

SKM 400GB176D



SEMITRANS® 3

Trench IGBT Modules

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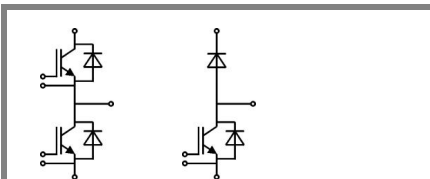
SKM 400GAL176D

Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications*

- AC inverter drives
- mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power



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Absolute Maximum Ratings		$T_{case} = 25^\circ\text{C}$, unless otherwise specified		
Symbol	Conditions	Values	Units	
IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$	1700	V	
I_C	$T_j = 150^\circ\text{C}$	$T_c = 25^\circ\text{C}$	430	A
		$T_c = 80^\circ\text{C}$	310	A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	600	A	
V_{GES}		± 20	V	
t_{psc}	$V_{CC} = 1200\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125^\circ\text{C}$ $V_{CES} < 1700\text{ V}$	10	μs	
Inverse Diode				
I_F	$T_j = 150^\circ\text{C}$	$T_c = 25^\circ\text{C}$	440	A
		$T_c = 80^\circ\text{C}$	300	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	600	A	
I_{FSM}	$t_p = 10\text{ ms}; \sin.$	$T_j = 150^\circ\text{C}$	2200	A
Freewheeling Diode				
I_F	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	440	A
		$T_{case} = 80^\circ\text{C}$	300	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	600	A	
I_{FSM}	$t_p = 10\text{ ms}; \sin.$	$T_j = 150^\circ\text{C}$	2200	A
Module				
$I_{t(RMS)}$		500	A	
T_{vj}		- 40 ... + 150	$^\circ\text{C}$	
T_{stg}		- 40 ... + 125	$^\circ\text{C}$	
V_{isol}	AC, 1 min.	4000	V	

Characteristics		$T_{case} = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CES}, I_C = 12\text{ mA}$	5,2	5,8	6,4	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$			4	mA
V_{CE0}		$T_j = 25^\circ\text{C}$	1	1,2	V
		$T_j = 125^\circ\text{C}$	0,9	1,1	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	3,3	4,2	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$	5,2	6	$\text{m}\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 300\text{ A}, V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}_{chiplev.}$	2	2,4	V
		$T_j = 125^\circ\text{C}_{chiplev.}$	2,45	2,9	V
C_{ies}	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	19,8		nF
C_{oes}			1,1		nF
C_{res}			0,88		nF
Q_G	$V_{GE} = -8\text{V}...+15\text{V}$		2500		nC
$t_{d(on)}$	$R_{Gon} = 4\ \Omega$	$V_{CC} = 1200\text{V}$ $I_C = 300\text{A}$	330		ns
t_r			55		ns
E_{on}			170		mJ
$t_{d(off)}$	$R_{Goff} = 4\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{V}$	880		ns
t_f			145		ns
E_{off}			118		mJ
$R_{th(j-c)}$	per IGBT			0,075	K/W

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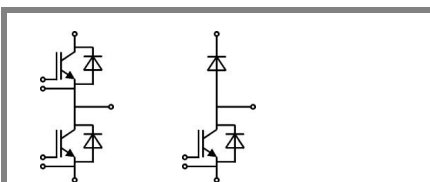
Typical Applications*

- AC inverter drives
- mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power

Characteristics				min.	typ.	max.	Units
Symbol	Conditions						
Inverse Diode							
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$		1,7	1,9		V
		$T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$		1,8	2		V
V_{F0}		$T_j = 25 \text{ }^\circ\text{C}$		1,2	1,4		V
		$T_j = 125 \text{ }^\circ\text{C}$		0,9	1,1		V
r_F		$T_j = 25 \text{ }^\circ\text{C}$		1,7	1,7		mΩ
		$T_j = 125 \text{ }^\circ\text{C}$		3	3		mΩ
I_{RRM}	$I_F = 300 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$		418			A
Q_{rr}	$di/dt = 5800 \text{ A}/\mu\text{s}$			117			μC
E_{rr}	$V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$			78			mJ
$R_{th(j-c)D}$	per diode				0,125		K/W
FWD							
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$		1,7	1,9		V
		$T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$		1,8	2		V
V_{F0}		$T_j = 25 \text{ }^\circ\text{C}$		1,2	1,4		V
		$T_j = 125 \text{ }^\circ\text{C}$		0,9	1,1		V
r_F		$T_j = 25 \text{ }^\circ\text{C}$		1,7	1,7		V
		$T_j = 125 \text{ }^\circ\text{C}$		3	3		V
I_{RRM}	$I_F = 300 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$		418			A
Q_{rr}	$di/dt = 5800 \text{ A}/\mu\text{s}$			117			μC
E_{rr}	$V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$			78			mJ
$R_{th(j-c)FD}$	per diode				0,125		K/W
Module							
L_{CE}				15	20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25 \text{ }^\circ\text{C}$		0,35			mΩ
		$T_{case} = 125 \text{ }^\circ\text{C}$		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.

