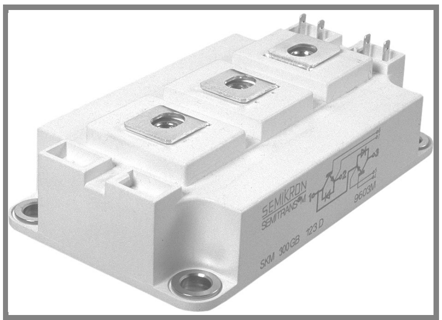
SKM 200GB123D



SEMITRANS^{TM} 3

Trench IGBT Modules

SKM 200GB123D

SKM 200GAL123D

SKM 200GAR123D

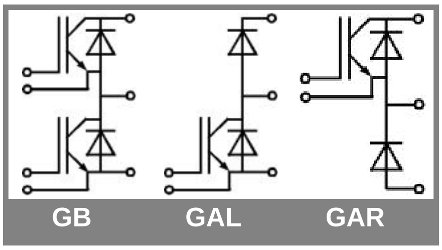
SKM 200GB123D1

Features

- MOS input (voltage controlled)
- N channel, homogeneous Si
- 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
- Large clearance (13 mm) and creepage distances (20 mm)

Typical Applications

- Switching (not for linear use)



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

Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1200	V
I_C	T_c = 25 (85) °C	200 (180)	A
I_{CRM}	T_c = 25 (85) °C, t_p = 1 ms	400 (360)	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	200 (130)	A
I_{FRM}	T_c = 25 (80) °C, t_p = 1 ms	400 (360)	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	1450	A
Freewheeling diode			
I_F	T_c = 25 (80) °C	260 (180)	A
I_{FRM}	T_c = 25 (80) °C, t_p = 1 ms	400 (360)	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	1800	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 = 6 mA	4,5	5,5	6,5	V
I_{CES}	V_{GE} = 0, $V_{CE} = V_{CES}$, T_j = 25 (125) °C		0,1	0,3	mA
$V_{CE(TO)}$	T_j = 25 (125) °C		1,4 (1,6)	1,6 (1,8)	V
r_{CE}	V_{GE} = 15 V, T_j = 25 (125) °C		7,33 (10)	9,33 (12,66)	mΩ
$V_{CE(sat)}$	I_C = 150 A, V_{GE} = 15 V, chip level		2,5 (3,1)	3 (3,7)	V
C_{ies}	under following conditions		10	13	nF
C_{oes}	V_{GE} = 0, V_{CE} = 25 V, f = 1 MHz		1,5	2	nF
C_{res}			0,8	1,2	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_C = 150 A		220	400	ns
t_r	$R_{Gon} = R_{Goff}$ = 5,6 Ω, T_j = 125 °C		100	200	ns
$t_{d(off)}$	V_{GE} = ± 15 V		600	800	ns
t_f			70	100	ns
E_{on} (E_{off})			24 (17)		mJ
Inverse diode					
$V_F = V_{EC}$	I_F = 150 A; V_{GE} = 0 V; T_j = 25 (125) °C		2 (1,8)	2,5	V
$V_{(TO)}$	T_j = 125 () °C			1,2	V
r_T	T_j = 125 () °C		5	7	mΩ
I_{RRM}	I_F = 150 A; T_j = 25 (125) °C		55 (80)		A
Q_{rr}	di/dt = A/µs		8 (20)		µC
E_{rr}	V_{GE} = V				mJ
FWD					
$V_F = V_{EC}$	I_F = 150 A; V_{GE} = 0 V, T_j = 25 (125) °C		1,85 (1,6)	2,2	V
$V_{(TO)}$	T_j = 125 () °C			1,2	V
r_T	T_j = 125 () °C		3	5,5	mΩ
I_{RRM}	I_F = 150 A; T_j = 25 (125) °C		60 (90)		A
Q_{rr}	di/dt = A/µs		8 (23)		µC
E_{rr}	V_{GE} = V				mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,09	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,25	K/W
$R_{th(j-c)FD}$	per FWD			0,18	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, M4	2,5		5	Nm
w				325	g

