

SEMITRANS® 3

Trench IGBT Modules

SKM 400GB066D

Features

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

Typical Applications*

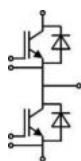
- AC inverter drives
- UPS
- Electronic welders

Remarks

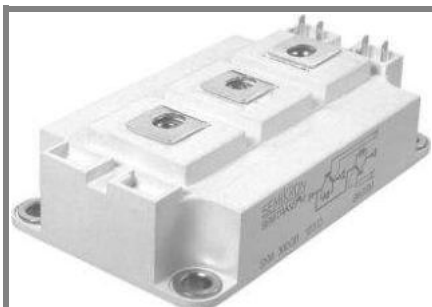
- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recommended $T_{op} = -40 \dots +150^\circ\text{C}$
- Product reliability results are valid for $T_j \leq 150^\circ\text{C}$
- Short circuit data: $t_p \leq 6 \text{ s}$; $V_{GE} \leq 15\text{V}$; $T_j = 150^\circ\text{C}$; $V_{CC} \leq 360\text{V}$, use of soft R_G necessary !
- Take care of over-voltage caused by stray inductances

Absolute Maximum Ratings				$T_{case} = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions			Values	Units
IGBT					
V_{CES}	$T_j = 25^\circ\text{C}$			600	V
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$		500	A
		$T_c = 80^\circ\text{C}$		380	A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$			800	A
V_{GES}				± 20	V
t_{psc}	$V_{CC} = 360 \text{ V}$; $V_{GE} \leq 15 \text{ V}$; $T_j = 150^\circ\text{C}$ $V_{CES} < 600 \text{ V}$			6	μs
Inverse Diode					
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$		450	A
		$T_c = 80^\circ\text{C}$		320	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$			800	A
Module					
$I_{t(RMS)}$				500	A
T_{vj}				- 40 ... +175	$^\circ\text{C}$
T_{stg}				- 40 ... +125	$^\circ\text{C}$
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 = 6,4 mA		5	5,8	6,5	V
I _{CES}	V _{GE} = 0 V, V _{CE} = V _{CES}	T _j = 25 °C		0,25	0,75	mA
V _{CE0}		T _j = 25 °C		0,9	1	V
		T _j = 150 °C		0,85	0,9	V
r _{CE}	V _{GE} = 15 V	T _j = 25°C		1,4	2,3	mΩ
		T _j = 150°C		2,1	3	mΩ
V _{CE(sat)}	I _{Cnom} = 400 A, V _{GE} = 15 V	T _j = 25°C _{chiplev.}		1,45	1,9	V
		T _j = 150°C _{chiplev.}		1,7	2,1	V
C _{ies}	V _{CE} = 25, V _{GE} = 0 V	f = 1 MHz		24,7		nF
C _{oes}				1,54		nF
C _{res}				0,73		nF
Q _G	V _{GE} = -8V...+15V			3000		nC
R _{Gint}	T _j = °C			2		Ω
t _{d(on)}	R _{Gon} = 1,5 Ω	V _{CC} = 300V I _C = 400A		200		ns
t _r				60		ns
E _{on}	R _{Goff} = 1,5 Ω	T _j = 150 °C V _{GE} = -8V/+15V		8		mJ
t _{d(off)}				560		ns
t _f				53		ns
E _{off}				16		mJ
R _{th(j-c)}	per IGBT				0,12	K/W



