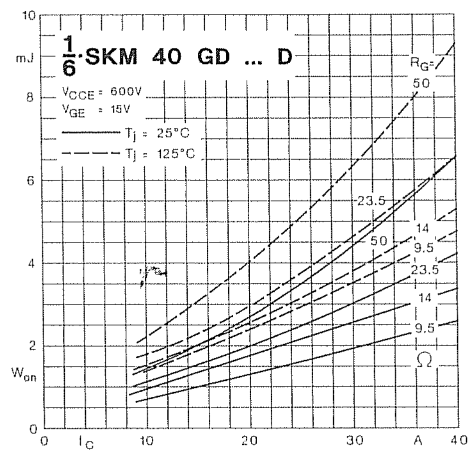


Fig. 23 Turn-on energy dissipation per pulse

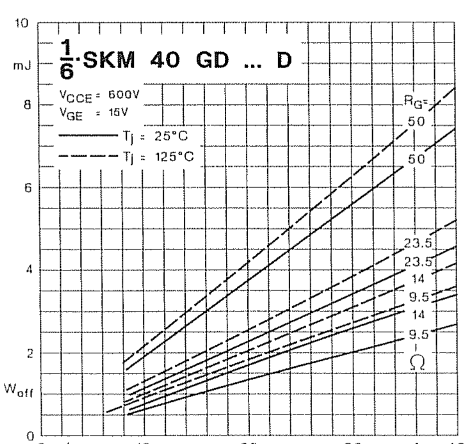


Fig. 24 Turn-off energy dissipation per pulse

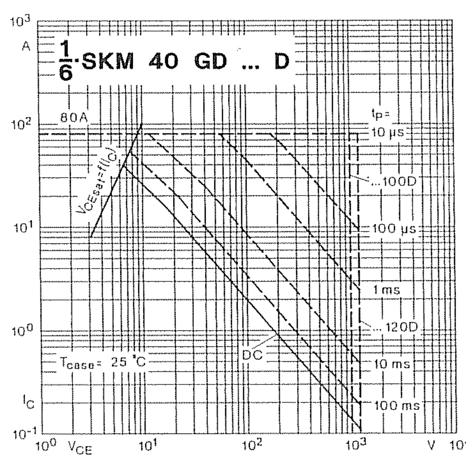


Fig. 25 Maximum safe operating area

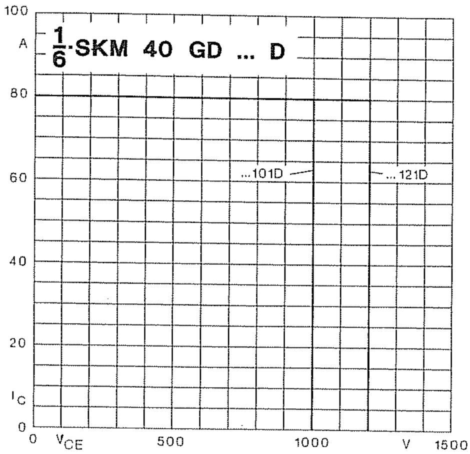


Fig. 26 Turn-off safe operating area

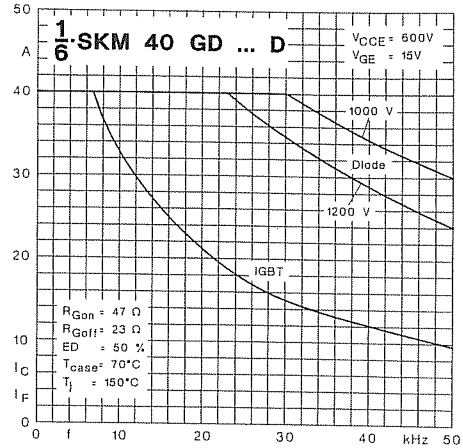


Fig. 27 Rated current vs. pulse frequency

