

SKM 400GA123D



SEMITRANS[®] 4

IGBT Modules

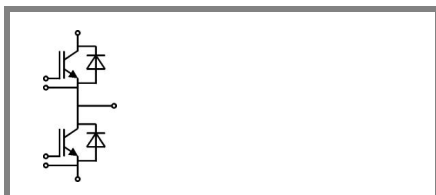
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Features

- 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 $6 \times I_{Cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (12 mm) and creepage distances (20 mm)

Typical Applications*

- Switching (not for linear use)



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Absolute Maximum Ratings		$T_C = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	Values			Units
IGBT					
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
		$T_{case} = 80^\circ\text{C}$	360		A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	600			A
V_{GES}		± 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			μs
Inverse Diode					
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					
$I_{t(RMS)}$		500			A
T_{vj}		- 40 ... + 150			$^\circ\text{C}$
T_{stg}		- 40 ... + 125			$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500			V

Characteristics		$T_C = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 12\text{ mA}$	4,5	5,5	6,5	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		0,1	0,3	mA
V_{CE0}		$T_j = 25^\circ\text{C}$	1,4	1,6	V
		$T_j = 125^\circ\text{C}$	1,6	1,8	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	3,66	4,66	m Ω
		$T_j = 125^\circ\text{C}$	5	6,33	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 300\text{ A}, V_{GE} = 15\text{ V}$	$T_j = ^\circ\text{C}_{chiplev.}$	2,5	3	V
C_{ies}	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	22	30	nF
C_{oes}			3,3	4	nF
C_{res}			1,2	1,6	nF
Q_G	$V_{GE} = -8\text{ V} - +20\text{ V}$		3000		nC
R_{Gint}	$T_j = ^\circ\text{C}$		1,25		Ω
$t_{d(on)}$	$R_{Gon} = 3,3\ \Omega$	$V_{CC} = 600\text{ V}$ $I_C = 300\text{ A}$	200	400	ns
t_r			115	220	ns
E_{on}			38		mJ
$t_{d(off)}$	$R_{Goff} = 3,3\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{ V}$	720	900	ns
t_f			80	100	ns
E_{off}			40		mJ
$R_{th(j-c)}$	per IGBT			0,045	K/W



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Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$	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}	$I_F = 300 \text{ A}$	$T_j = 25 \text{ }^\circ\text{C}$	85		A
Q_{rr}	$di/dt = 2000 \text{ A}/\mu\text{s}$		13		μC
E_{rr}	$V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$				mJ
$R_{th(j-c)D}$	per diode			0,125	K/W
Freewheeling Diode					
$V_F = V_{EC}$	$I_{Fnom} = \text{A}; V_{GE} = \text{V}$	$T_j = \text{ }^\circ\text{C}_{chiplev.}$			V
V_{F0}		$T_j = 25 \text{ }^\circ\text{C}$			V
		$T_j = 125 \text{ }^\circ\text{C}$			V
r_F		$T_j = 25 \text{ }^\circ\text{C}$			V
		$T_j = 125 \text{ }^\circ\text{C}$			V
I_{RRM}	$I_F = \text{A}$	$T_j = \text{ }^\circ\text{C}$			A
Q_{rr}					μC
E_{rr}	$V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$				mJ
	per diode				K/W
Module					
L_{CE}			15	20	nH
R_{CC+EE}	res., terminal-chip	$T_{case} = 25 \text{ }^\circ\text{C}$	0,18		mΩ
		$T_{case} = 125 \text{ }^\circ\text{C}$	0,22		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 (M4)		2,5 (1,1)	5 (2)	Nm
w				330	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.

