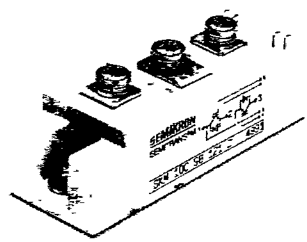
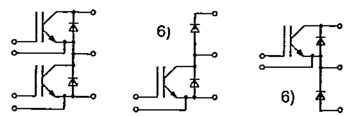
SEMIKRON

SEMITRANS® M IGBT Modules

SKM 100 GB 101 D, 102 D
SKM 100 GAL 101D, 102 D [6)]
SKM 100 GAR 101 D [6)]
SKM 100 GB 121 D, 122 D
SKM 100 GAL 121 D, 122 D [6)]
SKM 100 GAR 121 D, 122 D [6)]

T-39-31





GB GAL GAR

Absolute Maximum Ratings

Symbol	Conditions [1)]	Values ... 101 D / ... 102 D	Values ... 121 D / ... 122 D	Units
V_{CES}		1000	1200	V
V_{CGR}	R_{GE} = 20 kΩ	1000	1200	V
I_C	T_{case} = 25/80 °C	100/75		A
I_{CM}	T_{case} = 25/80 °C	200/150		A
V_{GES}		± 20		V
P_{tot}	per IGBT, T_{case} = 25 °C	625		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		100		A
I_{FM} = – I_{CM}		200		A

Characteristics

Symbol	Conditions [1)]	min.	typ.	max.	Units
$V_{(BR)CES}$	V_{GE} = 0, I_C = 1,4 mA	≥ V_{CES}	–	–	V
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 5 mA	4,5	5,5	6,5	V
I_{CES}	V_{GE} = 0 } T_j = 25 °C	–	–	1,4	mA
	V_{CE} = V_{CES} } T_j = 125 °C	–	–	–	mA
I_{GES}	V_{GE} = 20 V, V_{CE} = 0	–	–	100	nA
V_{CEsat}	V_{GE} = 15 V } T_j = 25 °C	–	3,5	4	V
	I_C = 100 A } T_j = 150 °C	–	4	4,8	V
g_{fs}	V_{CE} = 20 V, I_C = 100 A	33	48	–	S
C_{CHC}	per IGBT	–	–	200	pF
C_{ies}	} V_{GE} = 0	–	11	–	nF
C_{oes}	} V_{CE} = 25 V	–	850	–	pF
C_{res}	} f = 1 MHz	–	350	–	pF
L_{CE}		–	–	80	nH
$t_{d(on)}$	} V_{CC} = 600 V	–	100 [3)]	–	ns
t_r	} V_{GE} = 15 V	–	240 [3)]	–	ns
$t_{d(off)}$	} I_C = 100 A	–	350 [3)]/350 [4)]	–	ns
t_f	} R_{Gon} = R_{Goff} = 3,3 Ω	–	300 [3)]/100 [4)]	–	ns
W_{off12} [5)]	} T_j = 125 °C	–	6,5 [4)]	–	mWs
W_{off23} [5)]		–	3,3 [4)]	–	mWs
Inverse Diode ...101 D, ...102 D					
V_F = V_{EC}	I_F= 100 A,V_{GE}=0;(T_j=125 °C)	–	2,0 (1,8)	2,8	V
t_{rr}	T_j = 25 °C [2)]	–	–	–	ns
	T_j = 125 °C [2)]	–	250	–	ns
Q_{rr}	T_j = 25/125 °C [2)]	–	3/13,5	–	µC
f_s	f_s = t_f / (t_{rr} – t_f)	–	1 [2)]	–	
Inverse Diode ...121 D, ...122 D					
V_F = V_{EC}	I_F= 100 A,V_{GE}=0;(T_j=125 °C)	–	2,8 (2,1)	3,3	V
t_{rr}	T_j = 25 °C [2)]	–	–	–	ns
	T_j = 125 °C [2)]	–	300	–	ns
Q_{rr}	T_j = 25/125 °C [2)]	–	3,5/15	–	µC
f_s	f_s = t_f / (t_{rr} – t_f)	–	1 [2)]	–	
Thermal Characteristics					
R_{thjc}	per IGBT	–	–	0,2	°C/W
R_{thjc}	per diode	–	–	0,75	°C/W
R_{thch}	per module, ...101D, ...121D	–	–	0,05	°C/W
	per module, ...102D, ...122D	–	–	0,038	°C/W

