

# SKM 200GB123D



**SEMITRANS® 3**

## IGBT Modules

**SKM 200GB123D**

**SKM 200GAL123D**

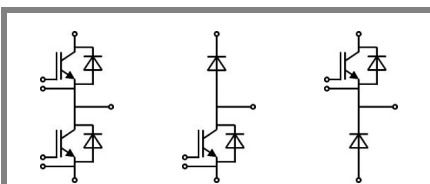
**SKM 200GAR123D**

### Features

- MOS input (voltage controlled)
- N channel, homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to  $6 \times I_{Cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

### Typical Applications\*

- AC inverter drives
- UPS



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GAL

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Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	Values		Units
<b>IGBT</b>				
$V_{CES}$	$T_j = 25^\circ\text{C}$	1200		V
$I_C$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	200	A
		$T_{case} = 85^\circ\text{C}$	180	A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	300		A
$V_{GES}$		$\pm 20$		V
$t_{psc}$	$V_{CC} = 600\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125^\circ\text{C}$ $V_{CES} < 1200\text{ V}$	10		$\mu\text{s}$
<b>Inverse Diode</b>				
$I_F$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	200	A
		$T_{case} = 80^\circ\text{C}$	130	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	300		A
$I_{FSM}$	$t_p = 10\text{ ms}; \sin.$	$T_j = 150^\circ\text{C}$	1440	A
<b>Freewheeling Diode</b>				
$I_F$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	260	A
		$T_{case} = 80^\circ\text{C}$	180	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	400		A
$I_{FSM}$	$t_p = 10\text{ ms}; \sin.$	$T_j = 150^\circ\text{C}$	1800	A
<b>Module</b>				
$I_{t(RMS)}$		500		A
$T_{vj}$		- 40 ... + 150 (125)		$^\circ\text{C}$
$T_{stg}$		- 40...+ 125		$^\circ\text{C}$
$V_{isol}$	AC, 1 min.	2500		V

Characteristics		$T_c = 25^\circ\text{C}$ , unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 6\text{ mA}$	4,5	5,5	6,5	V
$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		0,1	0,3	mA
$V_{CE0}$		$T_j = 25^\circ\text{C}$	1,4	1,6	V
		$T_j = 125^\circ\text{C}$	1,6	1,8	V
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	7,33	9,33	m $\Omega$
		$T_j = 125^\circ\text{C}$	10	12,66	m $\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 150\text{ A}, V_{GE} = 15\text{ V}$		2,5	3	V
$C_{ies}$			10	13	nF
$C_{oes}$	$V_{CE} = 25, V_{GE} = 0\text{ V}$		1,5	2	nF
$C_{res}$			0,8	1,2	nF
$Q_G$	$V_{GE} = -8\text{ V} - +20\text{ V}$		1500		nC
$R_{Gint}$	$T_j = ^\circ\text{C}$		2,5		$\Omega$
$t_{d(on)}$	$R_{Gon} = 5,6\ \Omega$	$V_{CC} = 600\text{ V}$ $I_C = 150\text{ A}$	220	400	ns
$t_r$			100	200	ns
$E_{on}$	$R_{Goff} = 5,6\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = -15\text{ V}$	24		mJ
$t_{d(off)}$			600	800	ns
$t_f$			70	100	ns
$E_{off}$			17		mJ
$R_{th(j-c)}$	per IGBT			0,09	K/W



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## IGBT Modules

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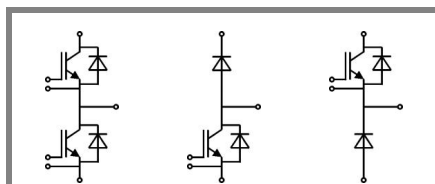
**SKM 200GAR123D**

