

# SKM 500GA123D



**SEMITRANS<sup>®</sup> 4**

## IGBT Modules

**SKM 500GA123D**

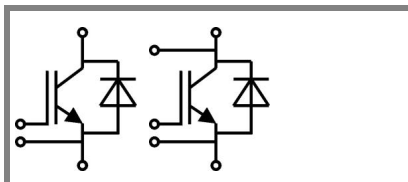
**SKM 500GA123DS**

### 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 CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (12 mm) and creepage distances (20 mm)

### Typical Applications\*

- AC inverter drives
- UPS



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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
$I_C$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	500	A
		$T_{case} = 80^\circ\text{C}$	420	A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	800		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		$\mu\text{s}$
<b>Inverse Diode</b>				
$I_F$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	500	A
		$T_{case} = 80^\circ\text{C}$	350	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	800		A
$I_{FSM}$	$t_p = 10\text{ ms}; \text{sin.}$	$T_j = 150^\circ\text{C}$	3600	A
<b>Module</b>				
$I_{t(RMS)}$		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	
<b>IGBT</b>						
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 16\text{ mA}$	4,5	5,5	6,5	V	
$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$	$T_j = 25^\circ\text{C}$		0,1	0,3	
$V_{CE0}$		$T_j = 25^\circ\text{C}$		1,4	1,6	
		$T_j = 125^\circ\text{C}$		1,6	1,8	
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$		2,75	3,5	
		$T_j = 125^\circ\text{C}$		3,75	4,75	
$V_{CE(sat)}$	$I_{Cnom} = 400\text{ A}, V_{GE} = 15\text{ V}$	$T_j = ^\circ\text{C}_{chiplev.}$		2,5	3	
$C_{ies}$	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		26	40	
$C_{oes}$				4	5,2	
$C_{res}$				2	2,6	
$R_{Gint}$	$T_j = ^\circ\text{C}$			1,25	$\Omega$	
$t_{d(on)}$	$R_{Gon} = 3,3\ \Omega$	$V_{CC} = 600\text{ V}$ $I_C = 400\text{ A}$			250	600
$t_r$					170	340
$E_{on}$					45	
$t_{d(off)}$	$R_{Goff} = 3,3\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{ V}$			900	1100
$t_f$					100	125
$E_{off}$						
$R_{th(j-c)}$	per IGBT			0,041	K/W	

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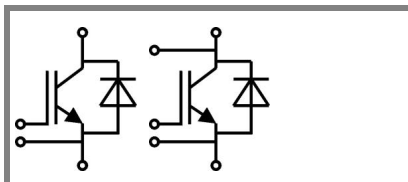
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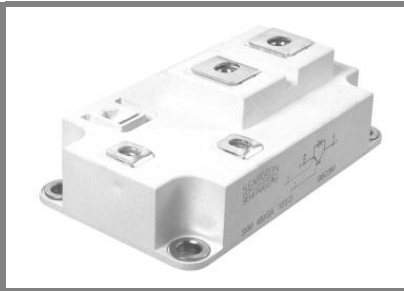
### Characteristics