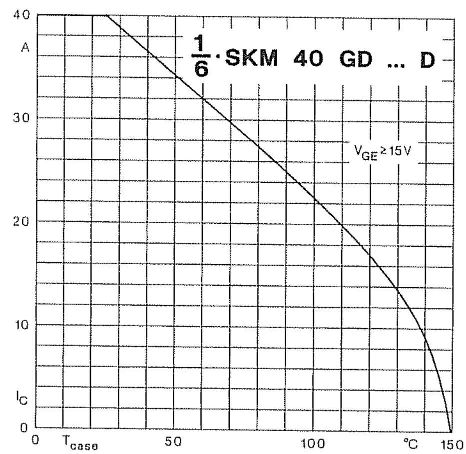


Fig. 28 Rated current vs. temperature

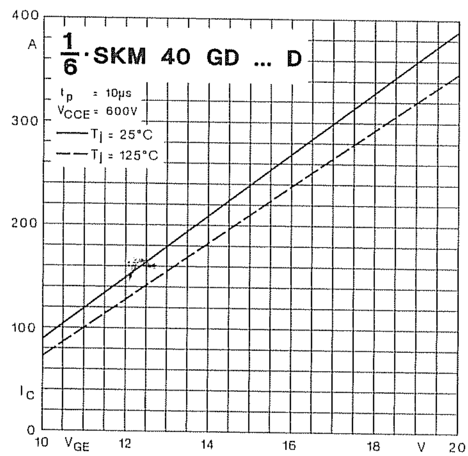


Fig. 29 Short-circuit current vs. turn-on gate voltage

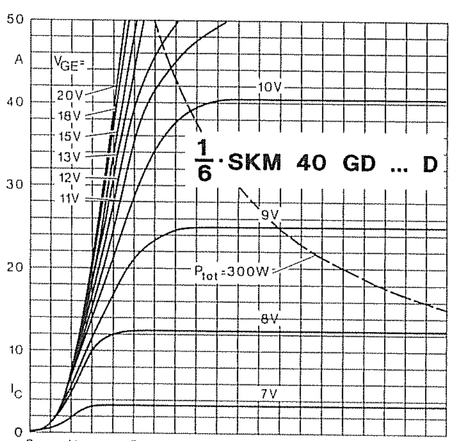


Fig. 30 Output characteristic

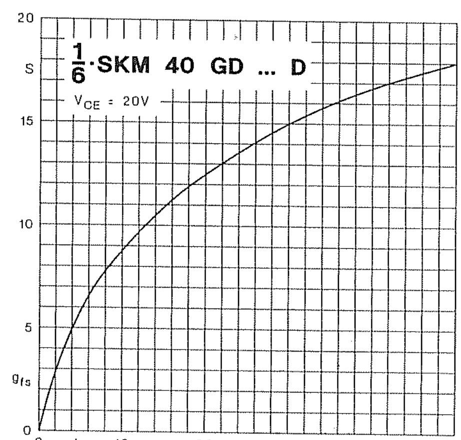


Fig. 31 Forward transconductance

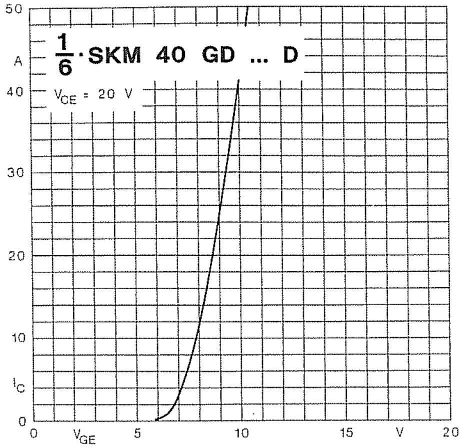


Fig. 32 Transfer characteristic

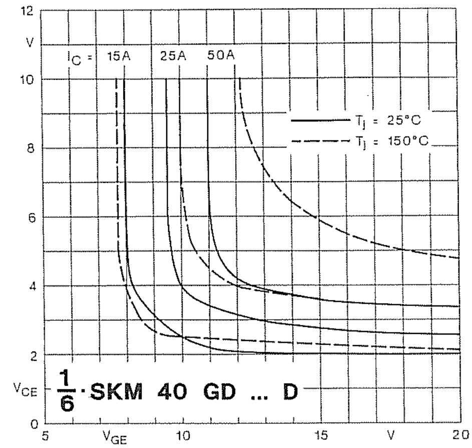


