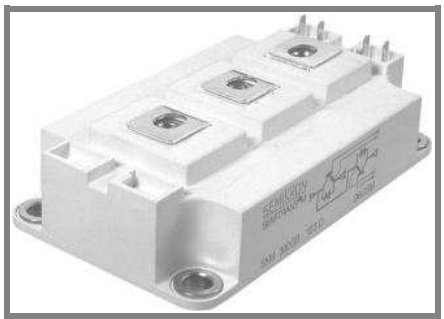
SKM 400GB125D



SEMITRANS® 3

Ultra Fast IGBT Modules

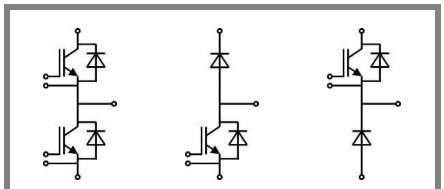
SKM 400GB125D
SKM 400GAL125D
SKM 400GAR125D

Features

- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting to 6 x I_{cnom}
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

Typical Applications*

- Switched mode power supplies at f_{sw} >20kHz
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at f_{sw} > 20 kHz

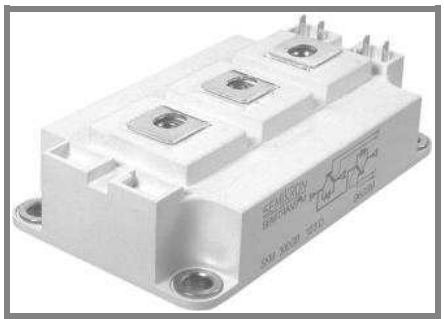


GB GAL GAR

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_{case} = 25 °C	400	A
		T_{case} = 80 °C	300	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		600	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 600 V; $V_{GE} \leq$ 20 V; VCES < 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	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C		0,15	0,45	mA
V_{CE0}		T_j = 25 °C		1,4		V
		T_j = 125 °C		1,7		V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		6,3		mΩ
		T_j = 125°C		7,6		mΩ
$V_{CE(sat)}$	I_{Cnom} = 300 A, V_{GE} = 15 V	T_j = 25°$C_{chiplev.}$		3,3	3,85	V
		T_j = 125°$C_{chiplev.}$		4	4,55	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		22	30	nF
C_{oes}				3,3	4	nF
C_{res}				1,2	1,6	nF
Q_G	V_{GE} = 0V - +20V			2650		nC
R_{Gint}	T_j = °C			1,25		Ω
$t_{d(on)}$	R_{Gon} = 2 Ω	V_{CC} = 600V		70		ns
t_r		I_C= 300A		50		ns
E_{on}		T_j = 125 °C		17		mJ
$t_{d(off)}$	R_{Goff} = 2 Ω	V_{GE} = ±15V		500		ns
t_f				32		ns
E_{off}				18		mJ
$R_{th(j-c)}$	per IGBT				0,05	K/W

© by SEMIKRON



SEMITRANS® 3

Ultra Fast IGBT Modules

SKM 400GB125D
SKM 400GAL125D
SKM 400GAR125D

Features

- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting to 6 x I_{cnom}
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

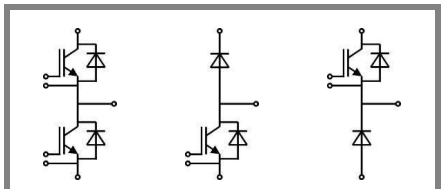
Typical Applications*

- Switched mode power supplies at f_{sw} >20kHz
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at f_{sw} > 20 kHz

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
		T_j = 125 °C				V
r_F		T_j = 25 °C		3	4,3	mΩ
		T_j = 125 °C				mΩ
I_{RRM}	I_F = 300 A	T_j = 125 °C		350		A
Q_{rr}	di/dt = 8300 A/µs			45		µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V			16		mJ
$R_{th(j-c)D}$	per diode				0,125	K/W
Freewheeling 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
		T_j = 125 °C				V
r_F		T_j = 25 °C		3	4,3	V
		T_j = 125 °C				V
I_{RRM}	I_F = 300 A	T_j = 125 °C		350		A
Q_{rr}	di/dt = 8300 A/µs			45		µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V			16		mJ
$R_{th(j-c)FD}$	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

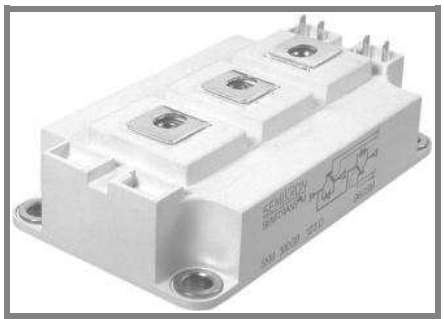
This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our personal.



