

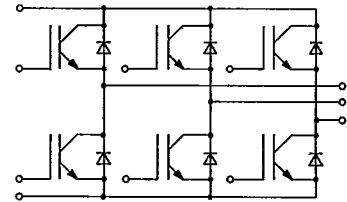
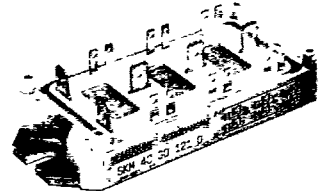
Absolute Maximum Ratings		Values		Units
Symbol	Conditions <sup>1)</sup>	... 101 D	... 121 D	
V <sub>CES</sub>		1000	1200	V
V <sub>CGR</sub>	R <sub>GE</sub> = 20 kΩ	1000	1200	V
I <sub>C</sub>	T <sub>case</sub> = 25/80 °C		40/25	A
I <sub>CM</sub>	T <sub>case</sub> = 25/80 °C		80/50	A
V <sub>GES</sub>			± 20	V
P <sub>tot</sub>	per IGBT, T <sub>case</sub> = 25 °C		300	W
T <sub>J</sub> , T <sub>stg</sub>		- 55 ... +150		°C
V <sub>isol</sub>	AC, 1 min		2 500	V
humidity	DIN 40 040		Class F	
climate	DIN IEC 68 T.1		55/150/56	
Inverse Diode				
I <sub>F</sub> = - I <sub>C</sub>			40	A
I <sub>FM</sub> = - I <sub>CM</sub>			80	A

## SEMITRANS® M IGBT Modules

SKM 40 GD 101 D

SKM 40 GD 121 D

T.39-31



Characteristics		Values			Units
Symbol	Conditions <sup>1)</sup>	min.	typ.	max.	
V <sub>(BR)CES</sub>	V <sub>GE</sub> = 0, I <sub>C</sub> = 0,75 mA	≥ V <sub>CES</sub>	-	-	V
V <sub>GE(th)</sub>	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 2 mA	4,5	5,5	6,5	V
I <sub>CES</sub>	V <sub>GE</sub> = 0	-	-	0,75	mA
	V <sub>CE</sub> = V <sub>CES</sub>	-	-	3	
I <sub>GES</sub>	V <sub>GE</sub> = 20 V, V <sub>CE</sub> = 0	-	-	100	nA
V <sub>CEsat</sub>	V <sub>GE</sub> = 15 V	-	3,4	3,8	V
	I <sub>C</sub> = 40 A	-	4,6	5	
g <sub>fs</sub>	V <sub>CE</sub> = 20 V, I <sub>C</sub> = 40 A	11	17	-	S
per IGBT					
C <sub>CHC</sub>	V <sub>GE</sub> = 0	-	-	60	pF
C <sub>ies</sub>	V <sub>CE</sub> = 25 V	-	4	-	nF
C <sub>oes</sub>	f = 1 MHz	-	320	-	pF
C <sub>res</sub>		-	130	-	pF
L <sub>CE</sub>		-	-	20	nH
t <sub>d(on)</sub>	V <sub>CC</sub> = 600 V I <sub>C</sub> = 40 A <sup>3)</sup> V <sub>GE</sub> = 15 V R <sub>Gon</sub> = R <sub>Goff</sub> = 47 Ω T <sub>J</sub> = 125 °C	-	50 <sup>3)</sup>	-	ns
t <sub>r</sub>		-	110 <sup>3)</sup>	-	ns
t <sub>d(off)</sub>		-	200 <sup>3)</sup> /200 <sup>4)</sup>	-	ns
t <sub>f</sub>		-	500 <sup>3)</sup> /100 <sup>4)</sup>	-	ns
W <sub>off12</sub> <sup>5)</sup>		-	2,4 <sup>4)</sup>	-	mWs
W <sub>off23</sub> <sup>5)</sup>	-	1,2 <sup>4)</sup>	-	mWs	
Inverse Diode SKM 40 GD 101 D					
V <sub>F</sub> = V <sub>EC</sub>	I <sub>F</sub> = 40 A, V <sub>GE</sub> = 0; (T <sub>J</sub> = 125 °C)	-	2,2 (1,8)	2,6	V
t <sub>rr</sub>	T <sub>J</sub> = 25 °C <sup>2)</sup>	-	70	-	ns
	T <sub>J</sub> = 125 °C <sup>2)</sup>	-	150	-	ns
Q <sub>rr</sub>	T <sub>J</sub> = 25/125 °C <sup>2)</sup>	-	1,3/5	-	μC
f <sub>s</sub>	f <sub>s</sub> = t <sub>f</sub> / (t <sub>rr</sub> - t <sub>f</sub> )	-	1 <sup>2)</sup>	-	
Inverse Diode SKM 40 GD 121 D					
V <sub>F</sub> = V <sub>EC</sub>	I <sub>F</sub> = 40 A, V <sub>GE</sub> = 0; (T <sub>J</sub> = 125 °C)	-	2,5 (1,9)	3	V
t <sub>rr</sub>	T <sub>J</sub> = 25 °C <sup>2)</sup>	-	-	-	ns
	T <sub>J</sub> = 125 °C <sup>2)</sup>	-	170	-	ns
Q <sub>rr</sub>	T <sub>J</sub> = 25/125 °C <sup>2)</sup>	-	1,5/6	-	μC
f <sub>s</sub>	f <sub>s</sub> = t <sub>f</sub> / (t <sub>rr</sub> - t <sub>f</sub> )	-	1 <sup>2)</sup>	-	
Thermal Characteristics					
R <sub>thjc</sub>	per IGBT	-	-	0,4	°C/W
R <sub>thjc</sub>	per diode	-	-	1,0	°C/W
R <sub>thch</sub>	per module	-	-	0,05	°C/W

