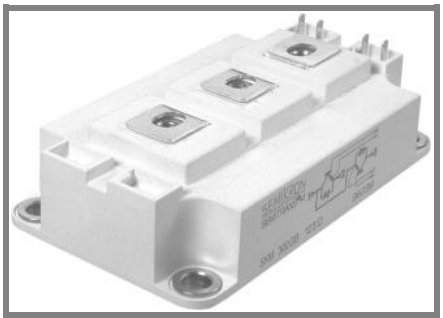
SKM 400GB12T4



SEMITRANS® 3

IGBT4 Modules

SKM 400GB12T4

SKM 400GAL12T4

SKM 400GAR12T4

Features

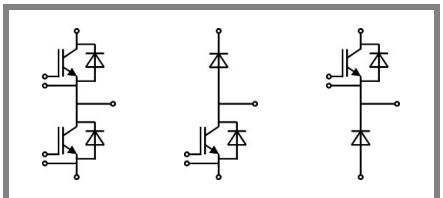
- IGBT4 = 4. Generation (Trench) IGBT
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_{CNOM}
- Electronic welders at f_{sw} up to 20 kHz

Typical Applications

- AC inverter drives
- UPS
- Electronic welders at f_{sw} up to 20 kHz

Remarks

- Case temperature limited to T_c = 125°C max, recomm. T_{op} = -40 ... +150°C, product rel. results valid for $T_j \leq 150°$



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Absolute Maximum Ratings T_c = 25 °C, unless otherwise specified

Symbol	Conditions		Values	Units
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_{case} = 25 °C	610	A
		T_{case} = 80 °C	475	A
I_{CRM}	I_{CRM} = 3 x I_{CNOM}		1200	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 800 V; $V_{GE} \leq$ 15 V; V_{CES} < 1200 V	T_j = 150 °C	10	µs
Inverse Diode				
I_F	T_j = 175 °C	T_{case} = 25 °C	440	A
		T_{case} = 80 °C	330	A
I_{FRM}	I_{FRM} = 3 x I_{FNOM}		1200	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	1980	A
Module				
$I_{t(RMS)}$			500	A
T_{vj}			-40 ... +175	°C
T_{stg}			-40 ... +125	°C
V_{isol}	AC, 1 min.		4000	V

Characteristics T_c = 25 °C, unless otherwise specified

Symbol	Conditions		min.	typ.	max.	Units
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 16 mA		5	5,8	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C				mA
V_{CE0}		T_j = 25 °C		0,8	0,9	V
		T_j = 150 °C		0,7	0,8	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		2,5	2,8	mΩ
		T_j = 150°C		3,8	4	mΩ
$V_{CE(sat)}$	I_{Cnom} = 400 A, V_{GE} = 15 V	T_j = 25°C$_{chiplev.}$		1,8	2	V
		T_j = 150°C$_{chiplev.}$		2,2	2,4	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		24,8		nF
C_{oes}				1,64		nF
C_{res}				1,4		nF
Q_G	V_{GE} = -8V /+15V			2250		nC
R_{Gint}	T_j = 25 °C			1,9		Ω
$t_{d(on)}$	R_{Gon} = 1 Ω di/dt = 9700 A/µs	V_{CC} = 600V I_C= 400A T_j = 150 °C V_{GE} = -8V		220		ns
t_r				47		ns
E_{on}				33		mJ
$t_{d(off)}$	R_{Goff} = 1 Ω di/dt = 4300 A/µs			505		ns
t_f				78		ns
E_{off}				42		mJ
$R_{th(j-c)}$	per IGBT				0,072	K/W

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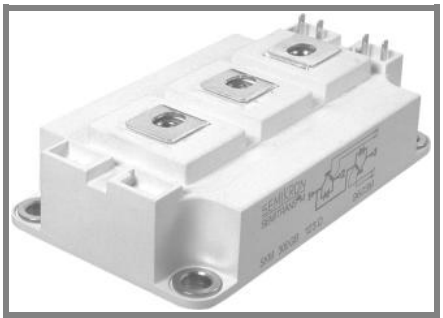

SEMITRANS® 3

IGBT4 Modules

SKM 400GB12T4

SKM 400GAL12T4

SKM 400GAR12T4

Features

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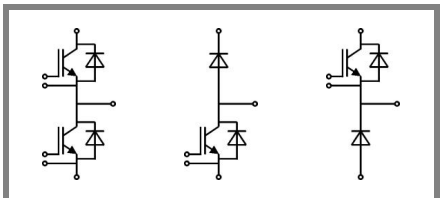