Cases and mechanical data see page B 6 – 118

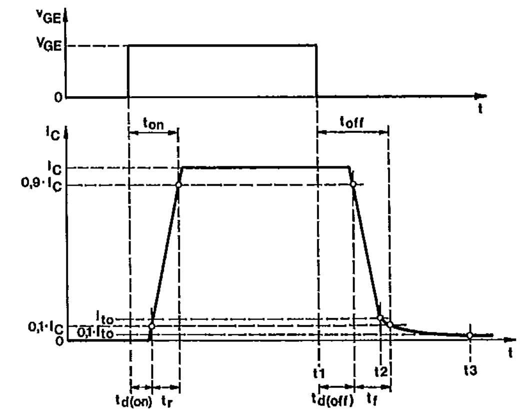
Features

- MOS input (voltage controlled)
- N channel
- 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

→ page B 6 – 103

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} = 4,7 Ω
6) The free-wheeling diodes of the GAL and GAR types have the data of the inverse diodes of SKM 150 ...



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

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

Fig. 21 Switching times and turn-off energies

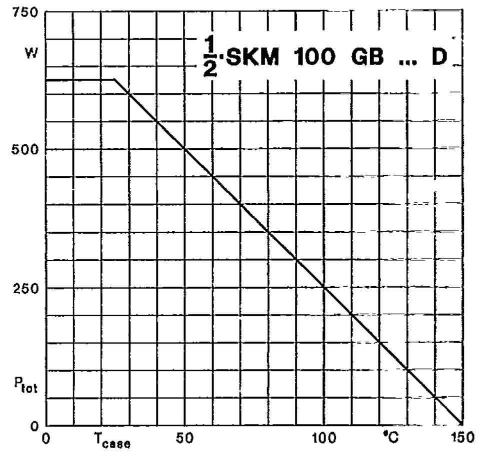


Fig. 22 Rated power dissipation vs. temperature

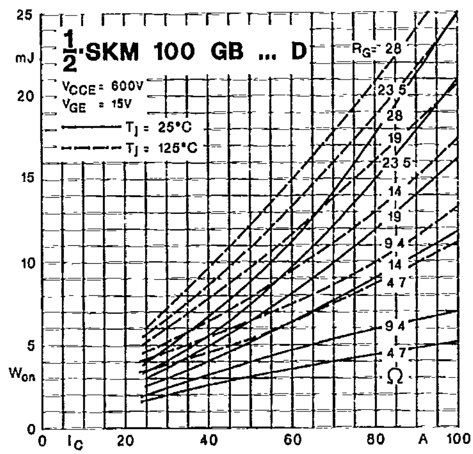


Fig. 23 Turn-on energy dissipation per pulse

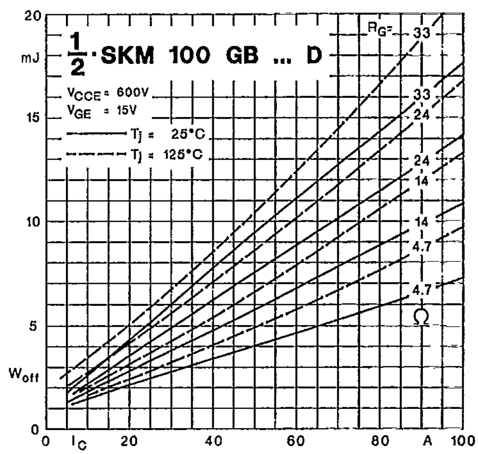


Fig. 24 Turn-off energy dissipation per pulse

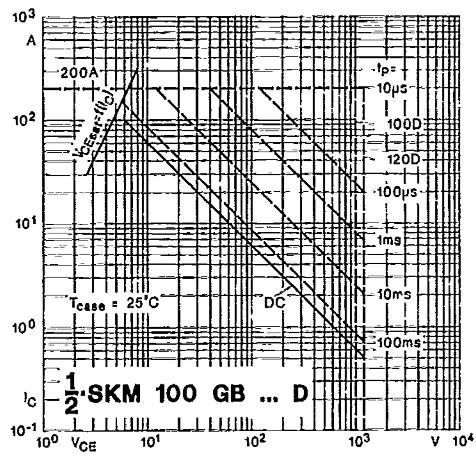


Fig. 25 Maximum safe operating area

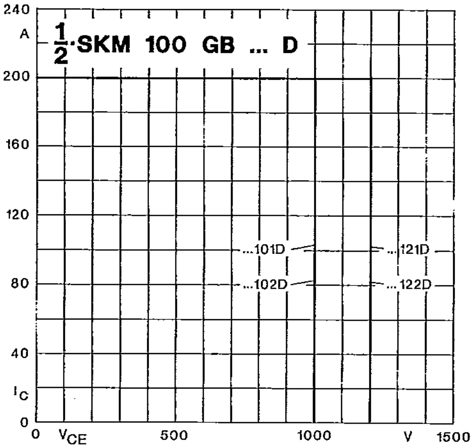


Fig. 26 Turn-off safe operating area

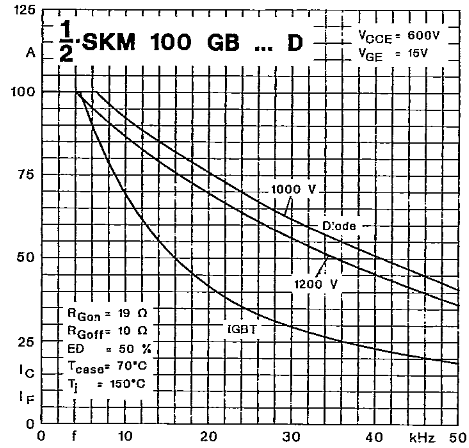


Fig. 27 Rated current vs. pulse frequency