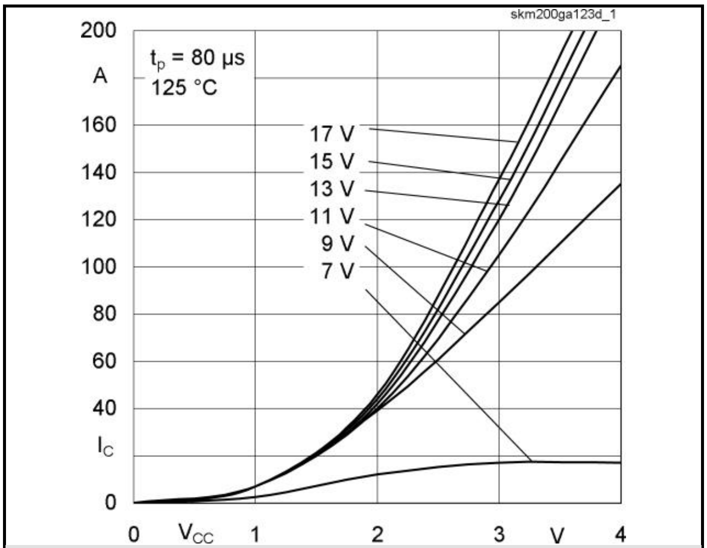


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

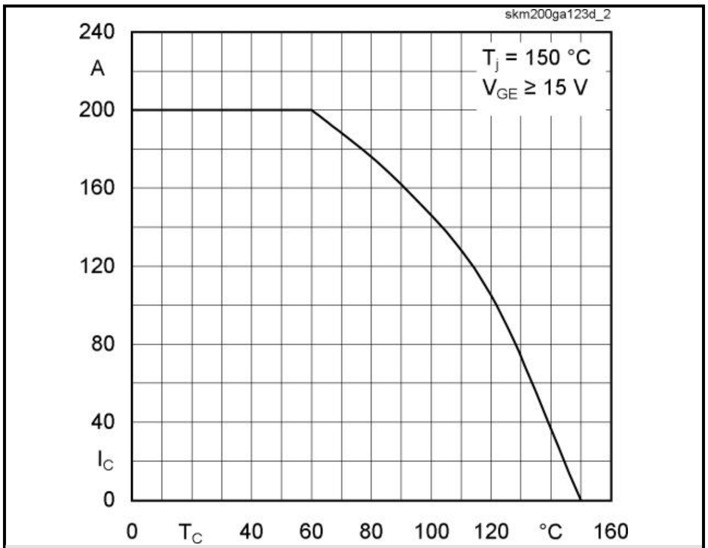


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

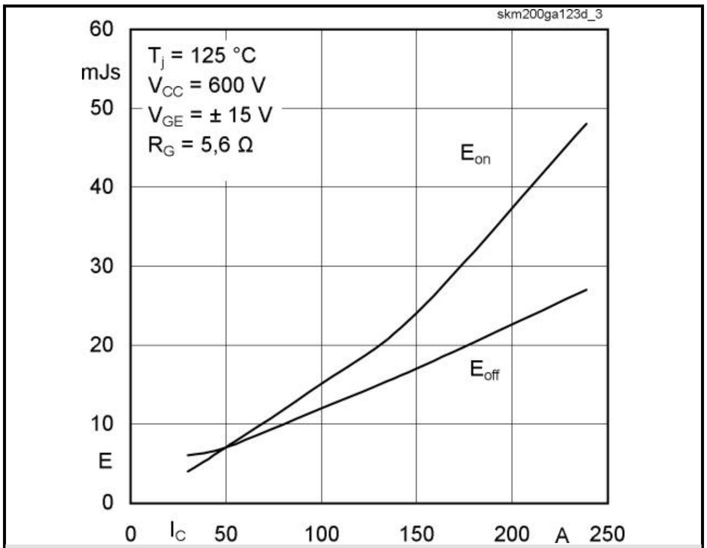


Fig. 3 Typ. turn-on /-off energy = f (I_C)