GB GAL GAR

 © by SEMIKRON



SEMITRANS® 3

Ultra Fast IGBT Modules

SKM 400GB125D

SKM 400GAL125D

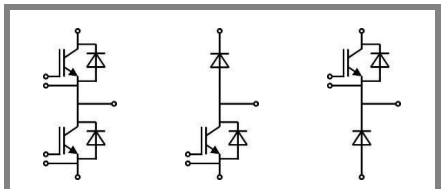
SKM 400GAR125D

Features

- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting to 6 x I_{cnom}
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

Typical Applications*

- Switched mode power supplies at f_{sw} >20kHz
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at f_{sw} > 20 kHz



GB GAL GAR

Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	36	mk/W
R_i	i = 2	10,5	mk/W
R_i	i = 3	3	mk/W
R_i	i = 4	0,5	mk/W
tau_i	i = 1	0,0744	s
tau_i	i = 2	0,0078	s
tau_i	i = 3	0,0016	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

 © by SEMIKRON

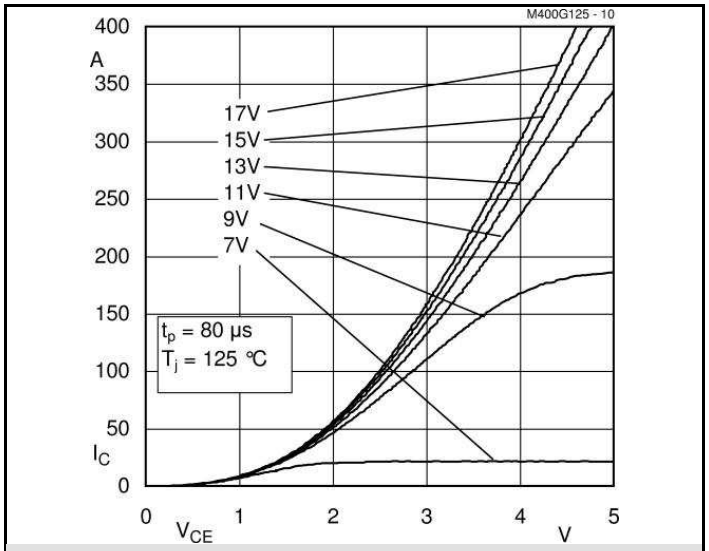


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

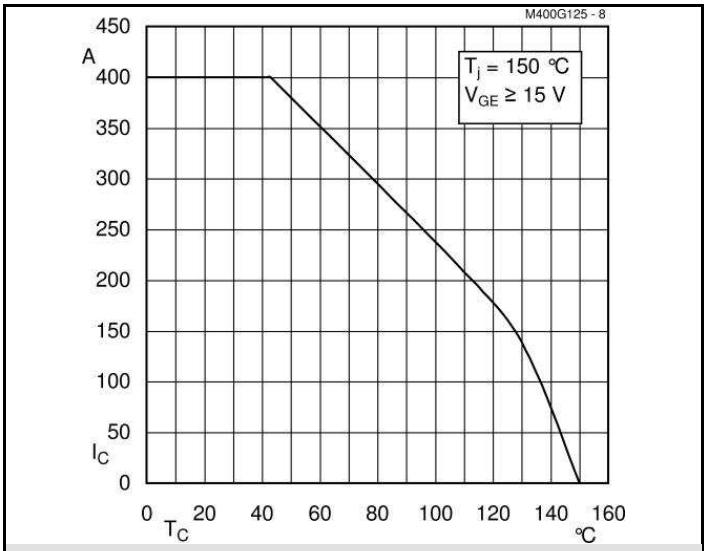


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

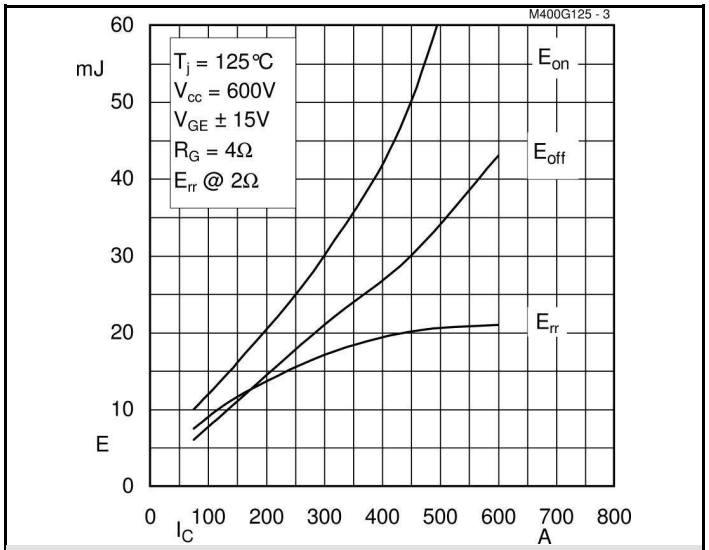


Fig. 3 Typ. turn-on /-off energy = f (I_C)

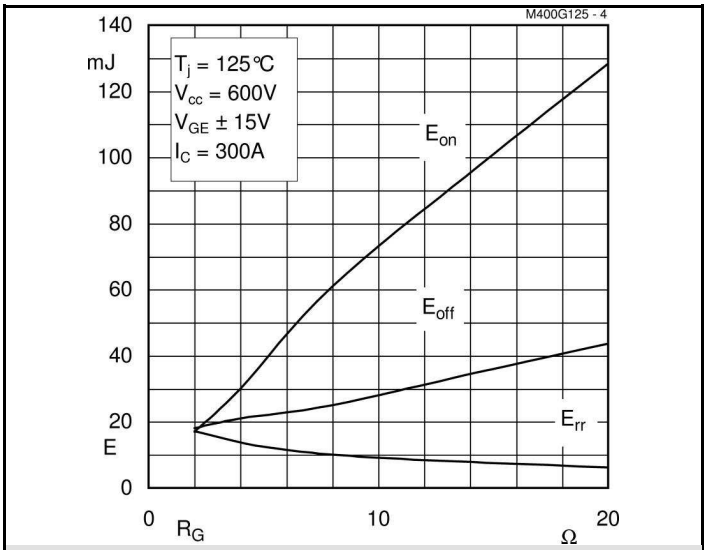


Fig. 4 Typ. turn-on /-off energy = f (R_G)

