

# SKM 500GA123D



**SEMITRANS® 4**

## IGBT Modules

**SKM 500GA123D**

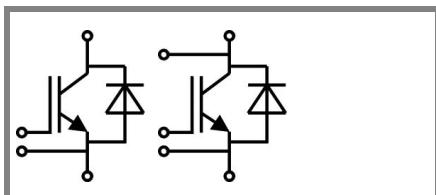
**SKM 500GA123DS**

### 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
$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		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
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	2,75	3,5	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$	3,75	4,75	$\text{m}\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 400\text{ A}, V_{GE} = 15\text{ V}$		2,5	3	V
$C_{ies}$			26	40	nF
$C_{oes}$	$V_{CE} = 25, V_{GE} = 0\text{ V}$		4	5,2	nF
$C_{res}$	$f = 1\text{ MHz}$		2	2,6	nF
$R_{Gint}$	$T_j = ^\circ\text{C}$		1,25		$\Omega$
$t_{d(on)}$	$R_{Gon} = 3,3\ \Omega$	$V_{CC} = 600\text{V}$ $I_{Cnom} = 400\text{A}$	250	600	ns
$t_r$			170	340	ns
$E_{on}$	$R_{Goff} = 3,3\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{V}$	45		mJ
$t_{d(off)}$			900	1100	ns
$t_f$			100	125	ns
$E_{off}$					mJ
$R_{th(j-c)}$	per IGBT			0,041	K/W



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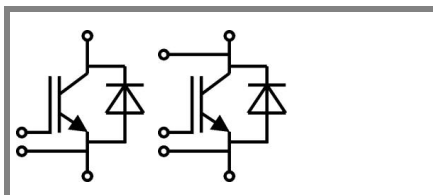
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#### Characteristics

Symbol	Conditions	min.	typ.	max.	Units
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 400 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{\text{chiplev.}}$	2	2,5	V
		$T_j = 125 \text{ }^\circ\text{C}_{\text{chiplev.}}$	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	mΩ
		$T_j = 125 \text{ }^\circ\text{C}$			mΩ
$I_{RRM}$	$I_{Fnom} = 400 \text{ A}$	$T_j = 25 \text{ }^\circ\text{C}$	90		A
$Q_{rr}$	$di/dt = 2000 \text{ A}/\mu\text{s}$		15		μC
$E_{rr}$	$V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$				mJ
$R_{th(j-c)D}$	per diode			0,09	K/W
<b>Freewheeling Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = \text{A}; V_{GE} = \text{V}$	$T_j = \text{ }^\circ\text{C}_{\text{chiplev.}}$			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
$I_{RRM}$	$I_{Fnom} = \text{A}$	$T_j = \text{ }^\circ\text{C}$			A
$Q_{rr}$					μC
$E_{rr}$	$V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$				mJ
	per diode				K/W
<b>Module</b>					
$L_{CE}$			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.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.

