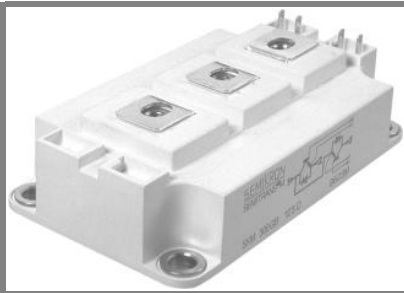


# SKM 400GB125D



**SEMITRANS® 3**

## Ultra Fast IGBT Modules

**SKM 400GB125D**

**SKM 400GAL125D**

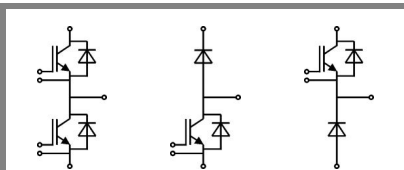
**SKM 400GAR125D**

### Features

- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting to  $6 \times I_{Cnom}$
- 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  $f_{sw} > 20\text{kHz}$
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at  $f_{sw} > 20\text{ kHz}$



GB

GAL

GAR

Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	Values	Units	
<b>IGBT</b>				
$V_{CES}$	$T_j = 25^\circ\text{C}$	1200	V	
$I_C$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	400	A
		$T_{case} = 80^\circ\text{C}$	300	A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	600	A	
$V_{GES}$		$\pm 20$	V	
$t_{psc}$	$V_{CC} = 600\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125^\circ\text{C}$ $V_{CES} < 1200\text{ V}$	10	$\mu\text{s}$	

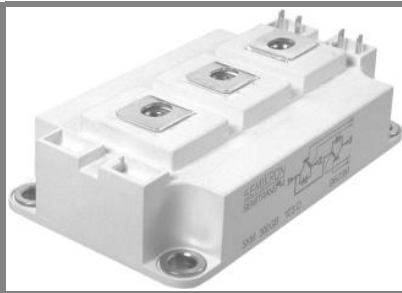
Inverse Diode		$T_c = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	Values	Units	
$I_F$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	390	A
		$T_{case} = 80^\circ\text{C}$	260	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	600	A	
$I_{FSM}$	$t_p = 10\text{ ms}; \text{sin.}$	$T_j = 150^\circ\text{C}$	2880	A

Freewheeling Diode		$T_c = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	Values	Units	
$I_F$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	390	A
		$T_{case} = 80^\circ\text{C}$	260	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	600	A	
$I_{FSM}$	$t_p = 10\text{ ms}; \text{sin.}$	$T_j = 150^\circ\text{C}$	2880	A

Module		$T_c = 25^\circ\text{C}$ , unless otherwise specified	
Symbol	Conditions	Values	Units
$I_{t(RMS)}$		500	A
$T_{vj}$		- 40...+ 150	$^\circ\text{C}$
$T_{stg}$		- 40...+ 125	$^\circ\text{C}$
$V_{isol}$	AC, 1 min.	4000	V

Characteristics		$T_c = 25^\circ\text{C}$ , unless otherwise specified				
Symbol	Conditions	min.	typ.	max.	Units	
<b>IGBT</b>						
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 12\text{ mA}$	4,5	5,5	6,5	V	
$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		0,15	0,45	mA	
$V_{CE0}$			$T_j = 25^\circ\text{C}$	1,4	V	
			$T_j = 125^\circ\text{C}$	1,7	V	
$r_{CE}$	$V_{GE} = 15\text{ V}$		$T_j = 25^\circ\text{C}$	6,3	m $\Omega$	
			$T_j = 125^\circ\text{C}$	7,6	m $\Omega$	
$V_{CE(sat)}$	$I_{Cnom} = 300\text{ A}, V_{GE} = 15\text{ V}$		$T_j = 25^\circ\text{C}_{chiplev.}$	3,3	3,85	V
			$T_j = 125^\circ\text{C}_{chiplev.}$	4	4,55	V
$C_{res}$	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		22	30	nF
$C_{oes}$				3,3	4	nF
$C_{res}$				1,2	1,6	nF
$Q_G$	$V_{GE} = 0\text{ V} - +20\text{ V}$		2650		nC	
$R_{Gint}$	$T_j = ^\circ\text{C}$		1,25		$\Omega$	
$t_{d(on)}$	$R_{Gon} = 2\ \Omega$		$V_{CC} = 600\text{ V}$ $I_C = 300\text{ A}$	70	ns	
$t_r$				50	ns	
$E_{on}$	$R_{Goff} = 2\ \Omega$		$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{ V}$	17	mJ	
$t_{d(off)}$				500	ns	
$t_f$				32	ns	
$E_{off}$				18	mJ	
$R_{th(j-c)}$	per IGBT			0,05	K/W	