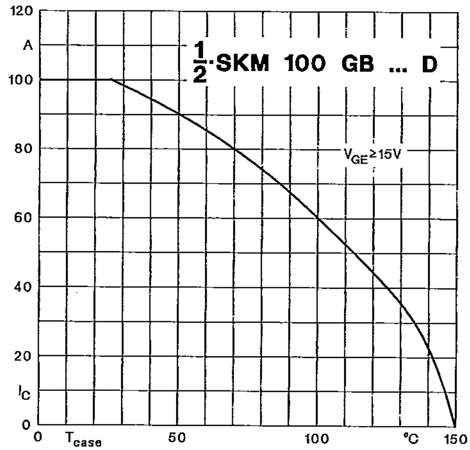


Fig. 28 Rated current vs. temperature

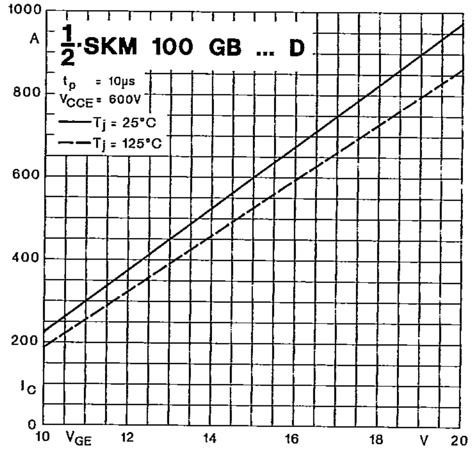


Fig. 29 Short-circuit current vs. turn-on gate voltage

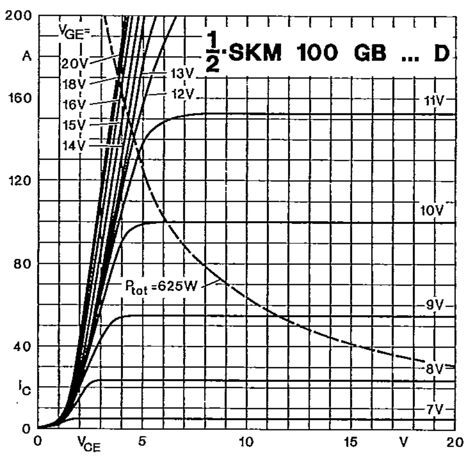


Fig. 30 Output characteristic

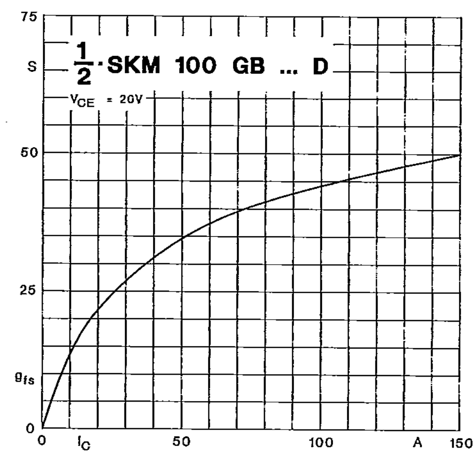


Fig. 31 Forward transconductance

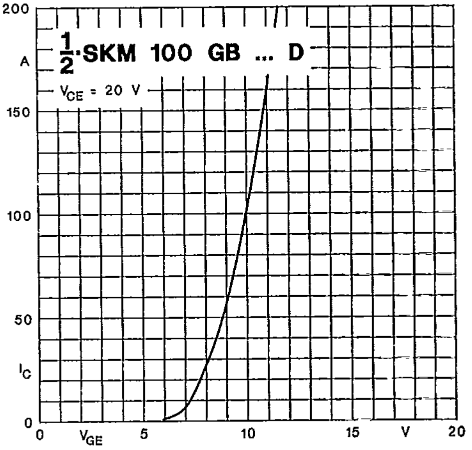


Fig. 32 Transfer characteristic

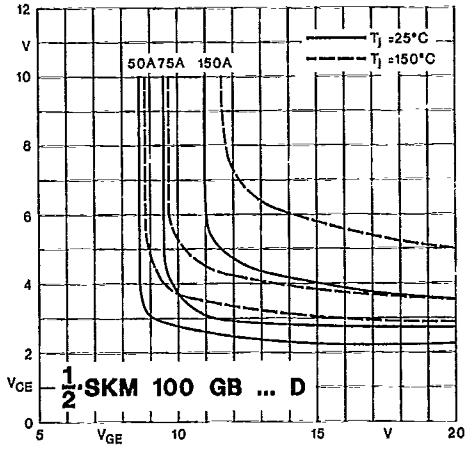


Fig. 33 Saturation characteristics