Symbol	Conditions	min.	typ.	max.	Units
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 400 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$	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
$r_F$		$T_j = 25 \text{ }^\circ\text{C}$	2,3	3,3	m $\Omega$
		$T_j = 125 \text{ }^\circ\text{C}$			m $\Omega$
$I_{RRM}$	$I_F = 400 \text{ A}$	$T_j = 25 \text{ }^\circ\text{C}$	90		A
$Q_{rr}$	$di/dt = 2000 \text{ A}/\mu\text{s}$		15		$\mu\text{C}$
$E_{rr}$	$V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$				mJ
$R_{th(j-c)D}$	per diode			0,09	K/W
<b>Freewheeling Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = \text{A}; V_{GE} = \text{V}$	$T_j = \text{ }^\circ\text{C}_{chiplev.}$			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
$Q_{rr}$					$\mu\text{C}$
$E_{rr}$	$V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$				mJ
	per diode				K/W
<b>Module</b>					
$L_{CE}$			15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25 \text{ }^\circ\text{C}$	0,18		m $\Omega$
		$T_{case} = 125 \text{ }^\circ\text{C}$	0,22		m $\Omega$
$R_{th(c-s)}$	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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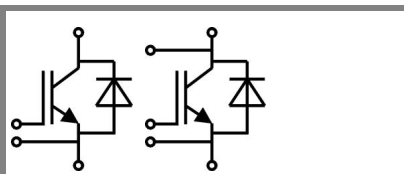
