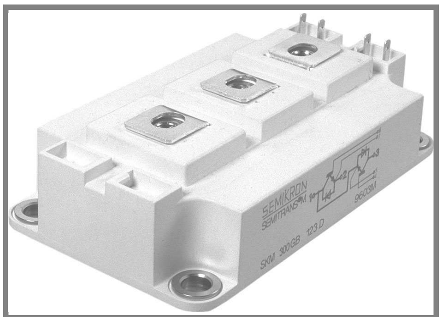
SKM 400GB124D



SEMITRANS™ 3

Low Loss IGBT Modules

SKM 400GB124D

SKM 400GAL124D

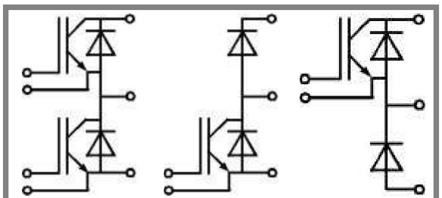
SKM 400GAR124D

Features

- MOS input (voltage controlled)
- N channel, homogeneous Si-structure (NPT- Non punch-through IGBT)
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to 6 x I_{CNOM}
- Latch-up free
- Fast & soft inverse CAL Diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology without hard mould
- Large clearance (12 mm) and creepage distance (20 mm)

Typical Applications

- Switching (not for lineal use)
- Inverter drives
- UPS



GB GAL GAR

Absolute Maximum Ratings		T_c = 25 °C, unless otherwise specified	
Symbol	**Conditions**	**Values**	**Units**
IGBT			
V_{CES}		1200	V
I_C	T_c = 25 (80) °C	570 (400)	A
I_{CRM}	t_p = 1 ms	600	A
V_{GES}		± 20	V
T_{vj}, (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	°C
V_{isol}	AC, 1 min.	2500	V
Inverse diode			
I_F	T_c = 25 (80) °C	390 (260)	A
I_{FRM}	t_p = 1 ms	600	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	2900	A
Freewheeling diode			
I_F	T_c = 25 (80) °C	390 (260)	A
I_{FRM}	t_p = 1 ms	600	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	2900	A

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	6,5	V
I_{CES}	V_{GE} = 0, $V_{CE} = V_{CES}$, T_j = 25 (125) °C		0,2	0,6	mA
$V_{CE(TO)}$	T_j = 25 (125) °C		1,1 (1,1)	1,25 (1,25)	V
r_{CE}	V_{GE} = 15 V, T_j = 25 (125) °C		3,3 (4,3)	4 (5,3)	mΩ
$V_{CE(sat)}$	I_{Cnom} = 300 A, V_{GE} = 15 V, chip level		2,1 (2,4)	2,45 (2,85)	V
C_{ies}	under following conditions		22	30	nF
C_{oes}	V_{GE} = 0, V_{CE} = 25 V, f = 1 MHz		3,3	4	nF
C_{res}			1,2	1,6	nF
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip T_c= 25 (125) °C		0,35 (0,5)		mΩ
$t_{d(on)}$	V_{CC} = 600 V, I_{Cnom} = 300 A		85		ns
t_r	$R_{Gon} = R_{Goff}$ = 5 Ω, T_j = 125 °C		65		ns
$t_{d(off)}$	V_{GE} = ± 15 V		680		ns
t_f			56		ns
E_{on} (E_{off})			36 (42)		mJ
Inverse diode					
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V; T_j = 25 (125) °C		2 (1,8)	2,5	V
$V_{(TO)}$	T_j = (125) °C		(1,1)	(1,2)	V
r_T	T_j = (125) °C			(3,5)	mΩ
I_{RRM}	I_{Fnom} = 300 A; T_j = (125) °C		(136)		A
Q_{rr}	di/dt = A/µs		36		µC
E_{rr}	V_{GE} = V				mJ
FWD					
$V_F = V_{EC}$	I_F = 300 A; V_{GE} = 0 V, T_j = 25 (125) °C		2 (1,8)	2,5	V
$V_{(TO)}$	T_j = (125) °C		(1,1)	(1,2)	V
r_T	T_j = (125) °C			(3,5)	mΩ
I_{RRM}	I_F = 300 A; T_j = (125) °C		(136)		A
Q_{rr}	di/dt = A/µs		36		µC
E_{rr}	V_{GE} = V				mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,05	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,125	K/W
$R_{th(j-c)FD}$	per FWD			0,125	K/W
$R_{th(c-s)}$	per module			0,038	K/W
Mechanical data					
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M6	2,5		5	Nm
w				325	g

