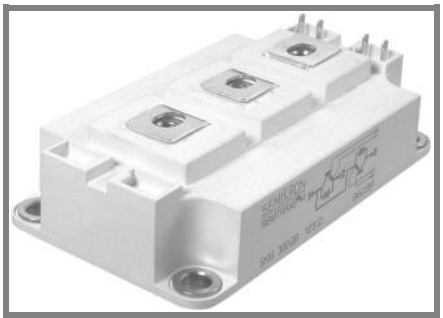
SKM 400GB128D...



SEMITRANS® 3

SPT IGBT Module

SKM 400GB128D

SKM 400GAL128D

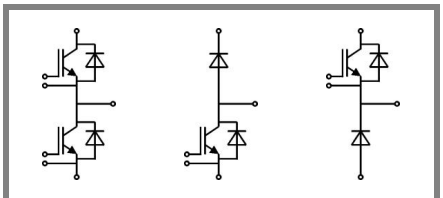
SKM 400GAR128D

Features

- Homogeneous Si
- SPT = Soft-Puch-Through technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_c

Typical Applications

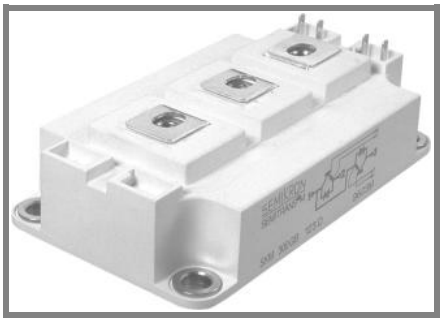
- AC inverter drives
- UPS
- Electronic welders at f_{sw} up to 20kHz



GB **GAL** **GAR**

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 = 150 °C	T_c = 25 °C	565	A
		T_c = 80 °C	400	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		600	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 600 V; $V_{GE} \leq$ 20 V; V_{CES} < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	390	A
		T_{case} = 80 °C	260	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		600	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	2880	A
Freewheeling Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	390	A
		T_{case} = 80 °C	260	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		600	A
I_{FSM}	t_p = 10 ms; sin	T_j = 150 °C	2880	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_c = 25 °C, unless otherwise specified			
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 12 mA		4,5	5,5	6,45	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C		0,2	0,6	mA
V_{CE0}		T_j = 25 °C		1	1,15	V
		T_j = 125 °C		0,9	1,05	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		3	4	mΩ
		T_j = 125°C		4	5	mΩ
$V_{CE(sat)}$	I_{Cnom} = 300 A, V_{GE} = 15 V	T_j = 25°C$_{chiplev.}$		1,9	2,35	V
		T_j = 125°C$_{chiplev.}$		2,1	2,55	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		26		nF
C_{oes}				3		nF
C_{res}				3		nF
Q_G	V_{GE} = -8V - +20V			3700		nC
R_{Gint}	T_j = 25 °C			1,25		Ω
$t_{d(on)}$	R_{Gon} = 4,7 Ω	V_{CC} = 600V		110		ns
t_r		I_{Cnom}= 300A		60		ns
E_{on}		T_j = 125 °C		32		mJ
$t_{d(off)}$	R_{Goff} = 4,7 Ω	V_{GE} = ± 15V		800		ns
t_f				60		ns
E_{off}				31		mJ
$R_{th(j-c)}$	per IGBT				0,055	K/W



SEMITRANS® 3

SPT IGBT Module

SKM 400GB128D

SKM 400GAL128D

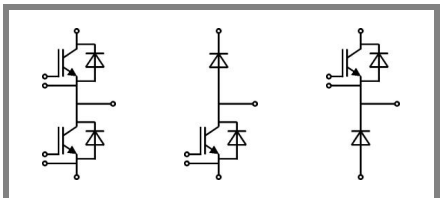
SKM 400GAR128D

Features

- Homogeneous Si
- SPT = Soft-Puch-Through technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_c