Fig. 33 Saturation characteristics

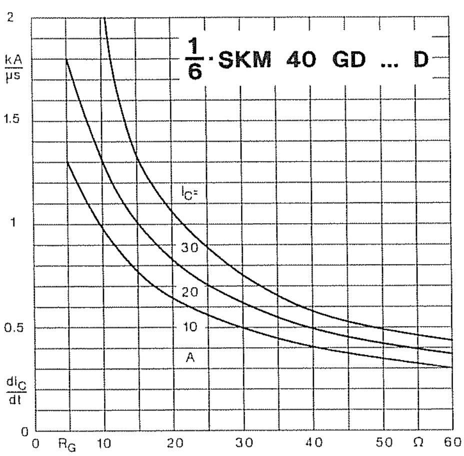


Fig. 34 Rate of rise of collector current

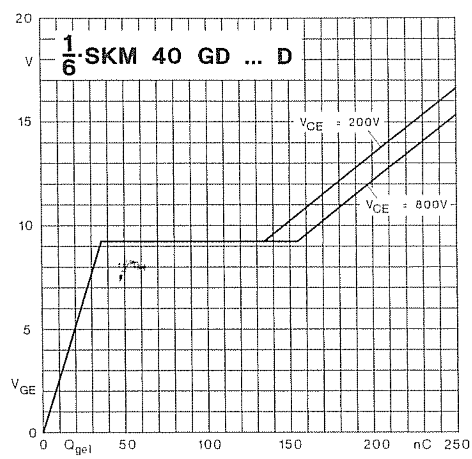


Fig. 35 Gate charge characteristic

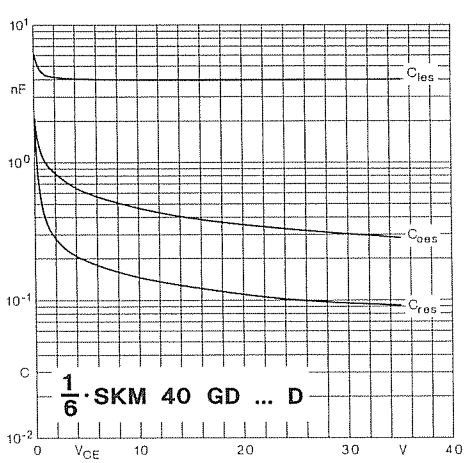


Fig. 36 Capacitances vs. collector-emitter voltage

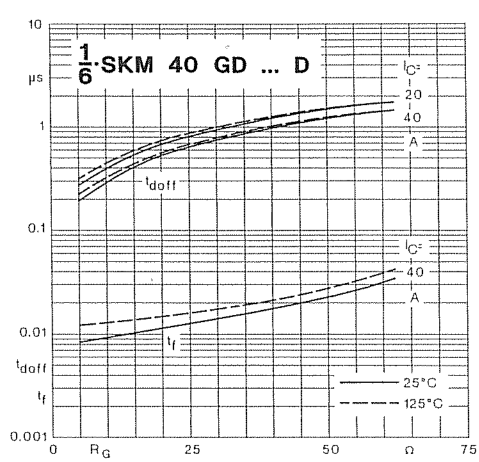


Fig. 37 Switching times vs. gate resistor

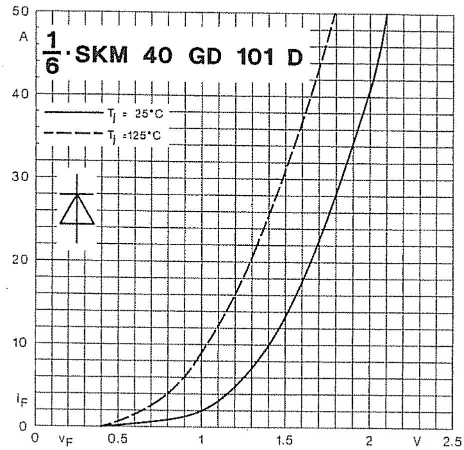


Fig. 38 a Diode forward characteristic