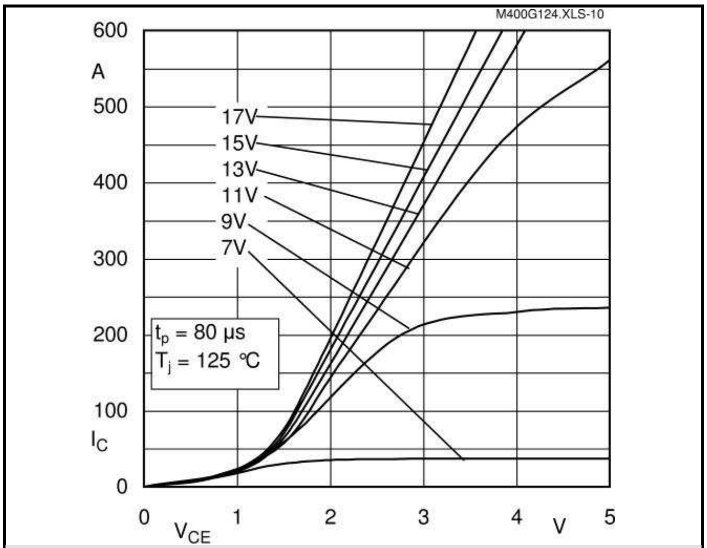


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

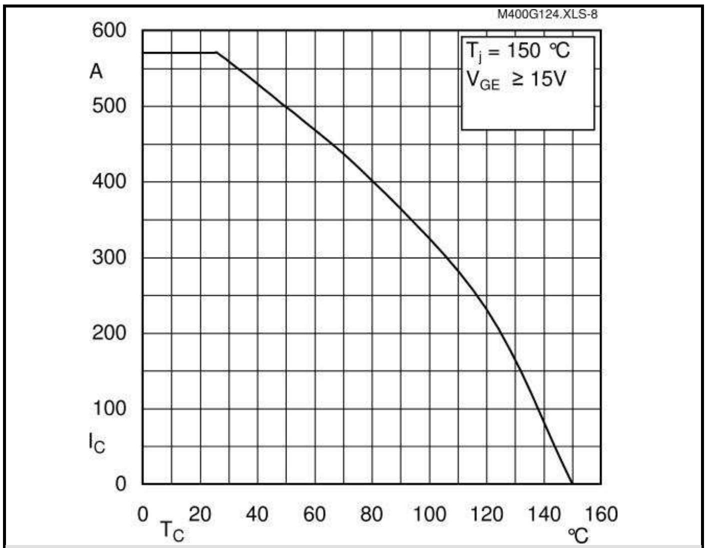


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

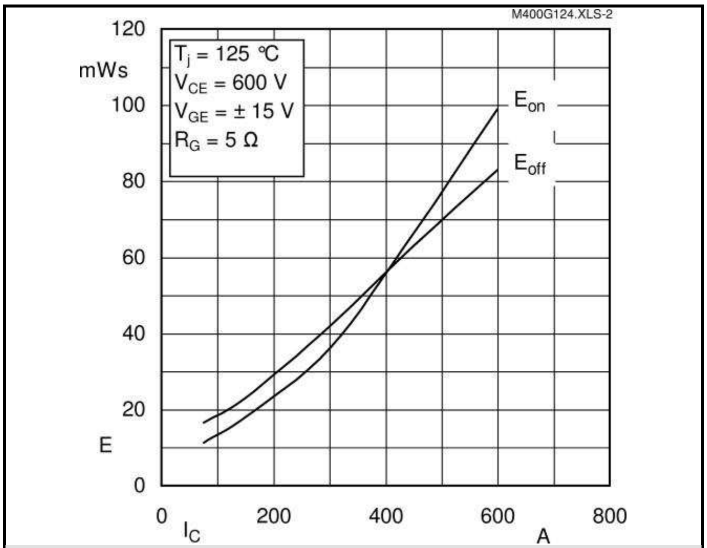


Fig. 3 Typ. turn-on /-off energy = f (I_C)