Typical Applications

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

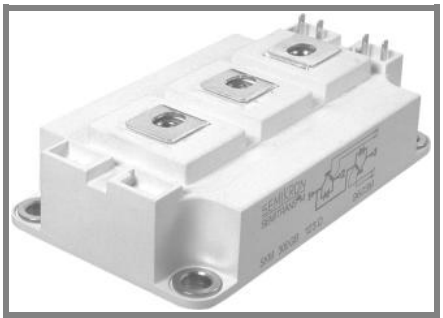


GB **GAL** **GAR**

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
r_F		T_j = 25 °C		3	4,3	mΩ
I_{RRM}	I_{Fnom} = 300 A	T_j = 125 °C		176		A
Q_{rr}	di/dt = 2400 A/µs			40		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			16		mJ
$R_{th(j-c)D}$	per diode				0,125	K/W
FWD						
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
r_F		T_j = 25 °C		3	4,3	V
I_{RRM}	I_{Fnom} = 300 A	T_j = 125 °C		176		A
Q_{rr}	di/dt = 2400 A/µs			40		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			16		mJ
$R_{th(j-c)D}$	per diode				0,125	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				0,038	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.



SEMITRANS® 3

SPT IGBT Module

SKM 400GB128D

SKM 400GAL128D

SKM 400GAR128D

Features

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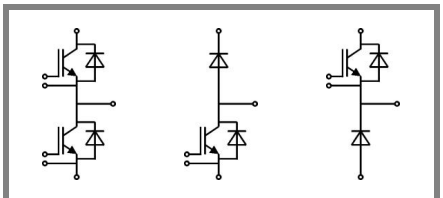

GB **GAL** **GAR**

Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	37	mk/W
R_i	i = 2	14	mk/W
R_i	i = 3	3,45	mk/W
R_i	i = 4	0,55	mk/W
tau_i	i = 1	0,0744	s
tau_i	i = 2	0,0078	s
tau_i	i = 3	0,0024	s
tau_i	i = 4	0,0002	s
$Z_{th(j-c)D}$			
R_i	i = 1	75	mk/W
R_i	i = 2	38	mk/W
R_i	i = 3	10,6	mk/W
R_i	i = 4	1,4	mk/W
tau_i	i = 1	0,0386	s
tau_i	i = 2	0,0201	s
tau_i	i = 3	0,001	s
tau_i	i = 4	0,003	s