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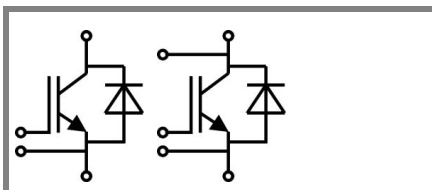
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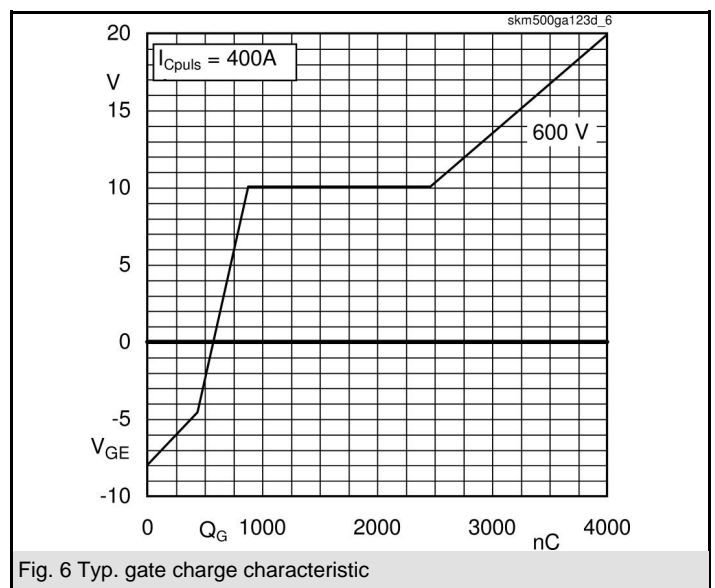
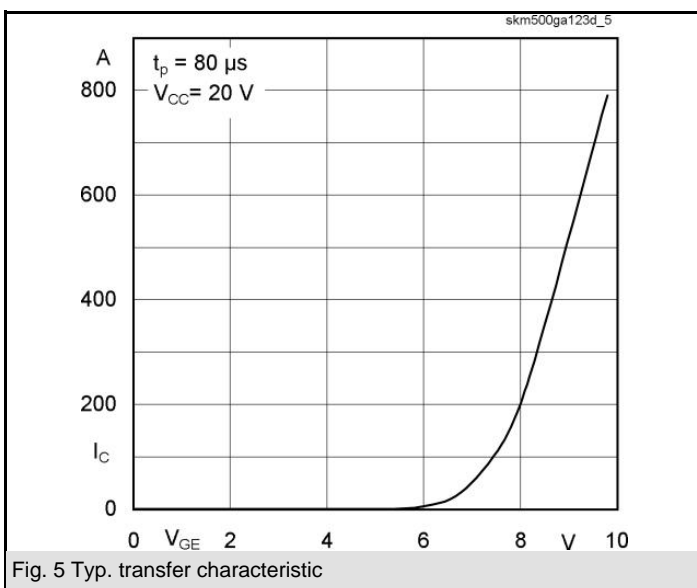
