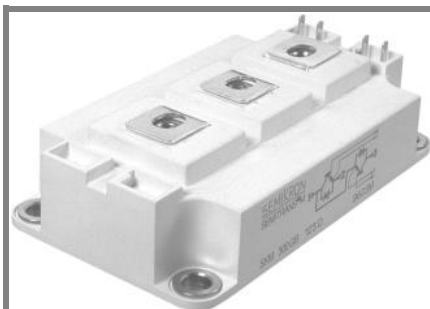


SKM 400GB176D



SEMITRANS® 3

Trench IGBT Modules

SKM 400GB176D

SKM 400GAL176D

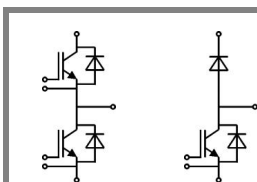
Preliminary Data

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

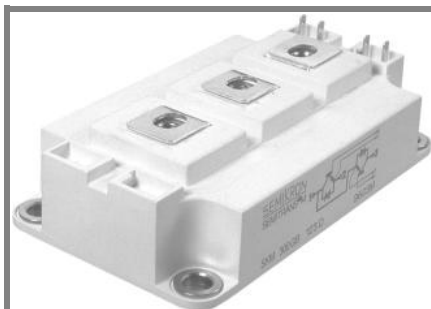


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Absolute Maximum Ratings			T _{case} = 25°C, unless otherwise specified	
Symbol	Conditions		Values	Units
IGBT				
V _{CES}	T _j = 25 °C		1700	V
I _C	T _j = 150 °C	T _c = 25 °C	430	A
		T _c = 80 °C	310	A
I _{CRM}	I _{CRM} =2xI _{Cnom}		600	A
V _{GES}			± 20	V
t _{psc}	V _{CC} = 1200 V; V _{GE} ≤ 20 V; T _j = 125 °C V _{CES} < 1700 V		10	μs
Inverse Diode				
I _F	T _j = 150 °C	T _c = 25 °C	440	A
		T _c = 80 °C	300	A
I _{FRM}	I _{FRM} =2xI _{Fnom}		600	A
I _{FSM}	t _p = 10 ms; sin.	T _j = 150 °C	2200	A
Freewheeling Diode				
I _F	T _j = 150 °C	T _{case} = 25 °C	440	A
		T _{case} = 80 °C	300	A
I _{FRM}	I _{FRM} =2xI _{Fnom}		600	A
I _{FSM}	t _p = 10 ms; sin.	T _j = 150 °C	2200	A
Module				
I _{t(RMS)}			500	A
T _{vj}			- 40 ... + 150	°C
T _{stg}			- 40 ... + 125	°C
V _{isol}	AC, 1 min.		4000	V

Characteristics			T _{case} = 25°C, unless otherwise specified			
Symbol	Conditions		min.	typ.	max.	Units
IGBT						
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 12 mA		5,2	5,8	6,4	V
I _{CES}	V _{GE} = 0 V, V _{CE} = V _{CES}	T _j = 25 °C		0,15	0,45	mA
V _{CE0}		T _j = 25 °C		1	1,2	V
		T _j = 125 °C		0,9	1,1	V
r _{CE}	V _{GE} = 15 V	T _j = 25°C		3,3	4,2	mΩ
		T _j = 125°C		5,2	6	mΩ
V _{CE(sat)}	I _{Cnom} = 300 A, V _{GE} = 15 V	T _j = 25°C _{chiplev.}		2	2,4	V
		T _j = 125°C _{chiplev.}		2,45	2,9	V
C _{ies}	V _{CE} = 25, V _{GE} = 0 V	f = 1 MHz		19,8		nF
C _{oes}				1,1		nF
C _{res}				0,88		nF
Q _G	V _{GE} = -8V...+15V			2500		nC
t _{d(on)}	R _{Gon} = 4 Ω	V _{CC} = 1200V I _{Cnom} = 300A		330		ns
t _r				55		ns
E _{on}				170		mJ
t _{d(off)}	R _{Goff} = 4 Ω	T _j = 125 °C V _{GE} = ± 15V		880		ns
t _f				145		ns
E _{off}				118		mJ
R _{th(j-c)}	per IGBT				0,075	K/W



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Preliminary Data

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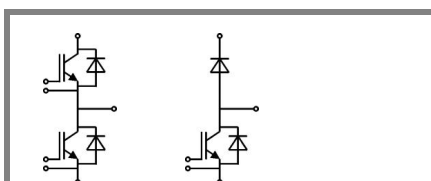
Typical Applications

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

Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
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}	$I_{Fnom} = 300 \text{ A}$		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}	$I_{Fnom} = 300 \text{ A}$		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.