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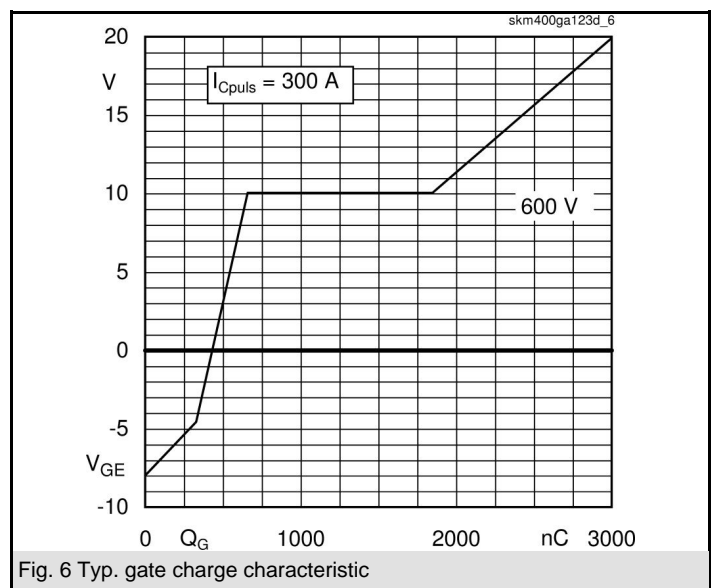
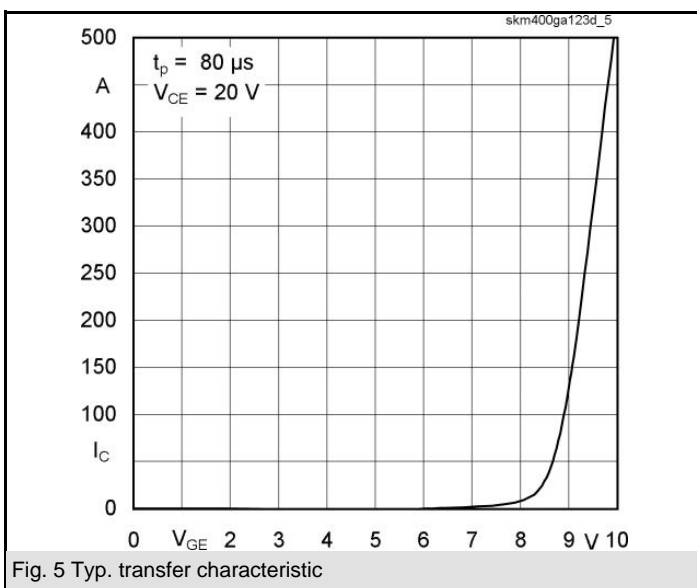
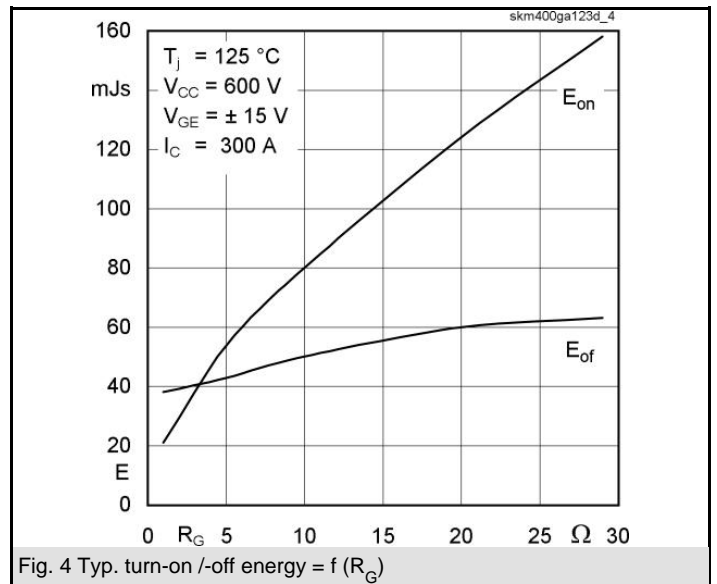