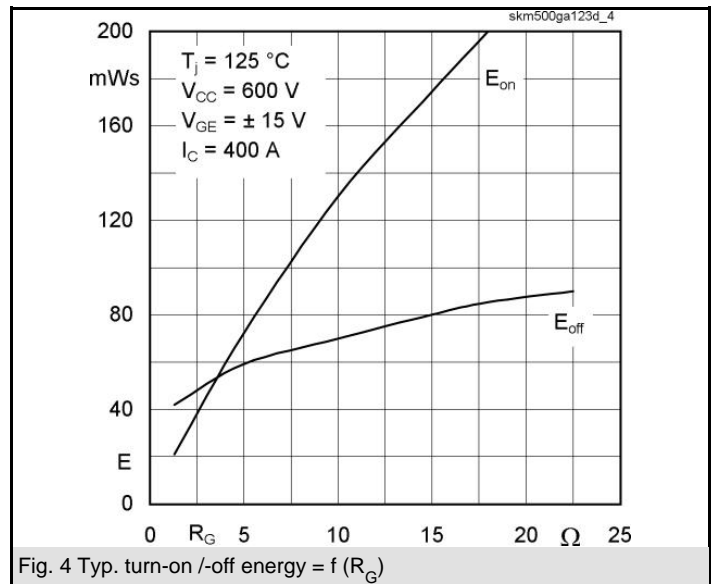
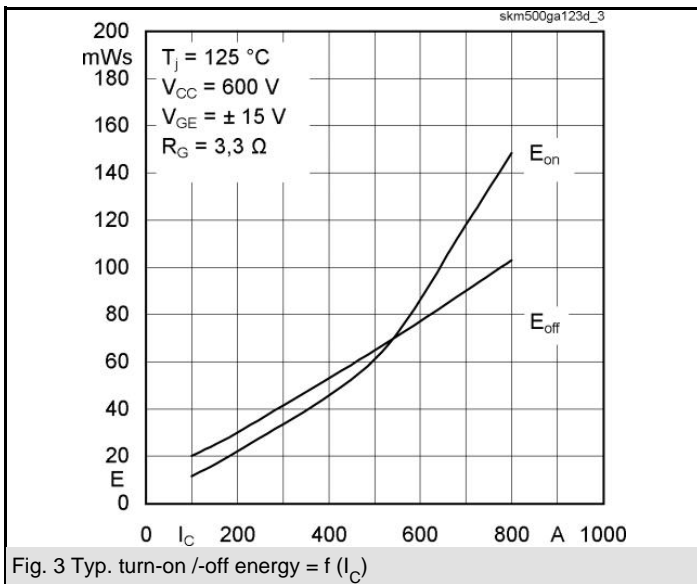
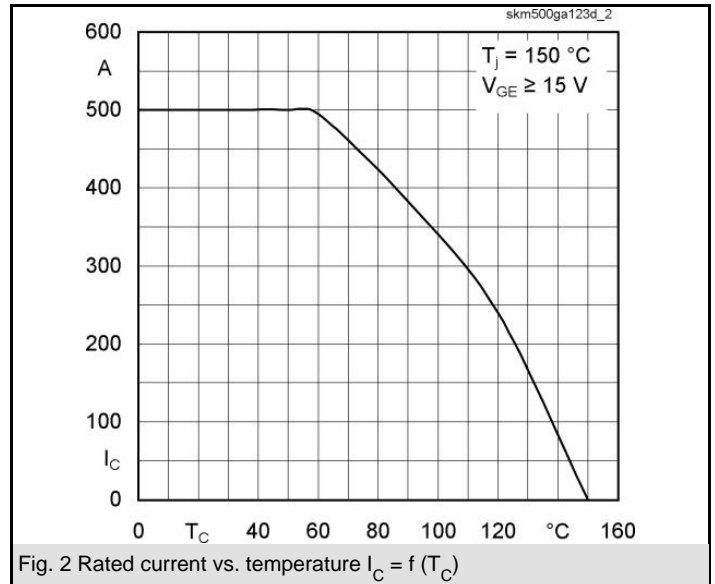
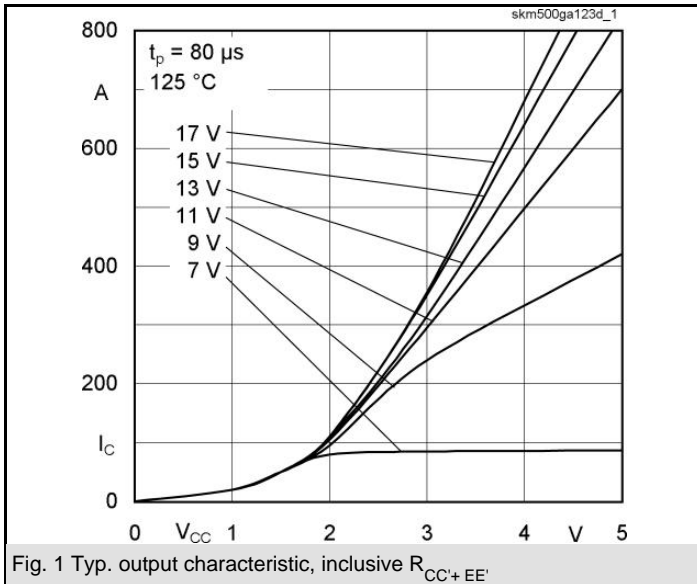
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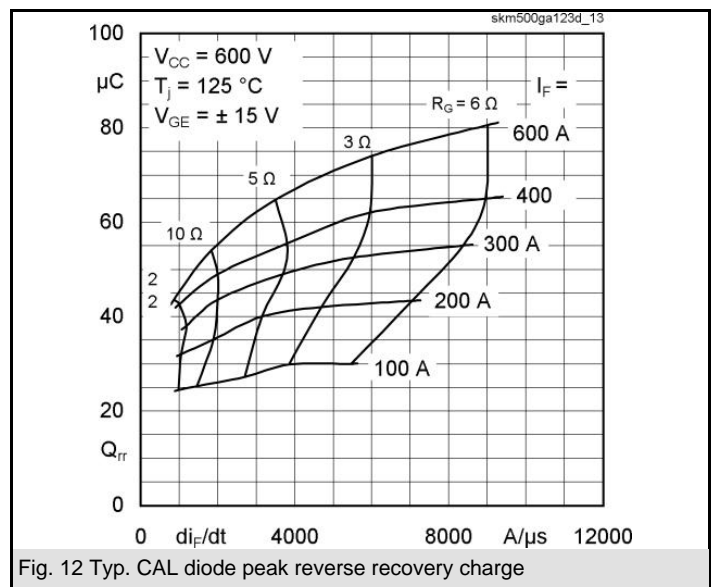