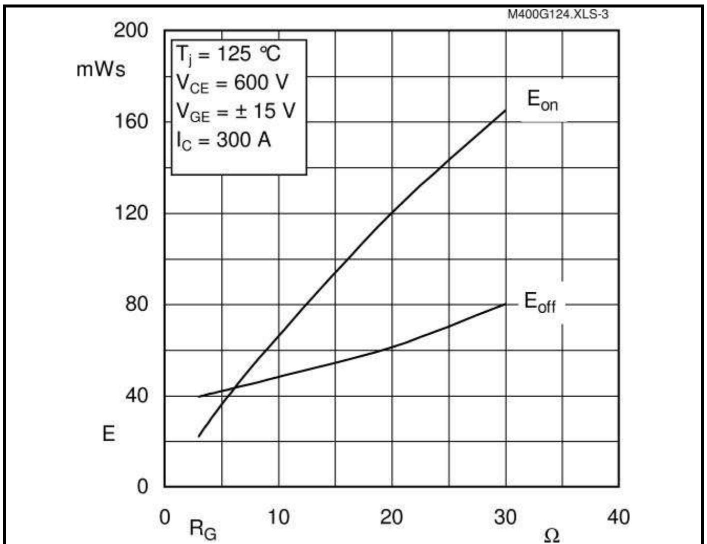


Fig. 4 Typ. turn-on /-off energy = f (R_G)