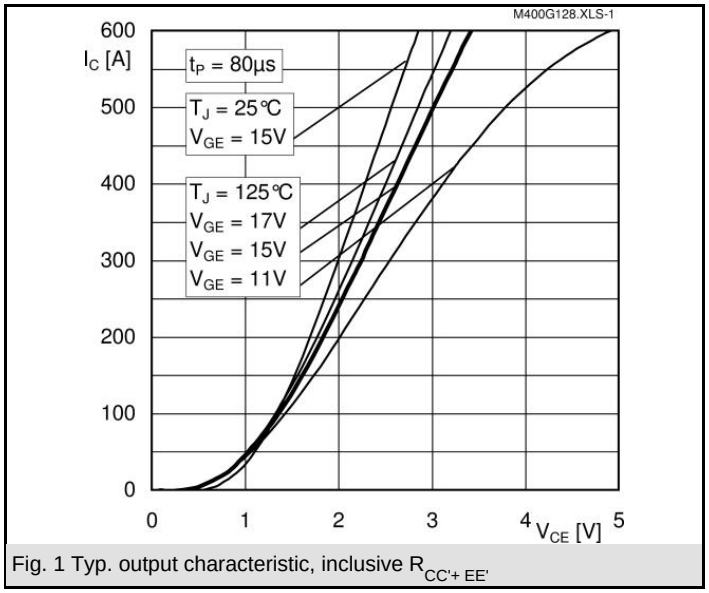

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

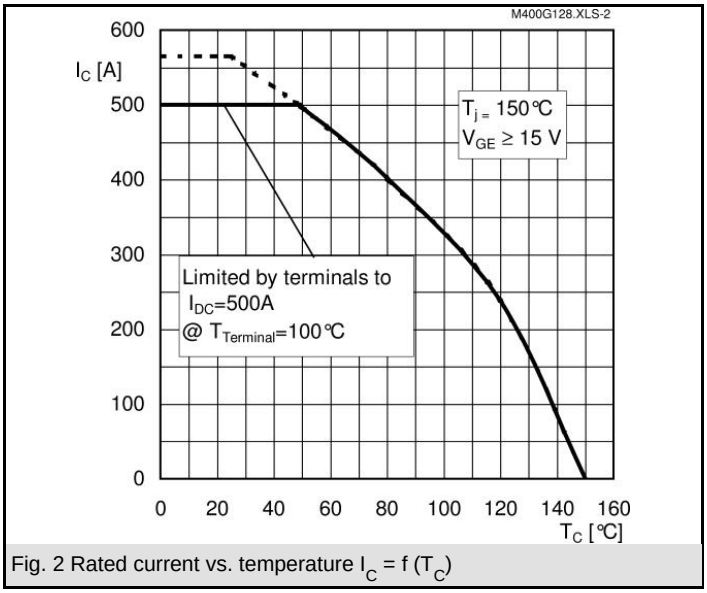

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

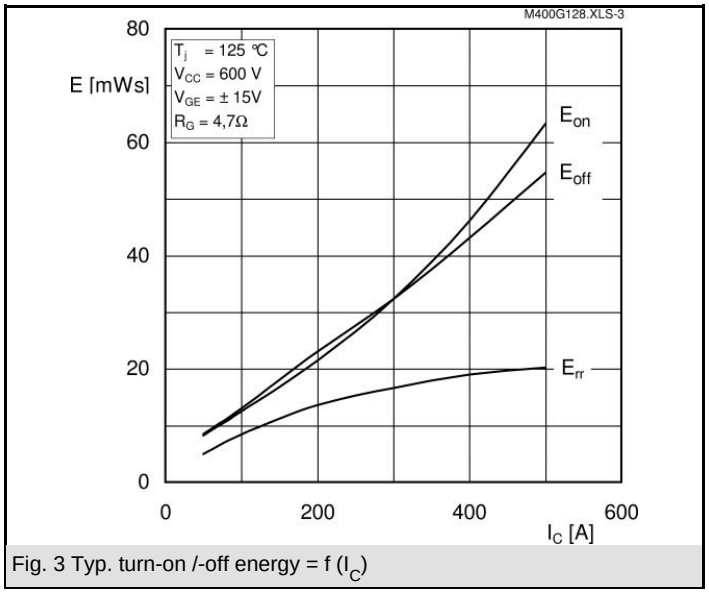

Fig. 3 Typ. turn-on /-off energy = f (I_C)

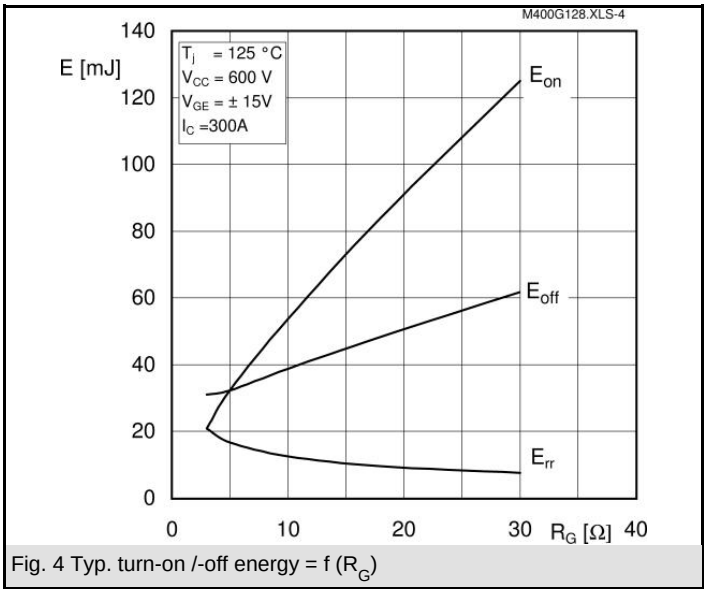

Fig. 4 Typ. turn-on /-off energy = f (R_G)