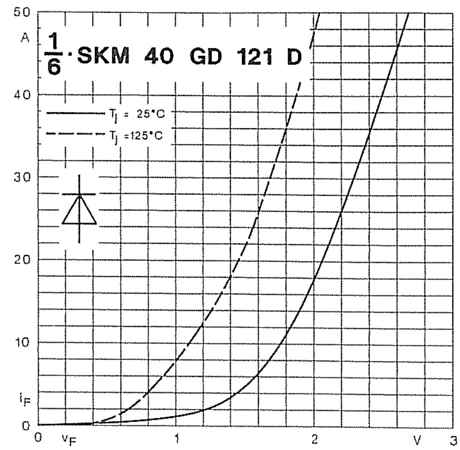


Fig. 38 b Diode forward characteristic

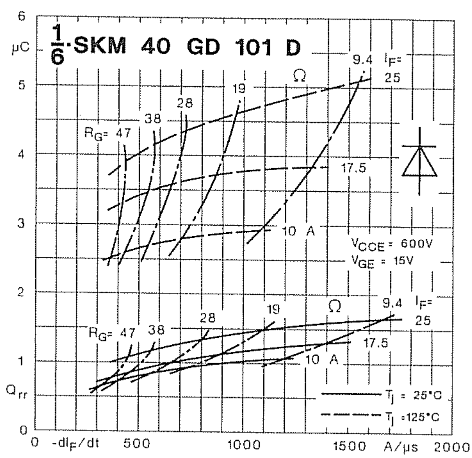


Fig. 39 a Diode recovered charge

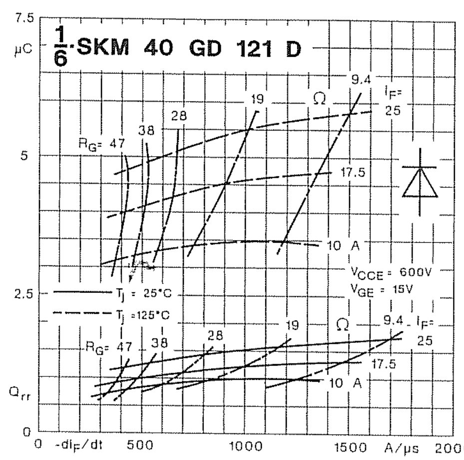


Fig. 39 b Diode recovered charge

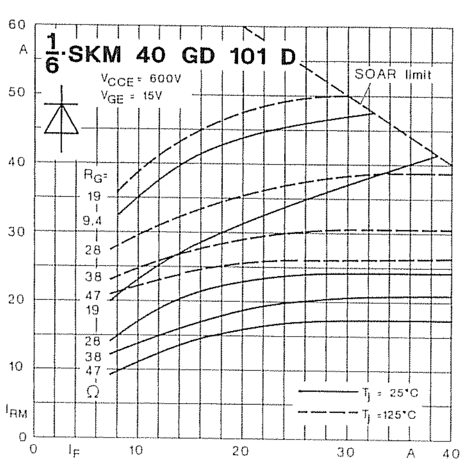


Fig. 40 a Diode peak reverse recovery current (I_F)

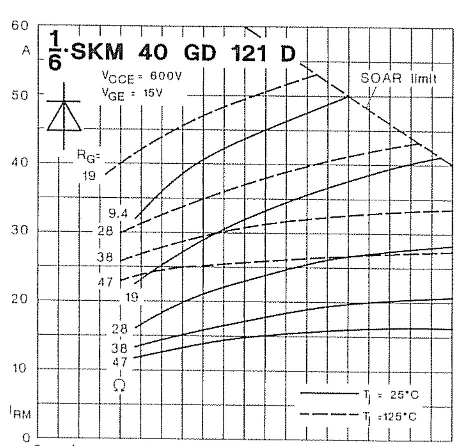


Fig. 40 b Diode peak reverse recovery current (I_F)