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 400 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2,2	2,5	V
		T_j = 150 °$C_{chiplev.}$		2,1	2,45	V
V_{F0}		T_j = 25 °C		1,3	1,5	V
		T_j = 150 °C		0,9	1,1	V
r_F		T_j = 25 °C		2,25	2,5	mΩ
		T_j = 150 °C		3	3,4	mΩ
I_{RRM}	I_F = 400 A	T_j = 150 °C		450		A
Q_{rr}	di/dt = 8800 A/µs			68		µC
E_{rr}	V_{GE} = -8V			30,5		mJ
$R_{th(j-c)}$	per diode				0,14	K/W
Freewheeling Diode						
$V_F = V_{EC}$	I_{Fnom} = A; V_{GE} = V	T_j = °$C_{chiplev.}$				V
V_{F0}		T_j = °C				V
r_F		T_j = °C				V
I_{RRM}	I_F = A	T_j = °C				A
Q_{rr}						µC
E_{rr}						mJ
	per diode					K/W
Module						
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			0,02	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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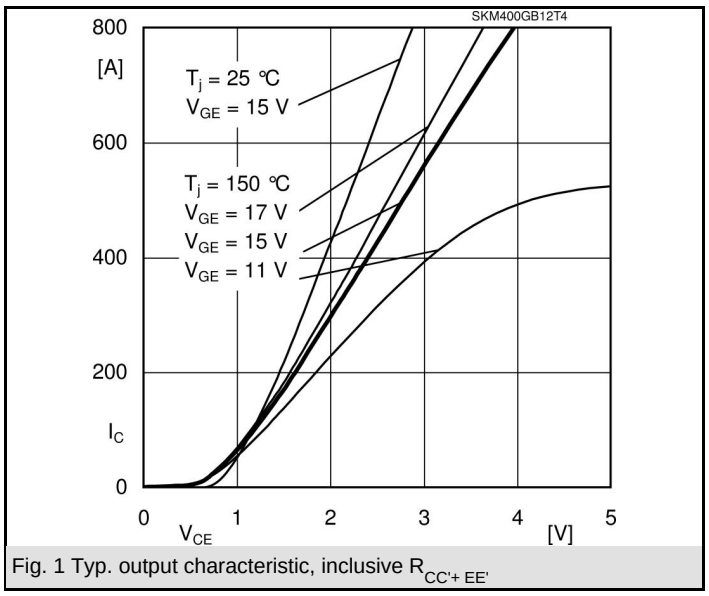