### Features

- MOS input (voltage controlled)
- N channel, homogeneous Si
- Low inductance case
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- High short circuit capability, self limiting to  $6 \times I_{cnom}$
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Characteristics				min.	typ.	max.	Units
Symbol	Conditions						
<b>Inverse Diode</b>							
$V_F = V_{EC}$	$I_{Fnom} = 150 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$		2 1,8		2,5	V V
$V_{F0}$		$T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$		1,1		1,2	V V
$r_F$		$T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$		6		8,7	mΩ mΩ
$I_{RRM}$ $Q_{rr}$ $E_{rr}$	$I_F = 150 \text{ A}$ $di/dt = 1500 \text{ A}/\mu\text{s}$ $V_{GE} = -15 \text{ V}; V_{CC} = 600 \text{ V}$	$T_j = 125 \text{ }^\circ\text{C}$		90 8 6,6			A μC mJ
$R_{th(j-c)D}$	per diode					0,25	K/W
<b>Freewheeling Diode</b>							
$V_F = V_{EC}$	$I_{Fnom} = 200 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$		2 1,8		2,5	V V
$V_{F0}$		$T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$		1,1		1,2	V V
$r_F$		$T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$		4,5		6,5	V V
$I_{RRM}$ $Q_{rr}$ $E_{rr}$	$I_F = 200 \text{ A}$ $di/dt = 2000 \text{ A}/\mu\text{s}$ $V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$	$T_j = 125 \text{ }^\circ\text{C}$		120 11			A μC mJ
$R_{th(j-c)FD}$	per diode					0,18	K/W
<b>Module</b>							
$L_{CE}$				15		20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25 \text{ }^\circ\text{C}$ $T_{case} = 125 \text{ }^\circ\text{C}$		0,35 0,5			mΩ mΩ
$R_{th(c-s)}$	per module					0,038	K/W
$M_s$	to heat sink M6			3		5	Nm
$M_t$	to terminals M6, M4			2,5		5	Nm
w						325	g

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

\* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our personal.

