

# SKM 200GB125D

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SEMITRANS® 3

## Ultra Fast IGBT Modules

SKM 200GB125D

SKM 200GAL125D

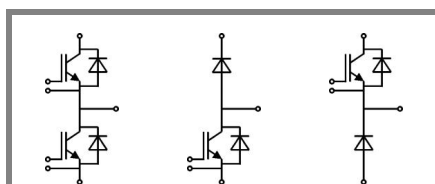
SKM 200GAR125D

### Features

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

### Typical Applications

- Switched mode power supplies at  $f_{sw} > 20$  kHz
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at  $f_{sw} > 20$  kHz



GB

GAL

GAR

## 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
		$T_{case} = 80^\circ\text{C}$	160	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>				
$I_F$	$T_j = ^\circ\text{C}$	$T_c = 25^\circ\text{C}$	200	A
		$T_c = 80^\circ\text{C}$	130	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	300	A	
$I_{FSM}$	$t_p = 10\text{ ms};$	$T_j = 150^\circ\text{C}$	1440	A
<b>Module</b>				
$I_{t(RMS)}$		500	A	
$T_{vj}$		- 40...+ 150	$^\circ\text{C}$	
$T_{stg}$		- 40...+ 125	$^\circ\text{C}$	
$V_{isol}$	AC, 1 min.	4000	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
$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		0,15	0,45	mA
$V_{CE0}$		$T_j = 25^\circ\text{C}$	1,5	1,75	V
		$T_j = 125^\circ\text{C}$			V
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	12	14	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$			$\text{m}\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 150\text{ A}, V_{GE} = 15\text{ V}$		3,3	3,85	V
$C_{ies}$			10	13	nF
$C_{oes}$	$V_{CE} = 25, V_{GE} = 0\text{ V}$		1,5	2	nF
$C_{res}$	$f = 1\text{ MHz}$		0,8	1,2	nF
$Q_G$	$V_{GE} = 0\text{ V} - +20\text{ V}$		1300		nC
$R_{Gint}$	$T_j = ^\circ\text{C}$		2,5		$\Omega$
$t_{d(on)}$	$R_{Gon} = 4\ \Omega$	$V_{CC} = 600\text{ V}$ $I_{Cnom} = 150\text{ A}$	75		ns
$t_r$			36		ns
$E_{on}$	$R_{Goff} = 4\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{ V}$	14		mJ
$t_{d(off)}$			420		ns
$t_f$			25		ns
$E_{off}$					mJ
$R_{th(j-c)}$	per IGBT			0,09	K/W

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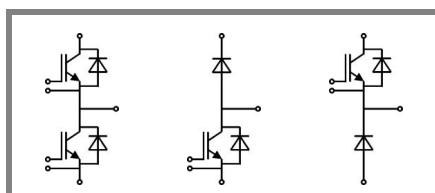
SKM 200GAR125D

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### Characteristics

Symbol	Conditions	min.	typ.	max.	Units
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 150$ A; $V_{GE} = 0$ V	$T_j = 25$ °C <sub>chiplev.</sub>	2	2,5	V
		$T_j = 125$ °C <sub>chiplev.</sub>	1,8		V
$V_{F0}$		$T_j = 25$ °C	1,1	1,2	V
		$T_j = 125$ °C			V
$r_F$		$T_j = 25$ °C	6	8,7	mΩ
		$T_j = 125$ °C			mΩ
$I_{RRM}$	$I_{Fnom} = 150$ A	$T_j = 125$ °C	230		A
$Q_{rr}$	$di/dt = 5500$ A/μs		24		μC
$E_{rr}$	$V_{GE} = 0$ V; $V_{CC} = 600$ V				mJ
$R_{th(j-c)D}$	per diode			0,25	K/W
<b>Freewheeling Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 150$ A; $V_{GE} = 0$ V	$T_j = 25$ °C <sub>chiplev.</sub>	2	2,5	V
		$T_j = 125$ °C <sub>chiplev.</sub>	1,8		V
$V_{F0}$		$T_j = 25$ °C	1,1	1,2	V
		$T_j = 125$ °C			V
$r_F$		$T_j = 25$ °C	6	8,7	V
		$T_j = 125$ °C			V
$I_{RRM}$	$I_{Fnom} = 150$ A	$T_j = 125$ °C	230		A
$Q_{rr}$	$di/dt = 5500$ A/μs		24		μC
$E_{rr}$	$V_{GE} = 0$ V; $V_{CC} = 600$ V				mJ
$R_{th(j-c)FD}$	per diode			0,25	K/W
<b>Module</b>					
$L_{CE}$			15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25$ °C	0,35		mΩ
		$T_{case} = 125$ °C	0,5		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		2,5	5	Nm
w				325	g