* 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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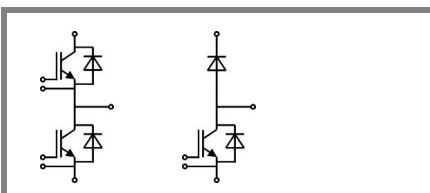
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Typical Applications*

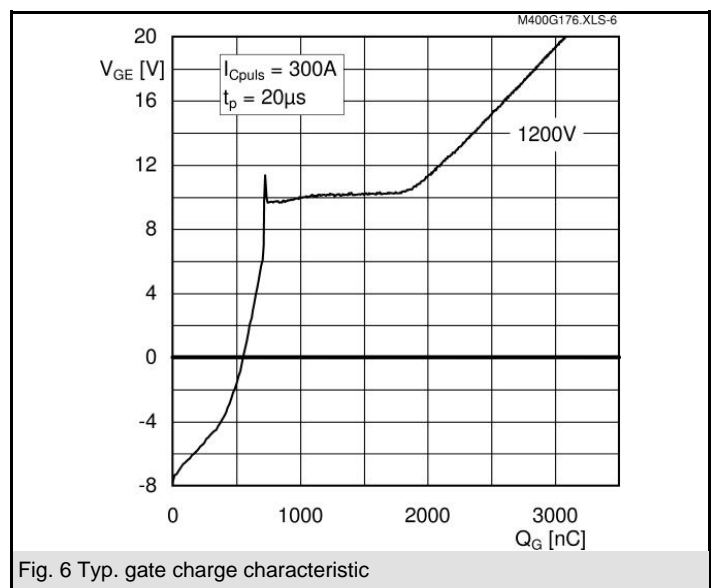
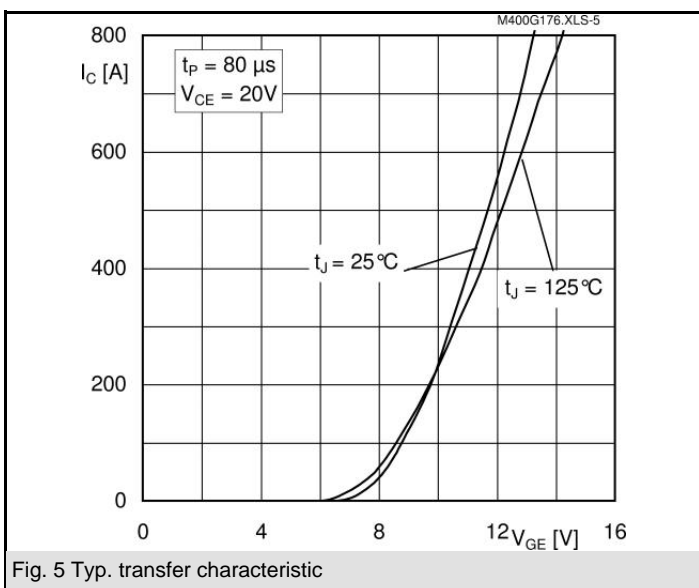
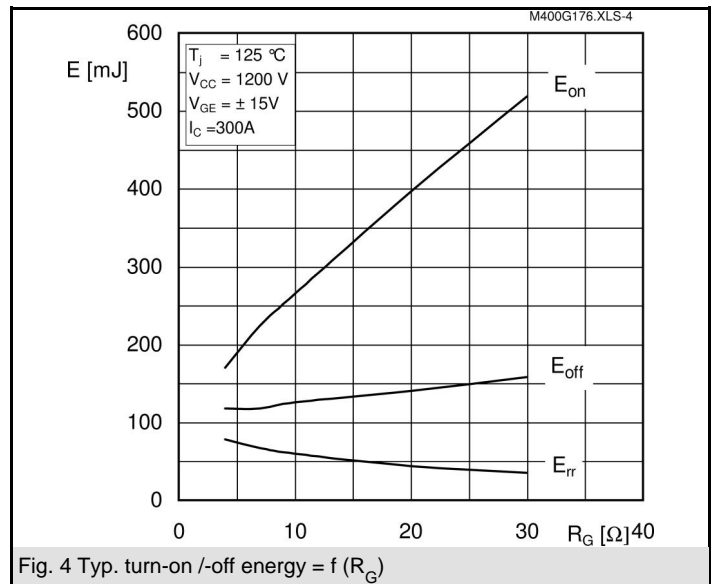