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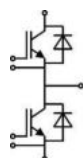
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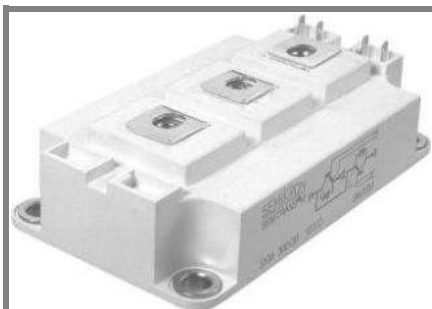
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Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 400 \text{ A}$; $V_{GE} = 0 \text{ V}$ $T_j = 25^\circ\text{C}_{chiplev.}$		1,4	1,6	V
V_{F0}	$T_j = 25^\circ\text{C}$		0,95	1	V
r_F	$T_j = 25^\circ\text{C}$		1,1	1,5	mΩ
I_{RRM}	$I_F = 400 \text{ A}$ $T_j = 150^\circ\text{C}$		410		A
Q_{rr}	$di/dt = 7250 \text{ A/s}$		62		C
E_{rr}	$V_{GE} = -8 \text{ V}$; $V_{CC} = 300 \text{ V}$		14		mJ
$R_{th(j-c)D}$	per diode			0,2	K/W
Module					
L_{CE}			15	20	nH
$R_{CC'+EE'}$	res., terminal-chip $T_{case} = 25^\circ\text{C}$		0,35		mΩ
	$T_{case} = 125^\circ\text{C}$		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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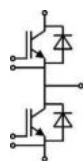
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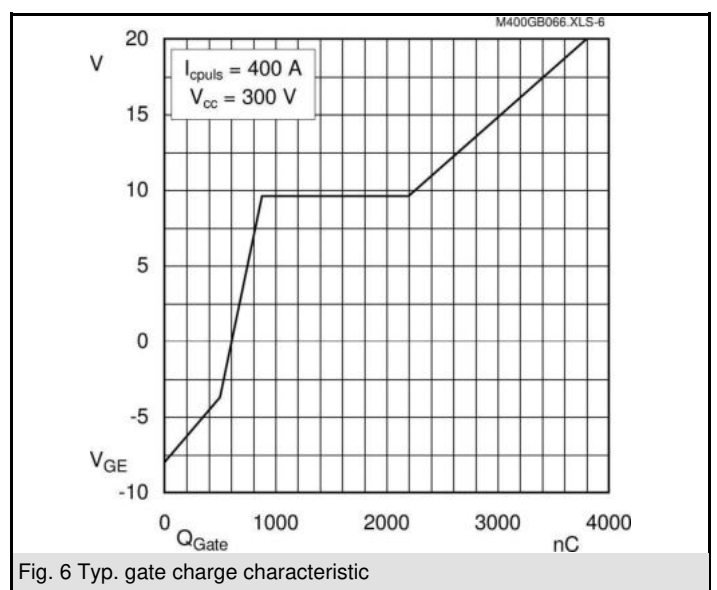