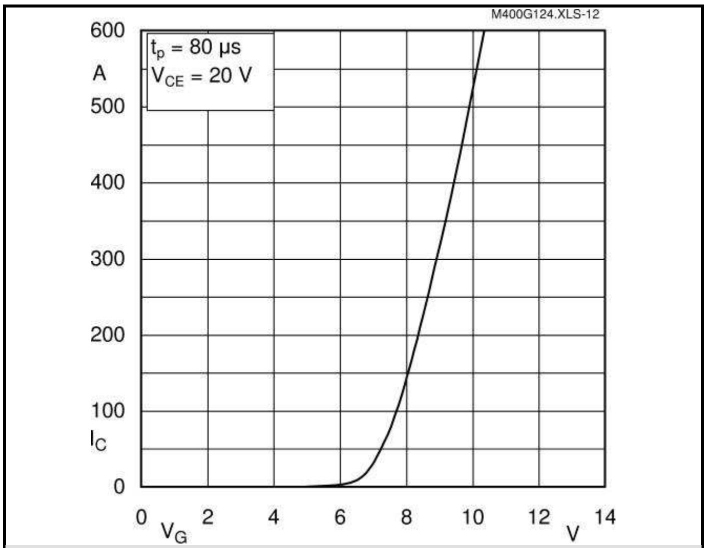


Fig. 5 Typ. transfer characteristic

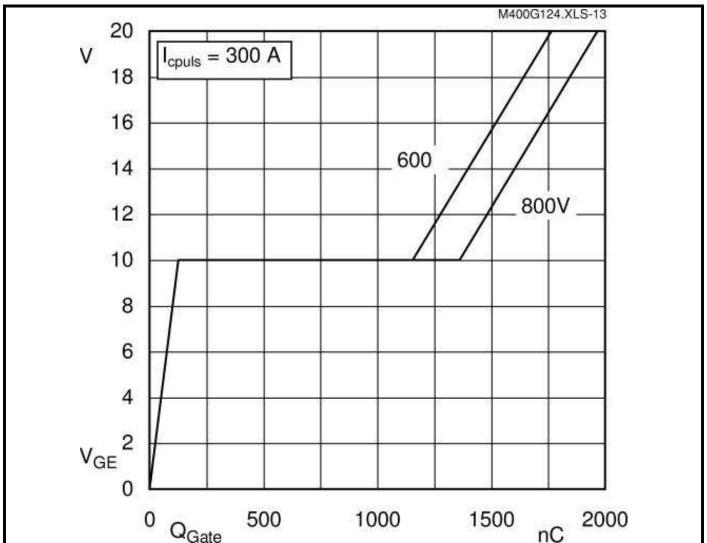


Fig. 6 Typ. gate charge characteristic

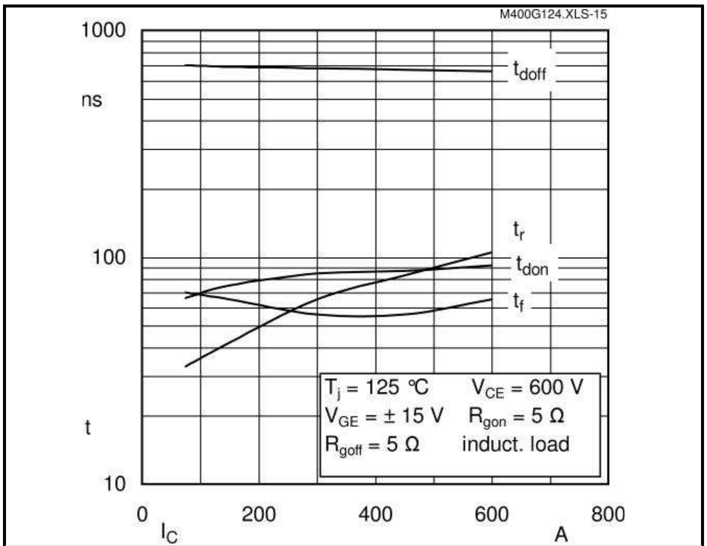


Fig. 7 Typ. switching times vs. I_C

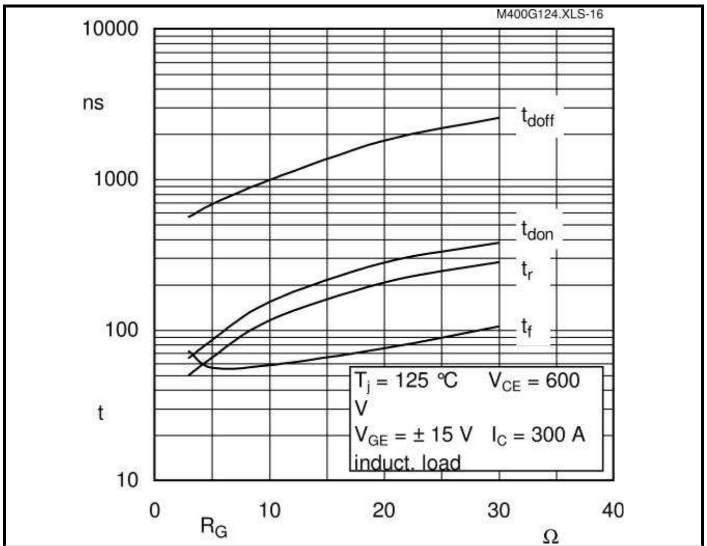


Fig. 8 Typ. switching times vs. gate resistor R_G

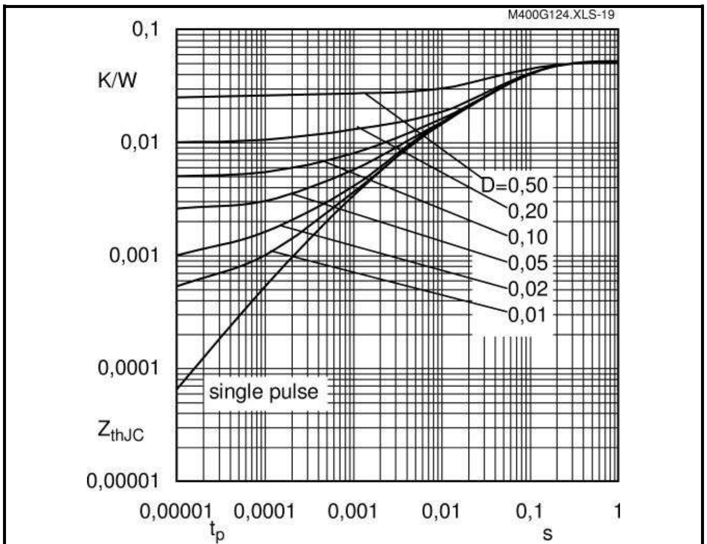


Fig. 9 Transient thermal impedance of IGBT