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

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.

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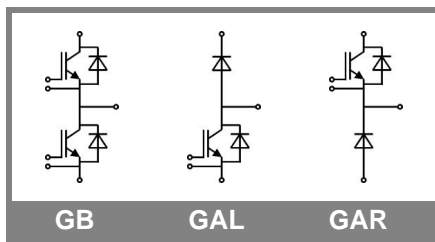
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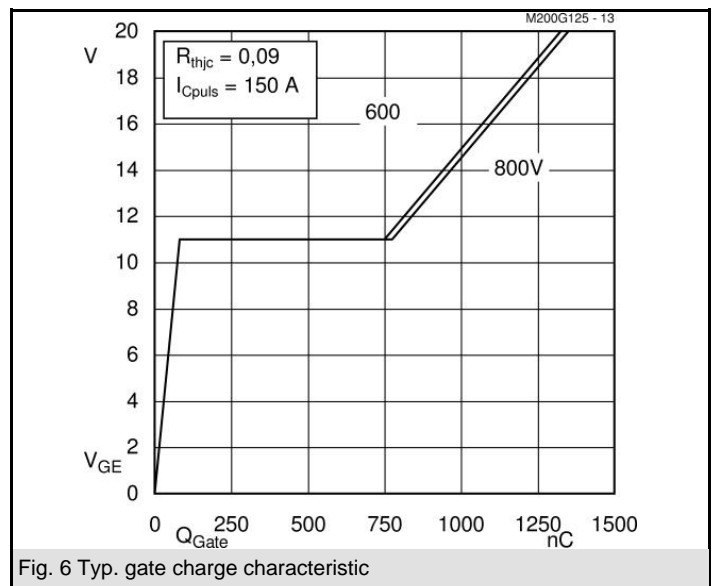