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

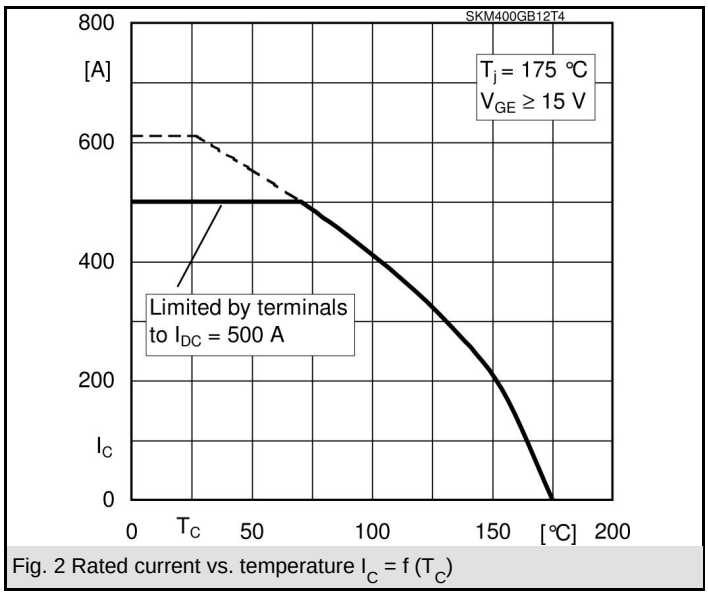

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

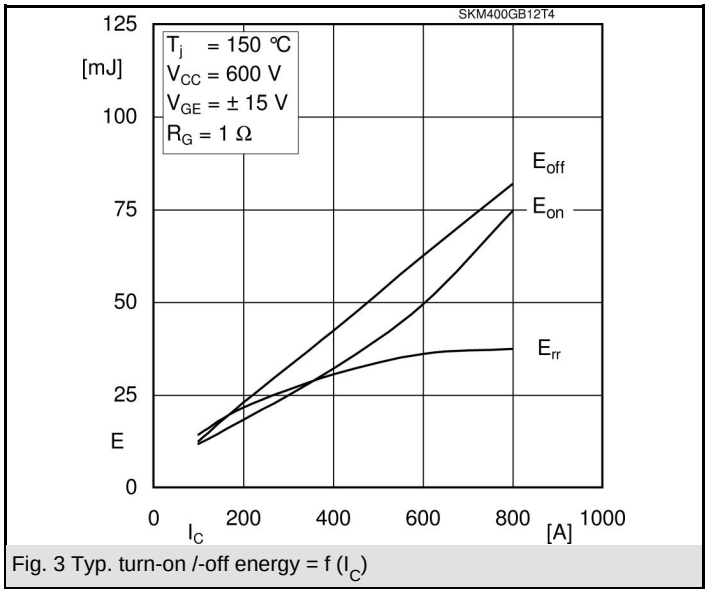

Fig. 3 Typ. turn-on /-off energy = f (I_C)

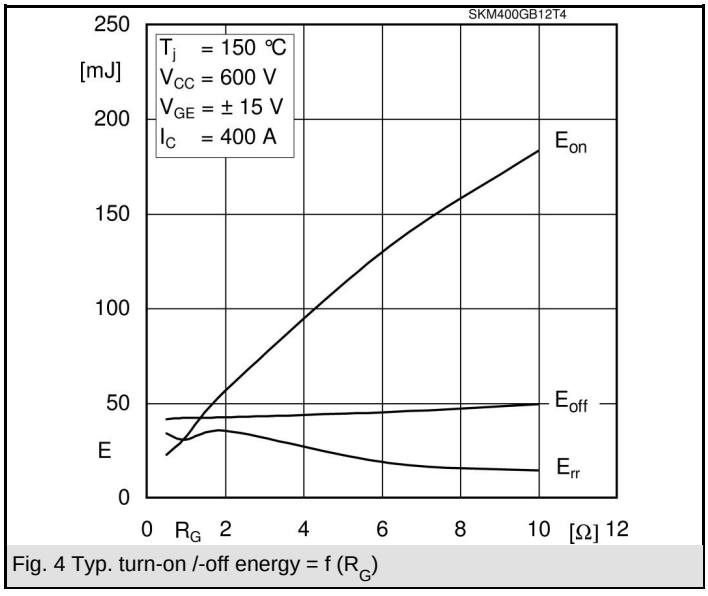

Fig. 4 Typ. turn-on /-off energy = f (R_G)

