

SKM 800GA176D



SEMITRANS® 4

Trench IGBT Modules

SKM 800GA176D

Preliminary Data

Features

- Homogeneous Si
- Trench = Trenchgate technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications

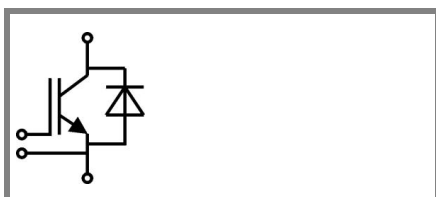
- AC inverter drives mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power

Remarks

- $I_{DC} \leq 500$ A limited for $T_{Terminal} = 100$ °C

Absolute Maximum Ratings		$T_c = 25$ °C, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}	$T_j = 25$ °C	1700	V
I_C	$T_j = 150$ °C	$T_c = 25$ °C	830
		$T_c = 80$ °C	590
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	1200	A
V_{GES}		± 20	V
t_{psc}	$V_{CC} = 1200$ V; $V_{GE} \leq 20$ V; $T_j = 125$ °C $V_{CES} < 1700$ V	10	μ s
Inverse Diode			
I_F	$T_j = 150$ °C	$T_c = 25$ °C	630
		$T_c = 80$ °C	440
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	1200	A
I_{FSM}	$t_p = 10$ ms; sin.	$T_j = 150$ °C	3600
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					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 24$ mA	5,2	5,8	6,4	V
I_{CES}	$V_{GE} = 0$ V, $V_{CE} = V_{CES}$		$T_j = 25$ °C 0,2	$T_j = 125$ °C 0,6	mA
V_{CE0}			$T_j = 25$ °C	1	1,2
			$T_j = 125$ °C	0,9	1,1
r_{CE}	$V_{GE} = 15$ V		$T_j = 25$ °C	1,7	2,1
			$T_j = 125$ °C	2,5	
$V_{CE(sat)}$	$I_{Cnom} = 600$ A, $V_{GE} = 15$ V		$T_j = 25$ °C _{chiplev.}	2	2,45
			$T_j = 125$ °C _{chiplev.}	2,45	2,9
C_{ies}	$V_{CE} = 25$, $V_{GE} = 0$ V	$f = 1$ MHz		39,6	nF
C_{oes}			2,2	nF	
C_{res}			2,5	nF	
Q_G	$V_{GE} = -8V...+15V$		4800		nC
$t_{d(on)}$	$R_{Gon} = 3$ Ω	$V_{CC} = 1200$ V $I_{Cnom} = 600$ A $T_j = 125$ °C $V_{GE} = \pm 15$ V		230	ns
t_r			90	ns	
E_{on}			335	mJ	
$t_{d(off)}$	$R_{Goff} = 3$ Ω			1030	ns
t_f			160	ns	
E_{off}			245	mJ	
$R_{th(j-c)}$	per IGBT			0,04	K/W



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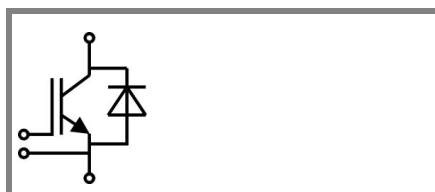
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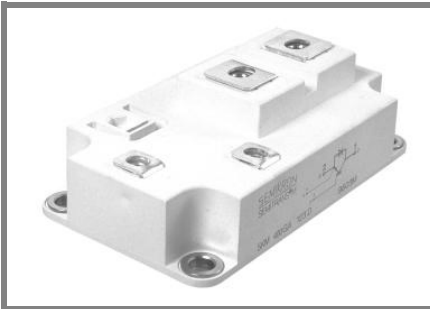
Characteristics

Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 600$ A; $V_{GE} = 0$ V		1,6	1,9	V
			1,6		V
					V
V_{F0}			1,1	1,3	V
r_F			0,83	1	mΩ
I_{RRM}	$I_{Fnom} = 600$ A		650		A
Q_{rr}	$di/dt = 6400$ A/μs		230		μC
E_{rr}	$V_{GE} = -15$ V; $V_{CC} = 1200$ V		155		mJ
$R_{th(j-c)D}$	per diode			0,07	K/W
Module					
L_{CE}			15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25$ °C	0,18		mΩ
		$T_{case} = 125$ °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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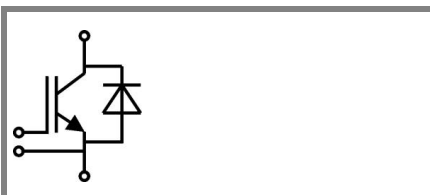
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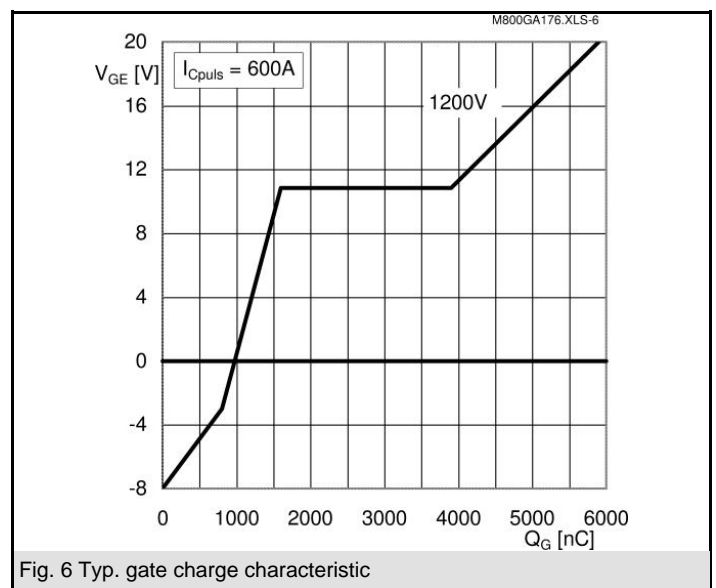
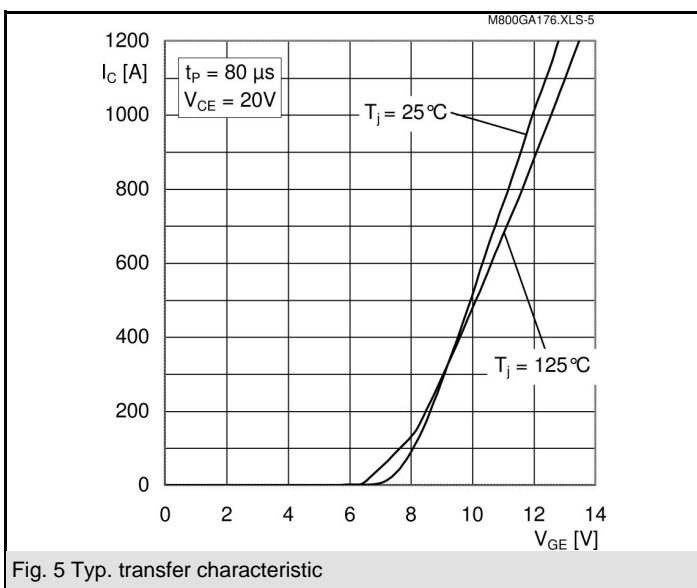
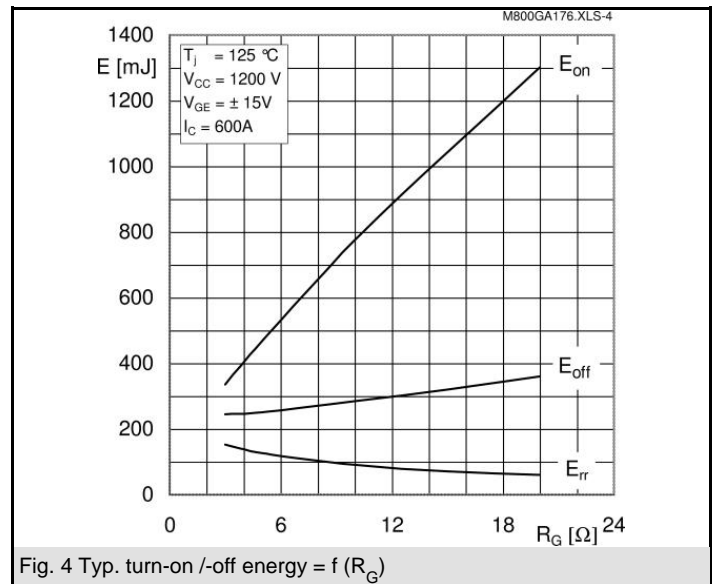
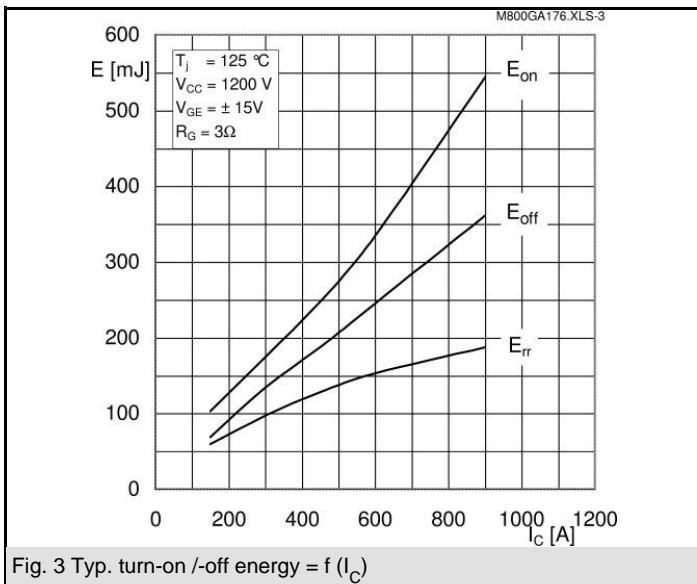
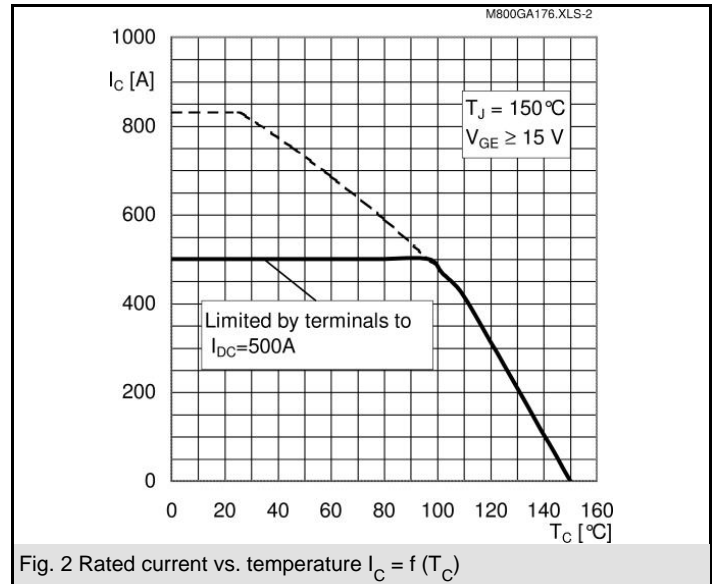