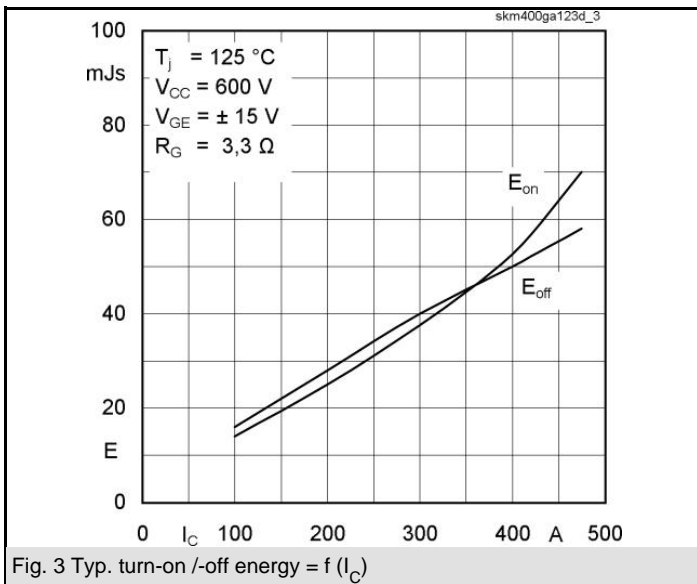
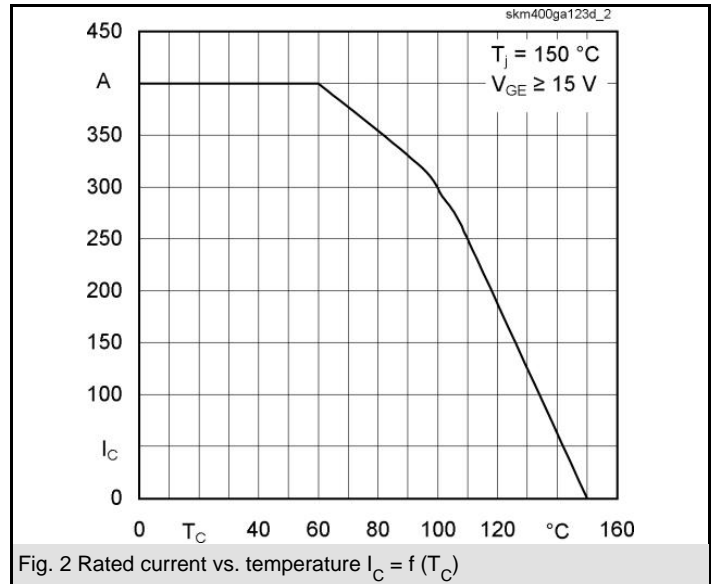
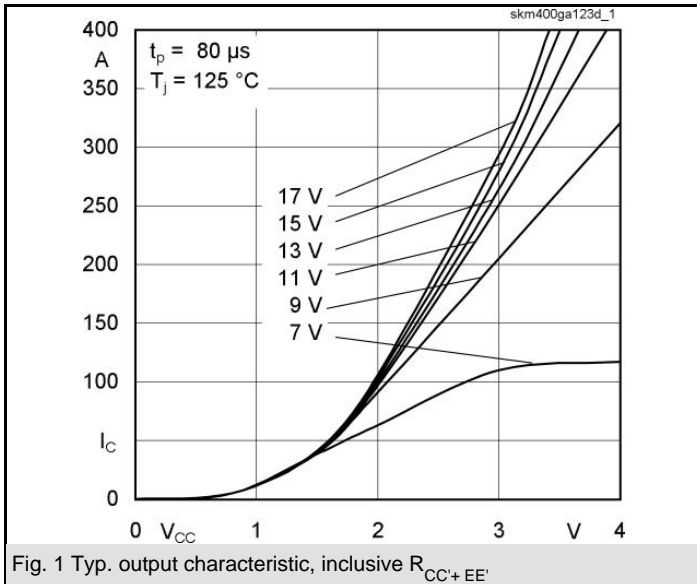
Typical Applications*