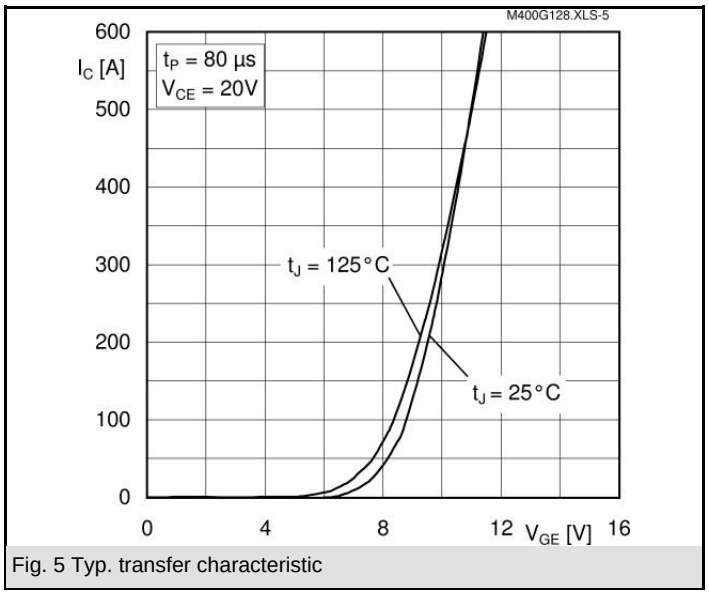

Fig. 5 Typ. transfer characteristic

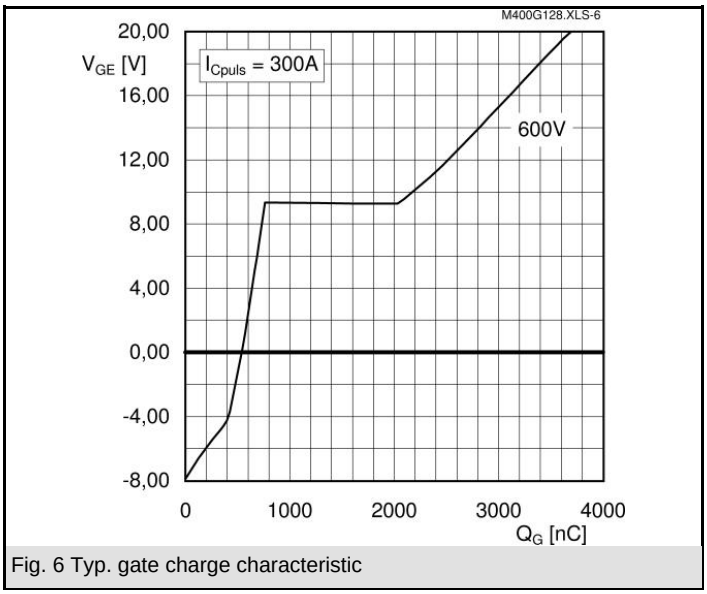

Fig. 6 Typ. gate charge characteristic

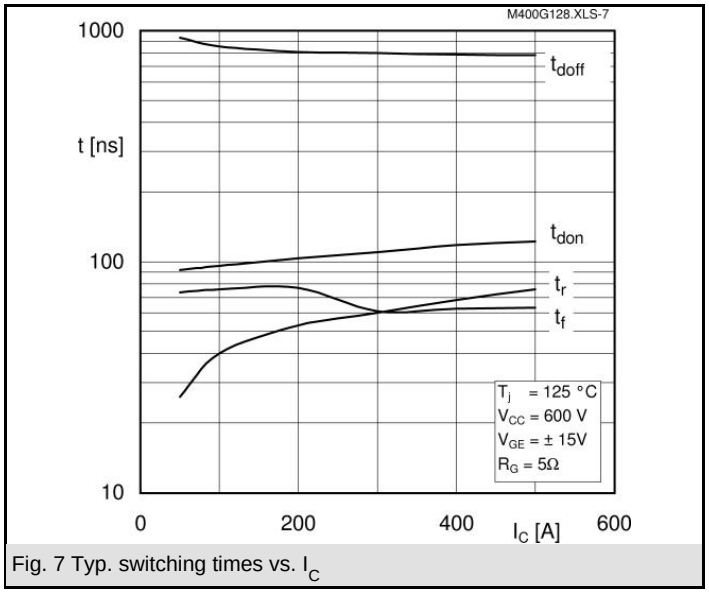

Fig. 7 Typ. switching times vs. I_C