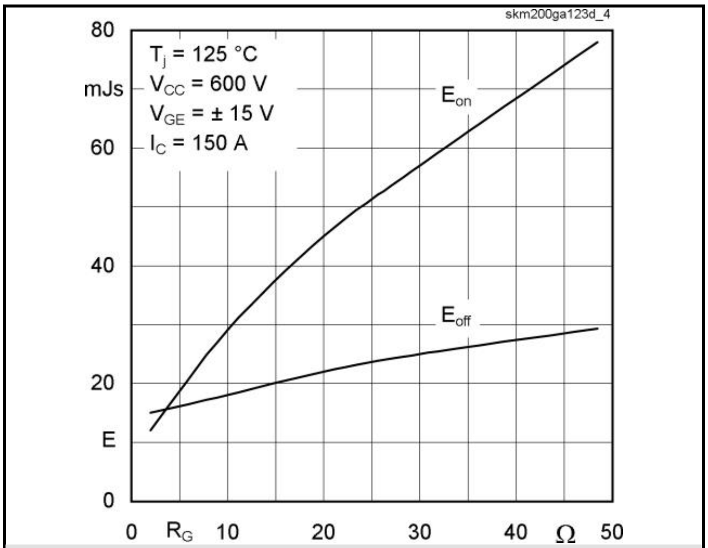


Fig. 4 Typ. turn-on /-off energy = f (R_G)