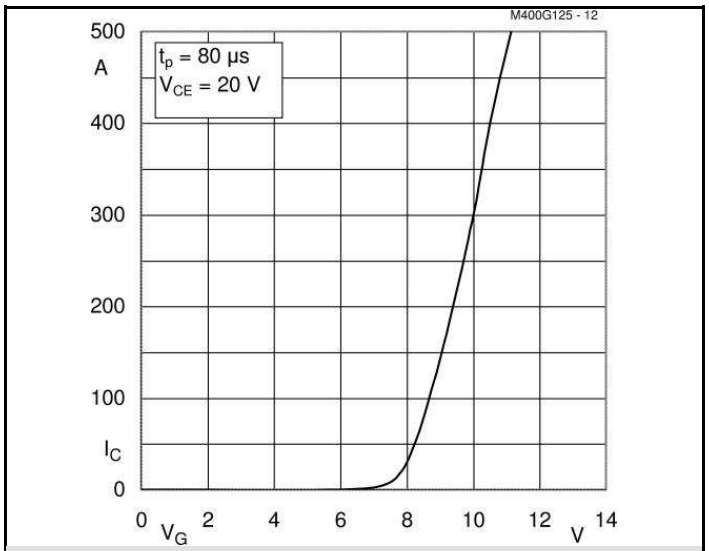


Fig. 5 Typ. transfer characteristic

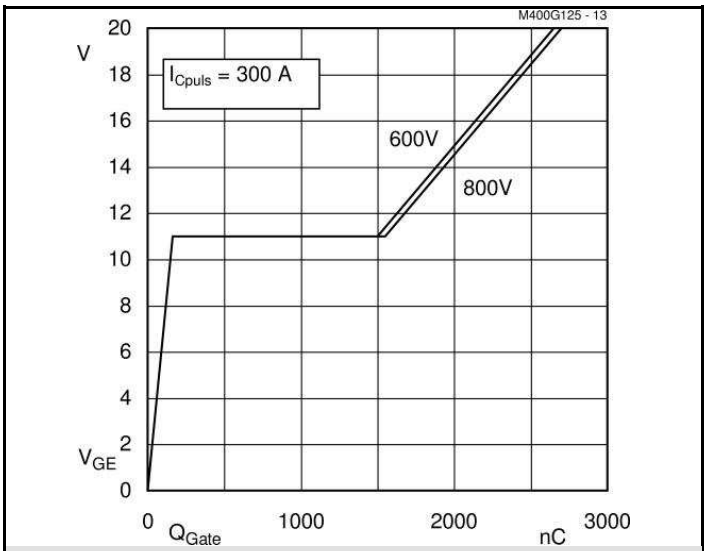


Fig. 6 Typ. gate charge characteristic

 © by SEMIKRON

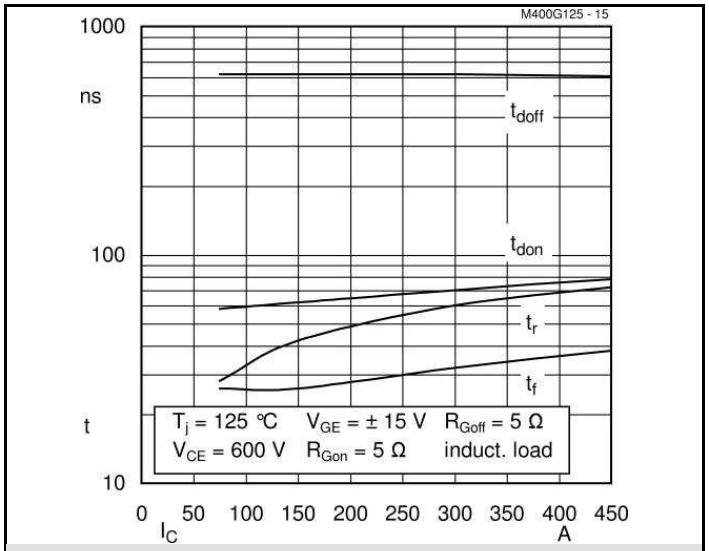


Fig. 7 Typ. switching times vs. I_C

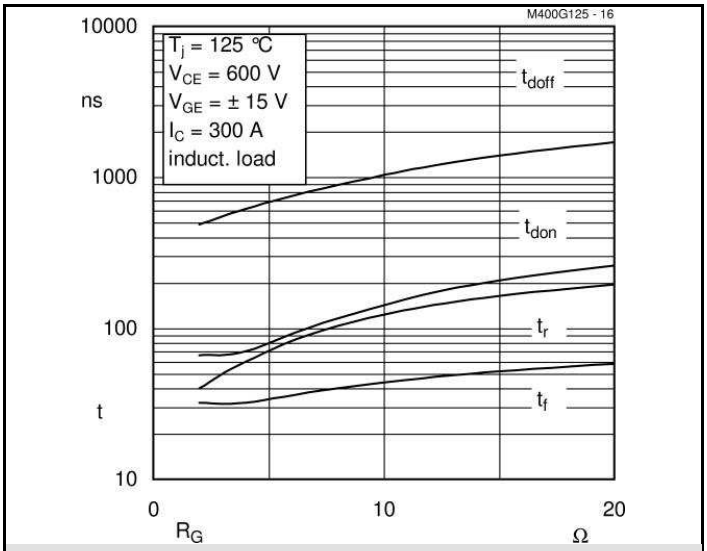


Fig. 8 Typ. switching times vs. gate resistor R_G