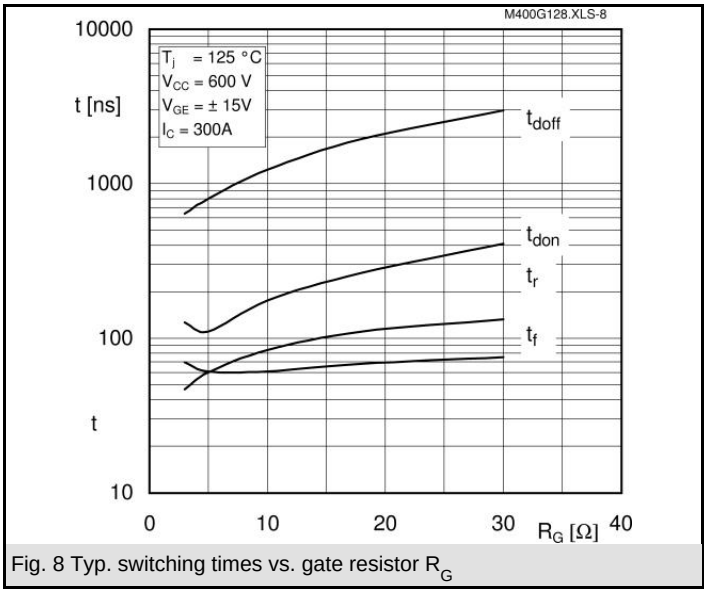

Fig. 8 Typ. switching times vs. gate resistor R_G

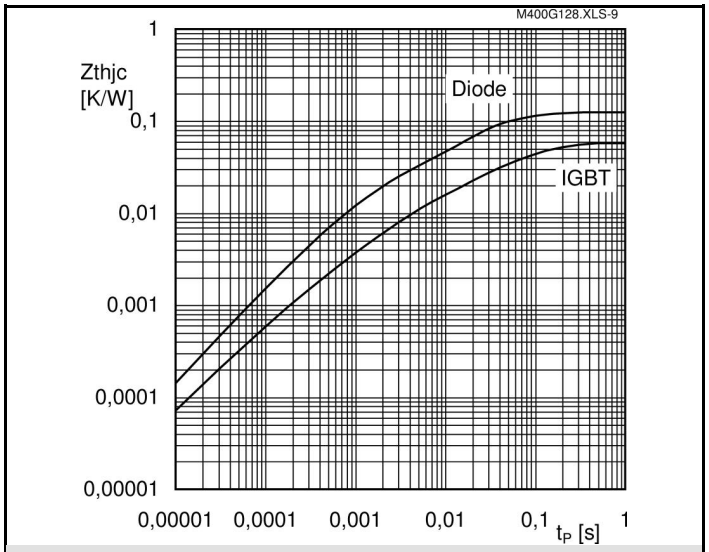

Fig. 9 Transient thermal impedance

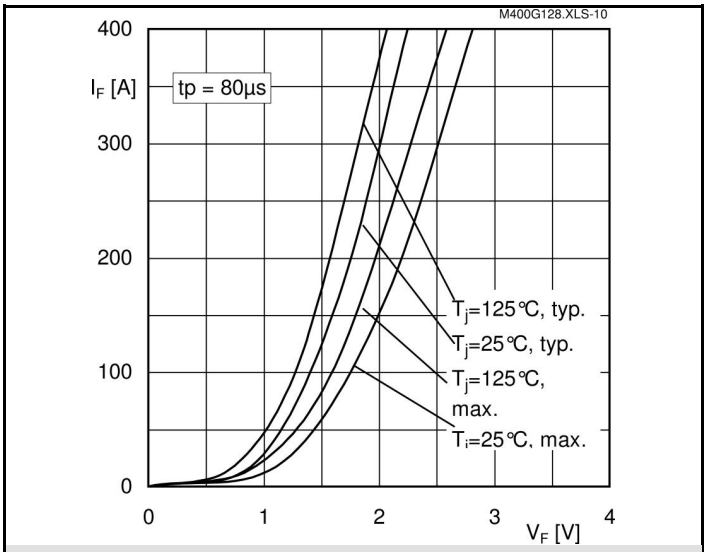

Fig. 10 CAL diode forward characteristic