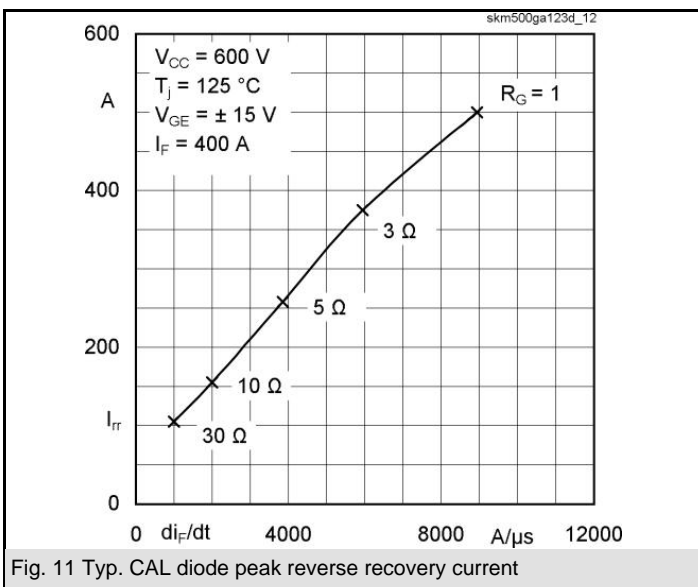
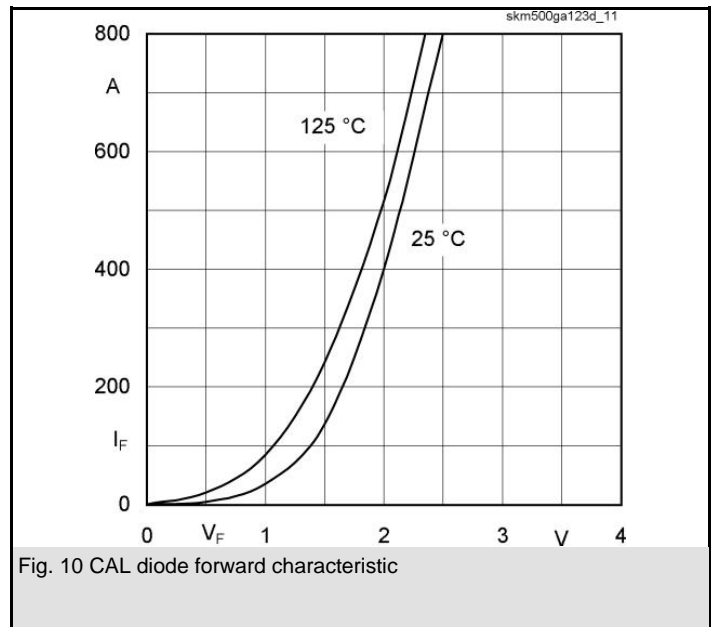
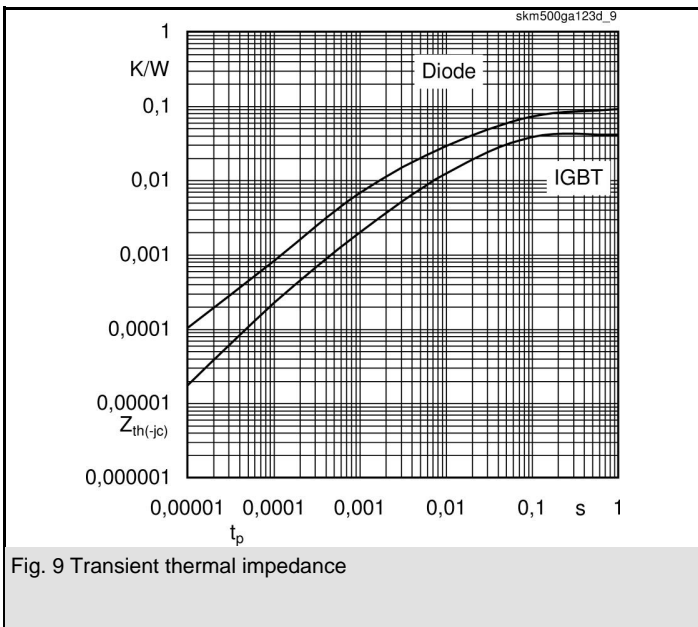
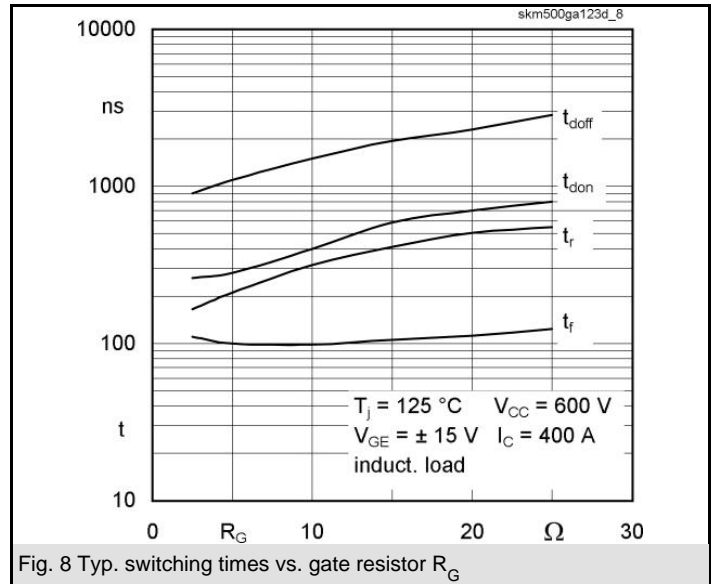
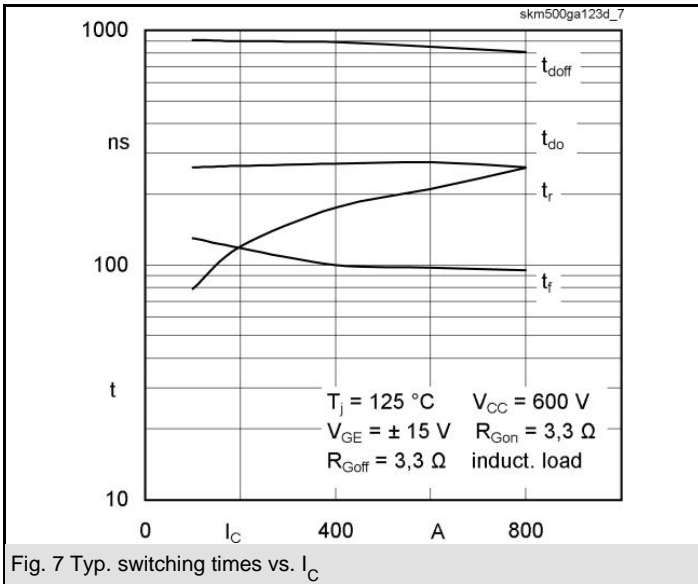