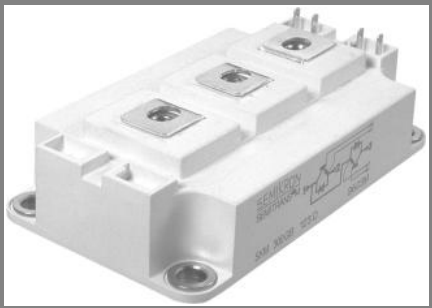
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SEMITRANS® 3

Trench IGBT Modules

SKM 400GB176D

SKM 400GAL176D

Preliminary Data

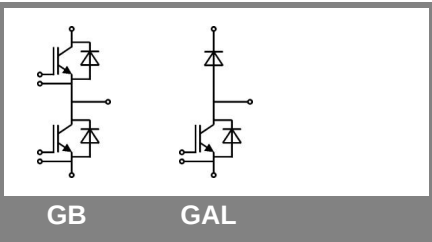
Features

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Typical Applications

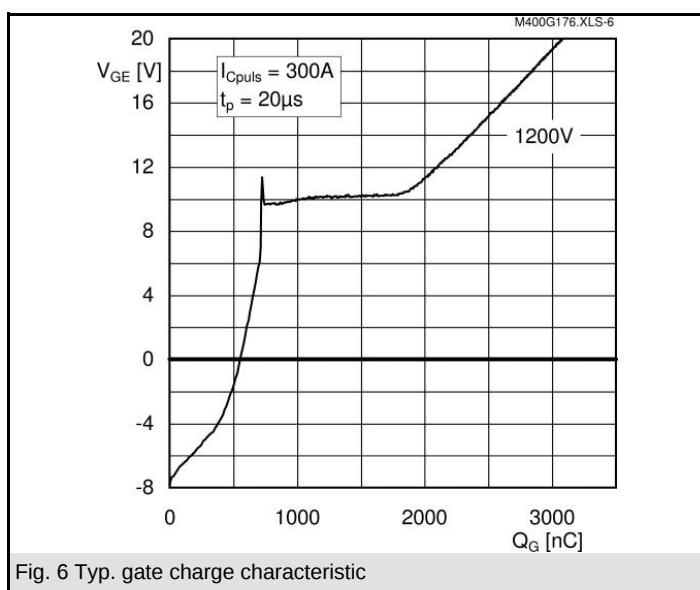
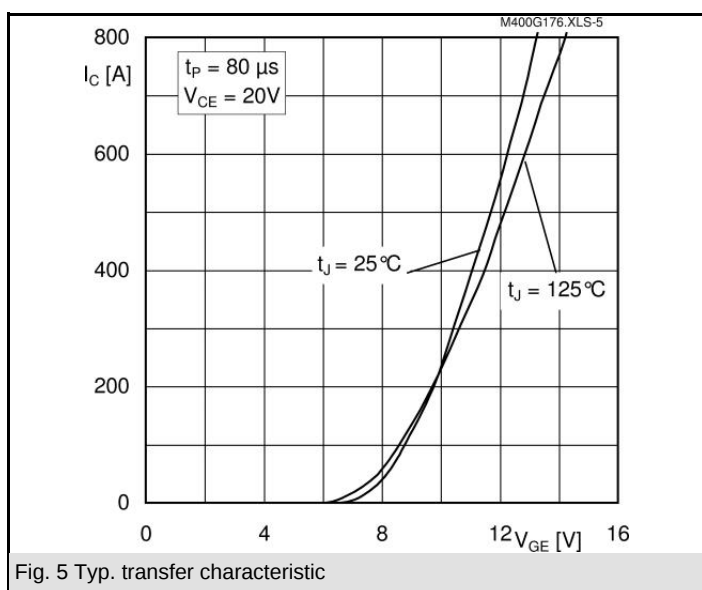
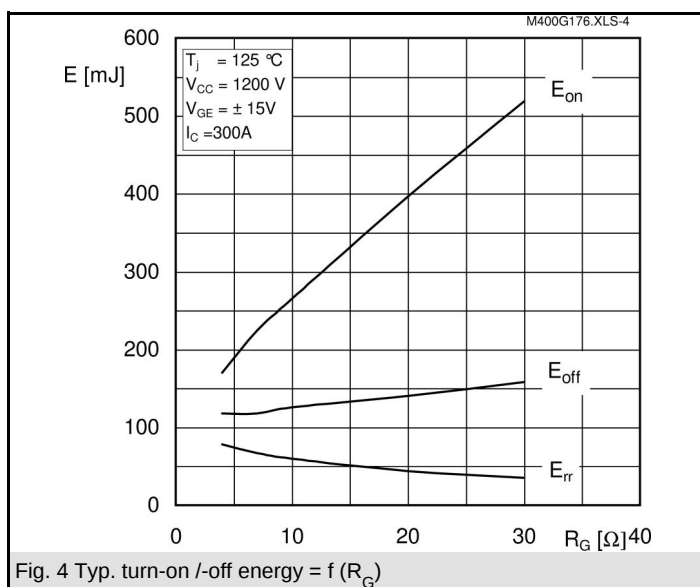
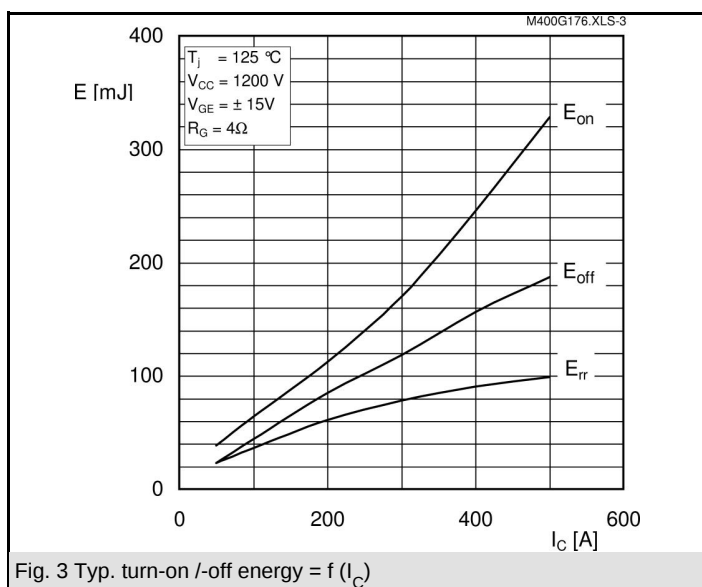
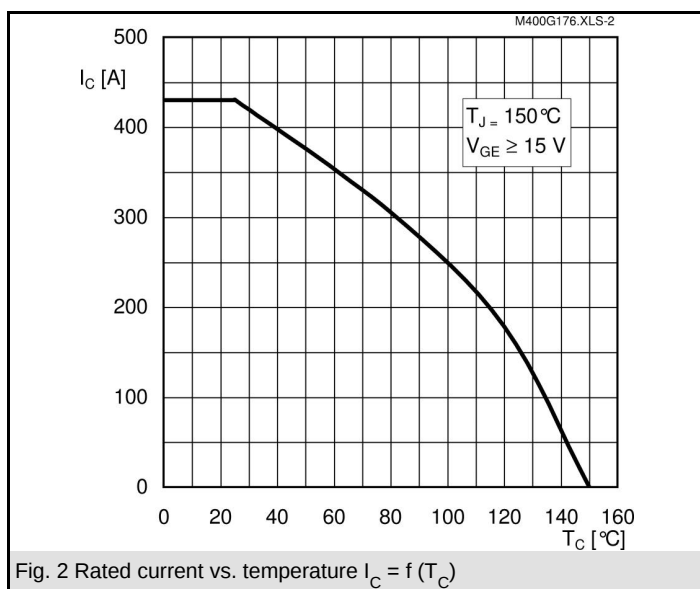
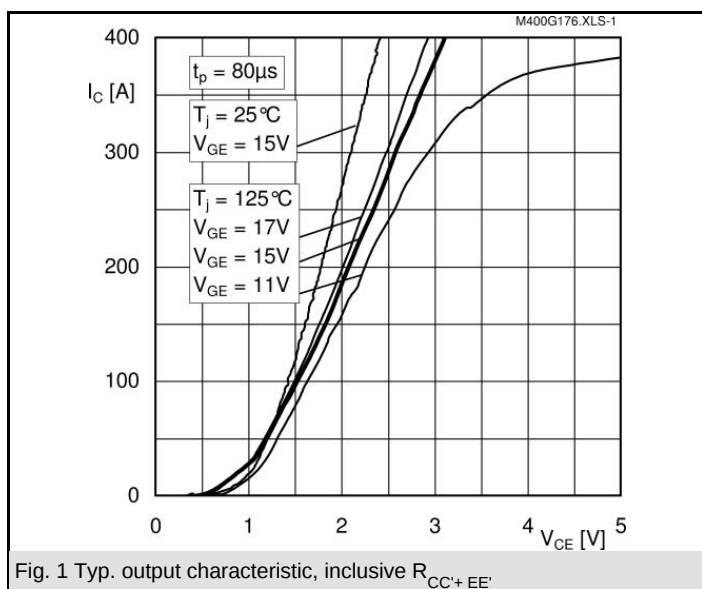
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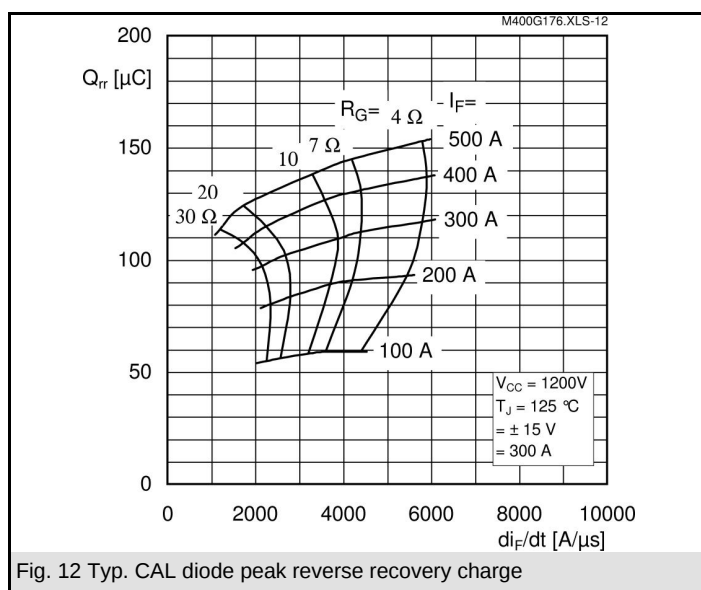