### 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

Cases and mechanical data see page B 6 – 94

<sup>1)</sup> T<sub>case</sub> = 25 °C, unless otherwise specified  
<sup>2)</sup> I<sub>F</sub> = - I<sub>C</sub>, V<sub>R</sub> = 600 V, - di<sub>F</sub>/dt = 800 A/μs, V<sub>GE</sub> = 0

<sup>3)</sup> resistive load  
<sup>4)</sup> inductive load  
<sup>5)</sup> see fig. 21; R<sub>Goff</sub> = 9,5 Ω

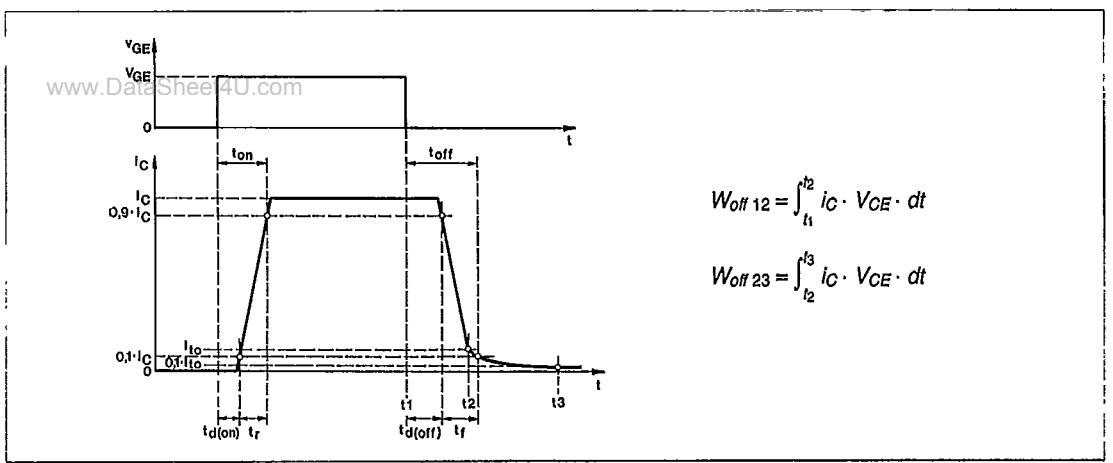