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$Z_{th}$		Conditions	Values	Units
<b>Symbol</b>				
$Z_{th(j-c)I}$				
$R_f$	$i = 1$		29	mk/W
$R_f$	$i = 2$		10	mk/W
$R_f$	$i = 3$		1,8	mk/W
$R_f$	$i = 4$		0,2	mk/W
$\tau_{u_i}$	$i = 1$		0,04	s
$\tau_{u_i}$	$i = 2$		0,0189	s
$\tau_{u_i}$	$i = 3$		0,0017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



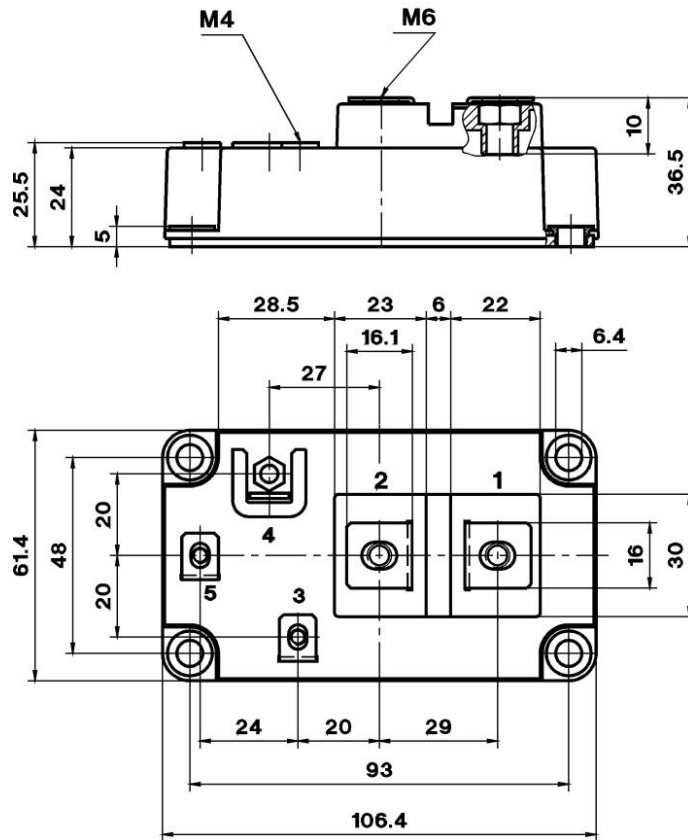


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UL Recognized

CASED59

File 63 532



Case D 60