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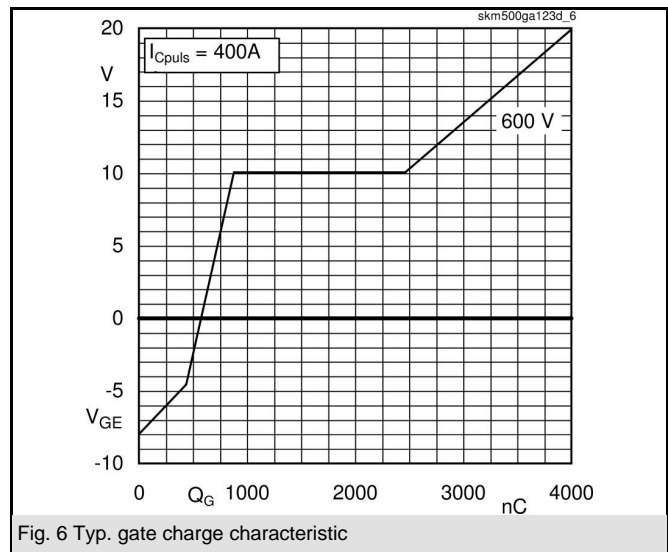
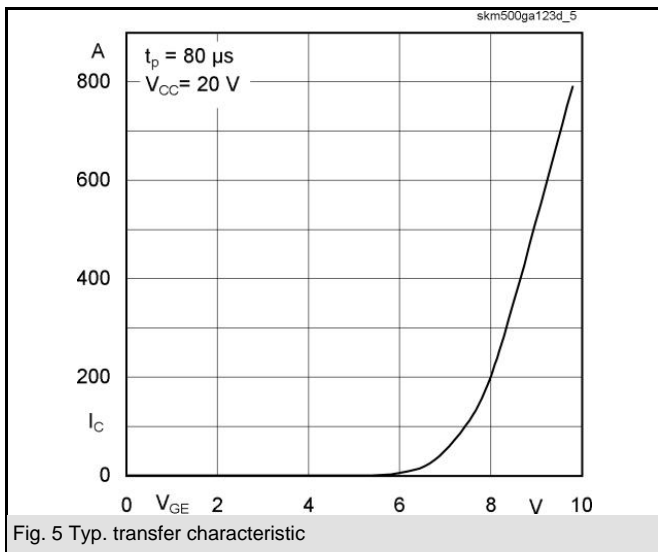
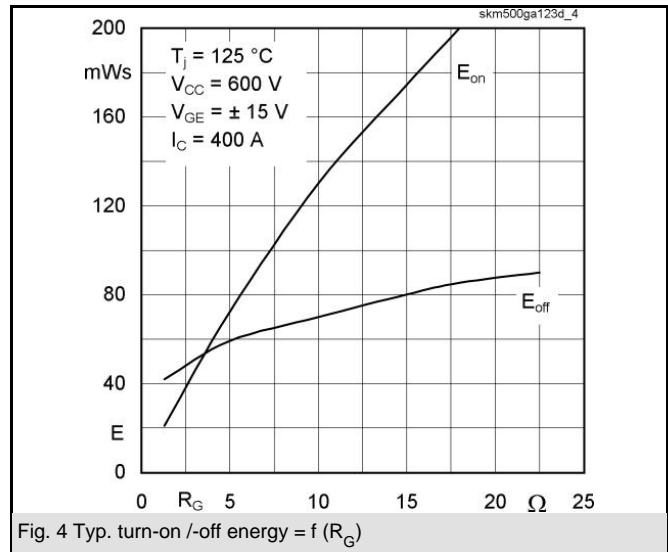
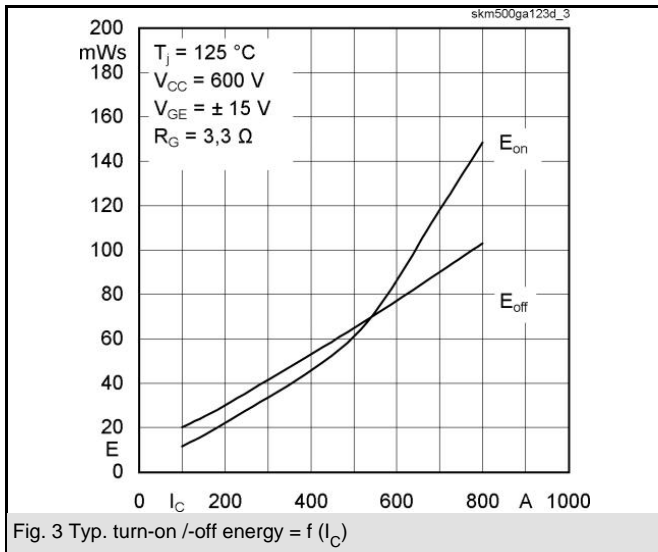
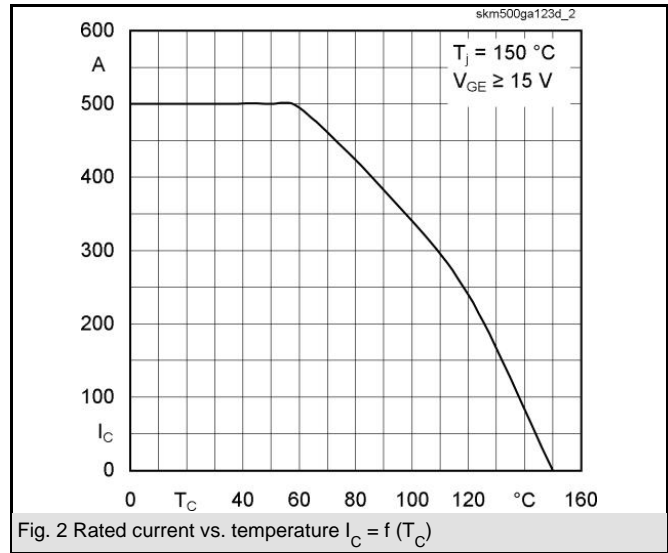
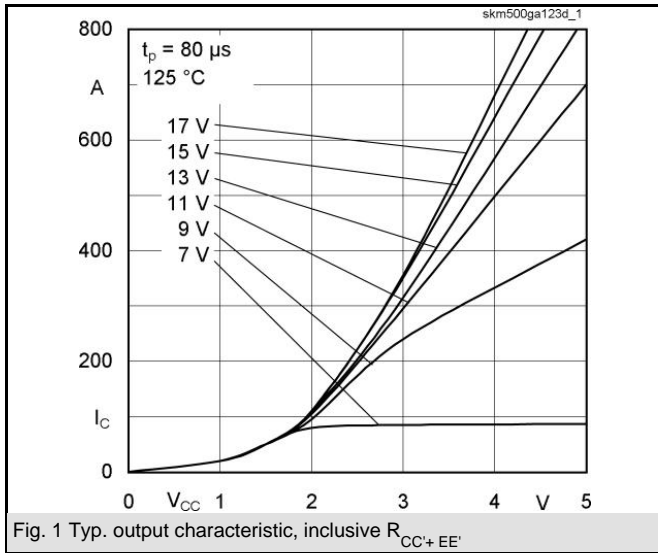
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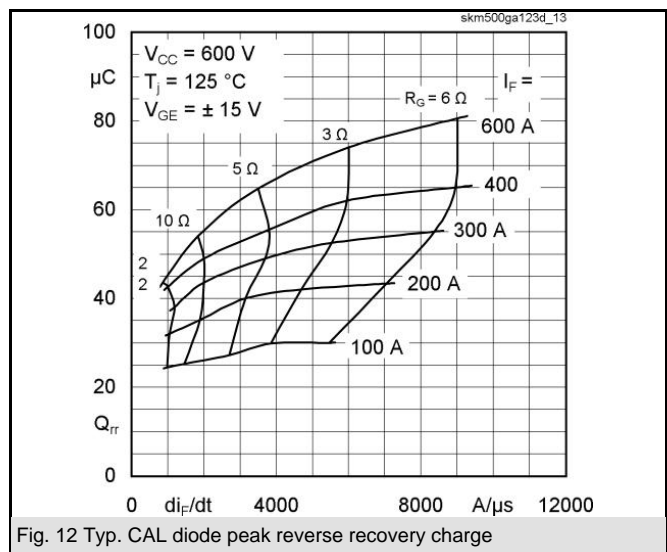
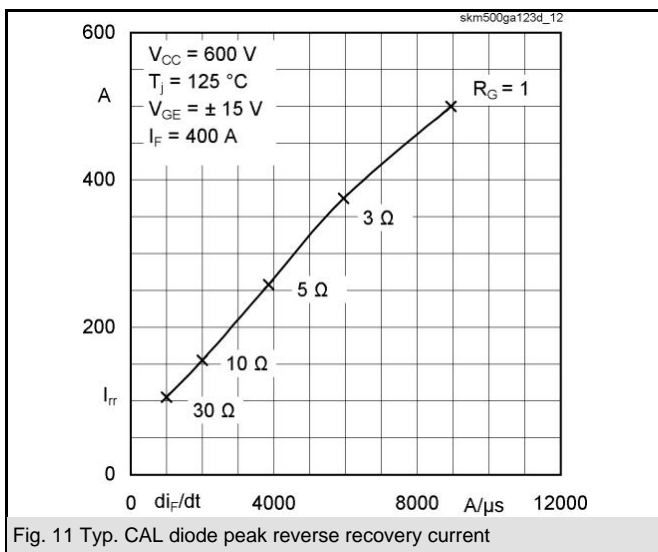
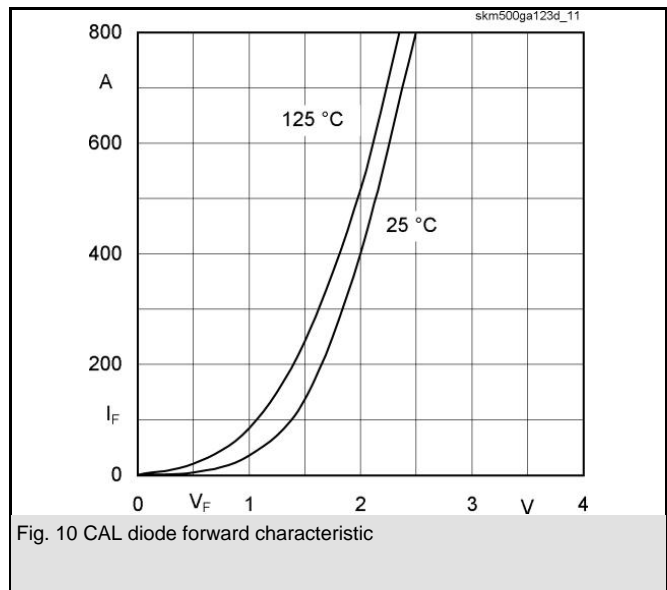
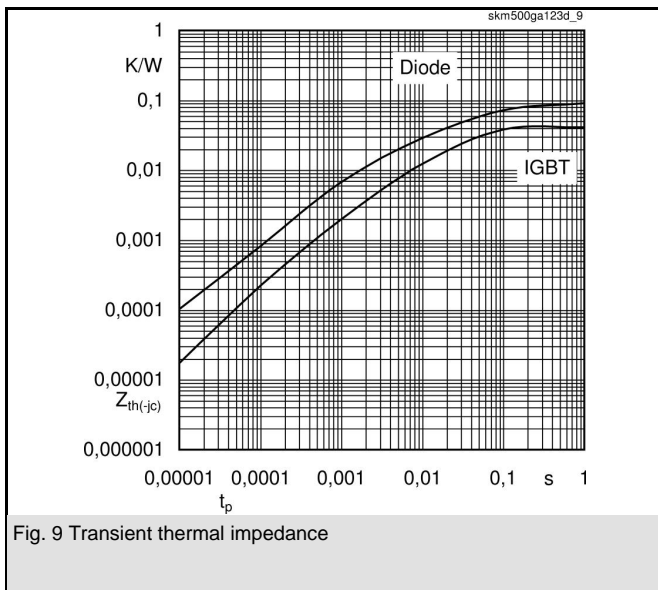
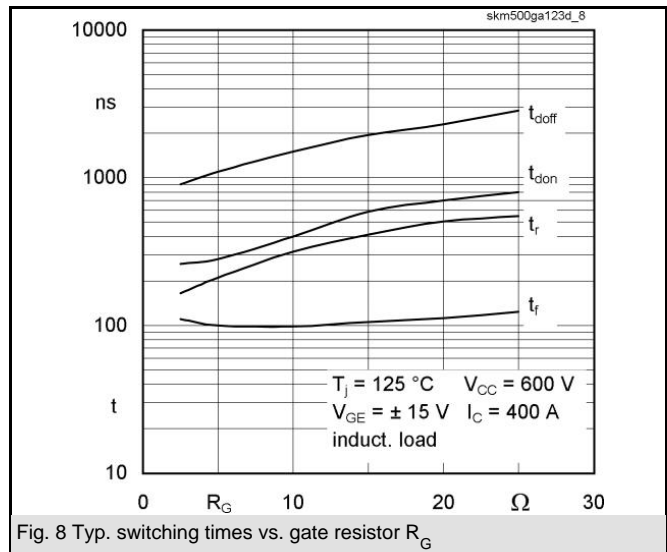
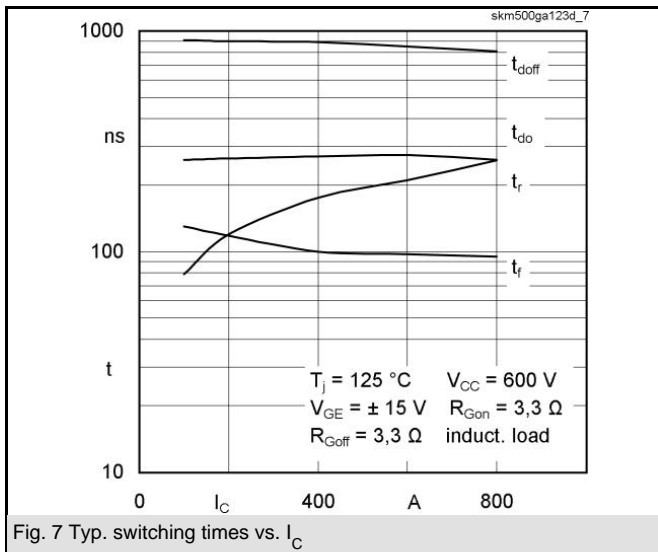