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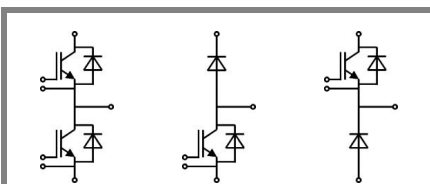
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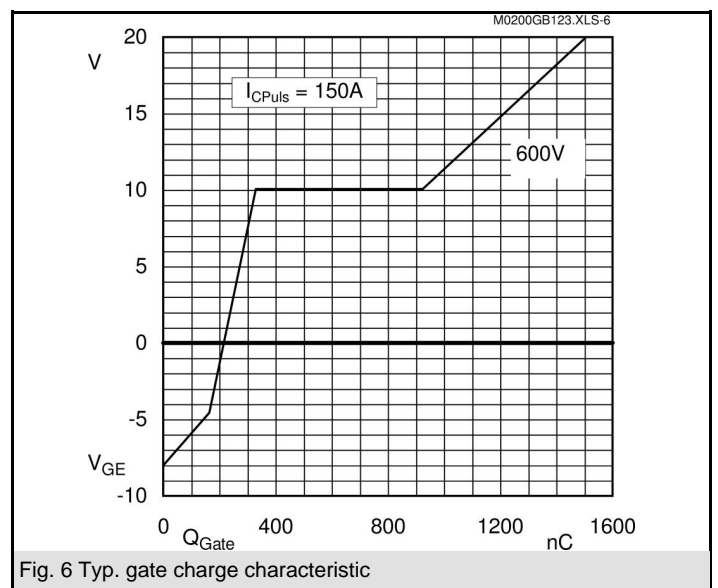
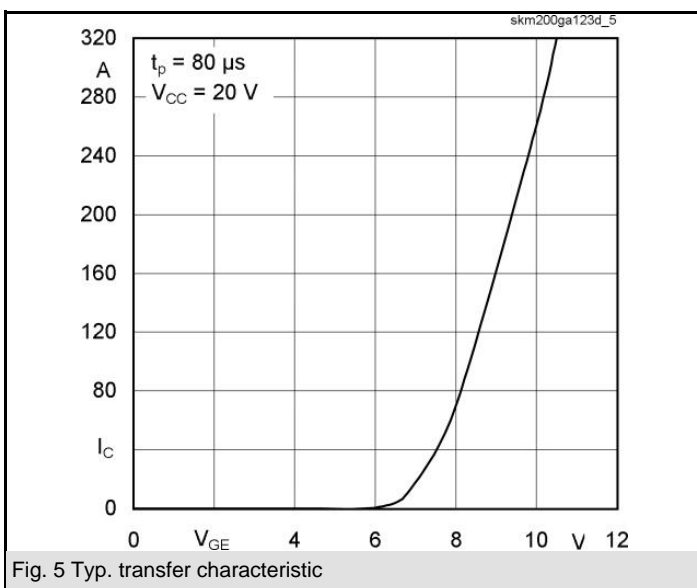
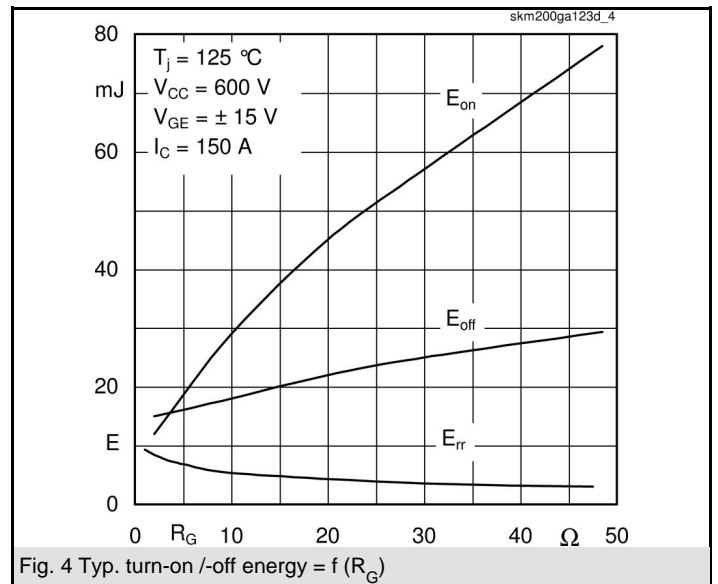
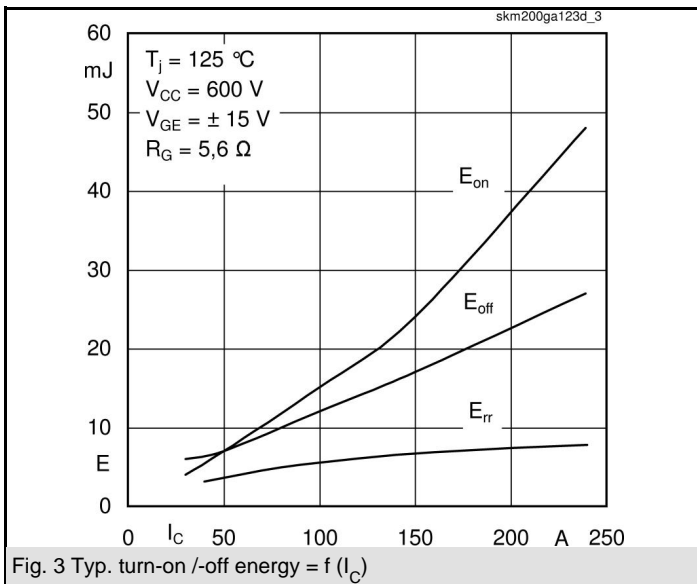
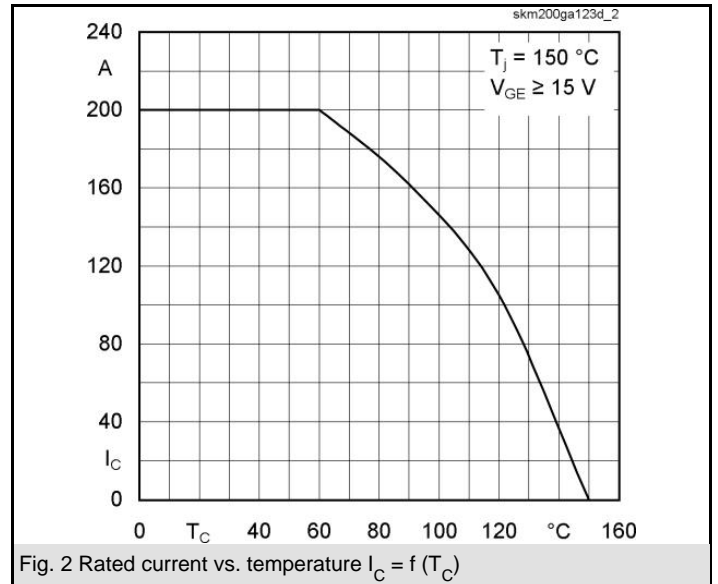
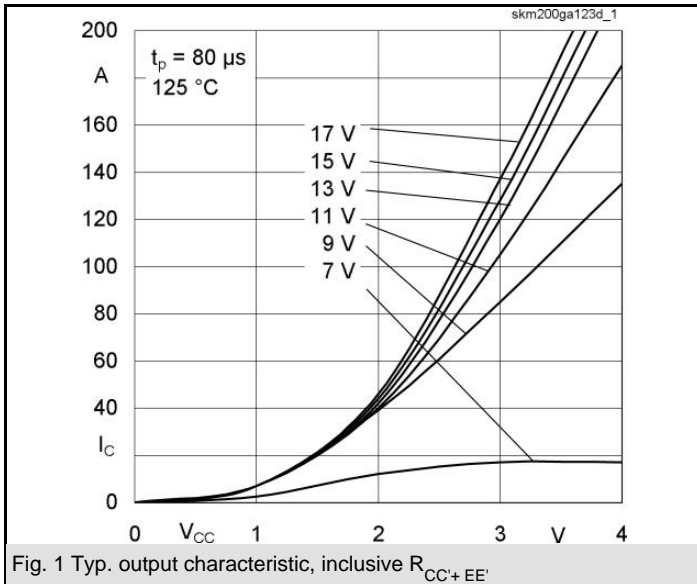
$Z_{th}$		Conditions	Values	Units
<b><math>Z_{th(j-c)I}</math></b>				
$R_f$	$i = 1$		59	mk/W
$R_f$	$i = 2$		23	mk/W
$R_f$	$i = 3$		6,8	mk/W
$R_f$	$i = 4$		1,2	mk/W
$\tau_{u_i}$	$i = 1$		0,03	s
$\tau_{u_i}$	$i = 2$		0,0087	s
$\tau_{u_i}$	$i = 3$		0,002	s
$\tau_{u_i}$	$i = 4$		0,0002	s
<b><math>Z_{th(j-c)D}</math></b>				
$R_f$	$i = 1$		170	mk/W
$R_f$	$i = 2$		66	mk/W
$R_f$	$i = 3$		12	mk/W
$R_f$	$i = 4$		2	mk/W
$\tau_{u_i}$	$i = 1$		0,0348	s
$\tau_{u_i}$	$i = 2$		0,0072	s
$\tau_{u_i}$	$i = 3$		0,077	s
$\tau_{u_i}$	$i = 4$		0,0002	s