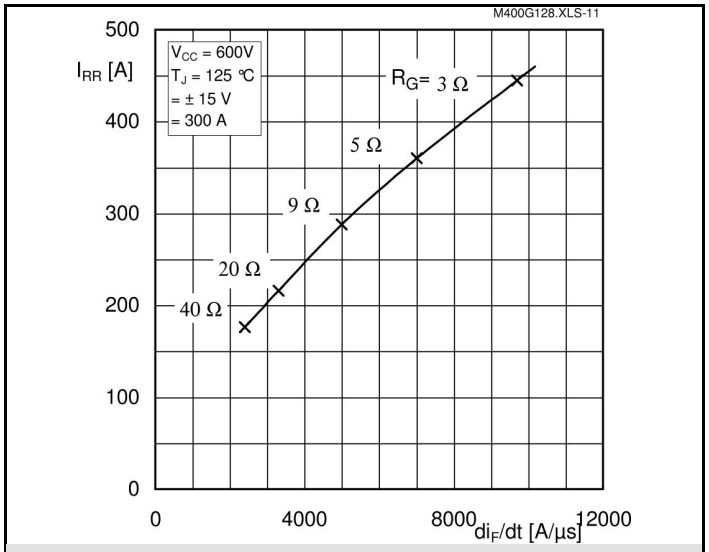

Fig. 11 Typ. CAL diode peak reverse recovery current

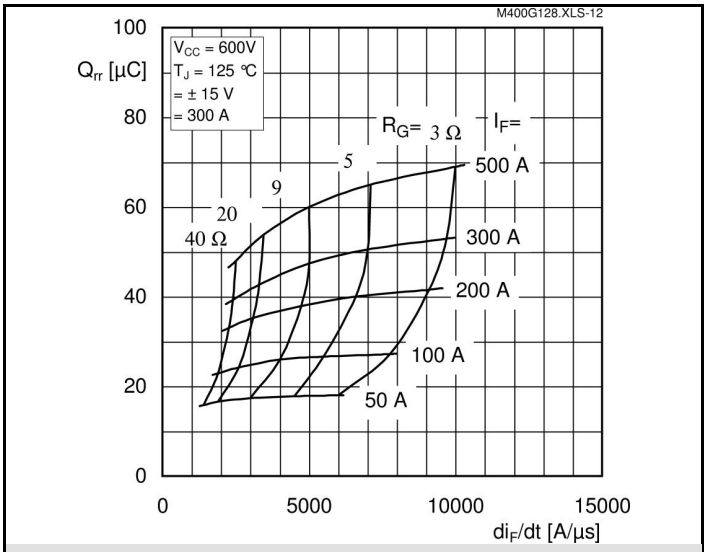

Fig. 12 Typ. CAL diode peak reverse recovery charge

UL Recognized File 63 532