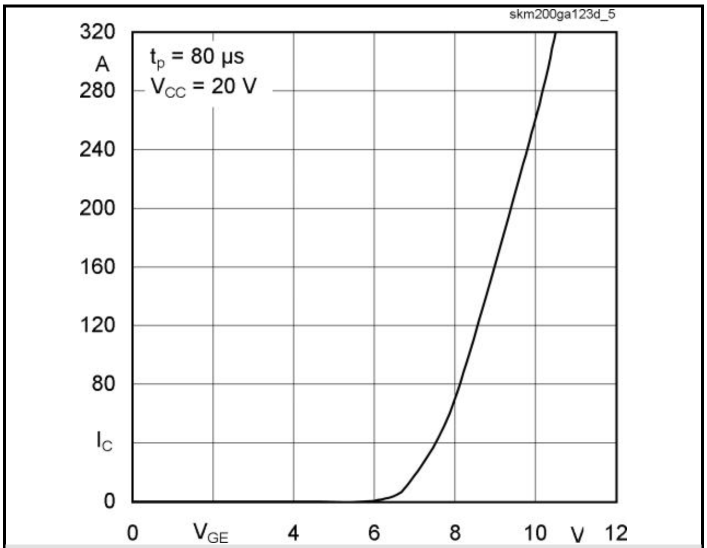


Fig. 5 Typ. transfer characteristic

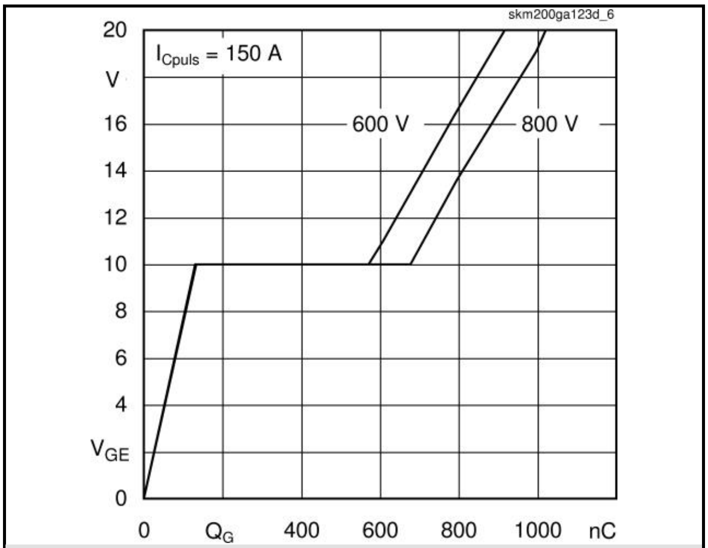


Fig. 6 Typ. gate charge characteristic

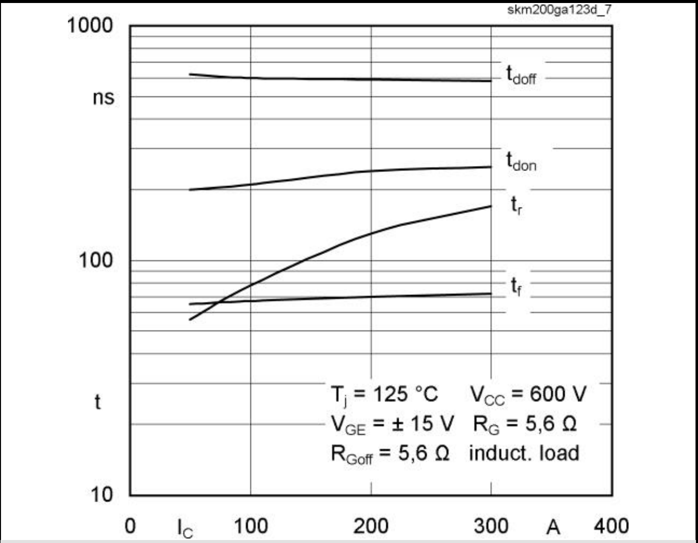


Fig. 7 Typ. switching times vs. I_C

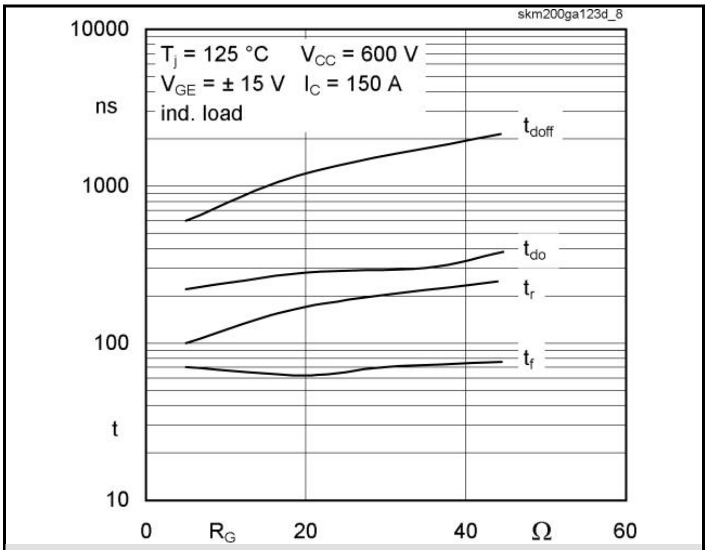


Fig. 8 Typ. switching times vs. gate resistor R_G

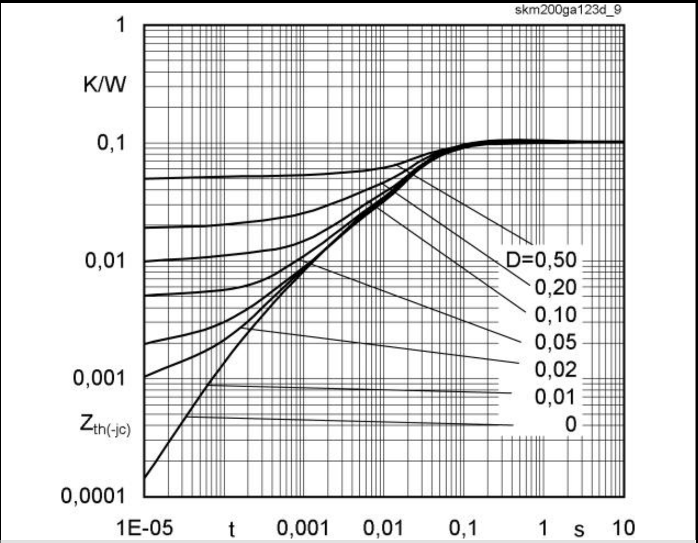