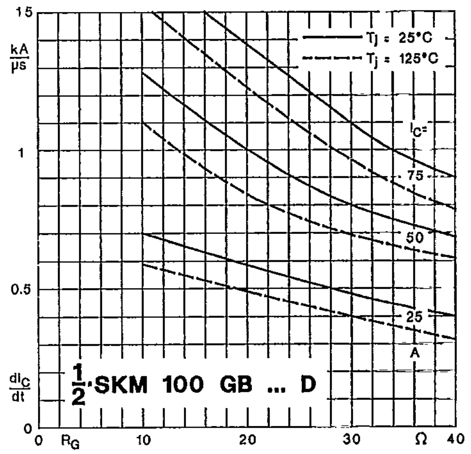


Fig. 34 Rate of rise of collector current

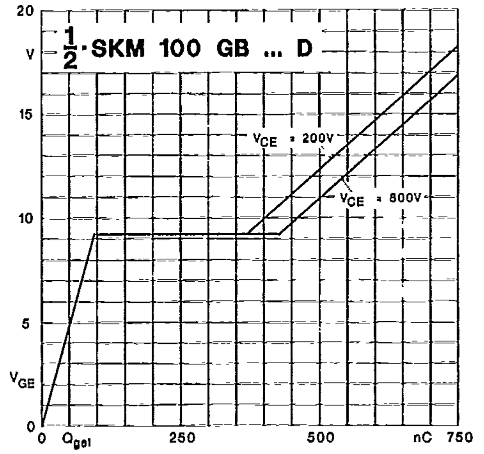


Fig. 35 Gate charge characteristic

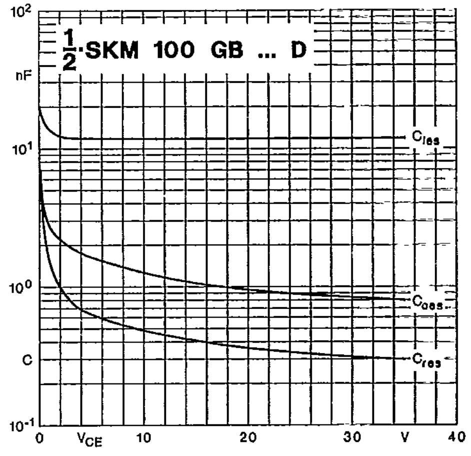


Fig. 36 Capacitances vs. collector-emitter voltage

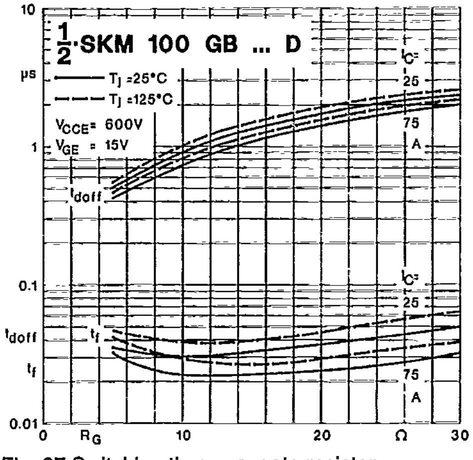


Fig. 37 Switching times vs. gate resistor

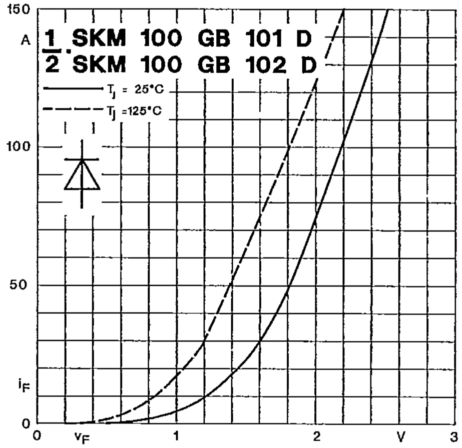


Fig. 38 a Diode forward characteristic

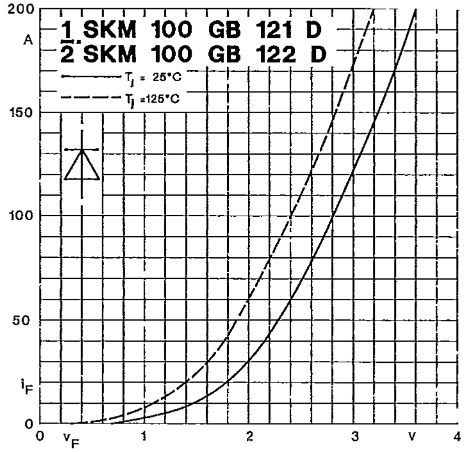


Fig. 38 b Diode forward characteristic

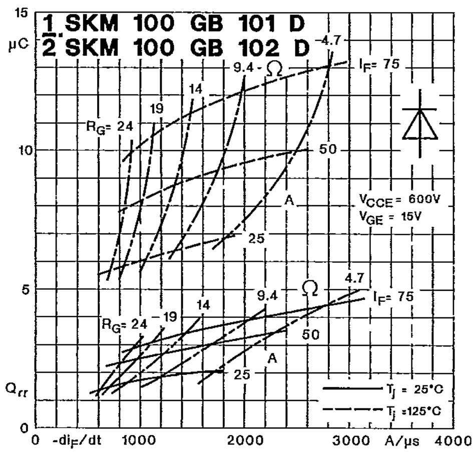