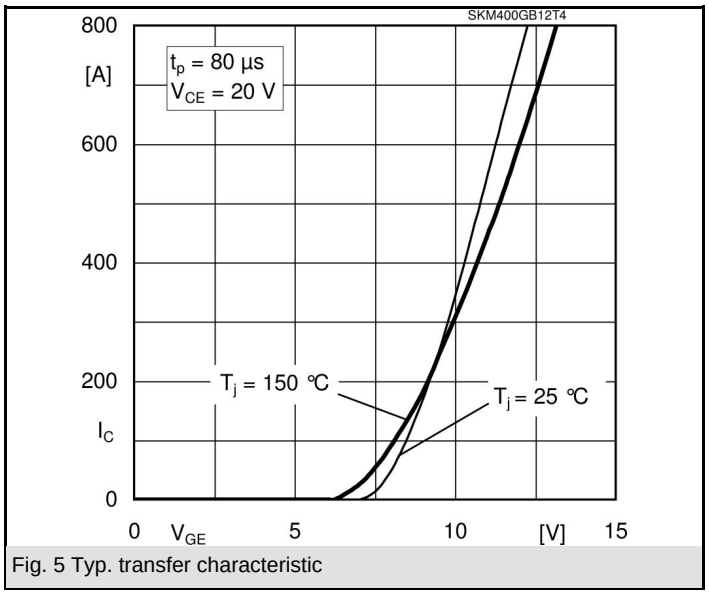

Fig. 5 Typ. transfer characteristic

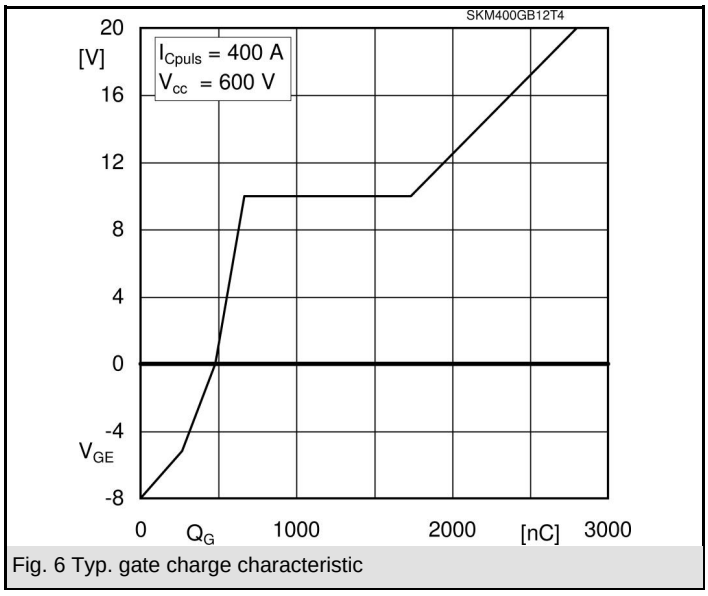

Fig. 6 Typ. gate charge characteristic

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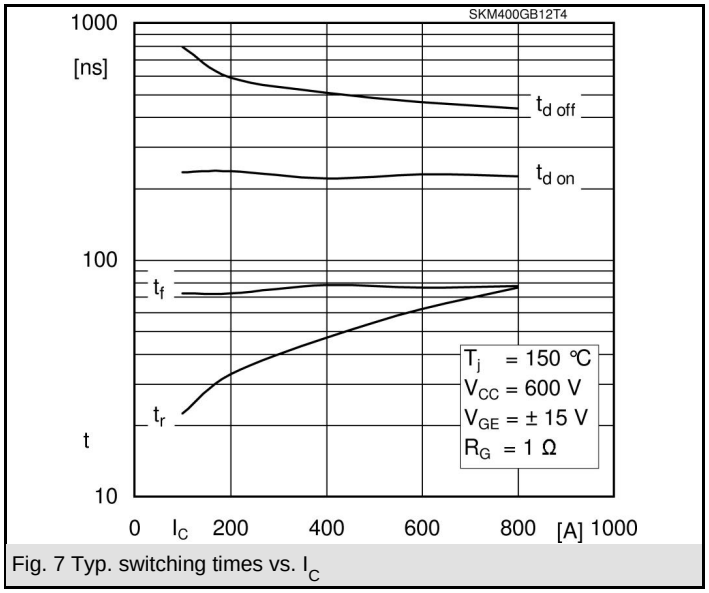