Fig. 21 Switching times and turn-off energies

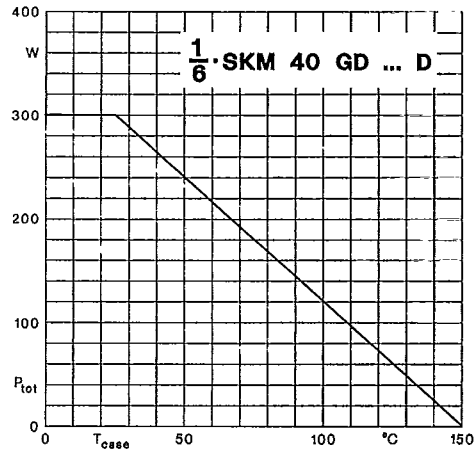


Fig. 22 Rated power dissipation vs. temperature

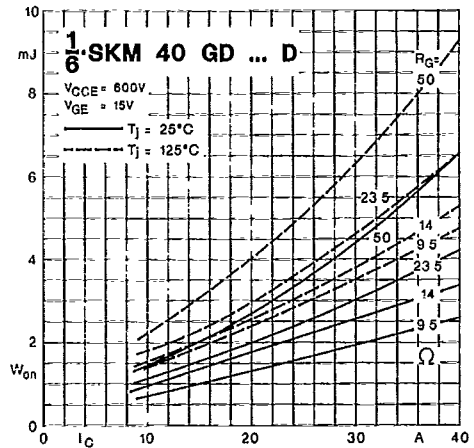


Fig. 23 Turn-on energy dissipation per pulse

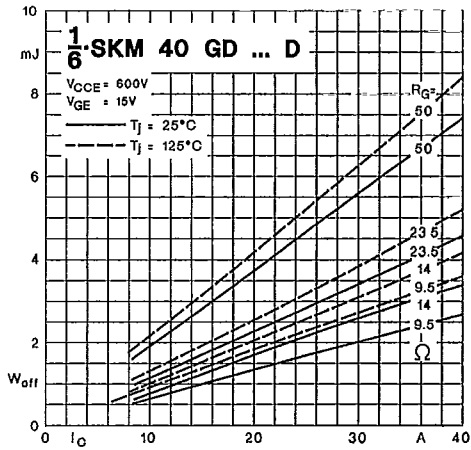


Fig. 24 Turn-off energy dissipation per pulse

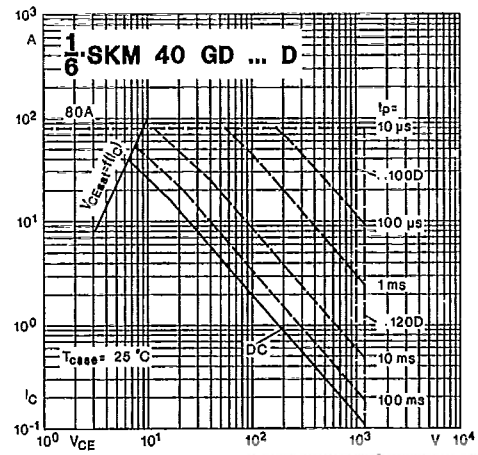


Fig. 25 Maximum safe operating area

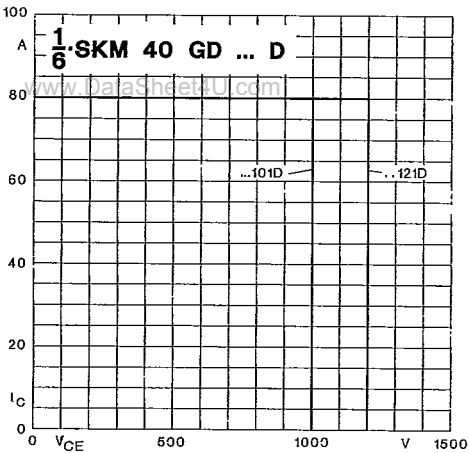