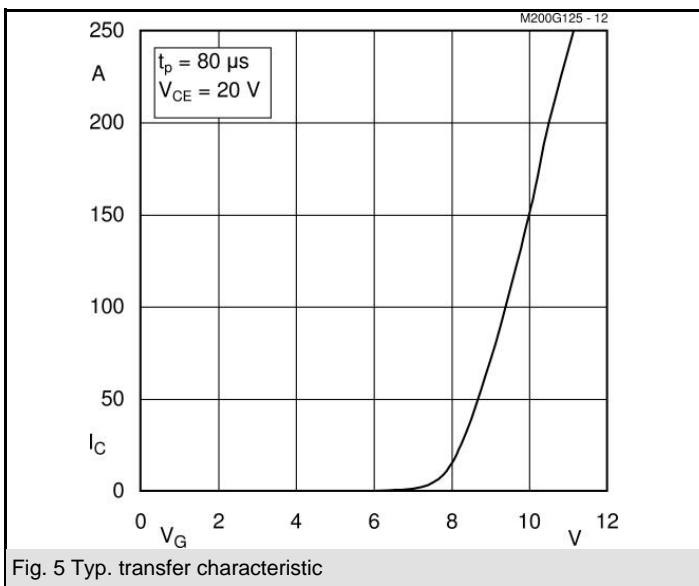
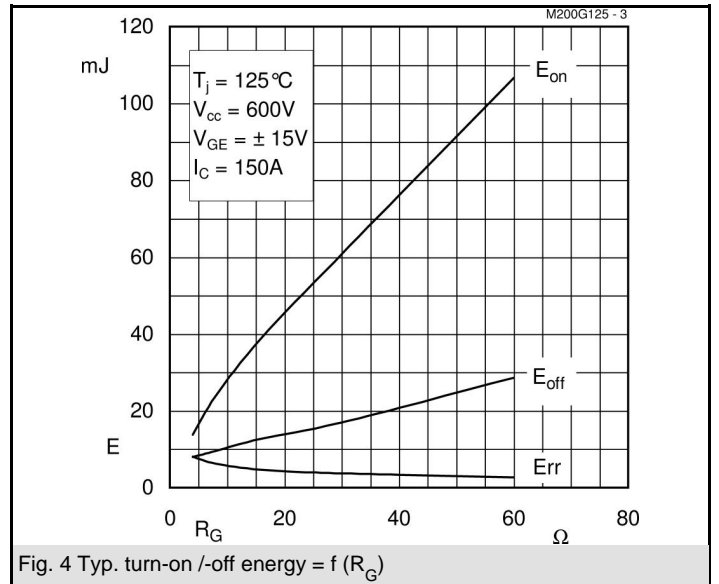
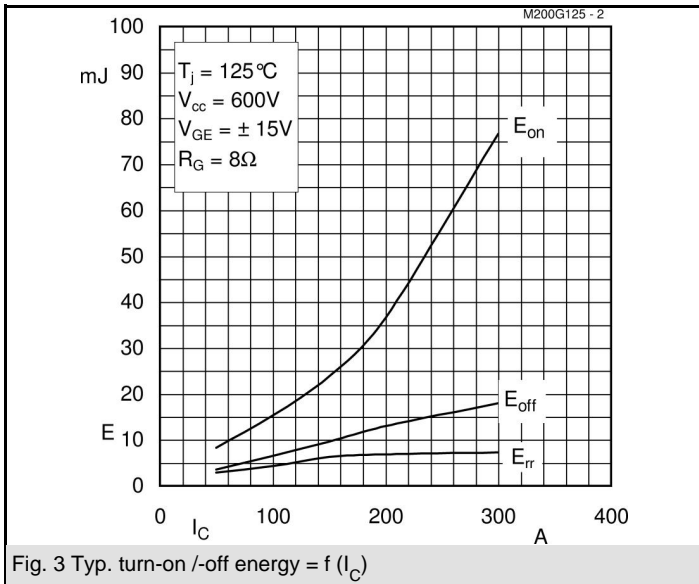
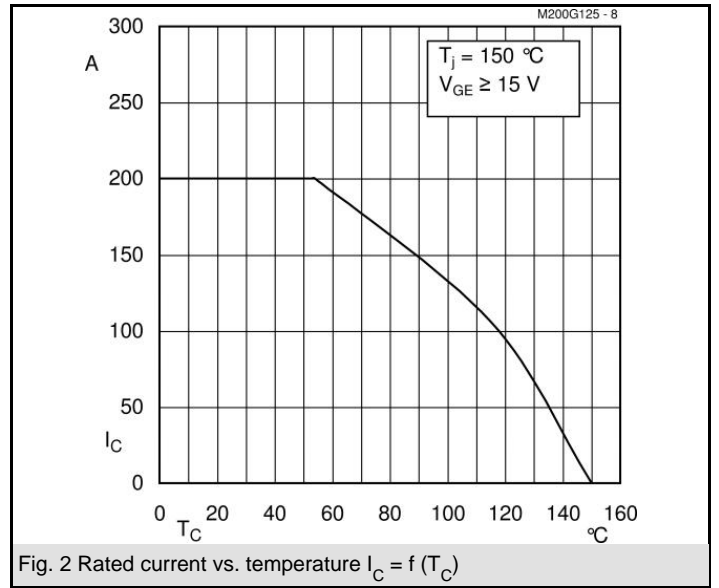
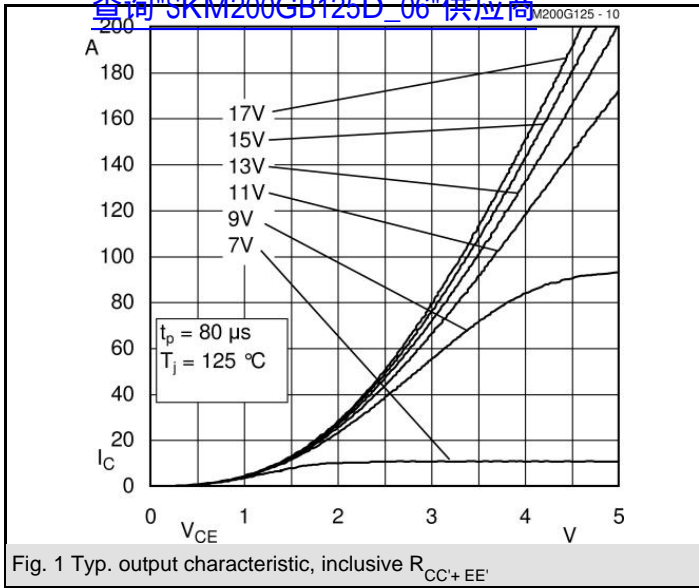
### Typical Applications