Fig. 7 Typ. switching times vs. I_C

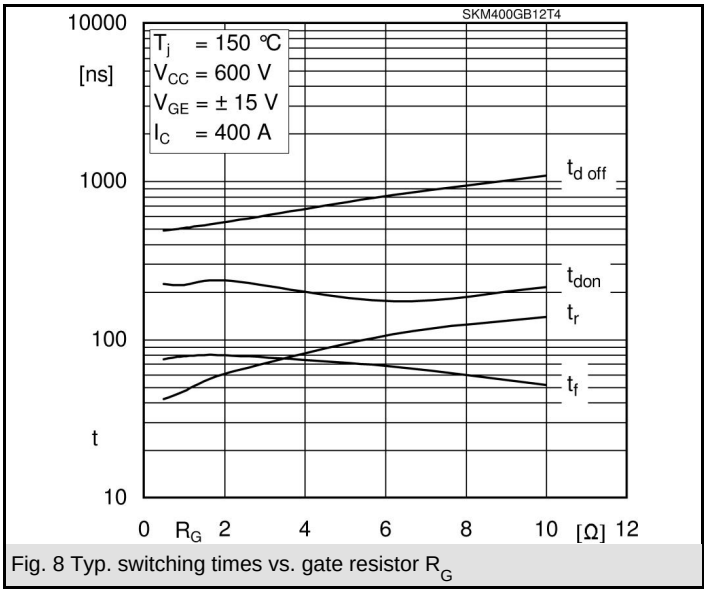

Fig. 8 Typ. switching times vs. gate resistor R_G

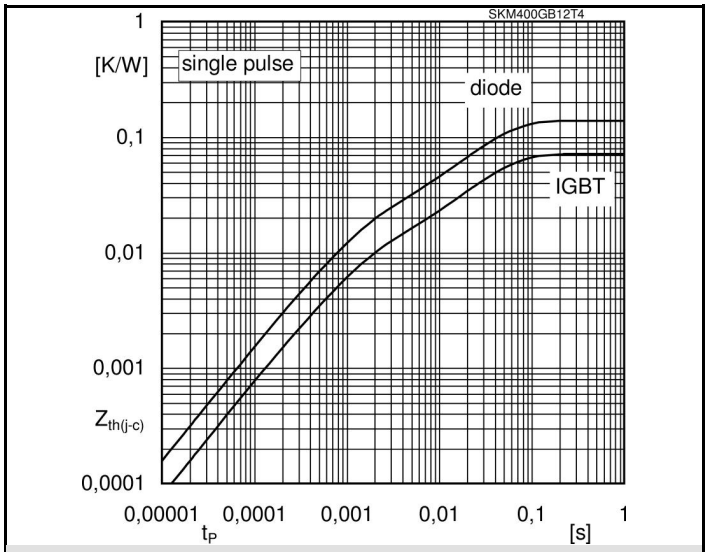

Fig. 9 Transient thermal impedance of IGBT and Diode

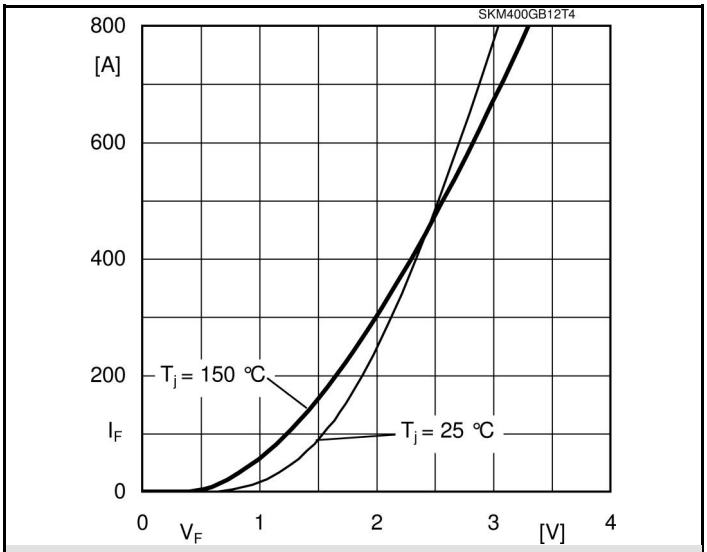

Fig. 10 CAL diode forward characteristic

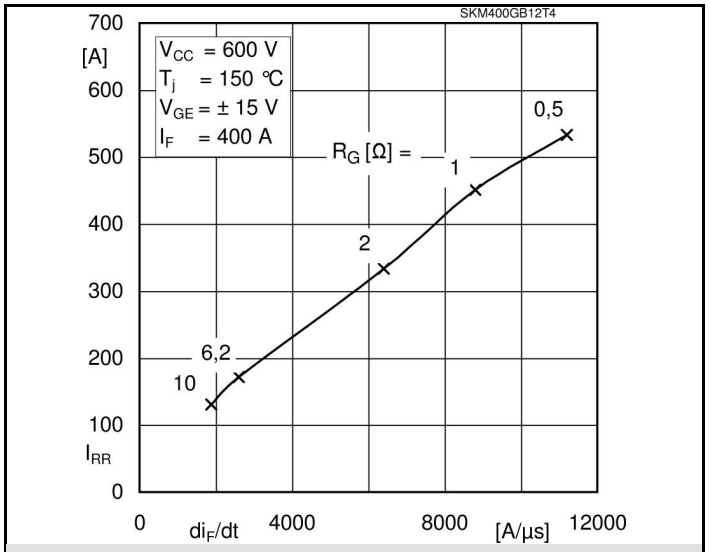

Fig. 11 Typ. CAL diode peak reverse recovery current

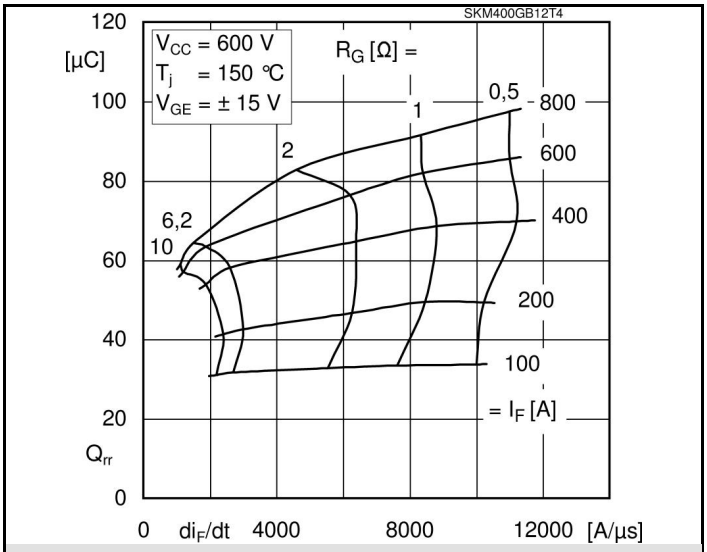