Fig. 26 Turn-off safe operating area

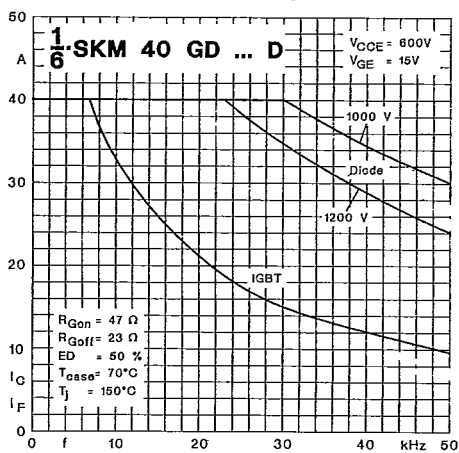


Fig. 27 Rated current vs. pulse frequency

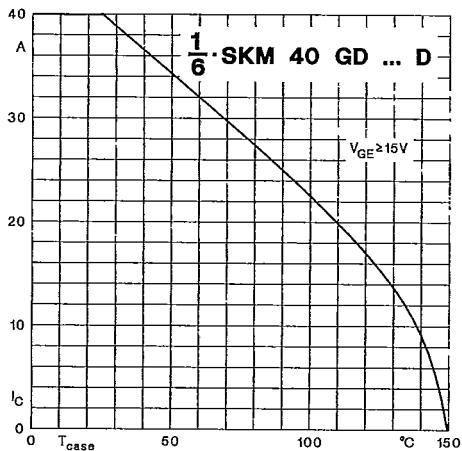


Fig. 28 Rated current vs. temperature

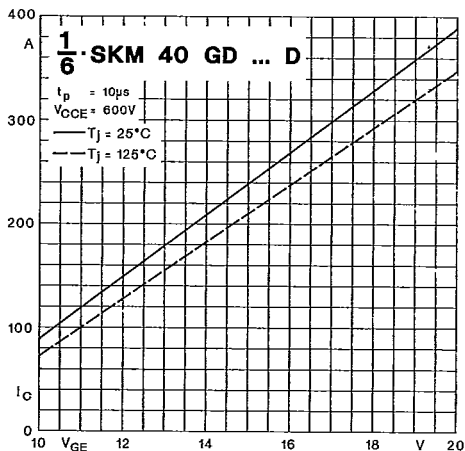


Fig. 29 Short-circuit current vs. turn-on gate voltage

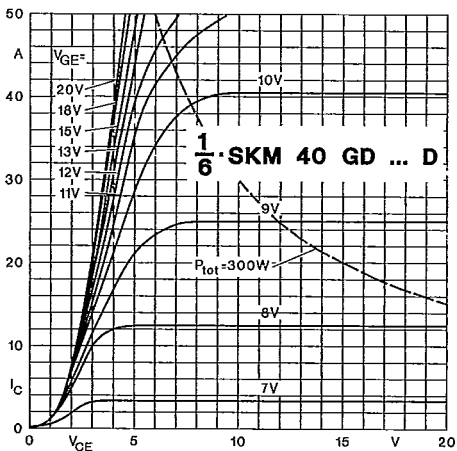


Fig. 30 Output characteristic

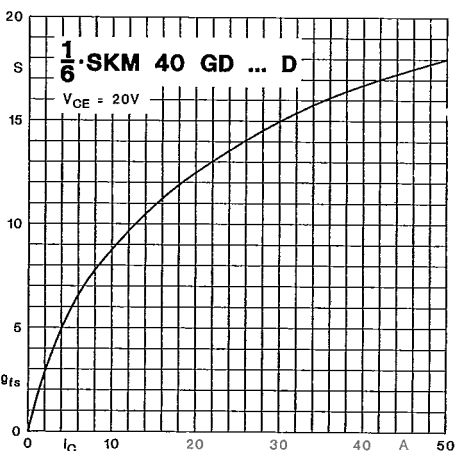


Fig. 31 Forward transconductance