# SKM 400GB125D



SEMITRANS<sup>®</sup> 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  $6 \times I_{cnom}$
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

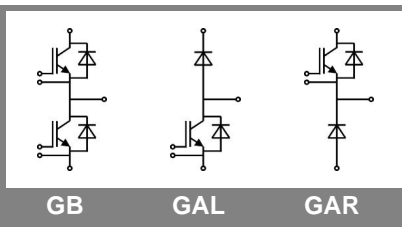
### Typical Applications\*

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

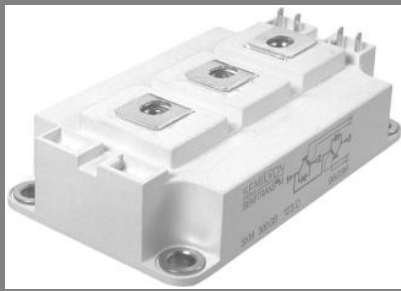
Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 300\text{ A}; V_{GE} = 0\text{ V}$	$T_j = 25\text{ }^\circ\text{C}_{chiplev.}$	2	2,5	V
		$T_j = 125\text{ }^\circ\text{C}_{chiplev.}$	1,8		V
$V_{F0}$		$T_j = 25\text{ }^\circ\text{C}$	1,1	1,2	V
		$T_j = 125\text{ }^\circ\text{C}$			V
$r_F$		$T_j = 25\text{ }^\circ\text{C}$	3	4,3	mΩ
		$T_j = 125\text{ }^\circ\text{C}$			mΩ
$I_{RRM}$	$I_F = 300\text{ A}$	$T_j = 125\text{ }^\circ\text{C}$	350		A
$Q_{rr}$	$di/dt = 8300\text{ A}/\mu\text{s}$		45		μC
$E_{tr}$	$V_{GE} = 0\text{ V}; V_{CC} = 600\text{ V}$		16		mJ
$R_{th(j-c)D}$	per diode			0,125	K/W
<b>Freewheeling Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 300\text{ A}; V_{GE} = 0\text{ V}$	$T_j = 25\text{ }^\circ\text{C}_{chiplev.}$	2	2,5	V
		$T_j = 125\text{ }^\circ\text{C}_{chiplev.}$	1,8		V
$V_{F0}$		$T_j = 25\text{ }^\circ\text{C}$	1,1	1,2	V
		$T_j = 125\text{ }^\circ\text{C}$			V
$r_F$		$T_j = 25\text{ }^\circ\text{C}$	3	4,3	V
		$T_j = 125\text{ }^\circ\text{C}$			V
$I_{RRM}$	$I_F = 300\text{ A}$	$T_j = 125\text{ }^\circ\text{C}$	350		A
$Q_{rr}$	$di/dt = 8300\text{ A}/\mu\text{s}$		45		μC
$E_{tr}$	$V_{GE} = 0\text{ V}; V_{CC} = 600\text{ V}$		16		mJ
$R_{th(j-c)FD}$	per diode			0,125	K/W
<b>Module</b>					
$L_{CE}$			15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25\text{ }^\circ\text{C}$	0,35		mΩ
		$T_{case} = 125\text{ }^\circ\text{C}$	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.