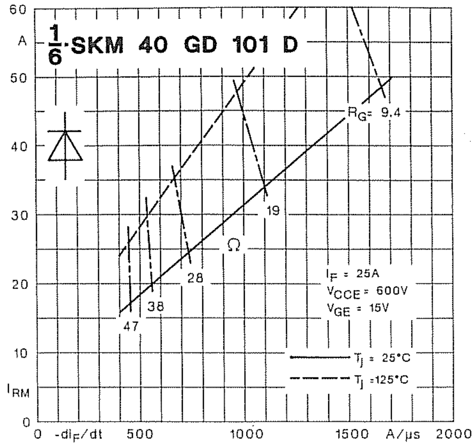


Fig. 41 a Diode peak reverse recovery current (-di_F/dt)

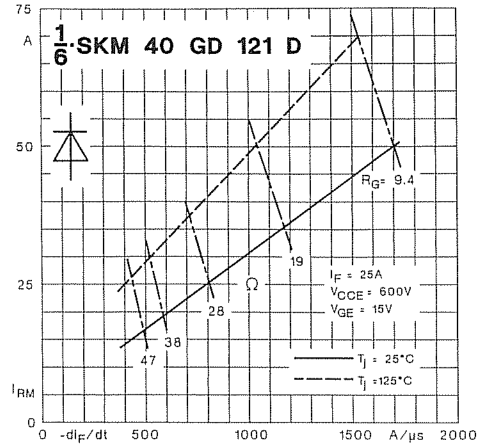


Fig. 41 b Diode peak reverse recovery current (-di_F/dt)