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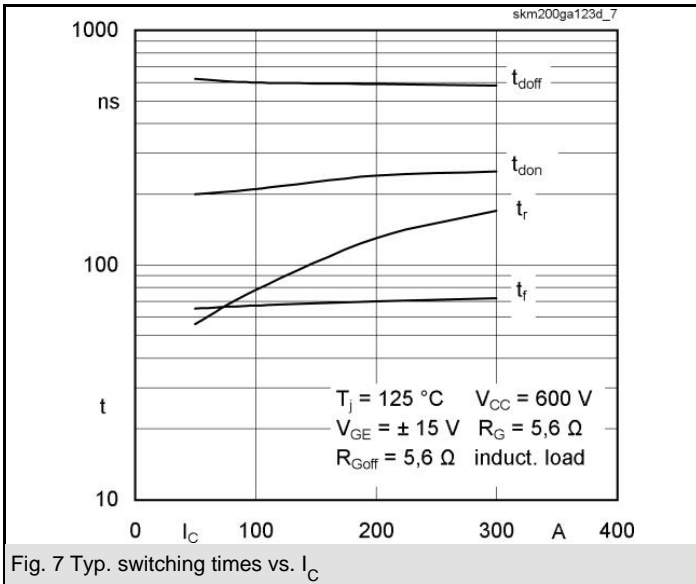