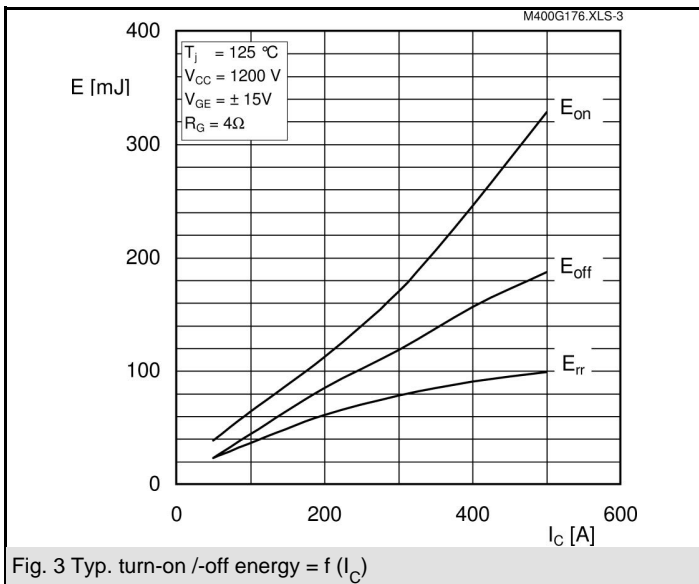
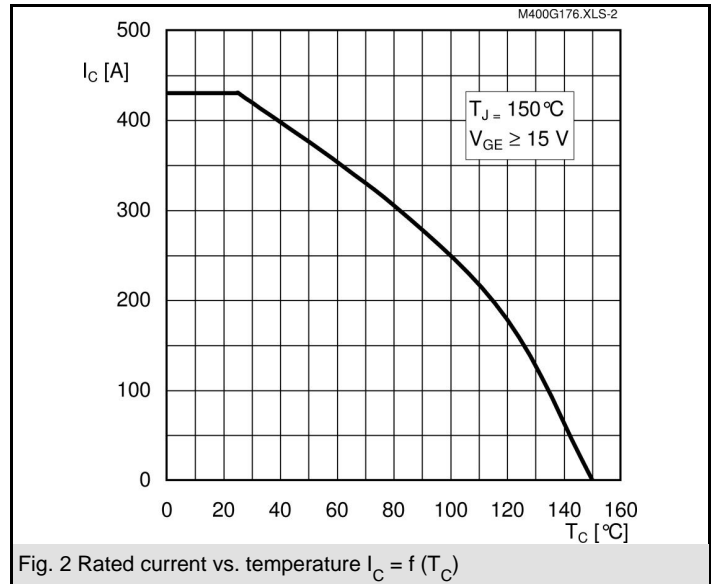
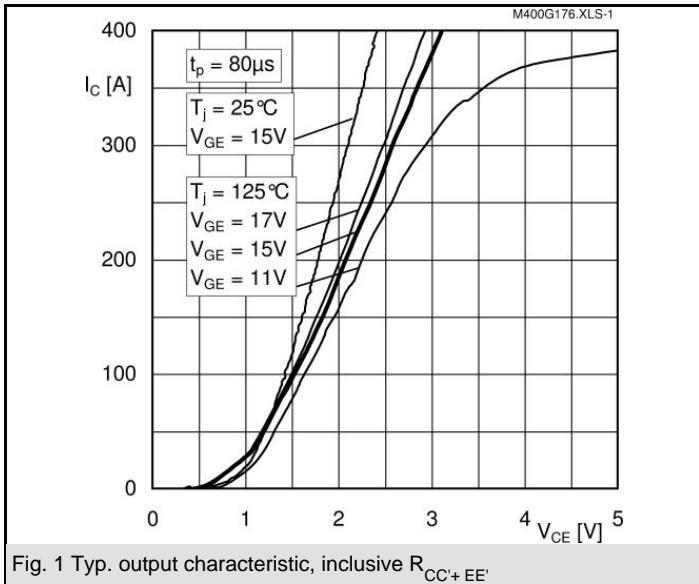
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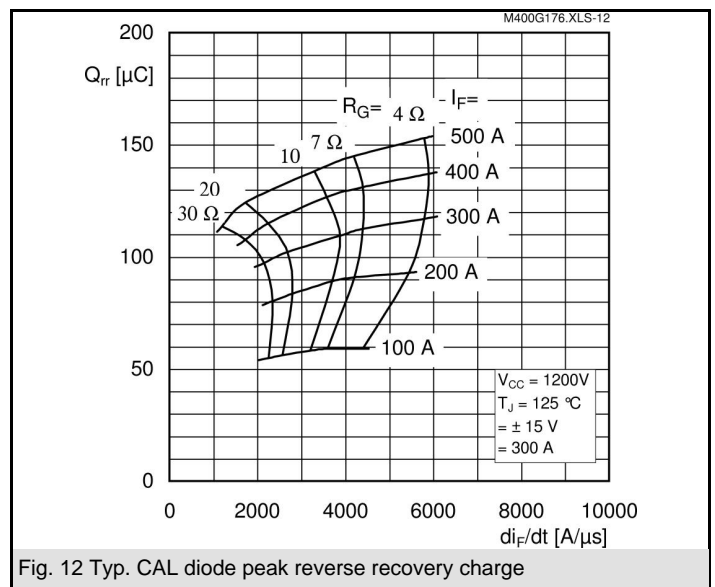
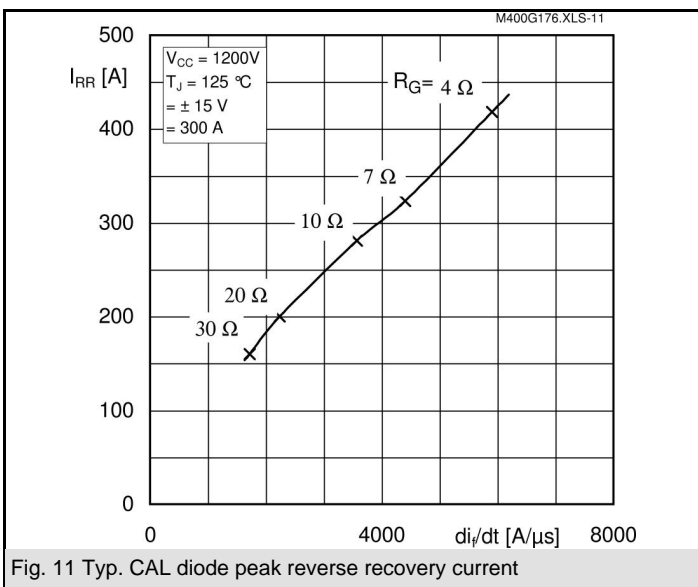
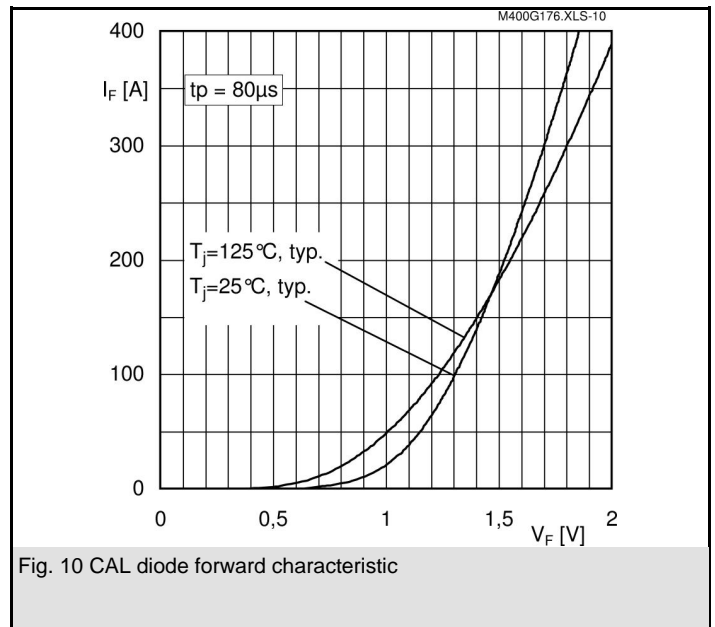
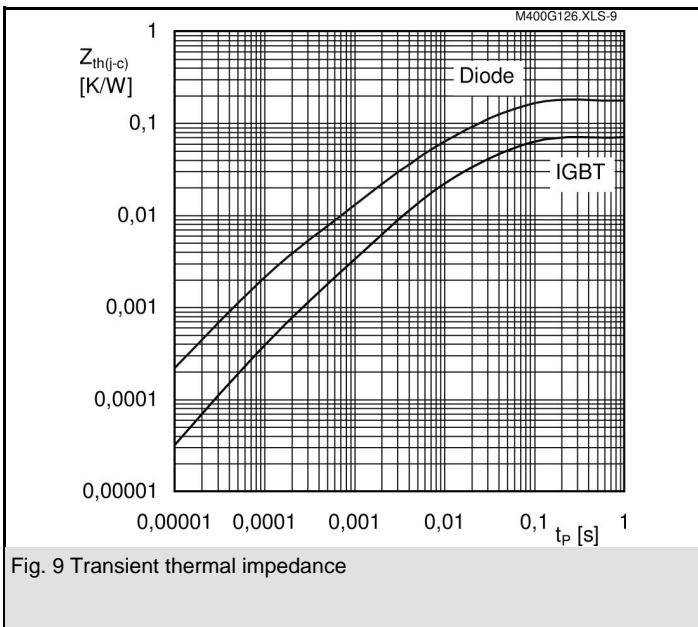