# SKM 400GB125D



**SEMITRANS<sup>®</sup> 3**

## Ultra Fast IGBT Modules

**SKM 400GB125D**

**SKM 400GAL125D**

**SKM 400GAR125D**

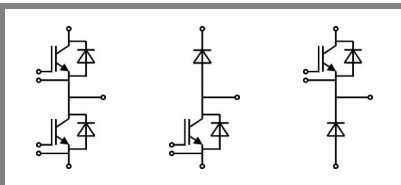
### Features

- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting to  $6 \times I_{cnom}$
- 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  $f_{sw} > 20\text{kHz}$
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at  $f_{sw} > 20\text{ kHz}$

$Z_{th}$		Values	Units
Symbol	Conditions		
$Z_{th(j-c)I}$			
$R_{\theta}$	$i = 1$	36	mk/W
$R_{\theta}$	$i = 2$	10,5	mk/W
$R_{\theta}$	$i = 3$	3	mk/W
$R_{\theta}$	$i = 4$	0,5	mk/W
$\tau_{\theta}$	$i = 1$	0,0744	s
$\tau_{\theta}$	$i = 2$	0,0078	s
$\tau_{\theta}$	$i = 3$	0,0016	s
$\tau_{\theta}$	$i = 4$	0,0002	s
$Z_{th(j-c)D}$			
$R_{\theta}$	$i = 1$	75	mk/W
$R_{\theta}$	$i = 2$	38	mk/W
$R_{\theta}$	$i = 3$	10,6	mk/W
$R_{\theta}$	$i = 4$	1,4	mk/W
$\tau_{\theta}$	$i = 1$	0,0386	s
$\tau_{\theta}$	$i = 2$	0,0201	s
$\tau_{\theta}$	$i = 3$	0,001	s
$\tau_{\theta}$	$i = 4$	0,003	s