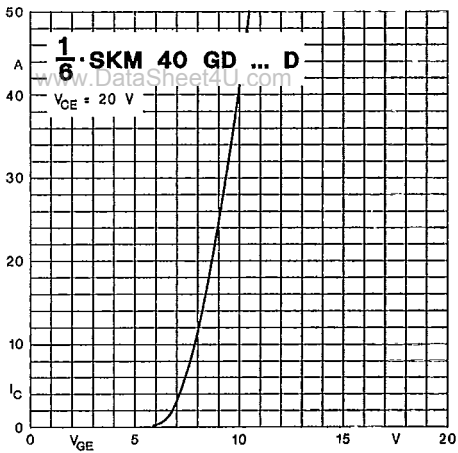


Fig. 32 Transfer characteristic

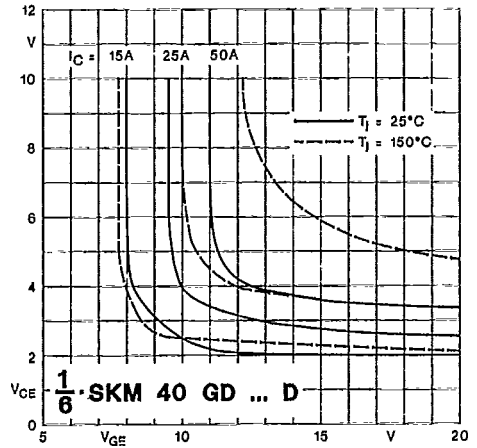


Fig. 33 Saturation characteristics

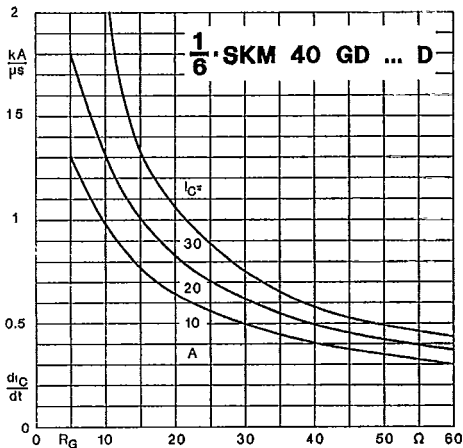


Fig. 34 Rate of rise of collector current

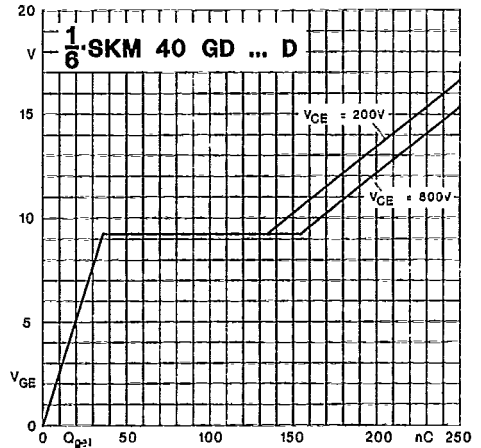


Fig. 35 Gate charge characteristic

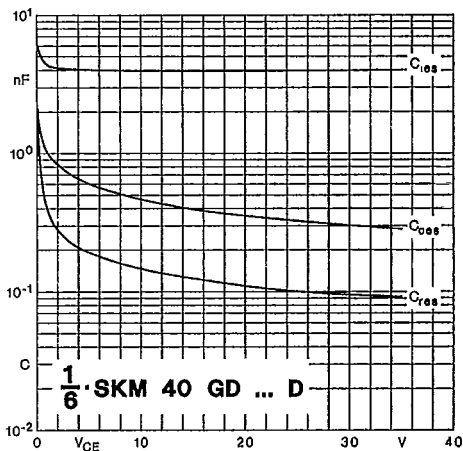


Fig. 36 Capacitances vs. collector-emitter voltage

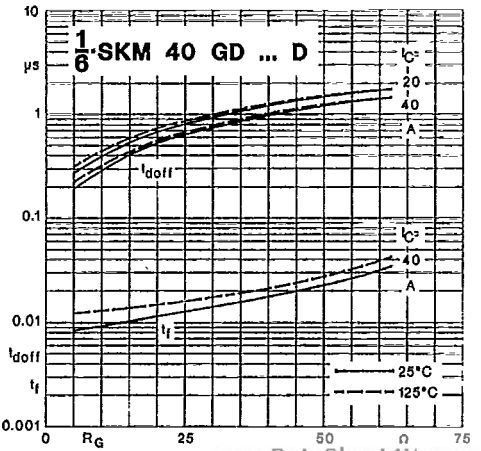