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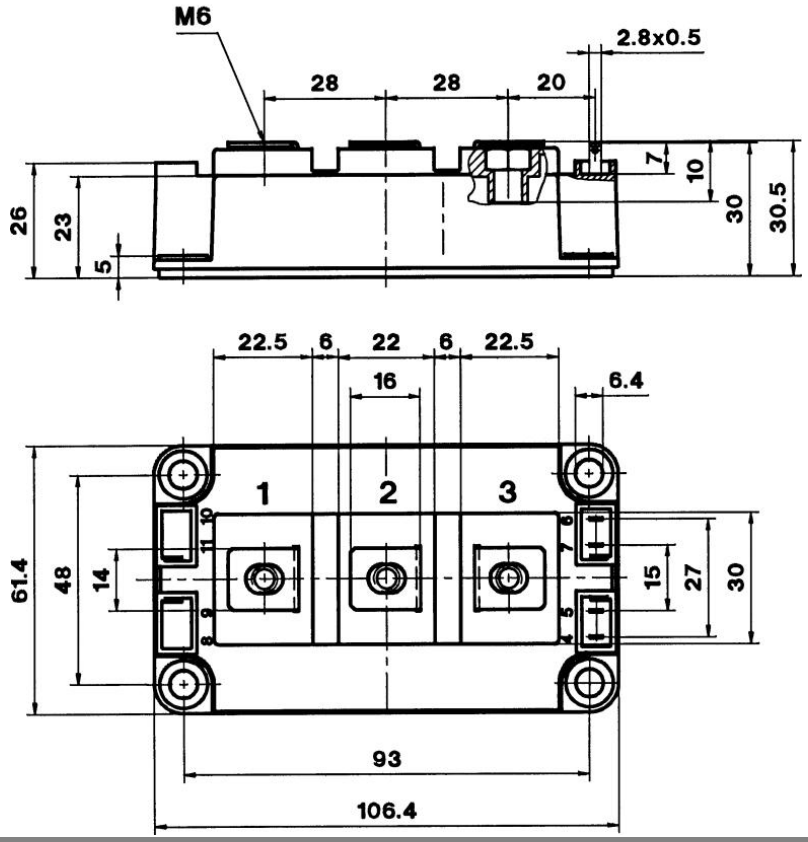
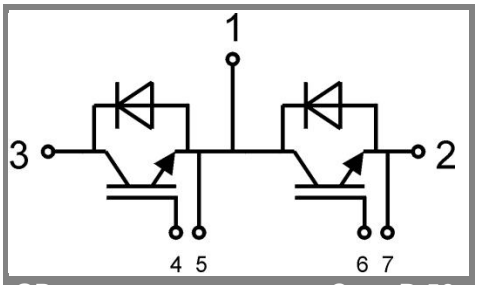
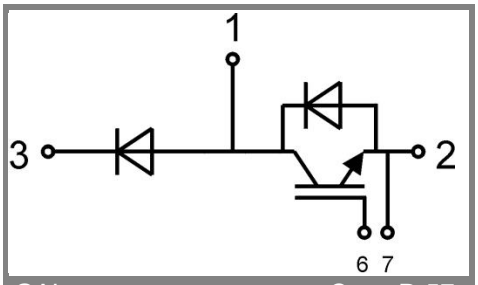


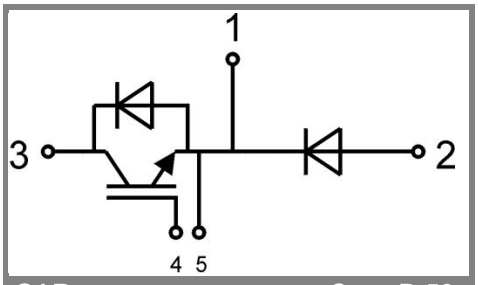
Case D 56



GB Case D 56



GAL Case D 57



GAR Case D 58