$Z_{thp(j-c)} = f(t_p)$; $D = t_p/t_c = t_p*f$

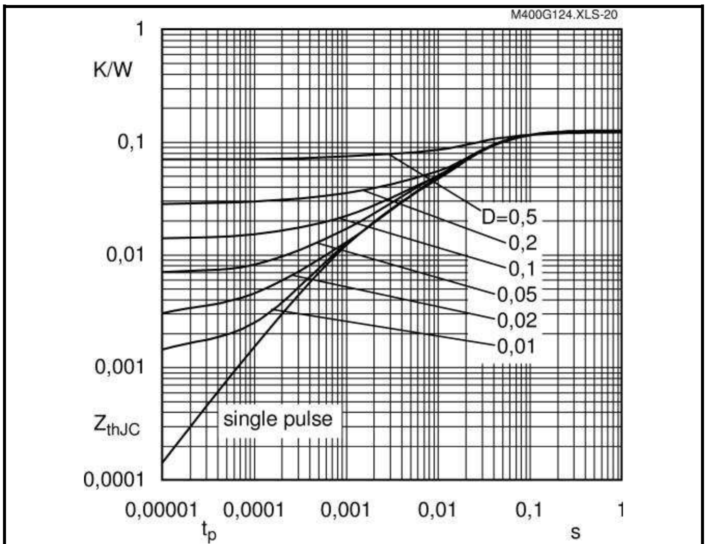


Fig. 10 Transient thermal impedance of FWD

$Z_{thp(j-c)} = f(t_p)$; $D = t_p/t_c = t_p*f$

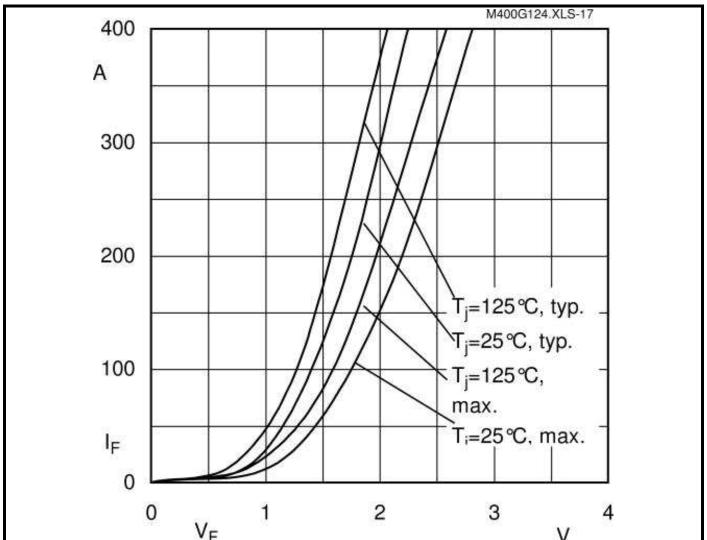


Fig. 11 CAL diode forward characteristic

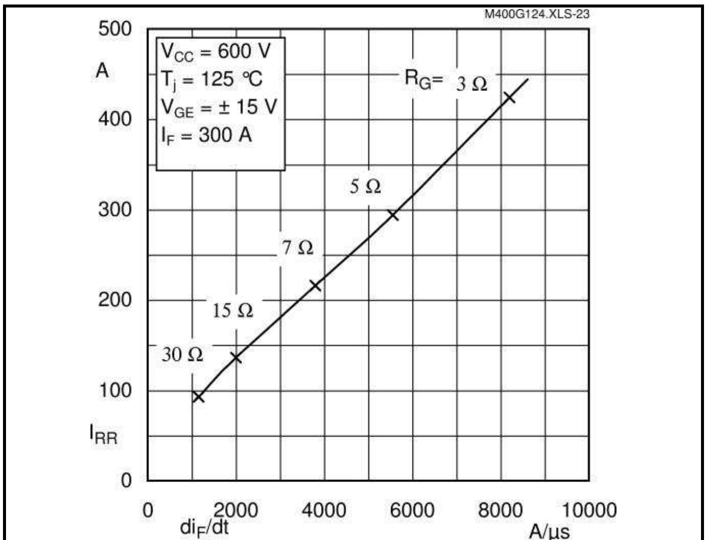


Fig. 12 Typ. CAL diode peak reverse recovery current

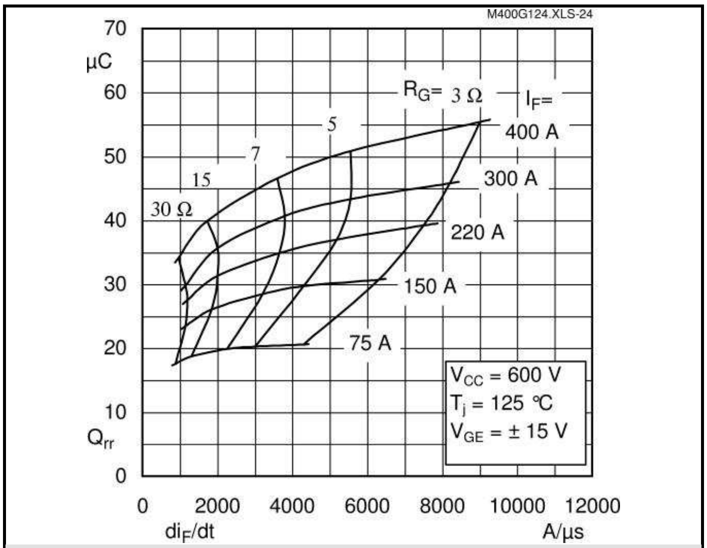