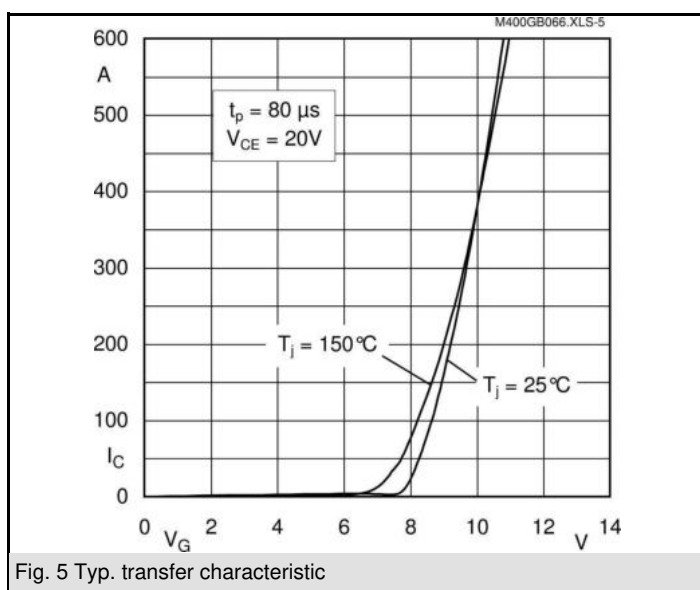
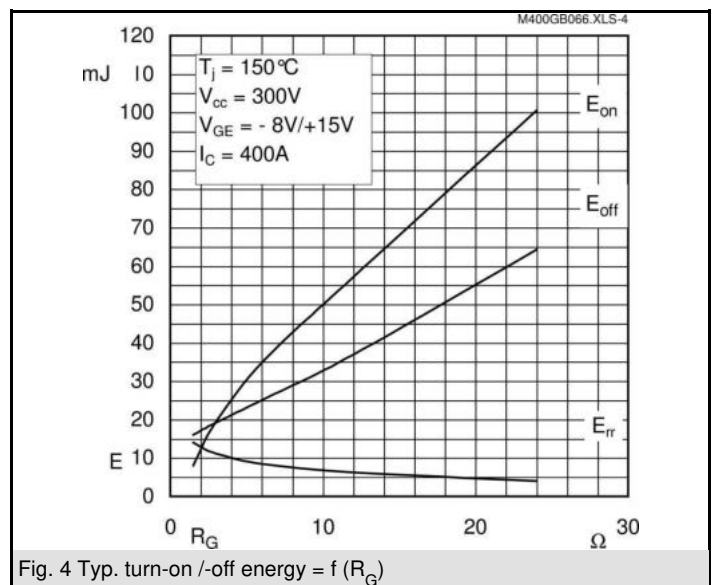
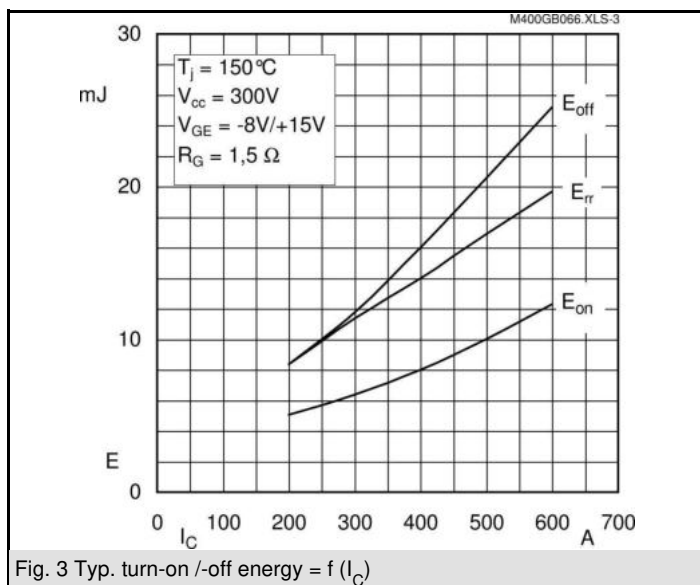
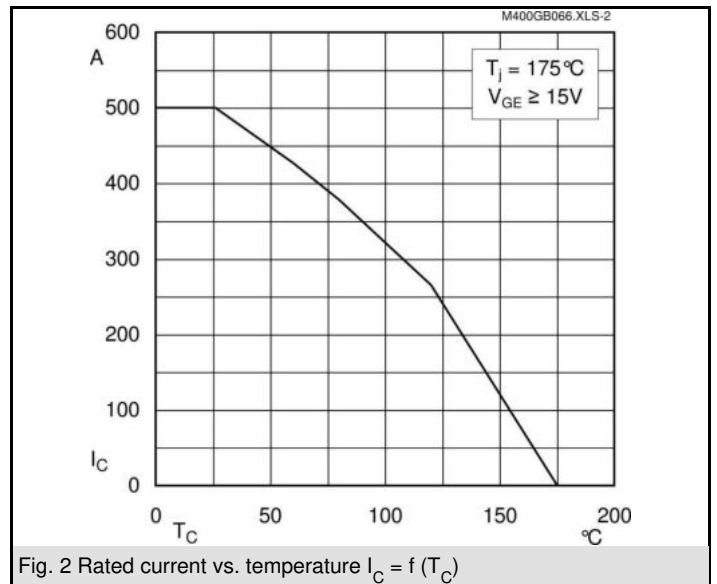
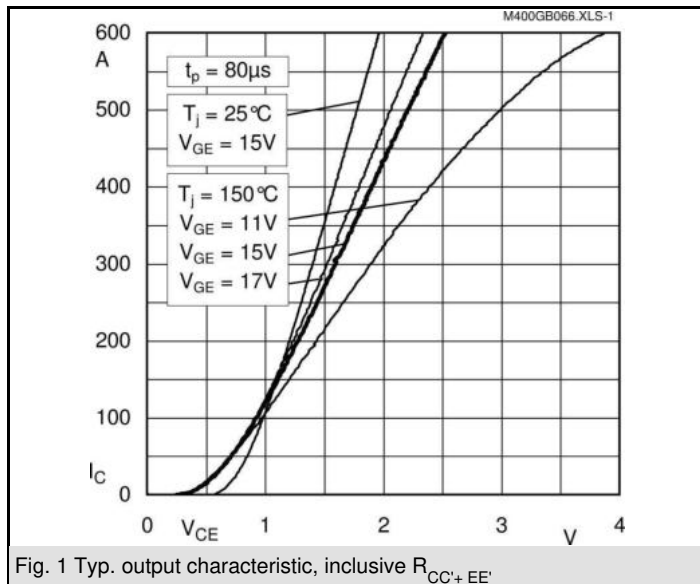
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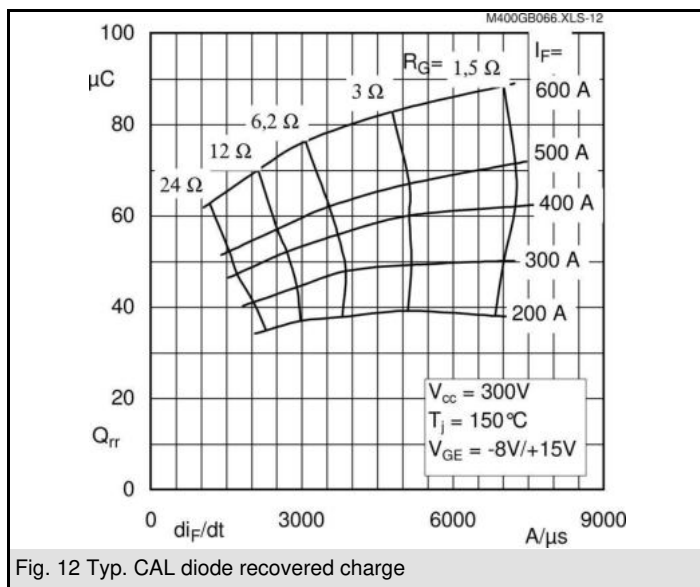
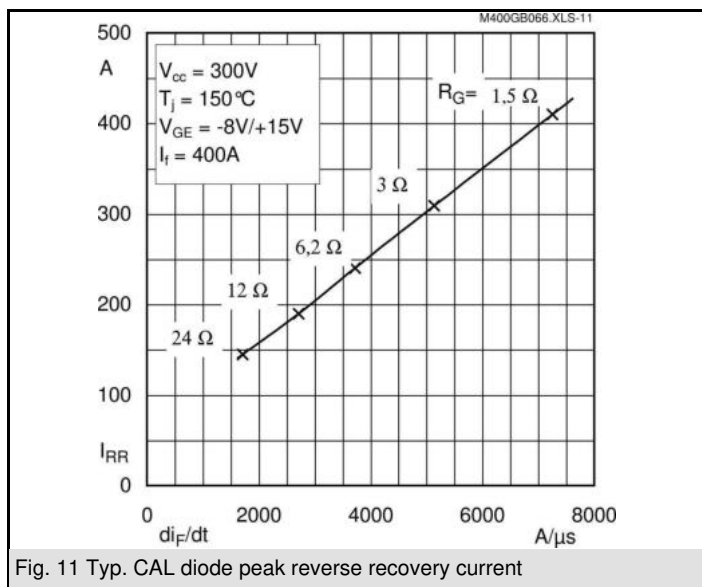
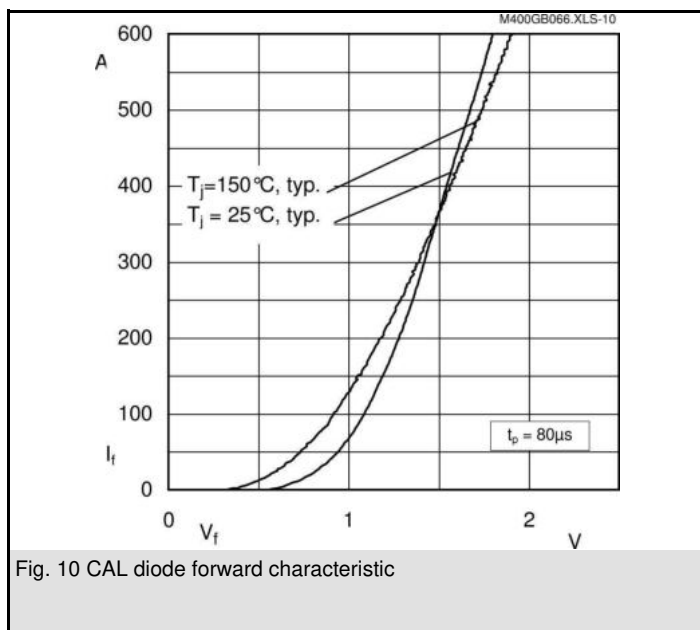
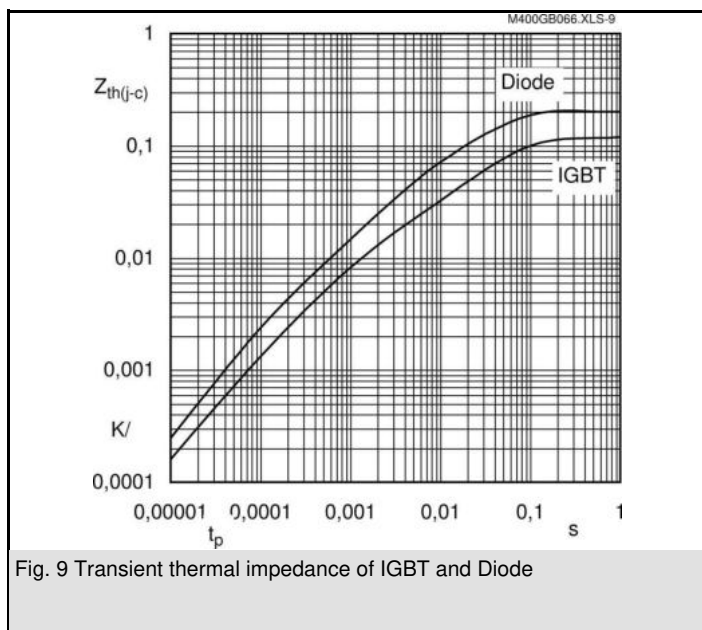
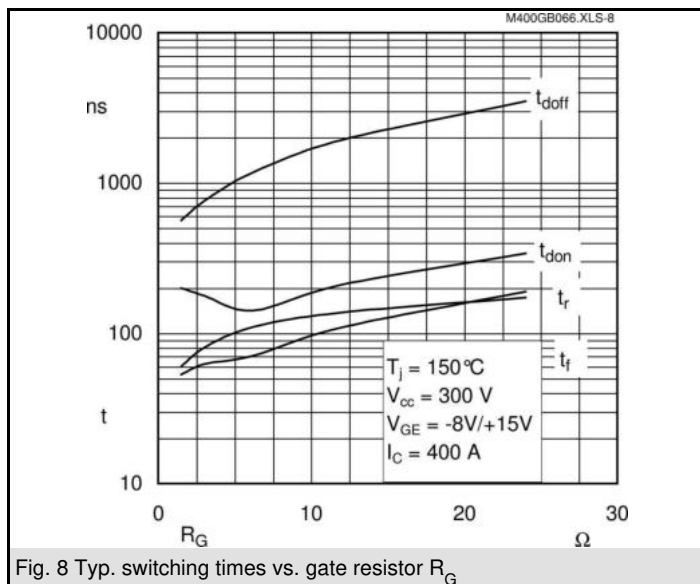