Fig. 9 Transient thermal impedance of IGBT

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

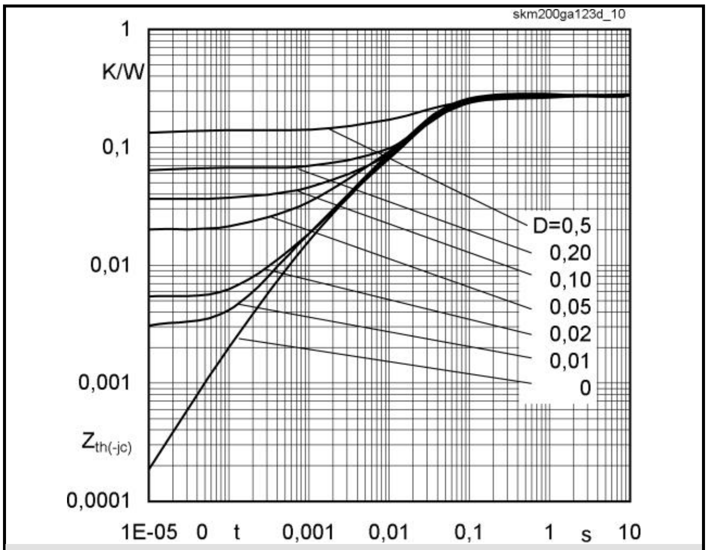


Fig. 10 Transient thermal impedance of FWD

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

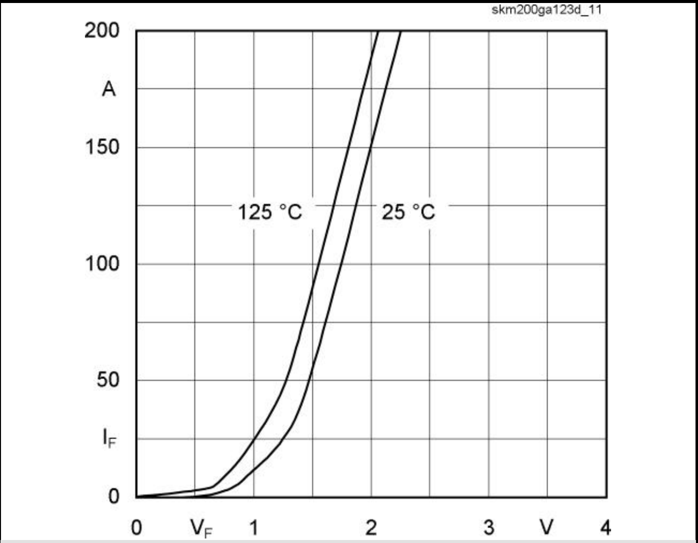


Fig. 11 CAL diode forward characteristic

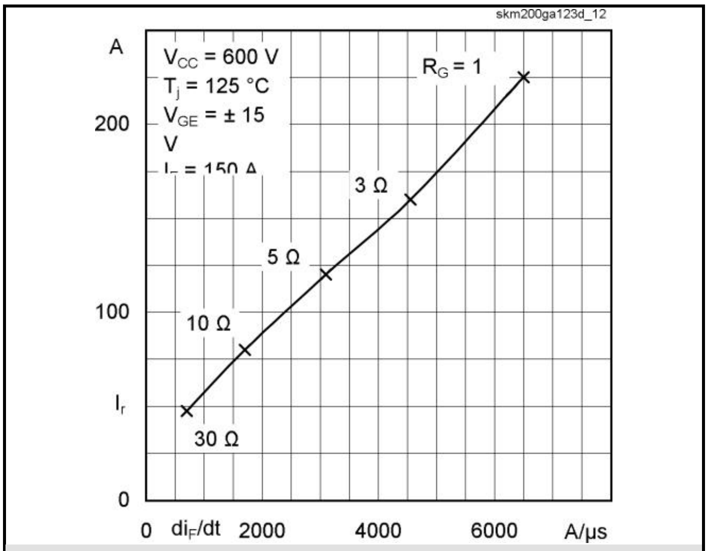


Fig. 12 Typ. CAL diode peak reverse recovery current