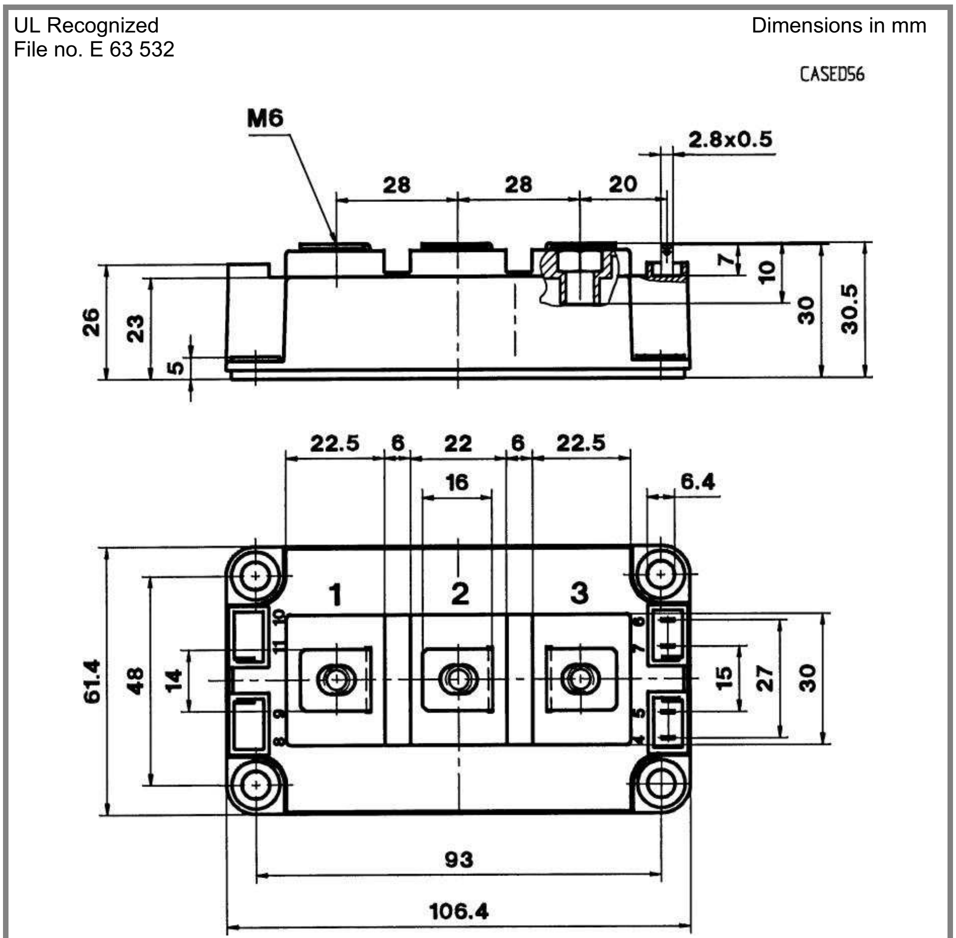
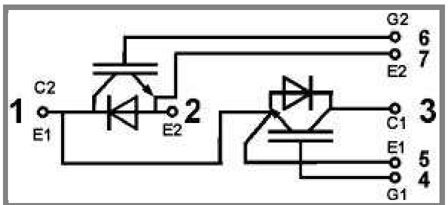


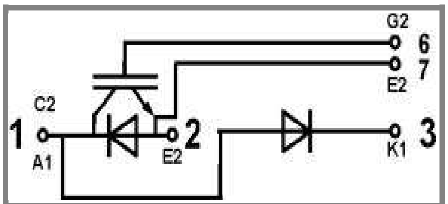
Fig. 13 Typ. CAL diode recovered charge



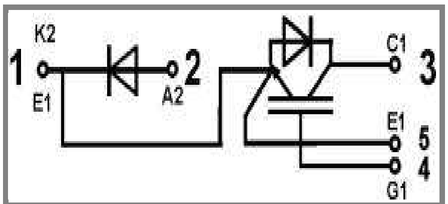
Case D 56



GB Case D 56



GAL Case D 57 (➞ D 56)



GAR Case D 58 (➞ D 56)

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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