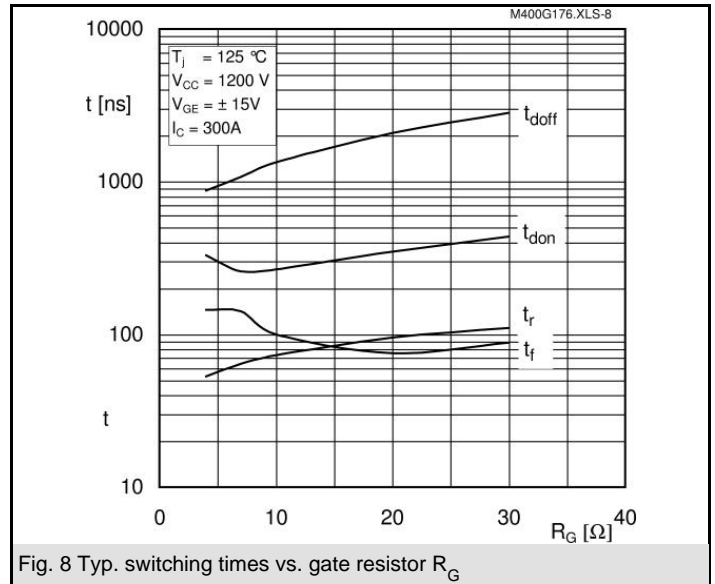
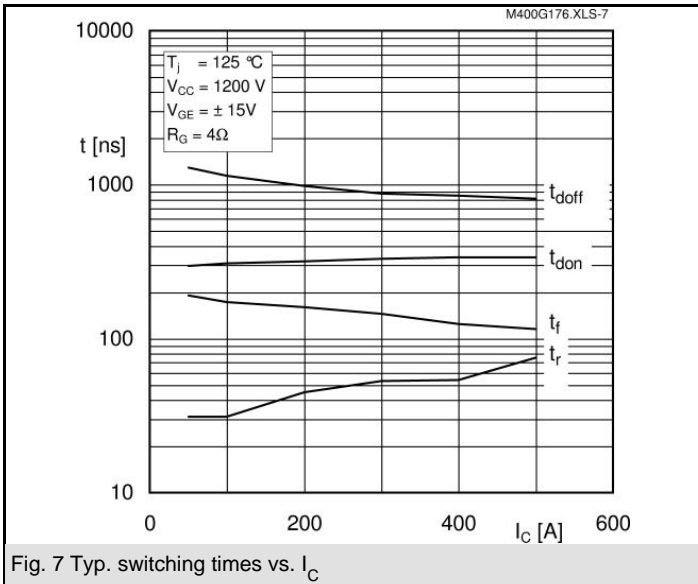
Z_{th}		Conditions	Values	Units
$Z_{th(j-c)I}$				
$R_{\theta j-c}$		$i = 1$	52	mk/W
$R_{\theta j-c}$		$i = 2$	18	mk/W
$R_{\theta j-c}$		$i = 3$	4,6	mk/W
$R_{\theta j-c}$		$i = 4$	0,4	mk/W
$\tau_{th(j-c)}$		$i = 1$	0,0569	s
$\tau_{th(j-c)}$		$i = 2$	0,0122	s
$\tau_{th(j-c)}$		$i = 3$	0,002	s
$\tau_{th(j-c)}$		$i = 4$	0,02	s
$Z_{th(j-c)D}$				
$R_{\theta j-cD}$		$i = 1$	85	mk/W
$R_{\theta j-cD}$		$i = 2$	28	mk/W
$R_{\theta j-cD}$		$i = 3$	10,5	mk/W
$R_{\theta j-cD}$		$i = 4$	1,5	mk/W
$\tau_{th(j-c)D}$		$i = 1$	0,054	s
$\tau_{th(j-c)D}$		$i = 2$	0,0075	s
$\tau_{th(j-c)D}$		$i = 3$	0,0018	s
$\tau_{th(j-c)D}$		$i = 4$	0,0002	s