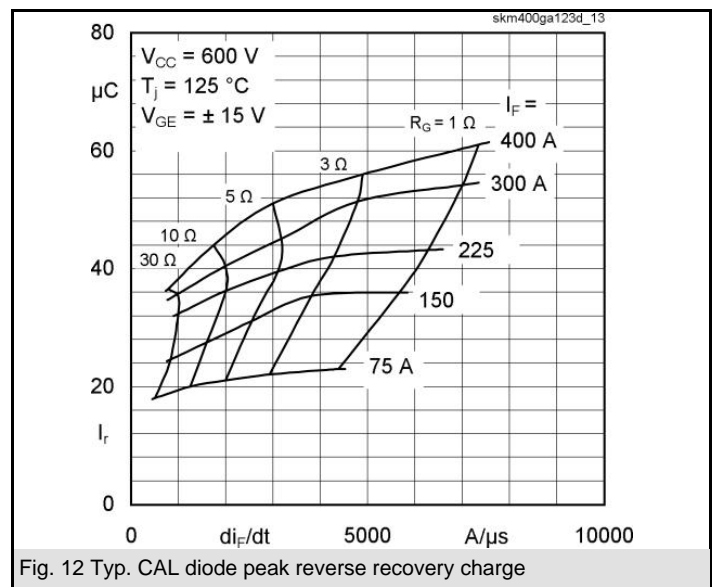
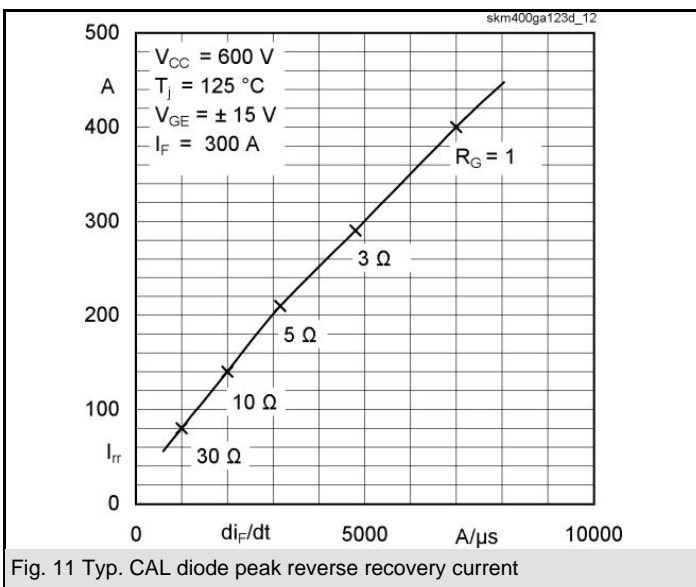
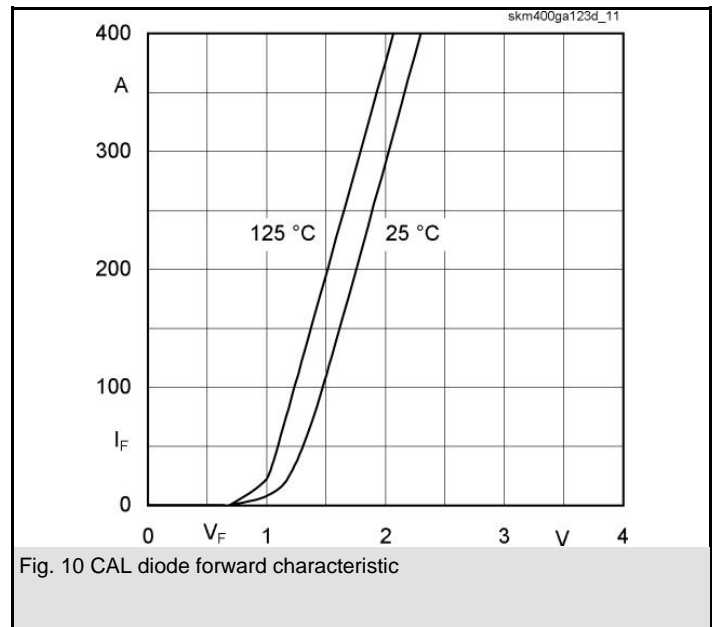
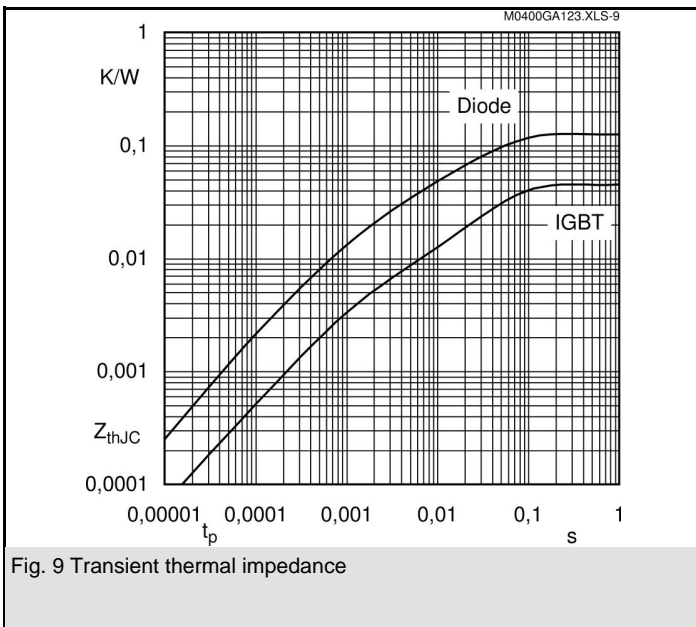
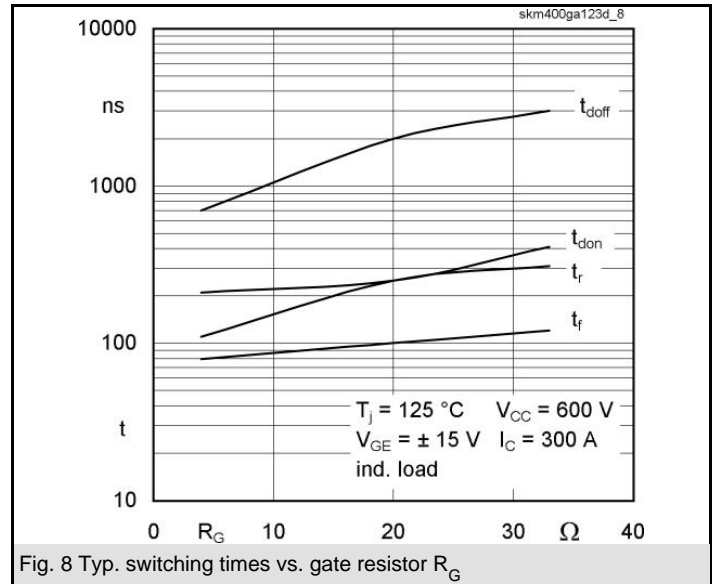
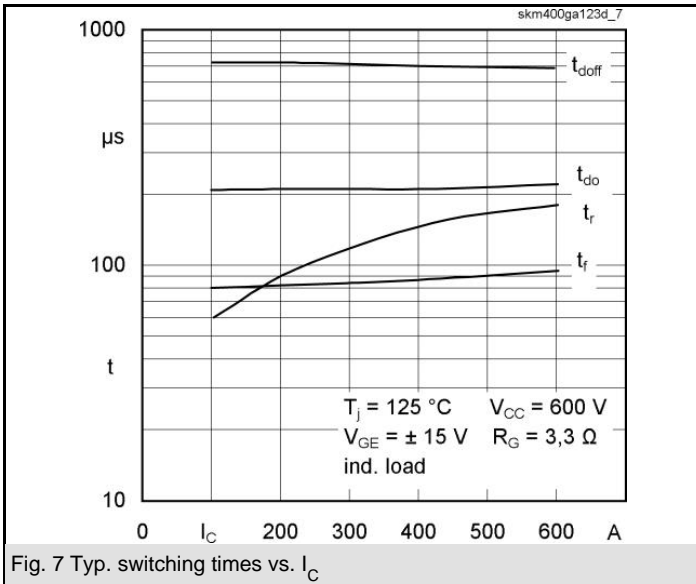
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Z_{th}			
Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
$R_{\theta j-c}$	$i = 1$	33	mk/W
$R_{\theta j-c}$	$i = 2$	8,8	mk/W
$R_{\theta j-c}$	$i = 3$	2,6	mk/W
$R_{\theta j-c}$	$i = 4$	0,6	mk/W
$\tau_{\theta j-c}$	$i = 1$	0,05	s
$\tau_{\theta j-c}$	$i = 2$	0,009	s
$\tau_{\theta j-c}$	$i = 3$	0,0024	s
$\tau_{\theta j-c}$	$i = 4$	0,0001	s
$Z_{th(j-c)D}$			
$R_{\theta j-c}$	$i = 1$	85	mk/W
$R_{\theta j-c}$	$i = 2$	31	mk/W
$R_{\theta j-c}$	$i = 3$	7,8	mk/W
$R_{\theta j-c}$	$i = 4$	1,2	mk/W
$\tau_{\theta j-c}$	$i = 1$	0,0537	s
$\tau_{\theta j-c}$	$i = 2$	0,0086	s
$\tau_{\theta j-c}$	$i = 3$	0,003	s
$\tau_{\theta j-c}$	$i = 4$	0,0001	s