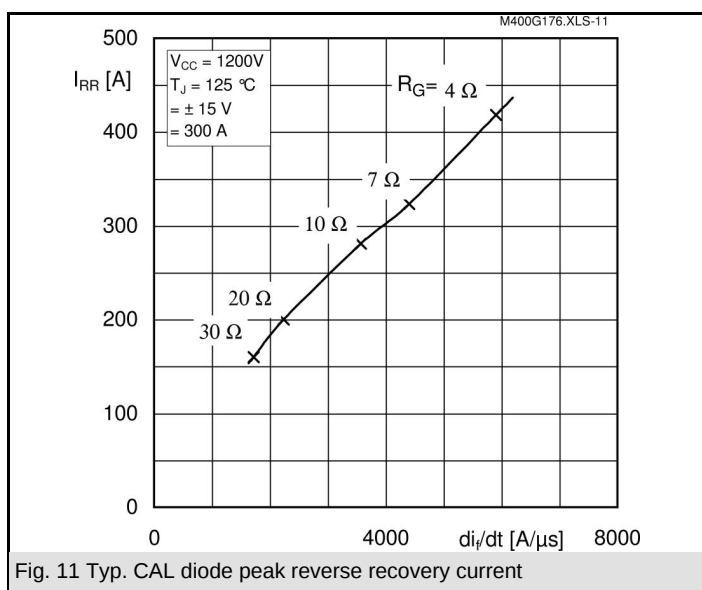
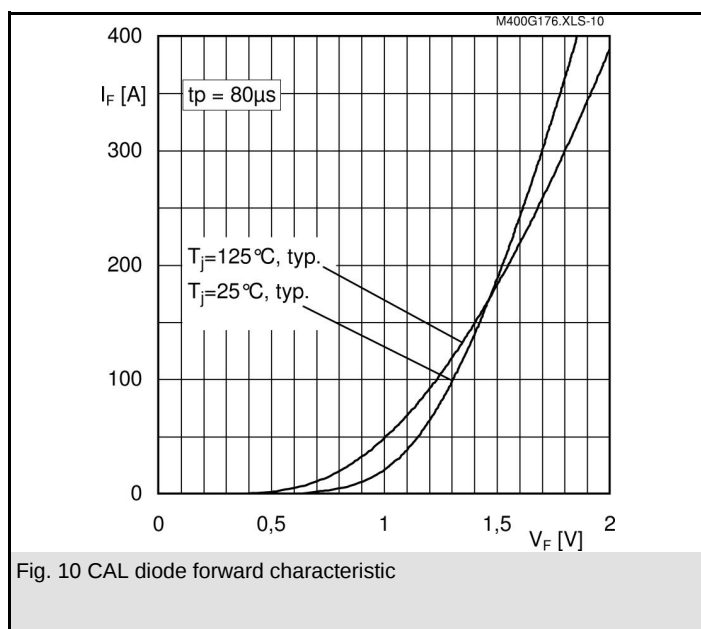
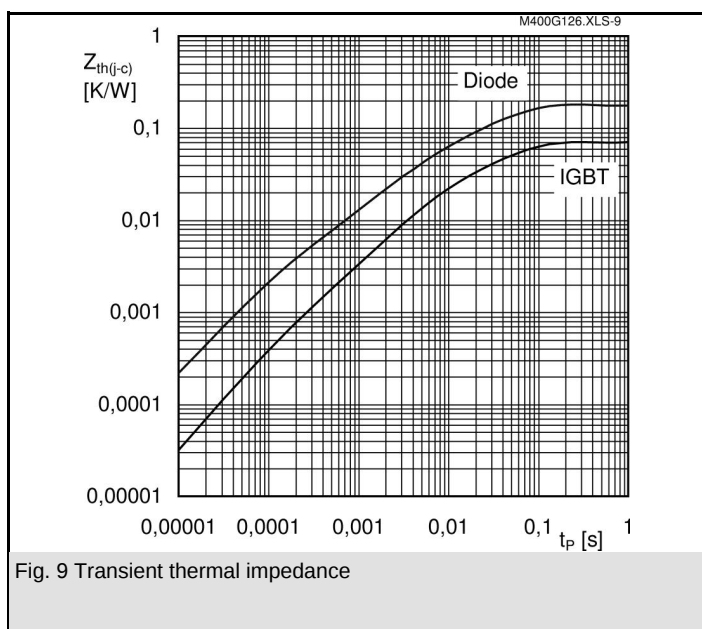
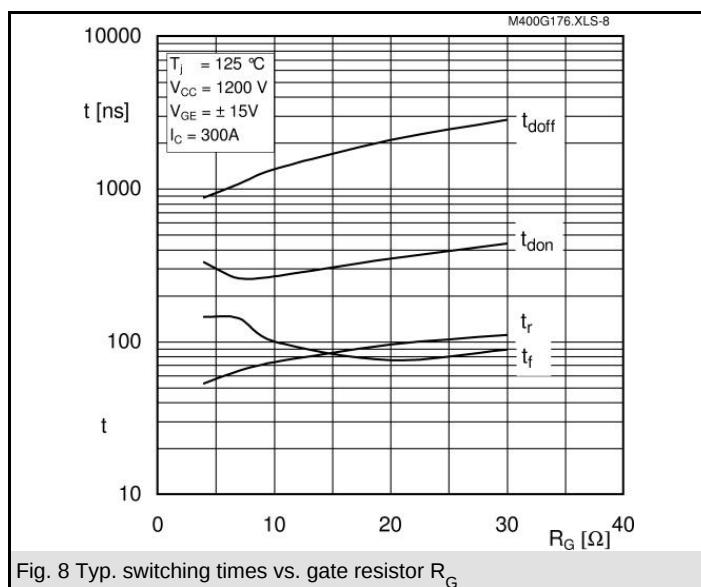
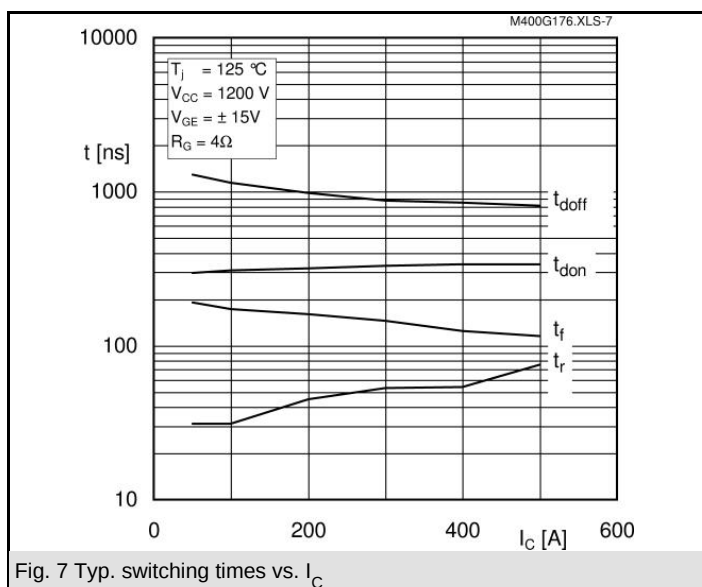
Z_{th}			
Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	$i = 1$	52	mk/W
R_i	$i = 2$	18	mk/W
R_i	$i = 3$	4,6	mk/W
R_i	$i = 4$	0,4	mk/W
τ_{ui}	$i = 1$	0,0569	s
τ_{ui}	$i = 2$	0,0122	s
τ_{ui}	$i = 3$	0,002	s
τ_{ui}	$i = 4$	0,02	s
$Z_{th(j-c)D}$			
R_i	$i = 1$	85	mk/W
R_i	$i = 2$	28	mk/W
R_i	$i =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