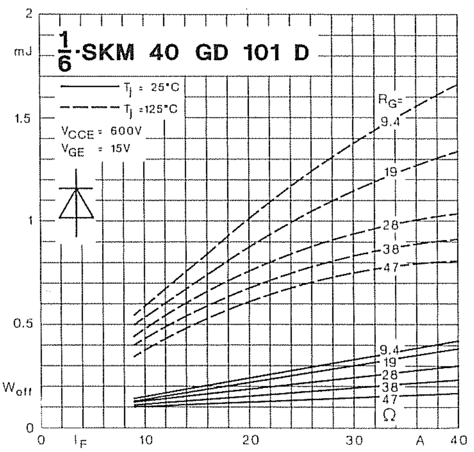


Fig. 42 a Diode turn-off energy dissipation per pulse

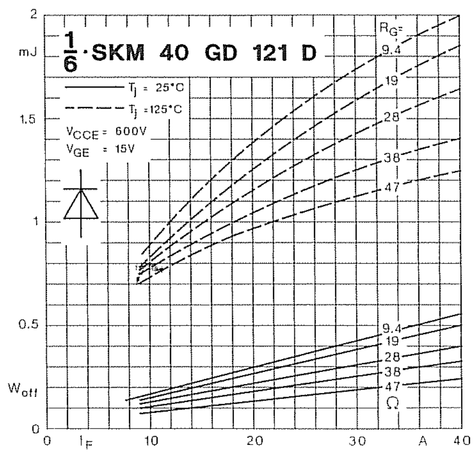


Fig. 42 b Diode turn-off energy dissipation per pulse

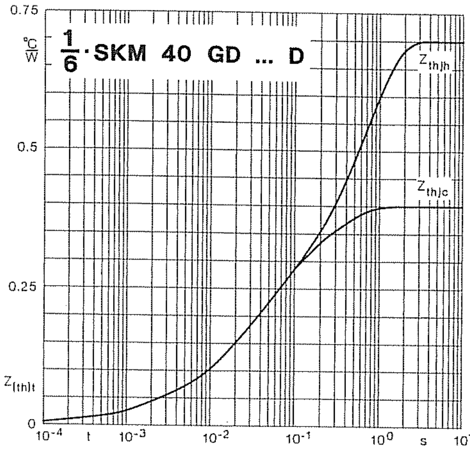


Fig. 51 Transient thermal impedance

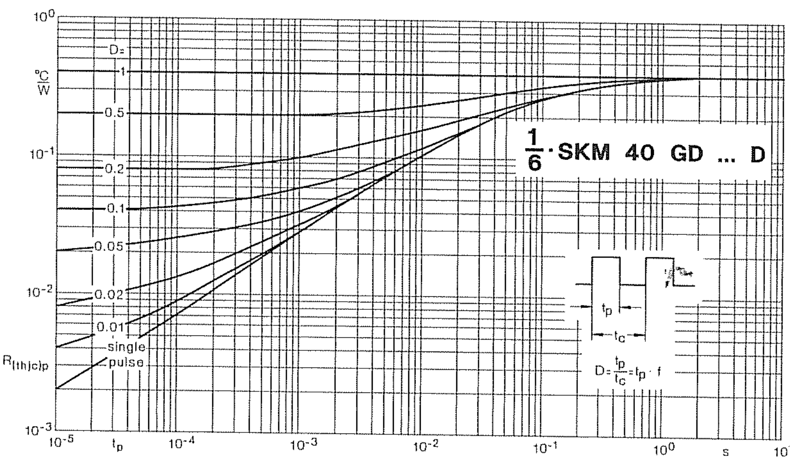


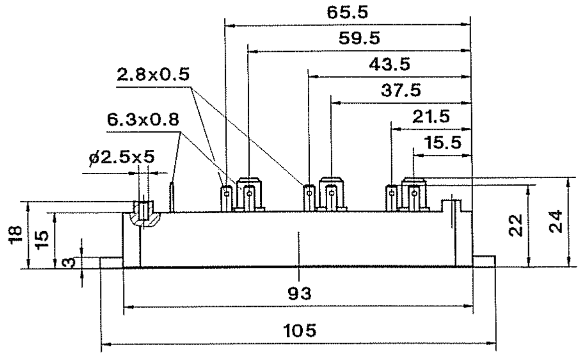
Fig. 52 Thermal impedance under pulse conditions

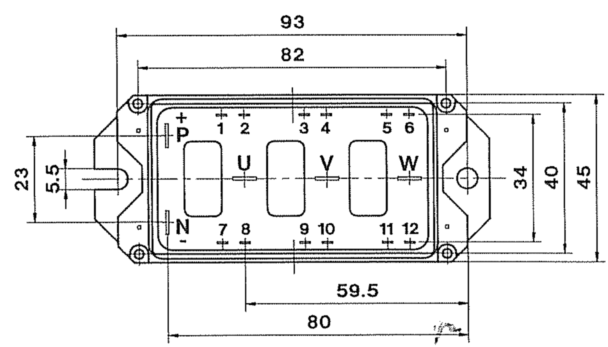
SKM 40 GD 101 D

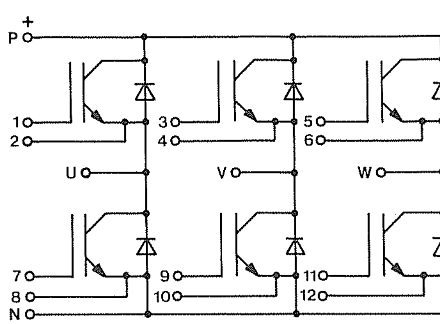
SKM 40 GD 121 D

Case D 28

UL recognized, file no. E 63 532







Dimensions in mm

Mechanical Data Symbol	Conditions	Values min.	 typ.	 max.	Units
M_1	to heatsink, SI Units	4	–	6	Nm
	to heatsink, US Units	35	–	53	lb.in.
a		–	–	5x9,81	m/s^2
w		–	–	190	g

This is an electrostatic discharge sensitive device (ESDS). Please observe the international standard IEC 747-1, Chapter IX.