Fig. 7 Typ. switching times vs.  $I_C$

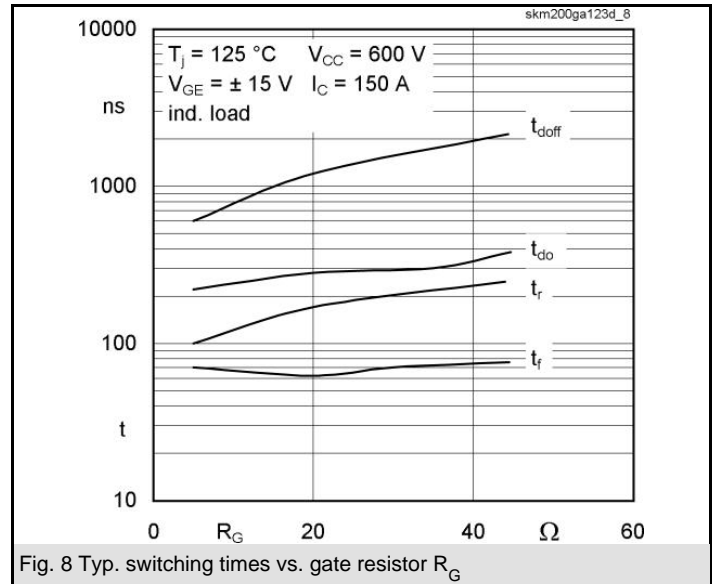


Fig. 8 Typ. switching times vs. gate resistor  $R_G$

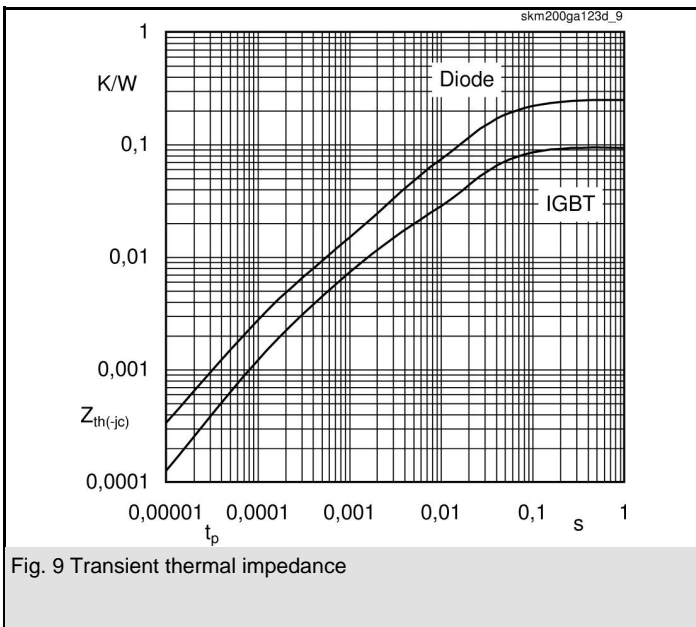


Fig. 9 Transient thermal impedance

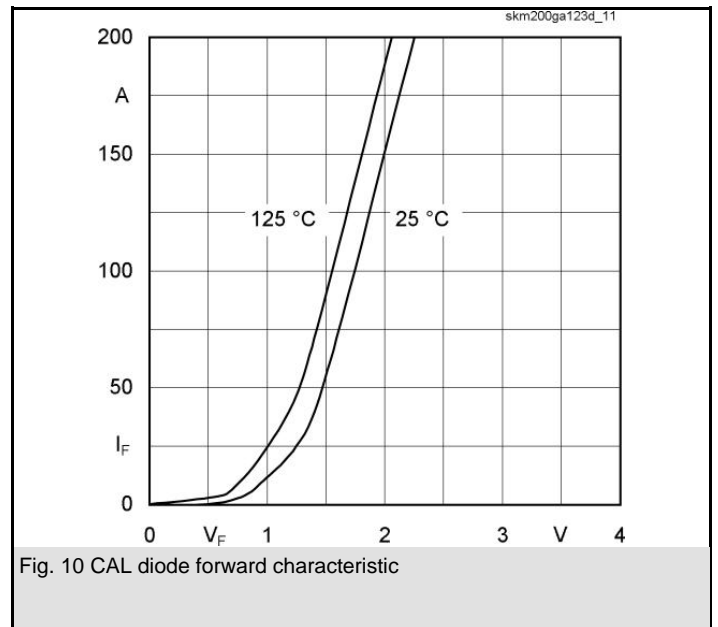


Fig. 10 CAL diode forward characteristic

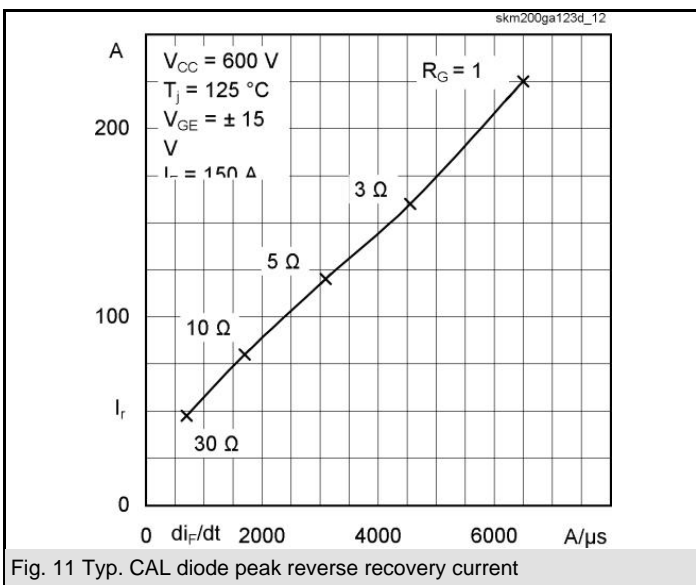


Fig. 11 Typ. CAL diode peak reverse recovery current

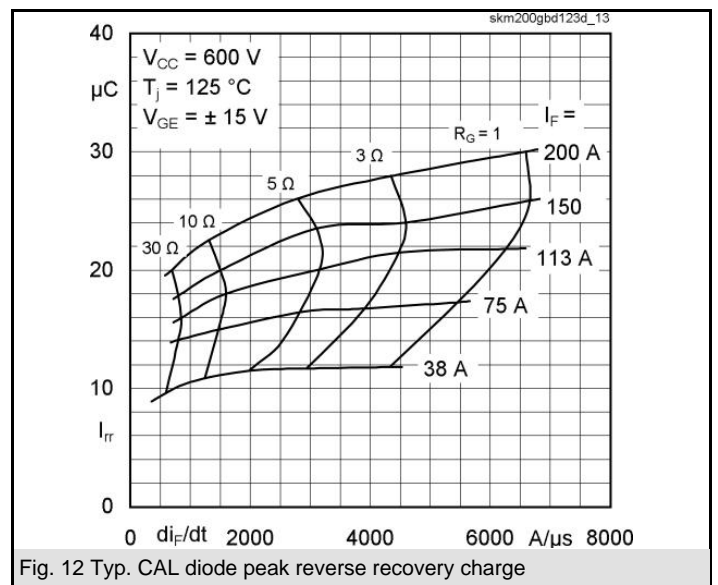


Fig. 12 Typ. CAL diode peak reverse recovery charge

# SKM 200GB123D

UL Recognized

CASED56

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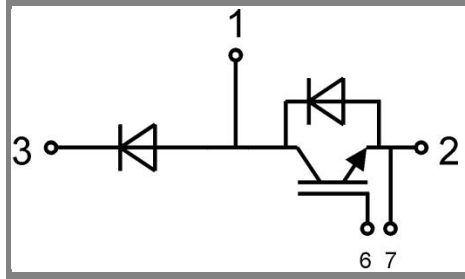


Case D 56



Case D 56

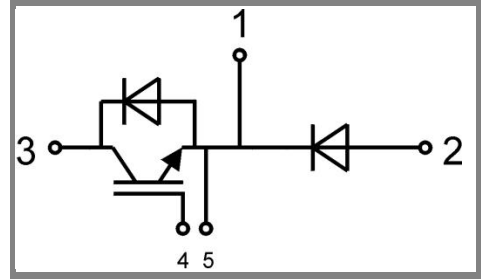
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Case D 57

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Case D 58

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