Fig. 39 a Diode recovered charge

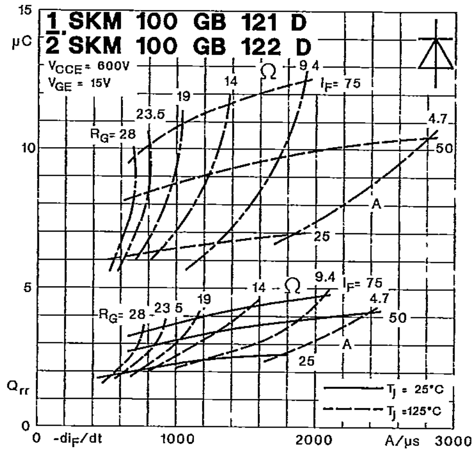


Fig. 39 b Diode recovered charge

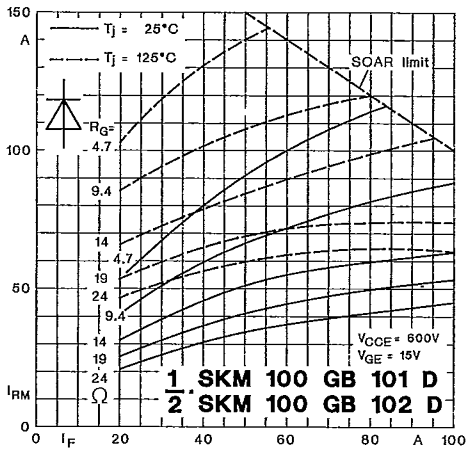


Fig. 40 a Diode peak reverse recovery current (I_F)

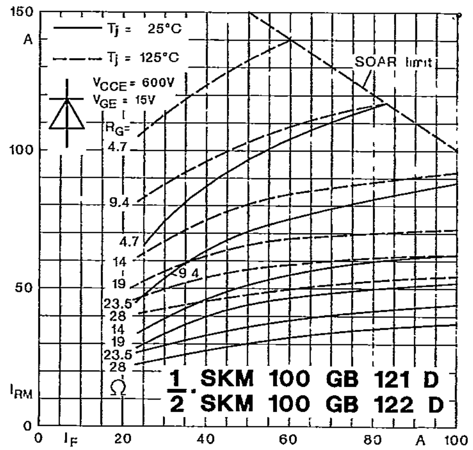


Fig. 40 b Diode peak reverse recovery current (I_F)

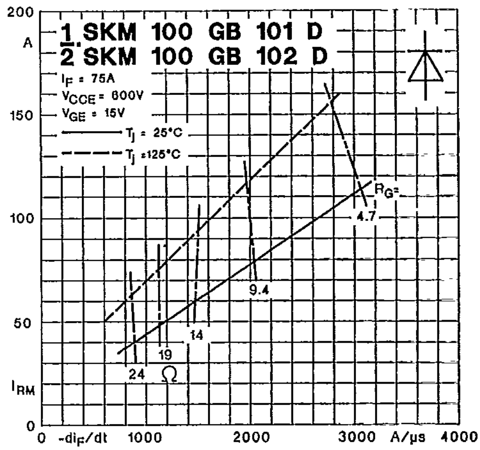


Fig. 41 a Diode peak reverse recovery current (-di$_F$/dt)

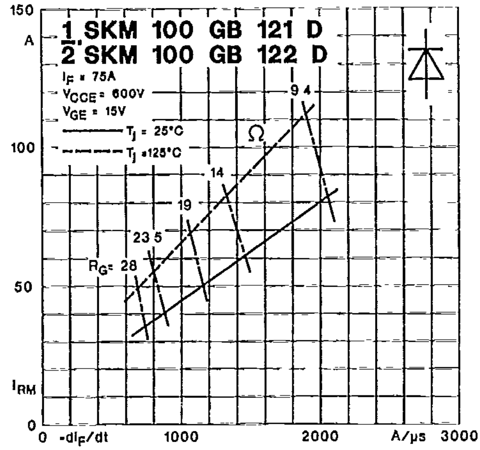


Fig. 41 b Diode peak reverse recovery current (-di$_F$/dt)