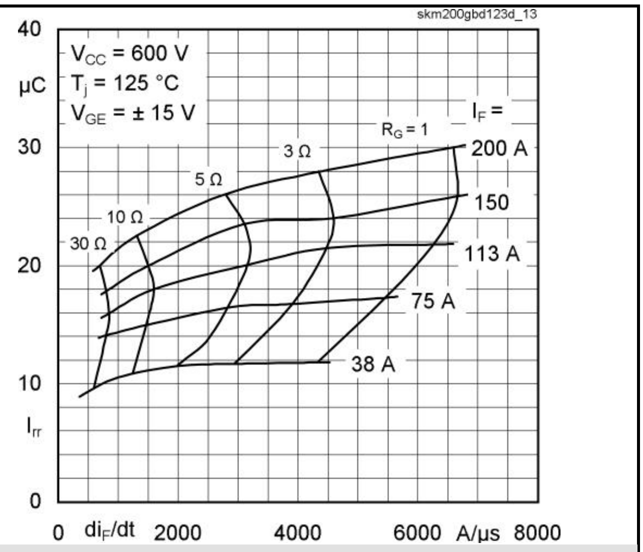
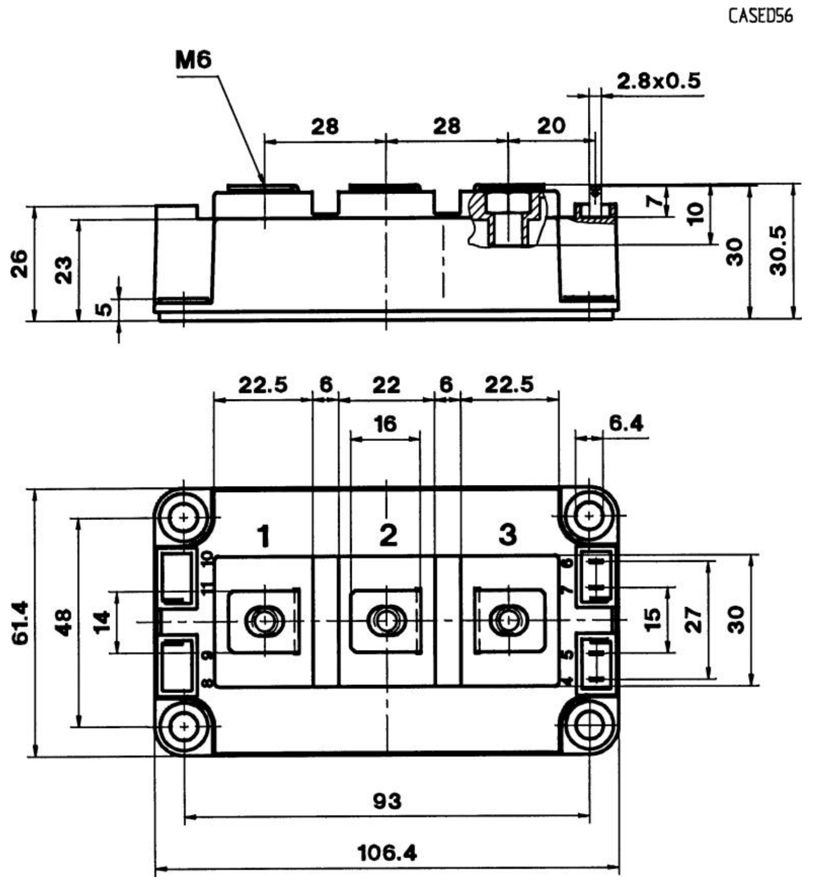


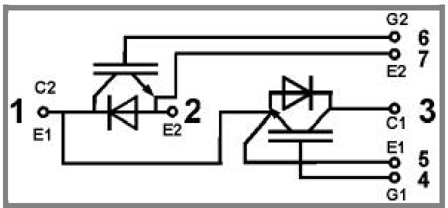
Fig. 13 Typ. CAL diode recovered charge

UL Recognized
File no. E 63 532

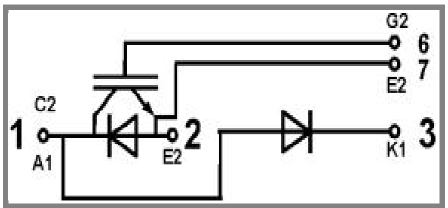
Dimensions in mm



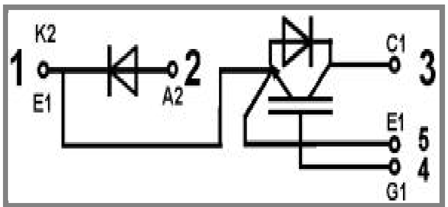
Case D 56



D 56 GB



D 56 GAL



D 56 GAR

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