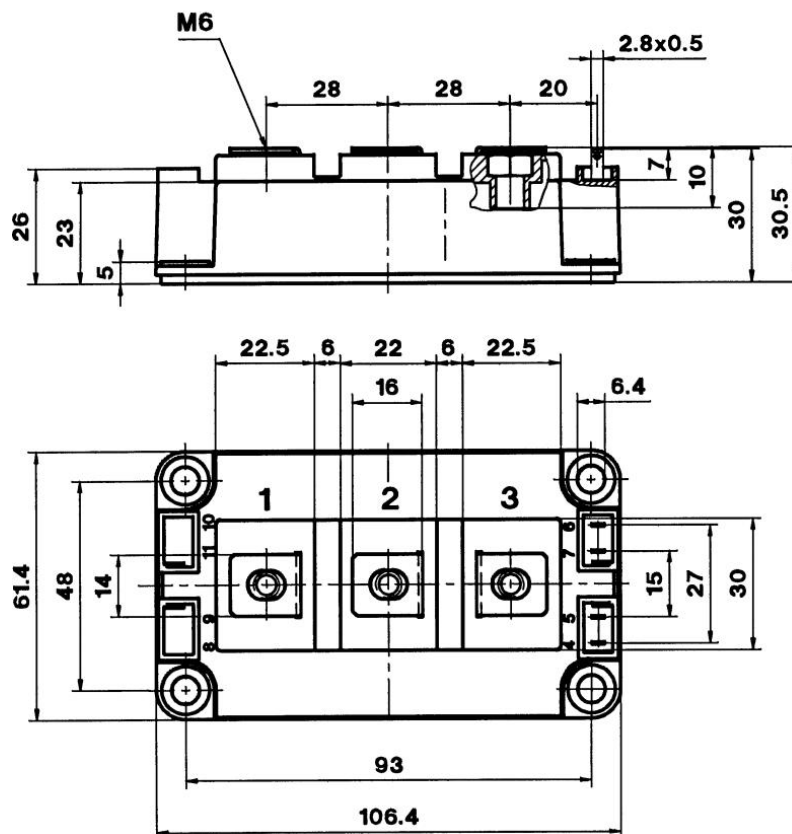
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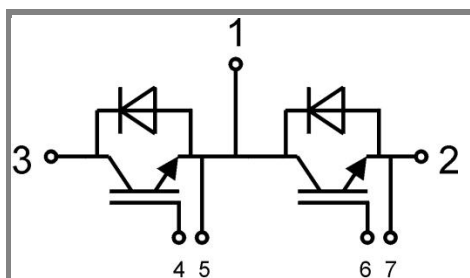




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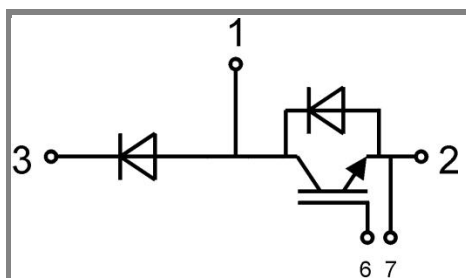


Case D 56



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Case D56



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Case D57