Fig. 12 Typ. CAL diode recovered charge

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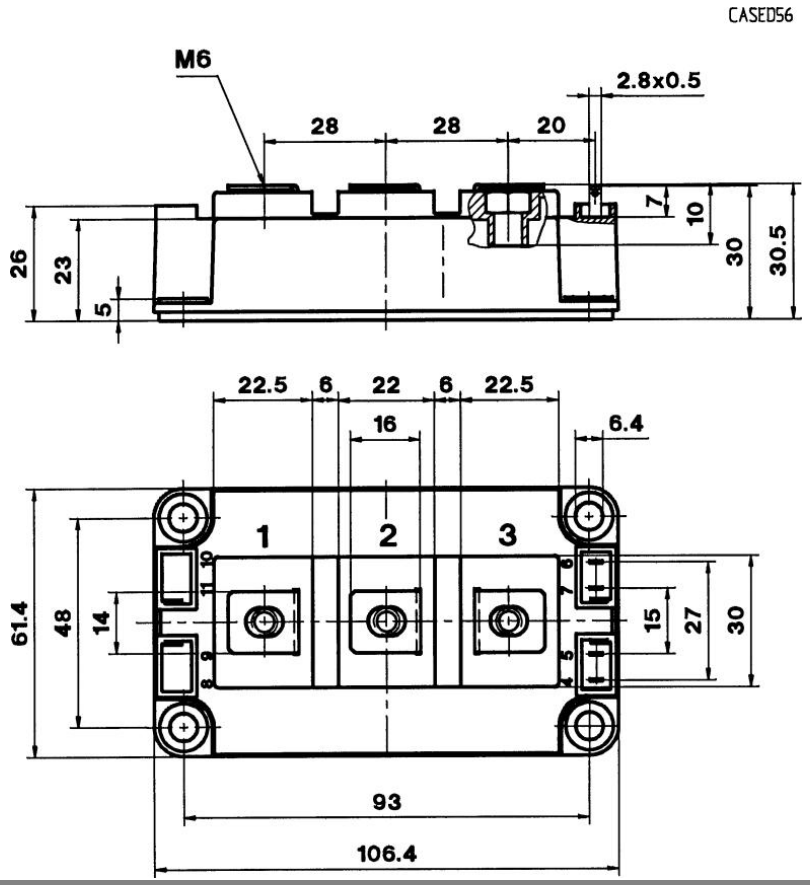
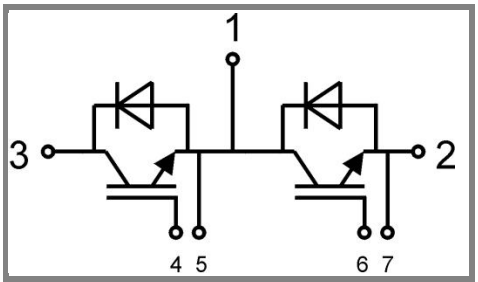
UL recognized file no. E 63 532



Case D56



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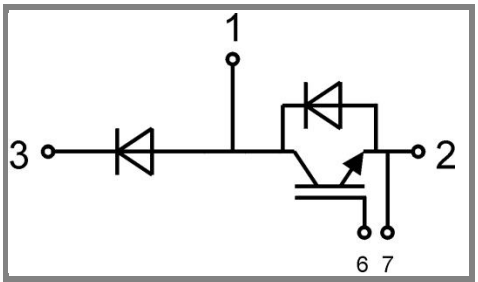
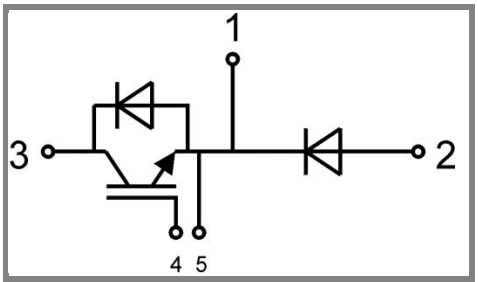


GAL



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