GB

GAL

GAR

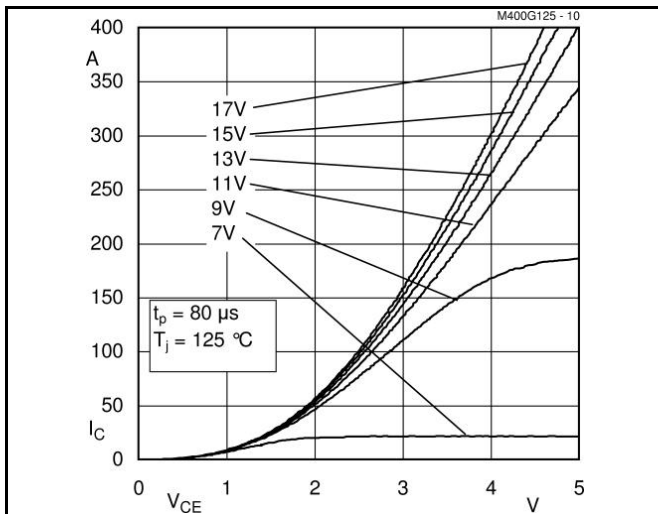


Fig. 1 Typ. output characteristic, inclusive  $R_{CC+EE}$

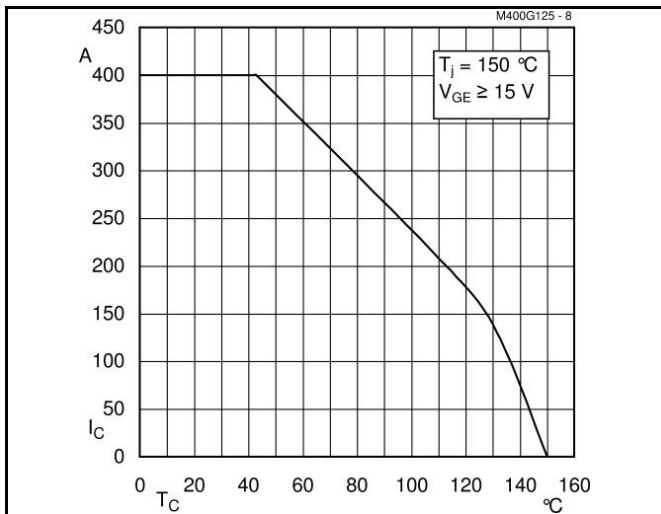


Fig. 2 Rated current vs. temperature  $I_C = f(T_C)$

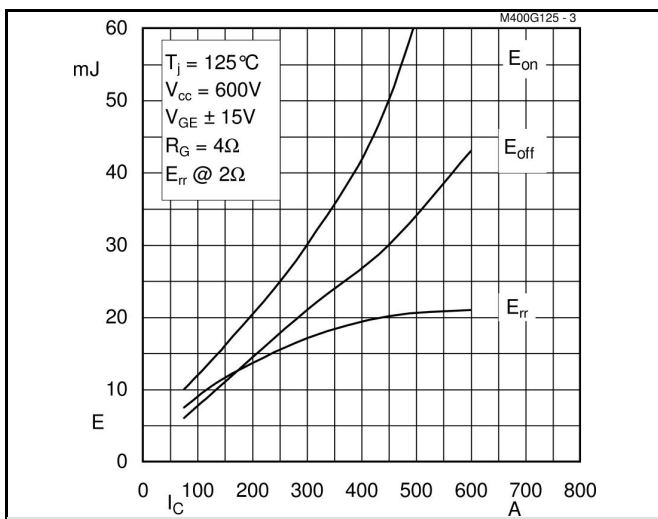