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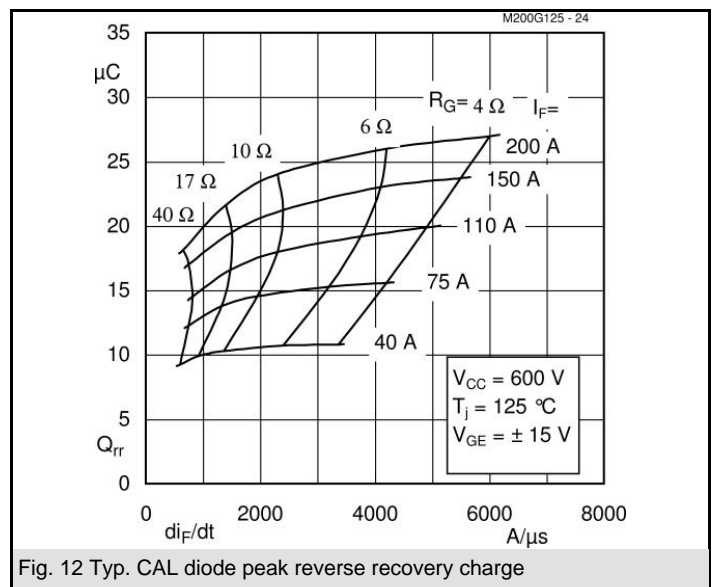
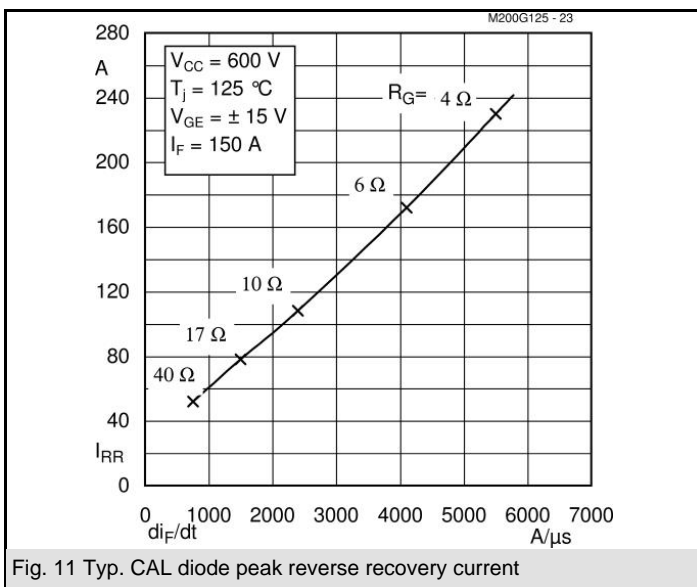
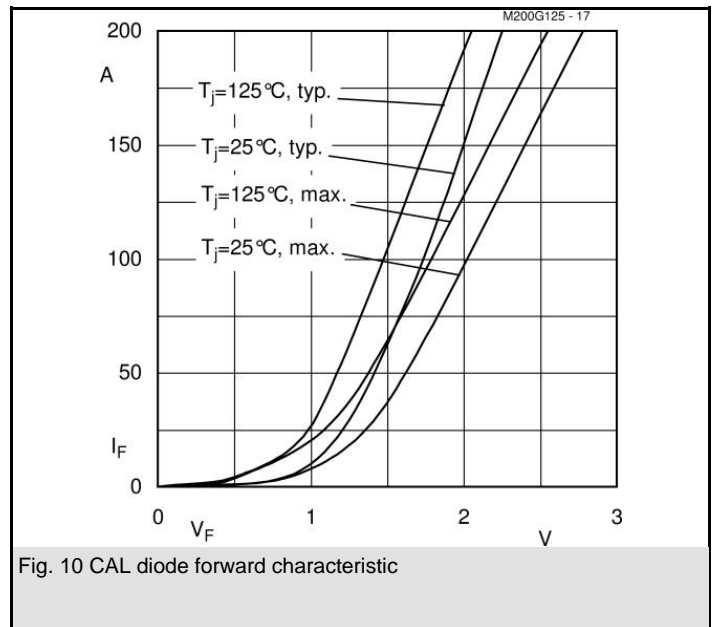
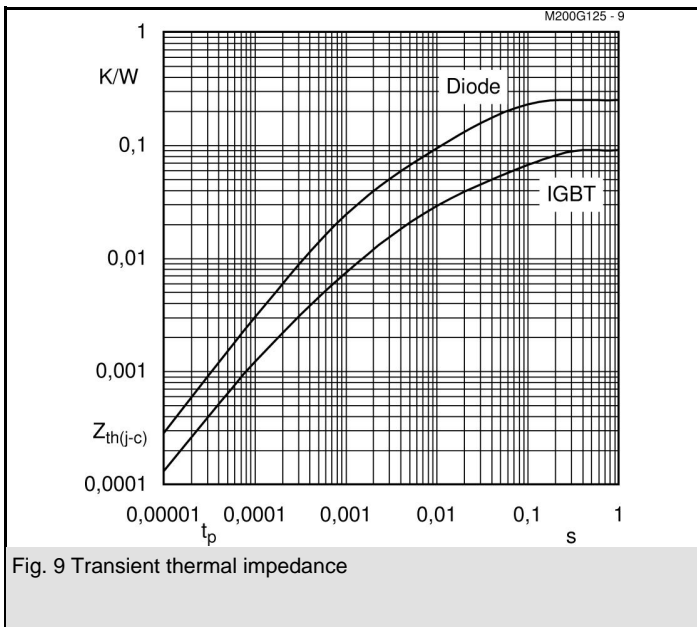
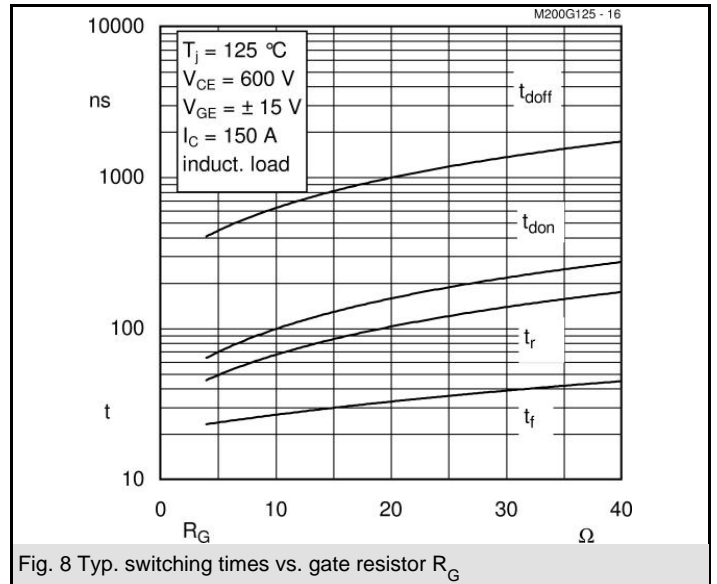
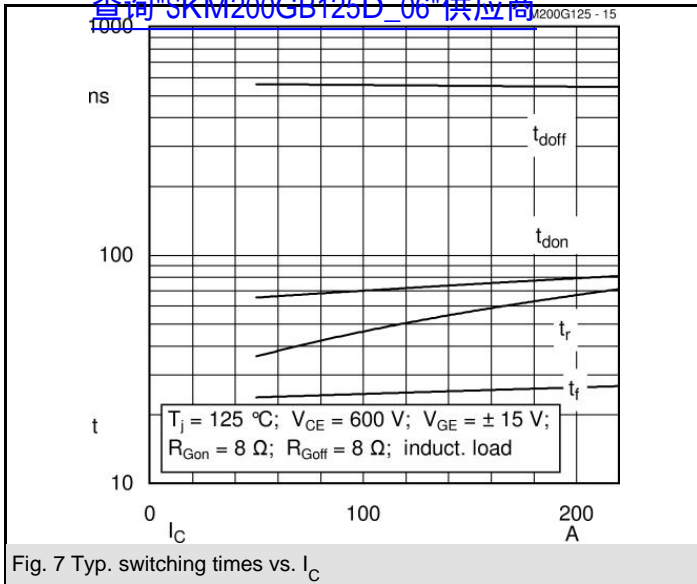
Symbol	Conditions	Values	Units
<b>Z<sub>th(j-c)I</sub></b>			
R <sub>i</sub>	i = 1	60	mk/W
R <sub>i</sub>	i = 2	23	mk/W
