

SKM 400GB176D



SEMITRANS[®] 3

Trench IGBT Modules

SKM 400GB176D

SKM 400GAL176D

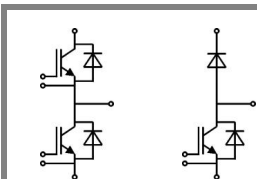
Preliminary Data

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					
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 12\text{ mA}$	5,2	5,8	6,4	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	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	
$t_{d(on)}$	$R_{Gon} = 4\ \Omega$	$V_{CC} = 1200\text{V}$ $I_{Cnom} = 300\text{A}$	330		ns
t_r			55		ns
E_{on}	$R_{Goff} = 4\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{V}$	170		mJ
$t_{d(off)}$			880		ns
t_f			145		ns
E_{off}			118		mJ
$R_{th(j-c)}$	per IGBT	0,075		K/W	

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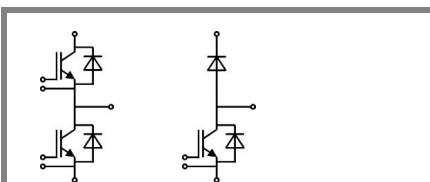
Typical Applications

- 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}	$I_{Fnom} = 300 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$		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}	$I_{Fnom} = 300 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$		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.

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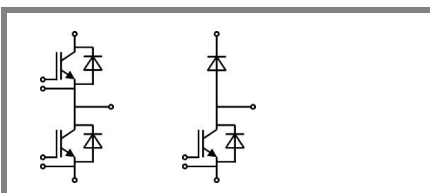
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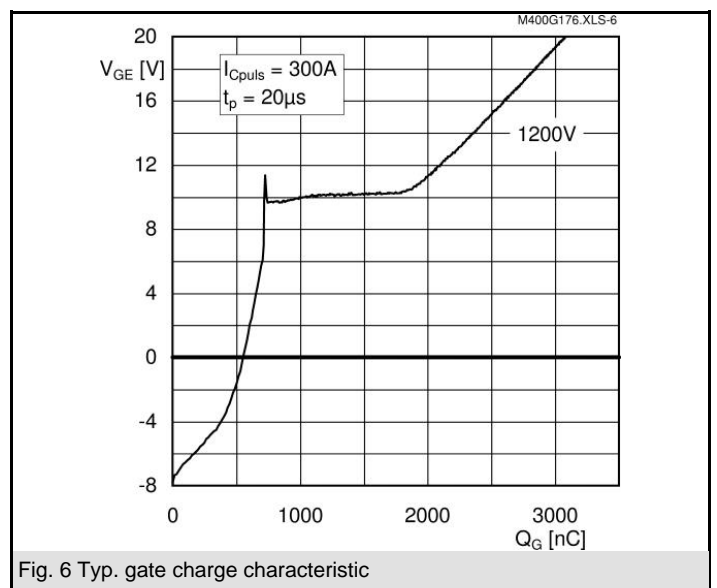
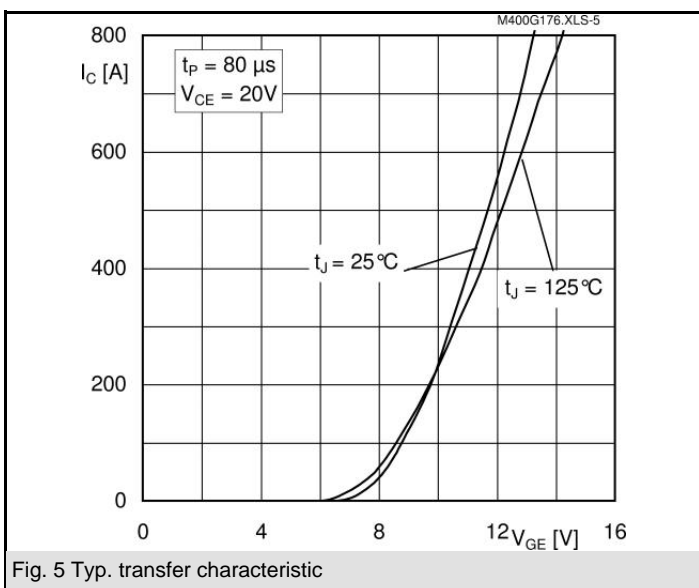
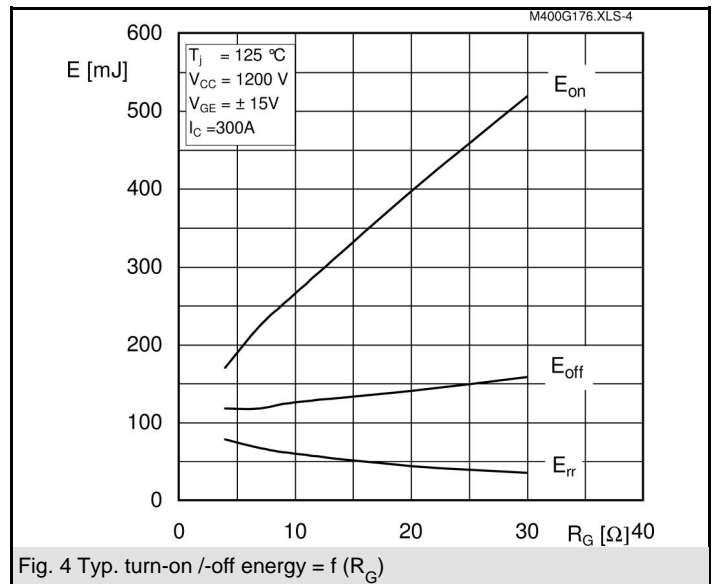
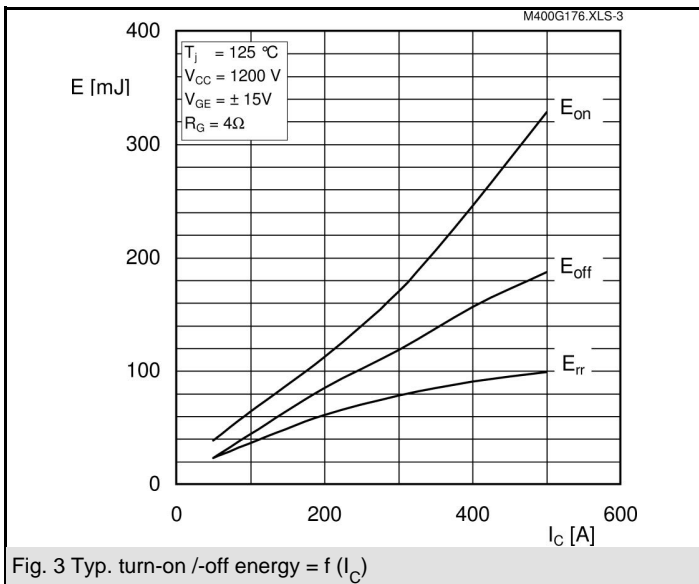
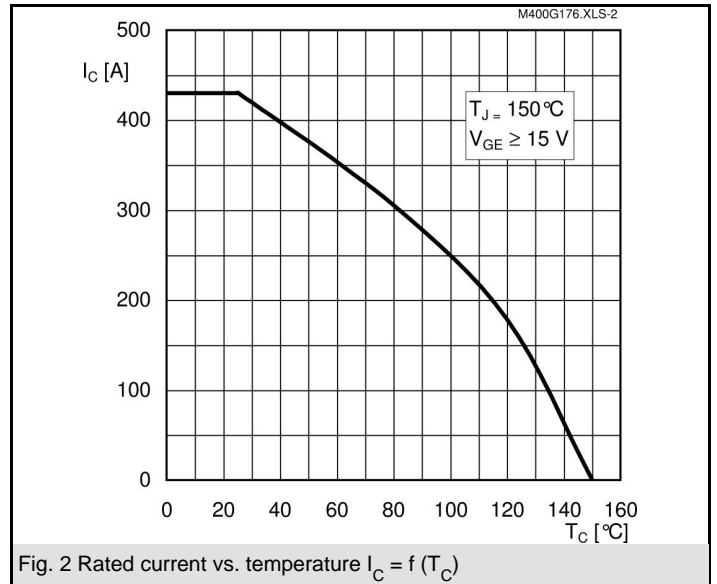
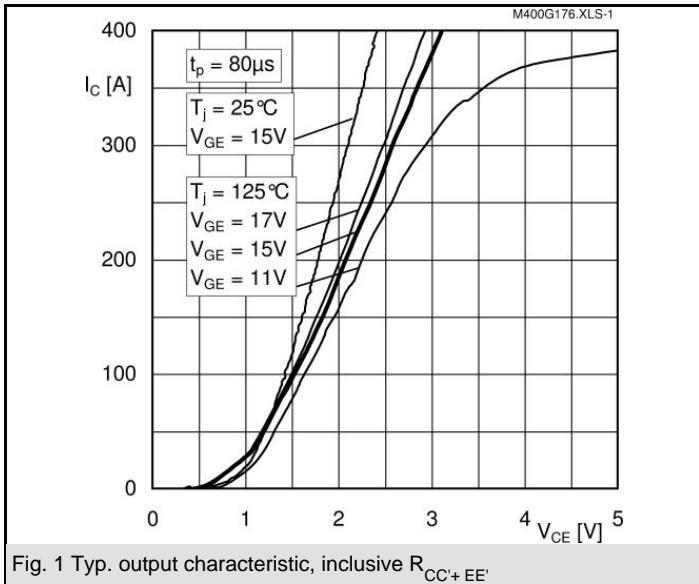
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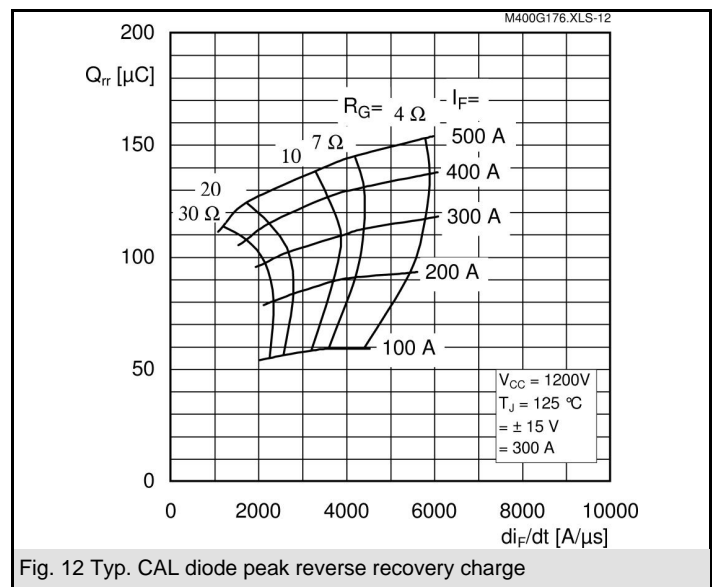
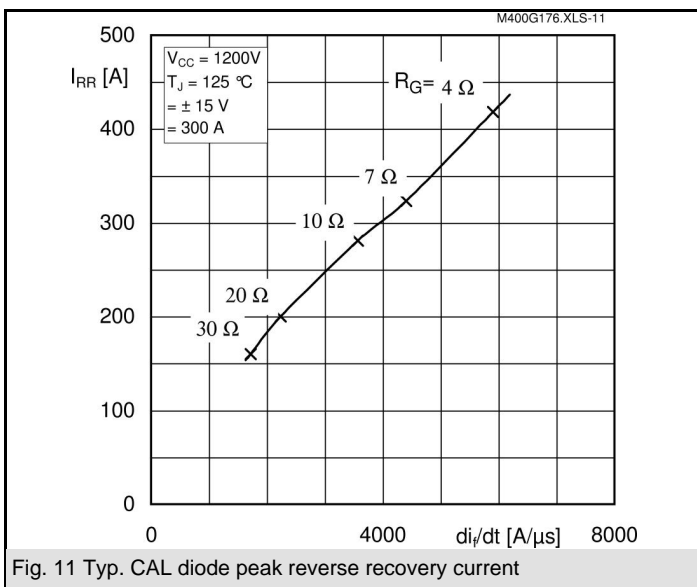