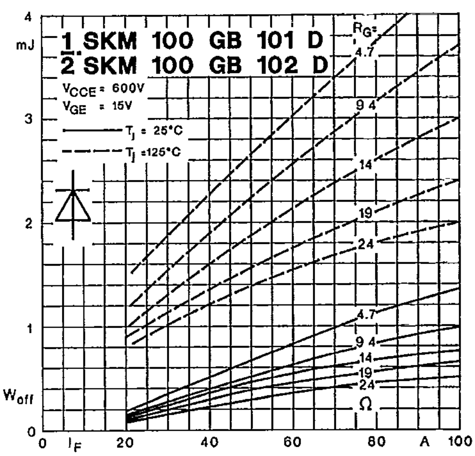


Fig. 42 a Diode turn-off energy dissipation per pulse

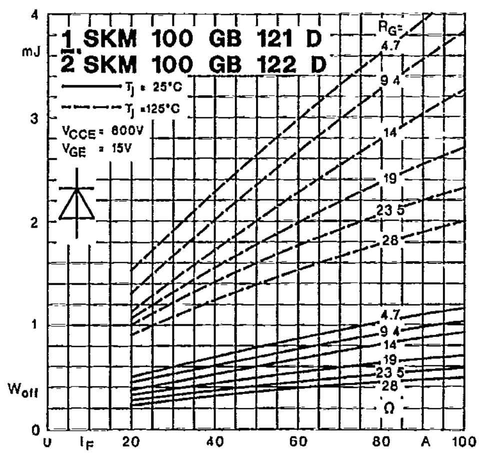


Fig. 42 b Diode turn-off energy dissipation per pulse

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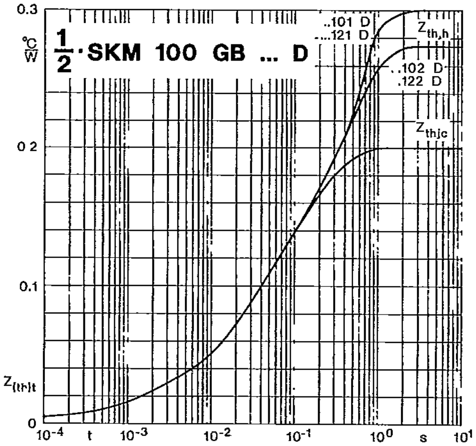


Fig. 51 Transient thermal impedance

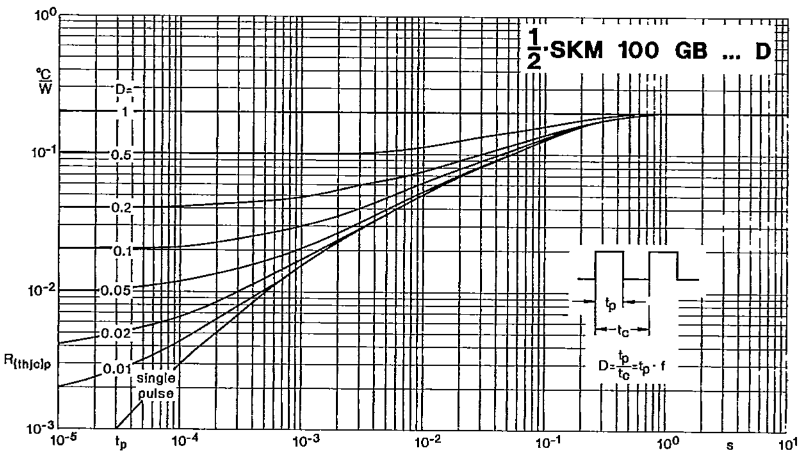
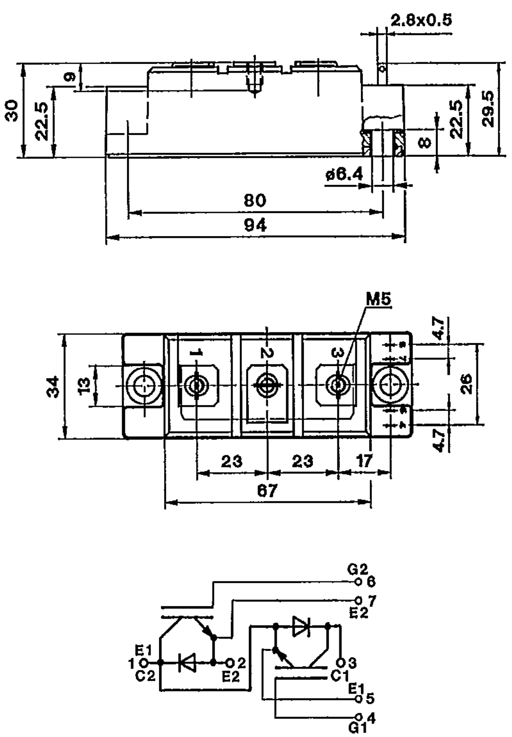