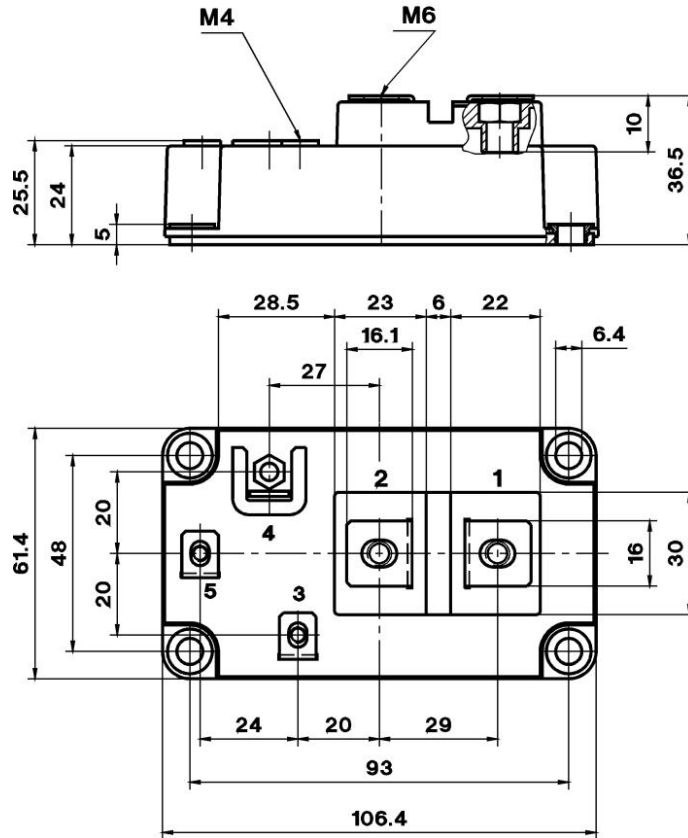


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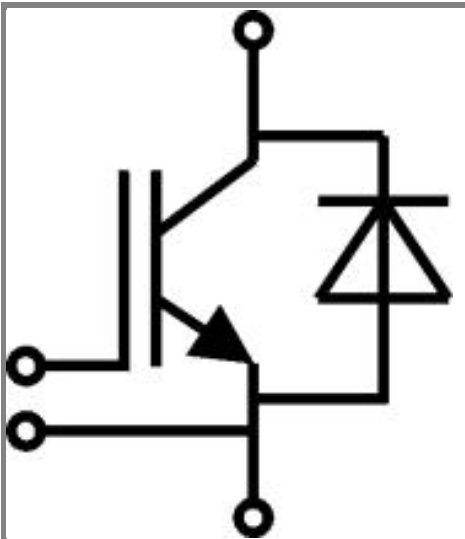
UL Recognized

CASED59

File 63 532



Case D 59



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Case D 59