Fig. 37 Switching times vs. gate resistor

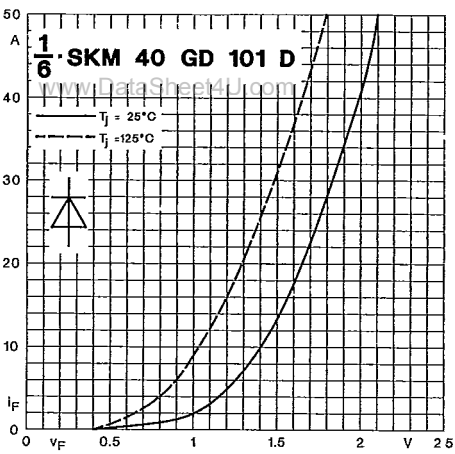


Fig. 38 a Diode forward characteristic

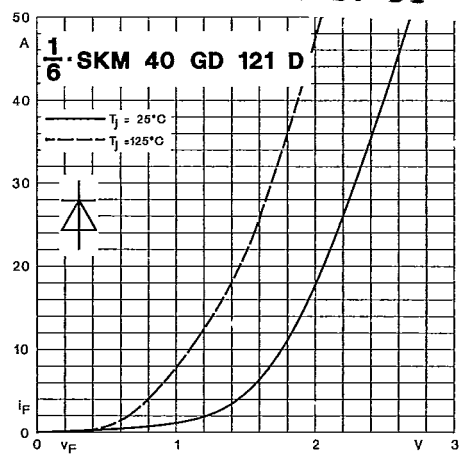


Fig. 38 b Diode forward characteristic

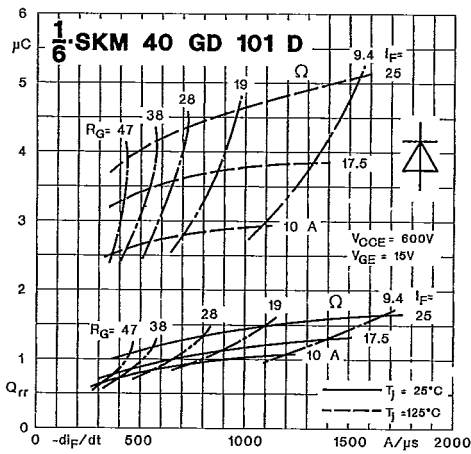


Fig. 39 a Diode recovered charge

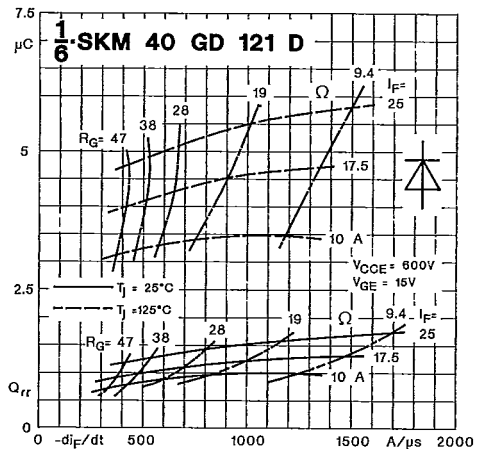


Fig. 39 b Diode recovered charge

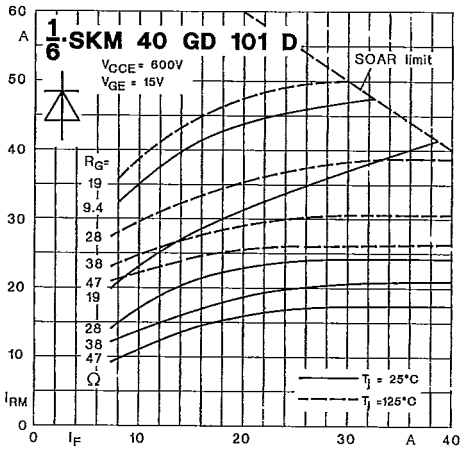


Fig. 40 a Diode peak reverse recovery current ( $I_{FRM}$ )