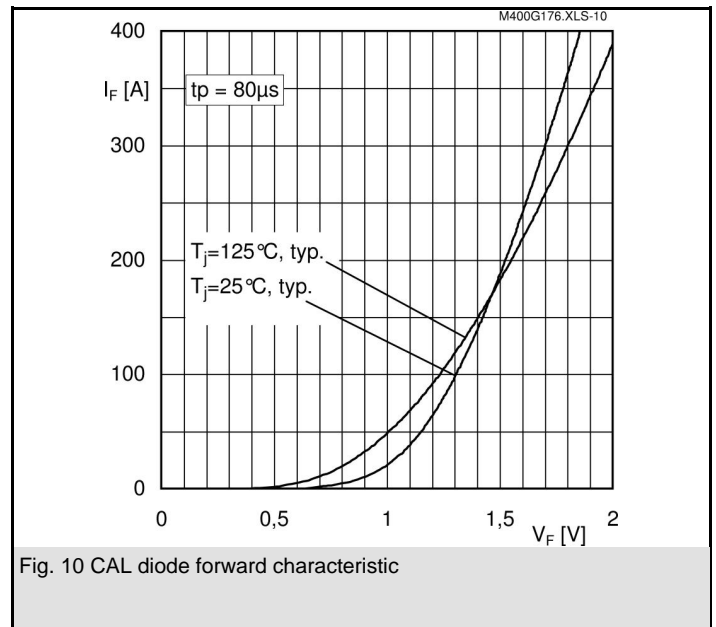
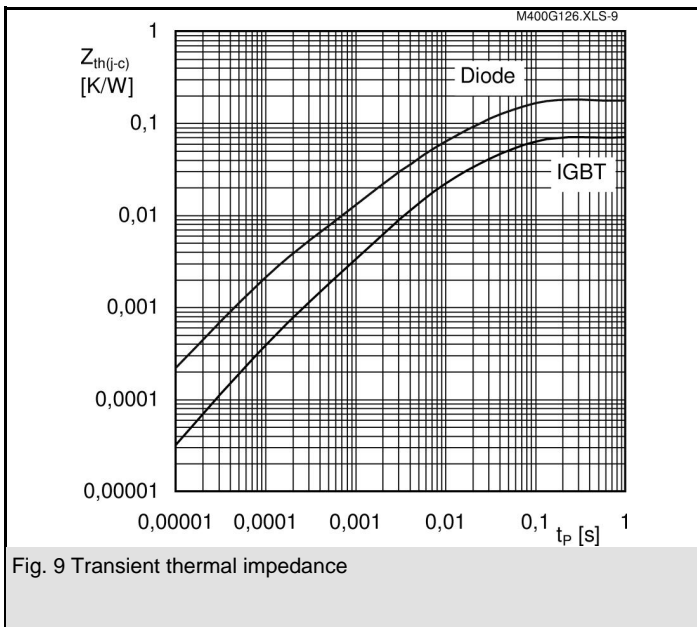
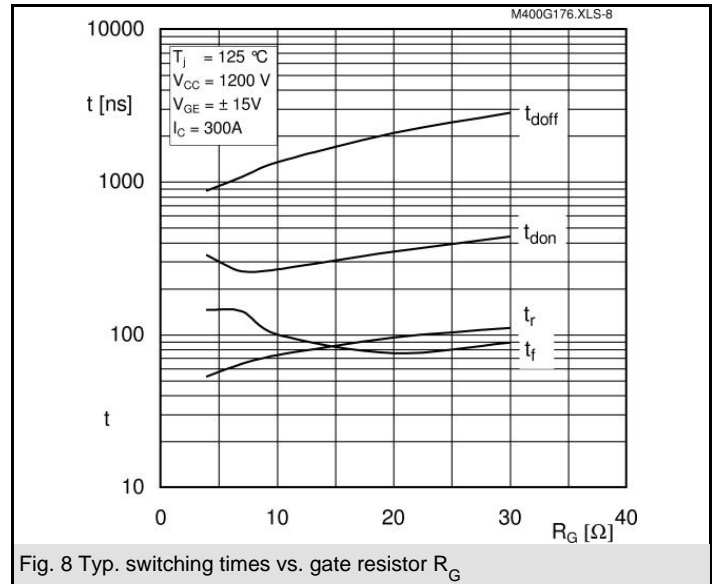
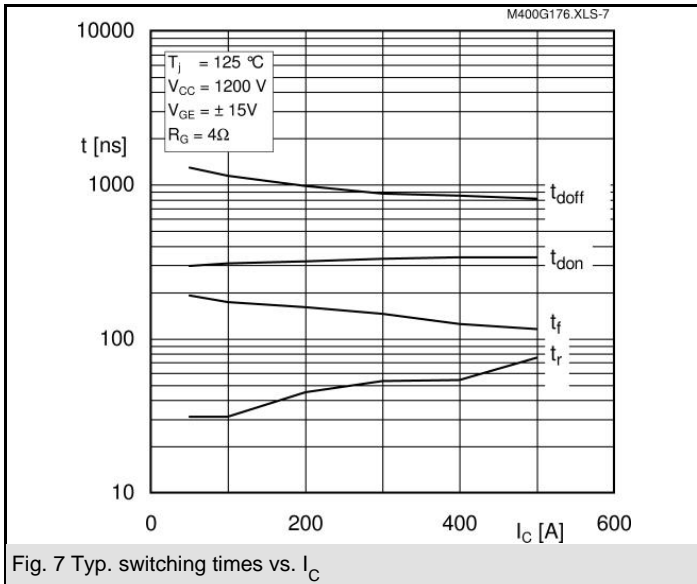
Z_{th}		Conditions	Values	Units
$Z_{th(j-c)I}$				
$R_{\theta j-c}$		i = 1	52	mk/W
$R_{\theta j-c}$		i = 2	18	mk/W
$R_{\theta j-c}$		i = 3	4,6	mk/W
$R_{\theta j-c}$		i = 4	0,4	mk/W
$\tau_{\theta j-c}$		i = 1	0,0569	s
$\tau_{\theta j-c}$		i = 2	0,0122	s
$\tau_{\theta j-c}$		i = 3	0,002	s
$\tau_{\theta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