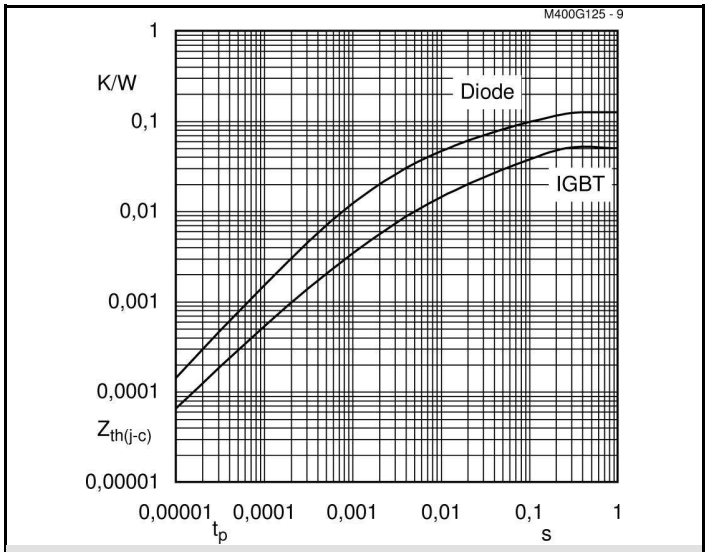


Fig. 9 Transient thermal impedance

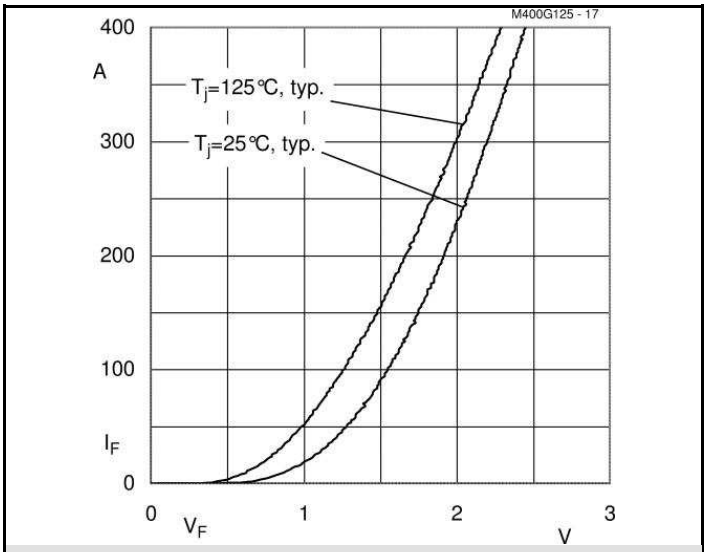


Fig. 10 CAL diode forward characteristic

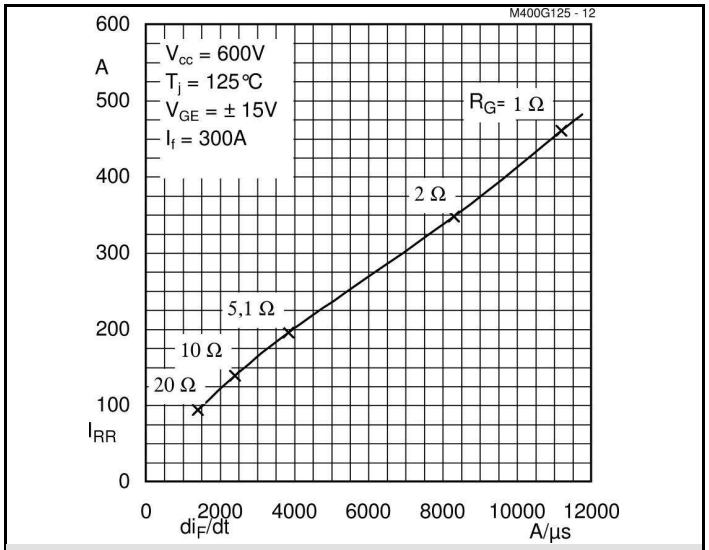


Fig. 11 Typ. CAL diode peak reverse recovery current

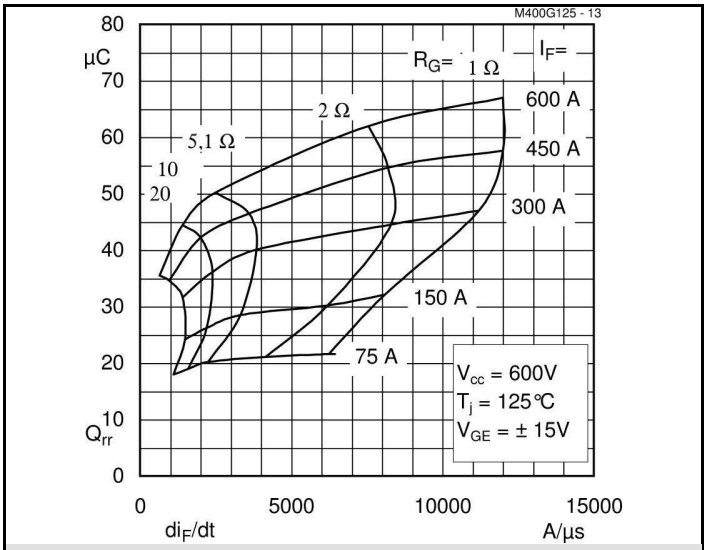