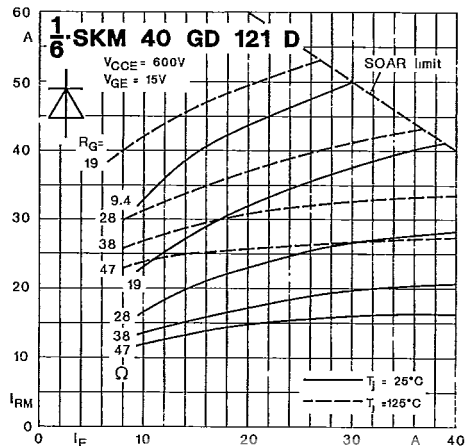


Fig. 40 b Diode peak reverse recovery current ( $I_{FRM}$ )

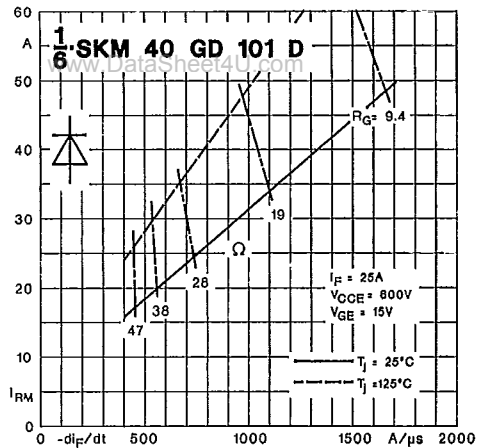


Fig. 41 a Diode peak reverse recovery current ( $-di_F/dt$ )

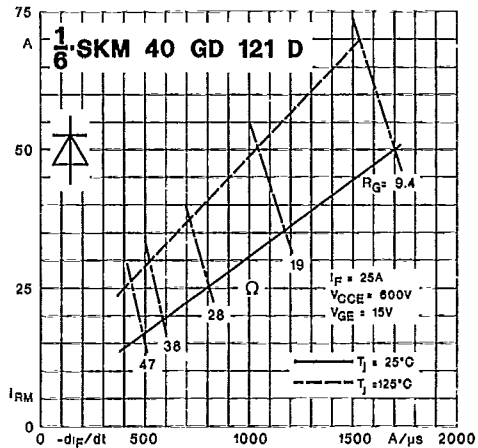


Fig. 41 b Diode peak reverse recovery current ( $-di_F/dt$ )