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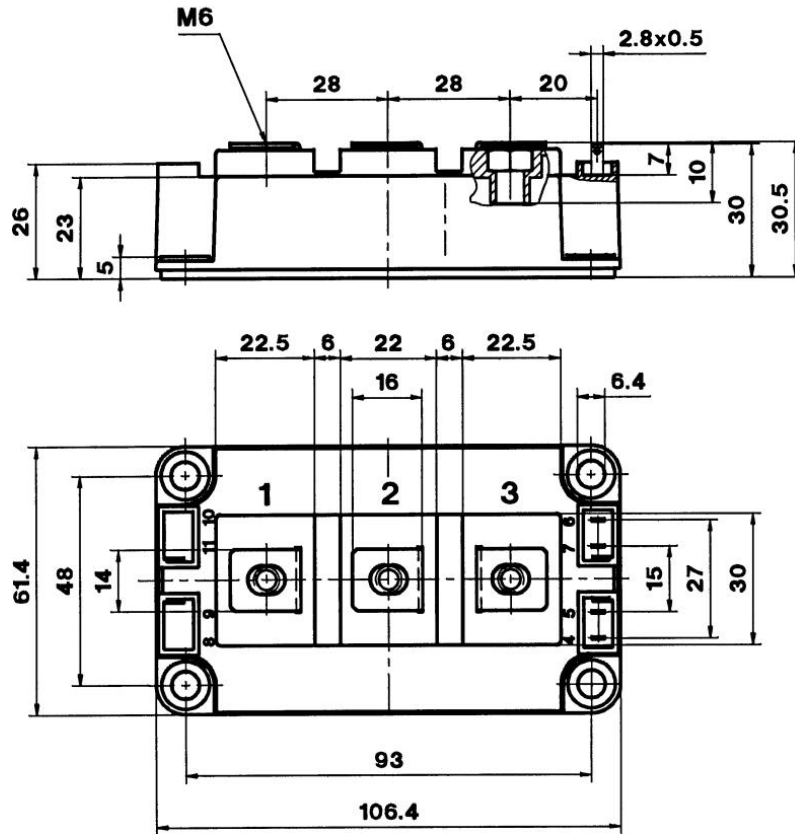


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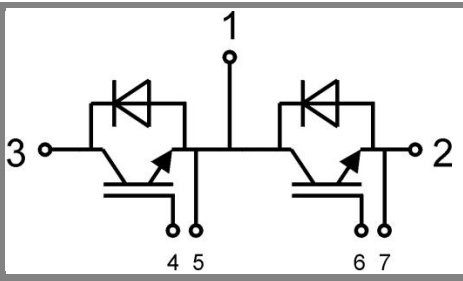
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