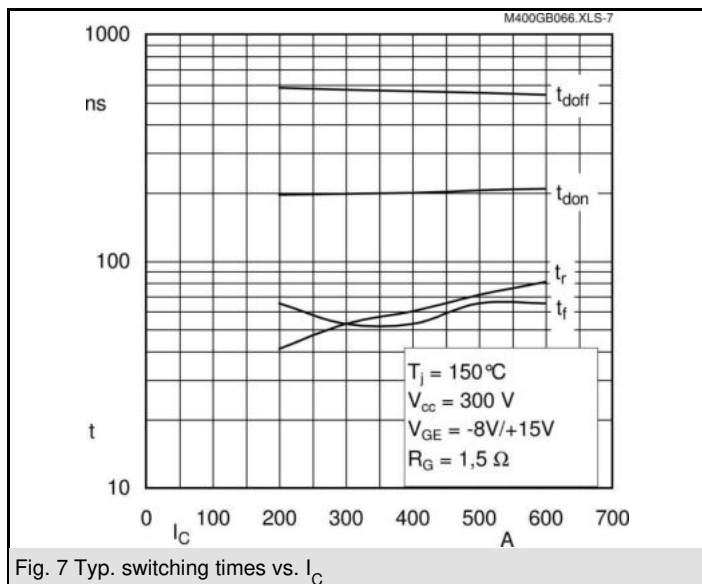
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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	$i = 1$	80	mk/W
R_i	$i = 2$	22,5	mk/W
R_i	$i = 3$	6,4	mk/W
R_i	$i = 4$	1,1	mk/W
τ_{ui}	$i = 1$	0,0447	s
τ_{ui}	$i = 2$	0,0223	s
τ_{ui}	$i = 3$	0,0015	s
τ_{ui}	$i = 4$	0,0002	s
$Z_{th(j-c)D}$			
R_i	$i = 1$	130	mk/W
R_i	$i = 2$	55	mk/W
R_i	$i = 3$	12,5	mk/W
R_i	$i = 4$	2,5	mk/W
τ_{ui}	$i = 1$	0,054	s
τ_{ui}	$i = 2$	0,01	s
τ_{ui}	$i = 3$	0,0015	s
τ_{ui}	$i = 4$	0,1	s