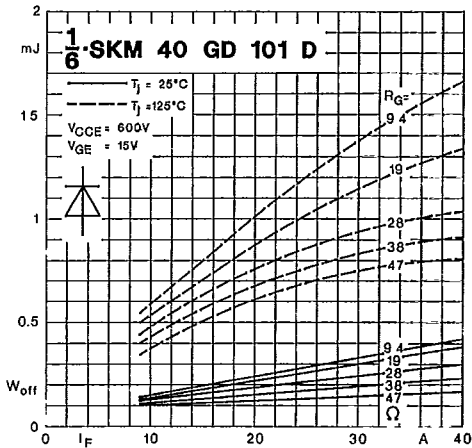


Fig. 42 a Diode turn-off energy dissipation per pulse

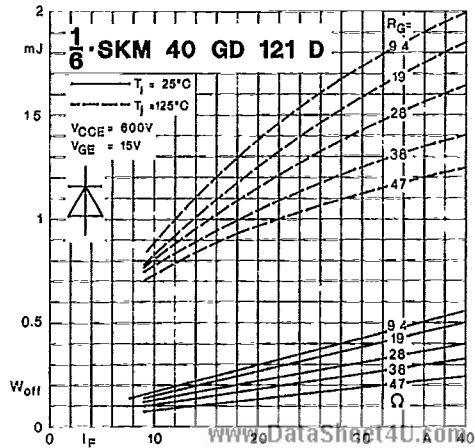


Fig. 42 b Diode turn-off energy dissipation per pulse

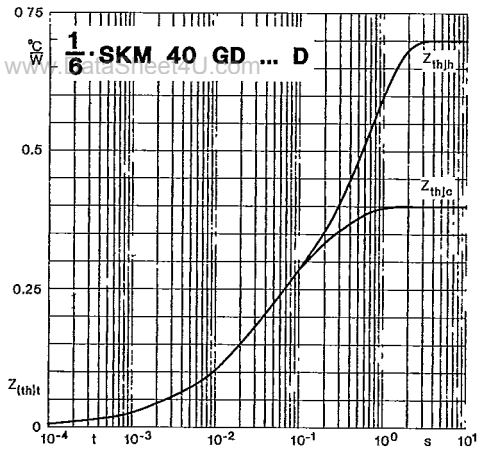


Fig. 51 Transient thermal impedance

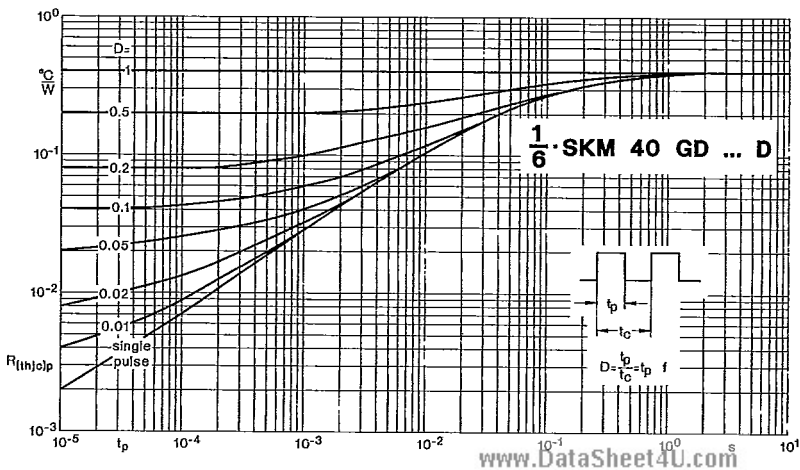
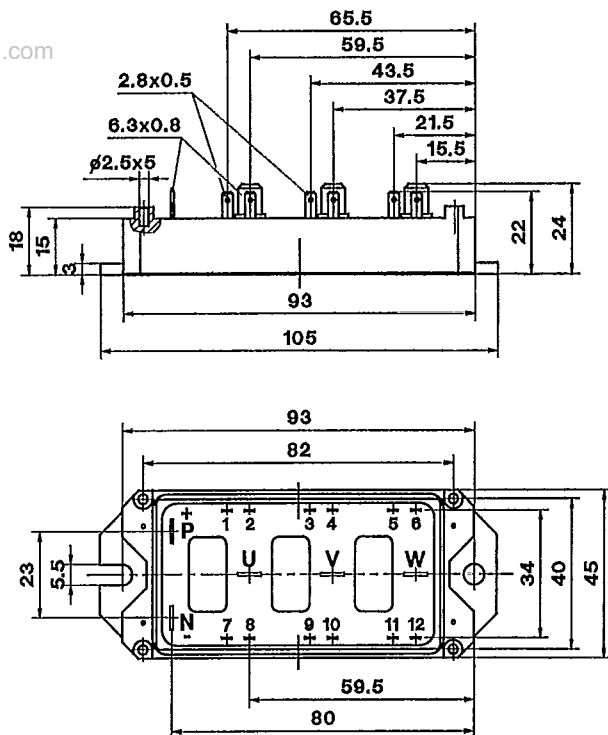


Fig. 52 Thermal impedance under pulse conditions

SKM 40 GD 101 D  
SKM 40 GD 121 D

UL recognized, file no. E 63 532

Case D 28 DataSheet4U.com



Dimensions in mm

Mechanical Data		Values			Units
Symbol	Conditions	min.	typ.	max.	
M <sub>1</sub>	to heatsink, SI Units to heatsink, US Units	4 35	—	6 53	Nm lb.in.
a		—	—	5x9,81	m/s <sup>2</sup>
w		—	—	190	g

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