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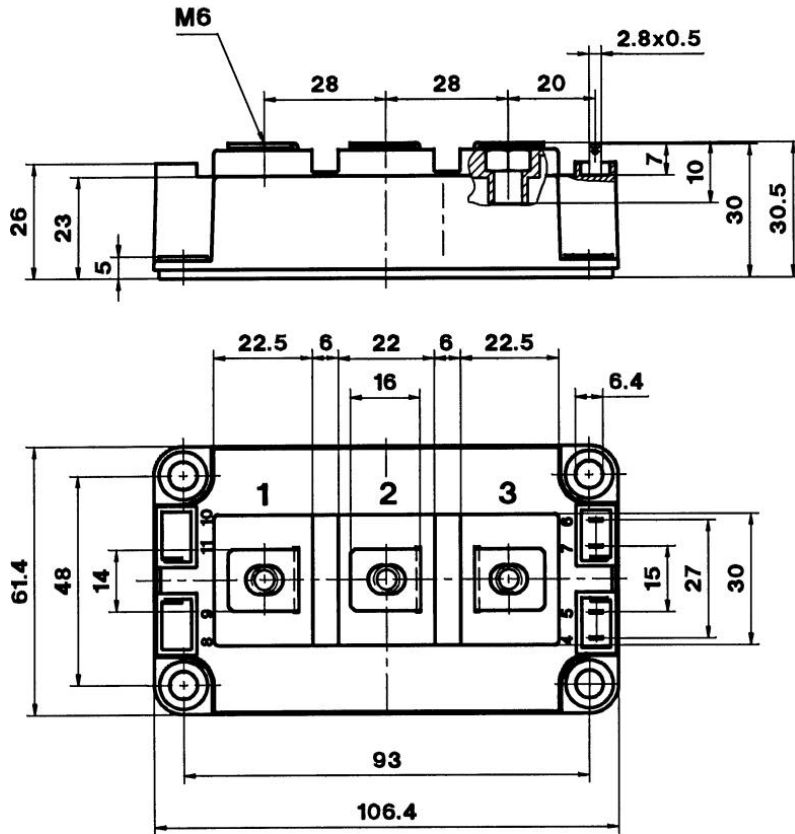
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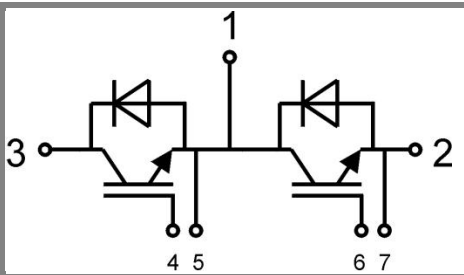


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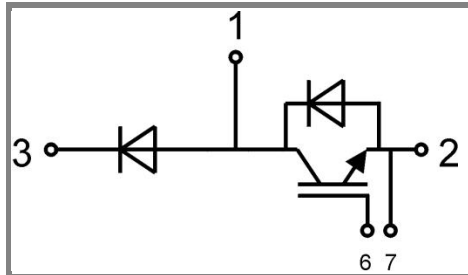


Case D 56



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Case D56



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Case D57