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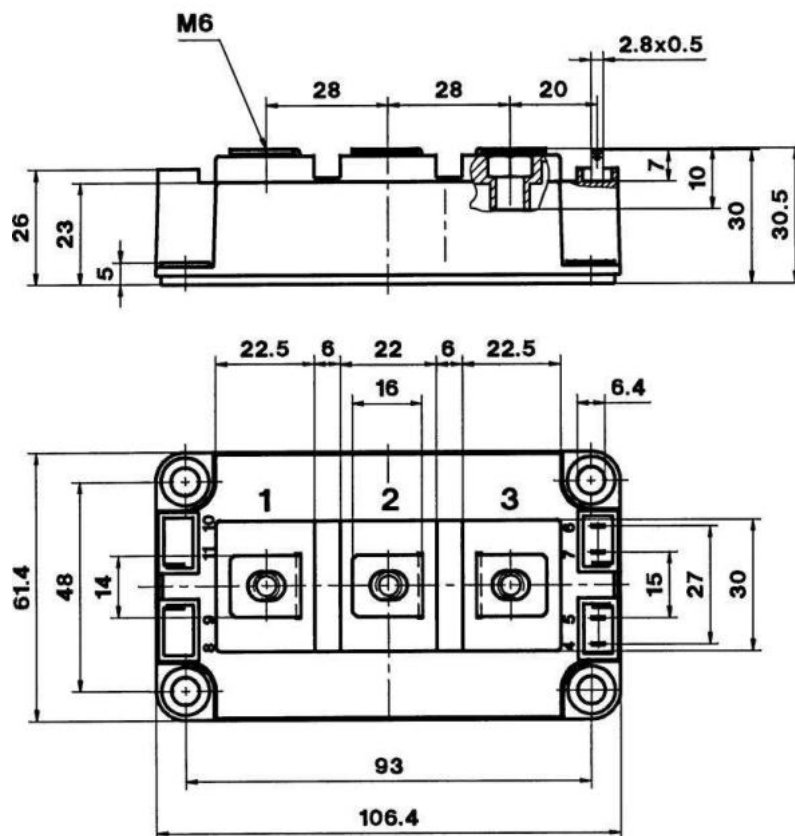




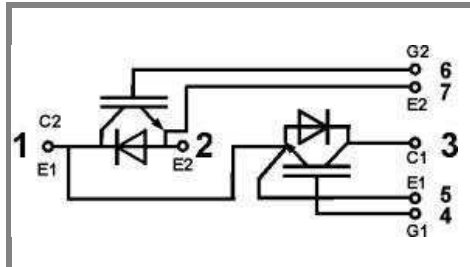
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