Fig. 3 Typ. turn-on /-off energy =  $f(I_C)$

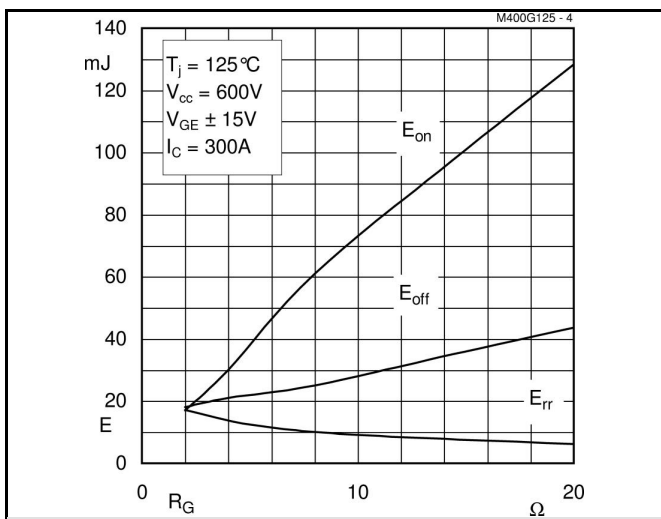


Fig. 4 Typ. turn-on /-off energy =  $f(R_G)$

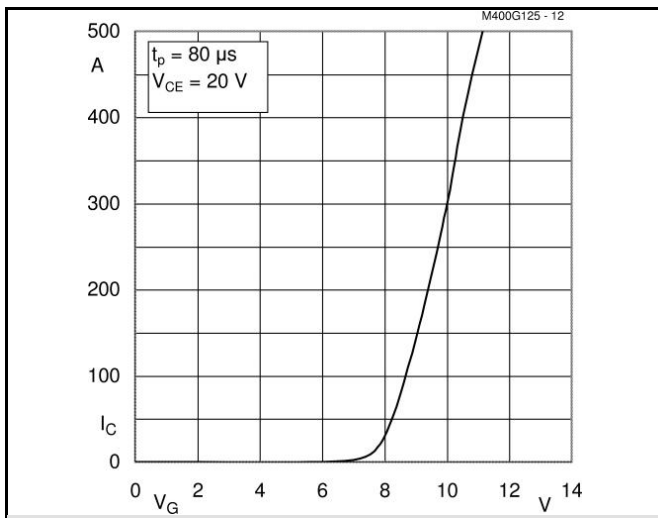


Fig. 5 Typ. transfer characteristic

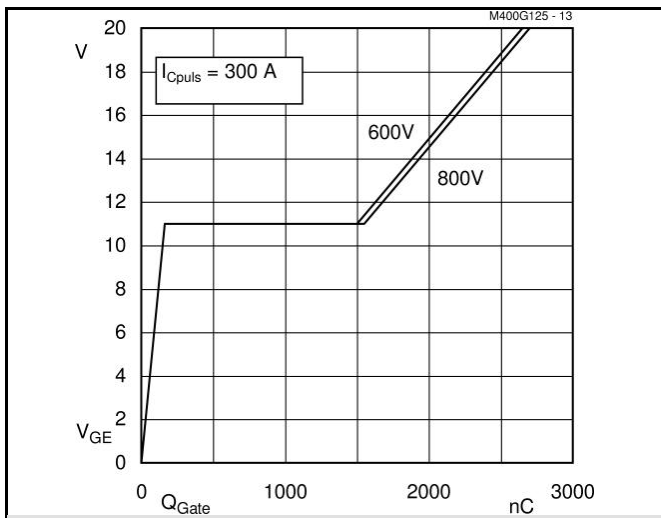