Fig. 52 Thermal impedance under pulse conditions

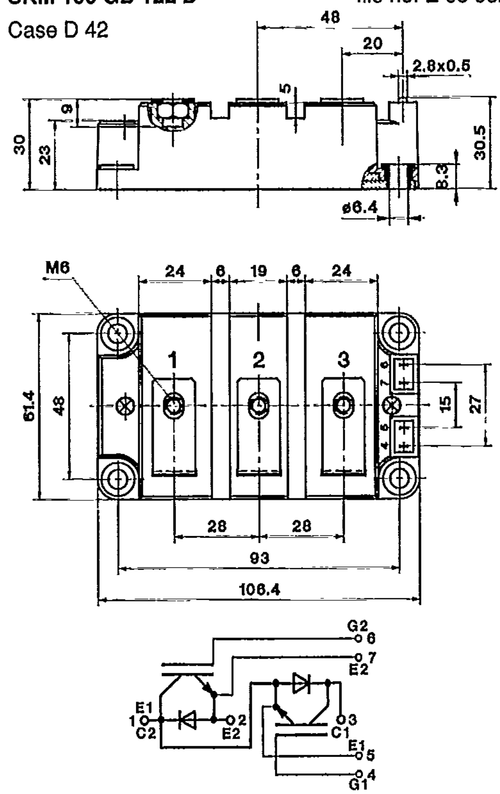
SKM 100 GB 101 D
SKM 100 GB 121 D
Case D 27

UL recognized,
file no. E 63 532



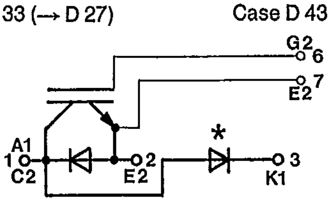
SKM 100 GB 102 D
SKM 100 GB 122 D
Case D 42

UL recognized,
file no. E 63 532



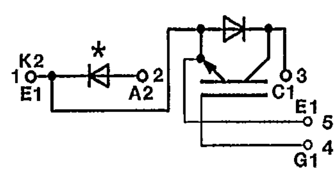
SKM 100 GAL 101 D
SKM 100 GAL 121 D
Case D 33 (→ D 27)

SKM 100 GAL 102 D
SKM 100 GAL 122 D
Case D 43 (→ D 42)



SKM 100 GAR 101 D
SKM 100 GAR 121 D
Case D 34 (→ D 27)

SKM 100 GAR 122 D
Case D 44 (→ D 42)



Mechanical Data

Symbol	Conditions	Values min.	Values typ.	Values max.	Units
M_1	to heatsink, SI Units	3	–	6	Nm
	to heatsink, US Units	27	–	53	lb.in.
M_2	for terminals, SI Units	2,5	–	5	Nm
	for terminals US Units	22	–	44	lb.in.
a		–	–	5x9,81	m/s^2
w	... 101 D, 121 D	–	–	250	g
	... 102 D, 122 D	–	–	420	g

*The free-wheeling diode has the data of the inverse diode of SKM 150 ...

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

Dimensions in mm