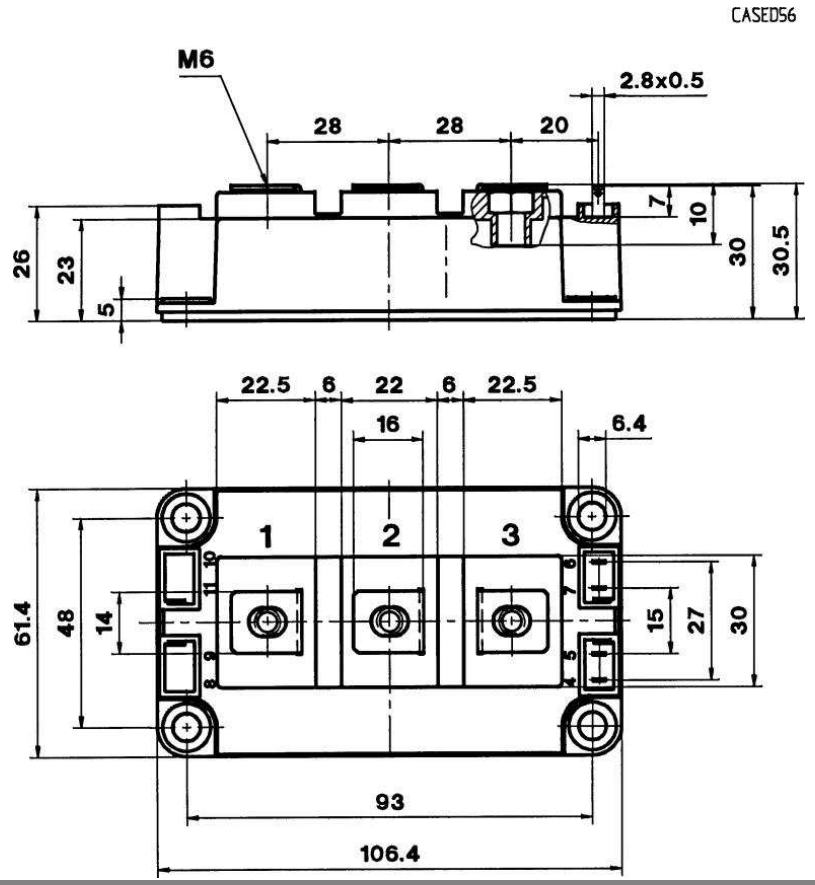


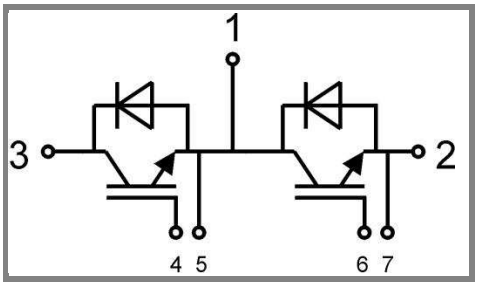
Fig. 12 Typ. CAL diode peak reverse recovery charge

 © by SEMIKRON

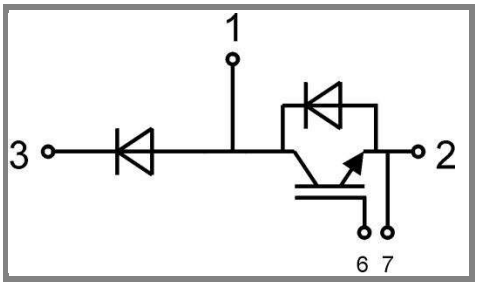
UL Recognized File 63 532



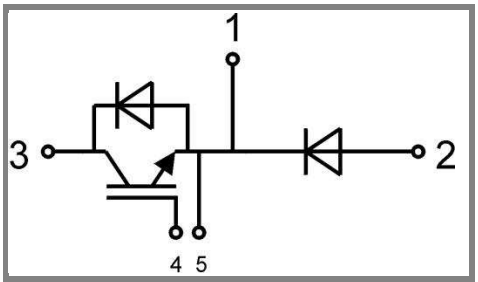
Case D 56



GB Case D 56



GAL Case D 57 (➞ D 56)



GAR Case D 58 (➞ D 56)

 © by SEMIKRON