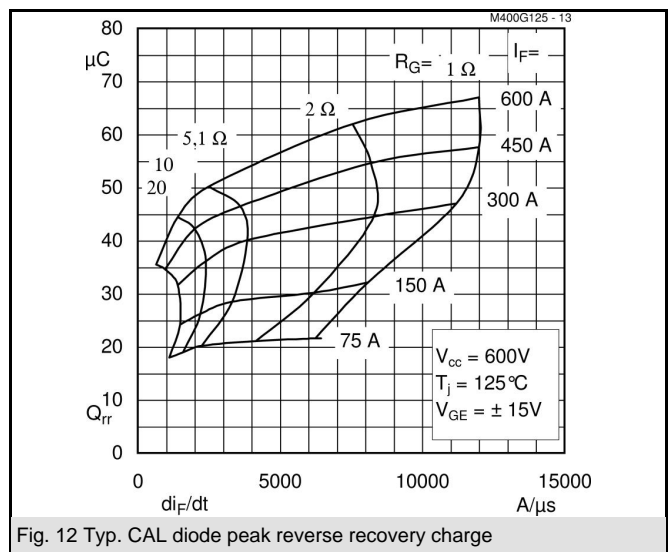
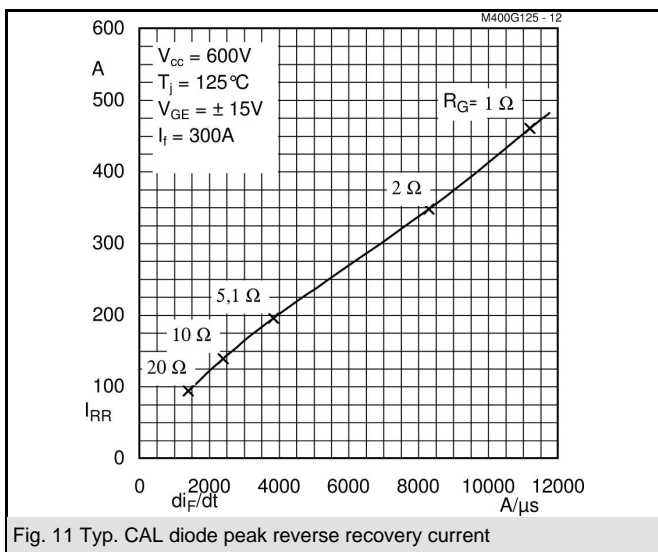
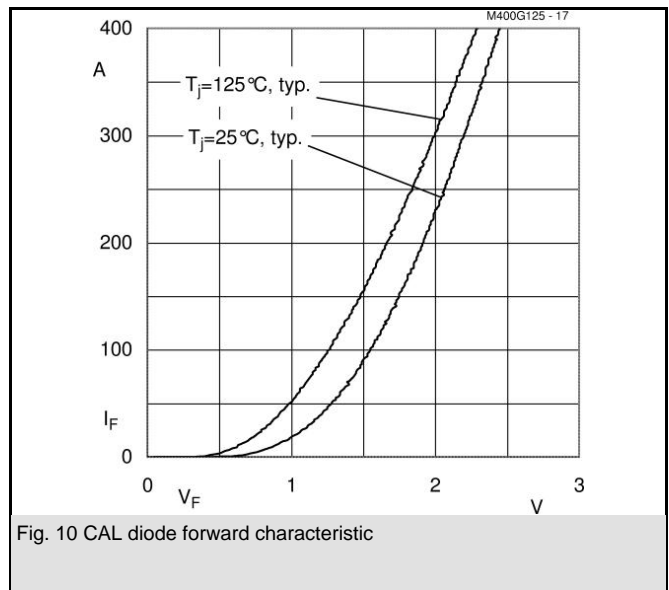
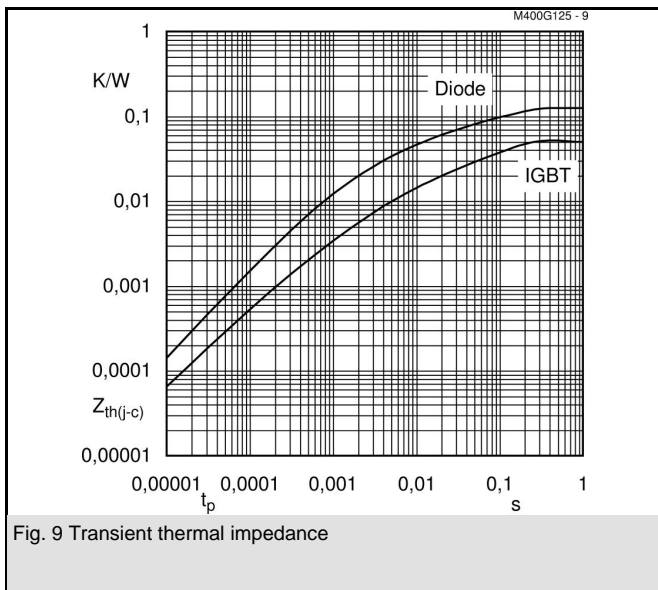
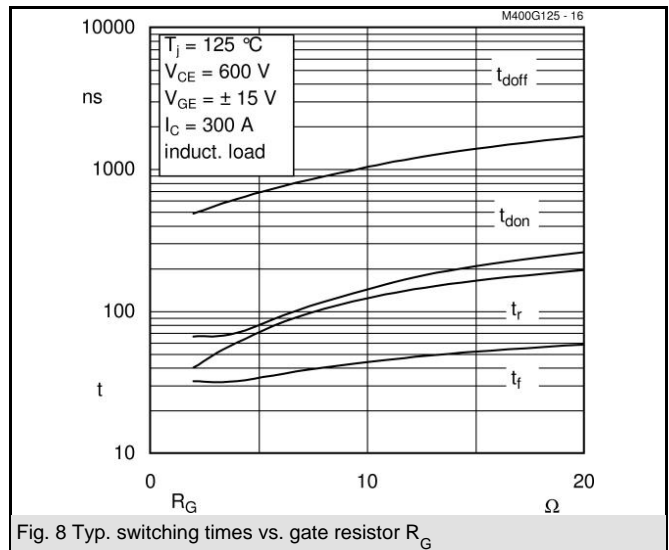
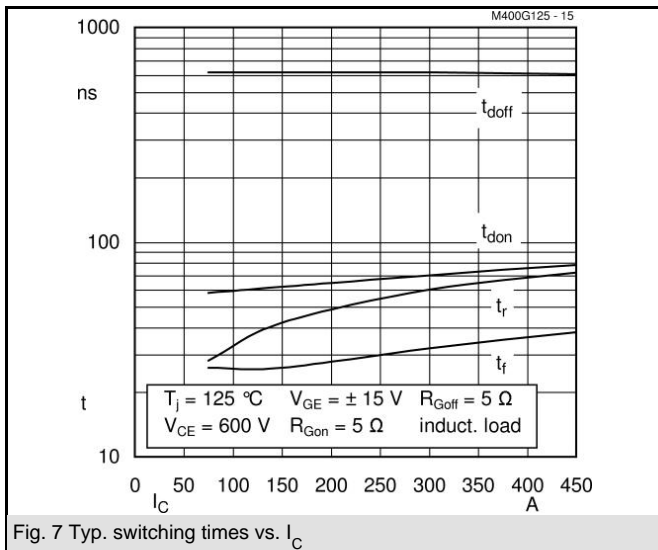