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$Z_{th}$		Values	Units
Symbol	Conditions		
$Z_{th(j-c)I}$			
$R_{\theta}$	$i = 1$	29	mk/W
$R_{\theta}$	$i = 2$	10	mk/W
$R_{\theta}$	$i = 3$	1,8	mk/W
$R_{\theta}$	$i = 4$	0,2	mk/W
$\tau_{\theta}$	$i = 1$	0,04	s
$\tau_{\theta}$	$i = 2$	0,0189	s
$\tau_{\theta}$	$i = 3$	0,0017	s
$\tau_{\theta}$	$i = 4$	0,001	s
$Z_{th(j-c)D}$			
$R_{\theta}$	$i = 1$	60	mk/W
$R_{\theta}$	$i = 2$	23	mk/W
$R_{\theta}$	$i = 3$	6,2	mk/W
$R_{\theta}$	$i = 4$	0,8	mk/W
$\tau_{\theta}$	$i = 1$	0,0366	s
$\tau_{\theta}$	$i = 2$	0,042	s
$\tau_{\theta}$	$i = 3$	0,0009	s
$\tau_{\theta}$	$i = 4$	0,002	s



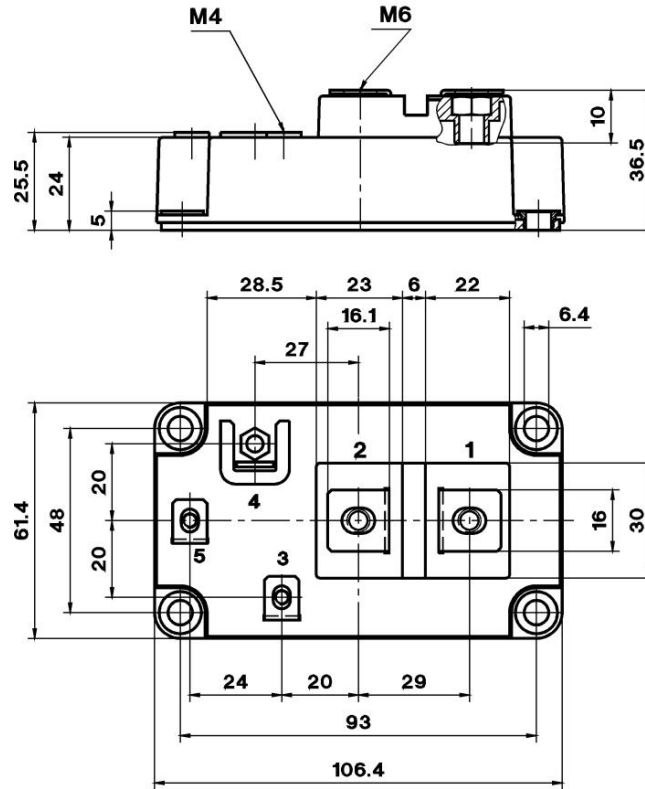


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UL Recognized

CASED59

File 63 532



Case D 60