R <sub>i</sub>	i = 3	5,9	mk/W
R <sub>i</sub>	i = 4	1,1	mk/W
tau <sub>i</sub>	i = 1	0,0744	s
tau <sub>i</sub>	i = 2	0,0087	s
tau <sub>i</sub>	i = 3	0,002	s
tau <sub>i</sub>	i = 4	0,0015	s
<b>Z<sub>th(j-c)D</sub></b>			
R <sub>i</sub>	i = 1	160	mk/W
R <sub>i</sub>	i = 2	67	mk/W
R <sub>i</sub>	i = 3	20	mk/W
R <sub>i</sub>	i = 4	3	mk/W
tau <sub>i</sub>	i = 1	0,0536	s
tau <sub>i</sub>	i = 2	0,0034	s
tau <sub>i</sub>	i = 3	0,077	s
tau <sub>i</sub>	i = 4	0,0003	s



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# SKM 200GB125D

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CASED56

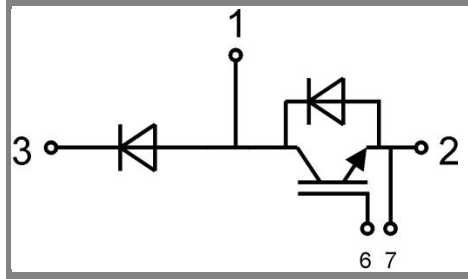
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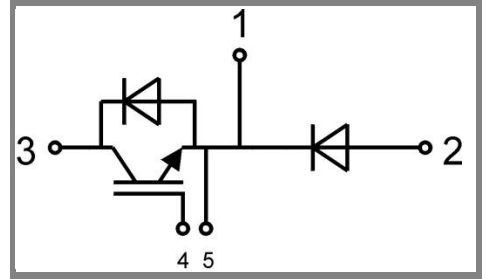
Case D 56



GB Case D 56



GAL Case D 57 (→ D 56)



GAR Case D 58 (→ D 56)