Fig. 6 Typ. gate charge characteristic

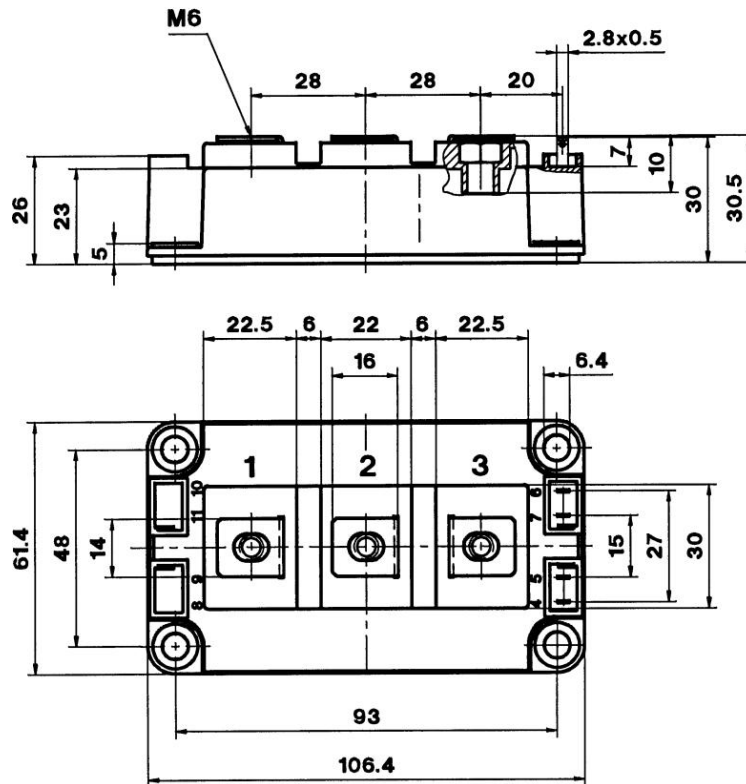


# SKM 400GB125D

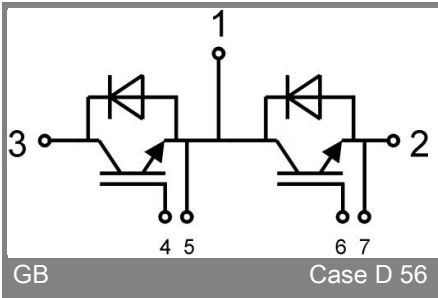
UL Recognized

CASED56

File 63 532

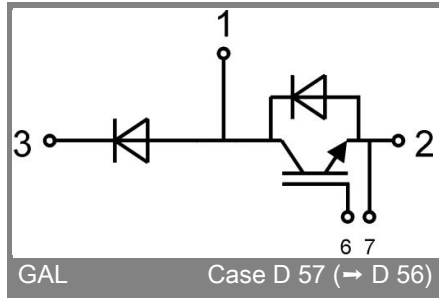


Case D 56



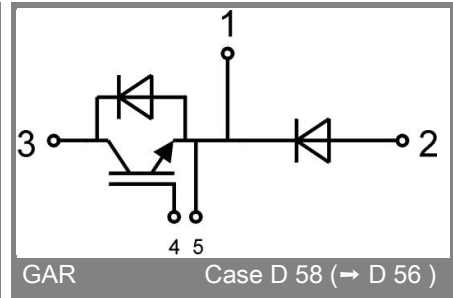
GB

Case D 56



GAL

Case D 57 (→ D 56)



GAR

Case D 58 (→ D 56)