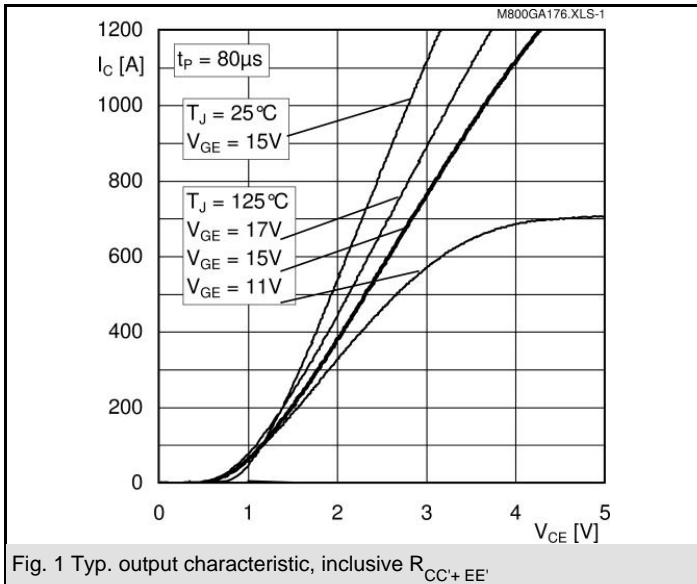
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Z_{th}		Conditions	Values	Units
$Z_{th(j-c)I}$				
$R_{\theta j-c}$		$i = 1$	28	mk/W
$R_{\theta j-c}$		$i = 2$	9,5	mk/W
$R_{\theta j-c}$		$i = 3$	2,17	mk/W
$R_{\theta j-c}$		$i = 4$	0,33	mk/W
$\tau_{\theta j-c}$		$i = 1$	0,0447	s
$\tau_{\theta j-c}$		$i = 2$	0,02	s
$\tau_{\theta j-c}$		$i = 3$	0,0015	s
$\tau_{\theta j-c}$		$i = 4$	0,0025	s
$Z_{th(j-c)D}$				
$R_{\theta j-cD}$		$i = 1$	46	mk/W
$R_{\theta j-cD}$		$i = 2$	17	mk/W
$R_{\theta j-cD}$		$i = 3$	5,9	mk/W
$R_{\theta j-cD}$		$i = 4$	1,1	mk/W
$\tau_{\theta j-cD}$		$i = 1$	0,05	s
$\tau_{\theta j-cD}$		$i = 2$	0,0075	s
$\tau_{\theta j-cD}$		$i = 3$	0,002	s
$\tau_{\theta j-cD}$		$i = 4$	0,0002	s



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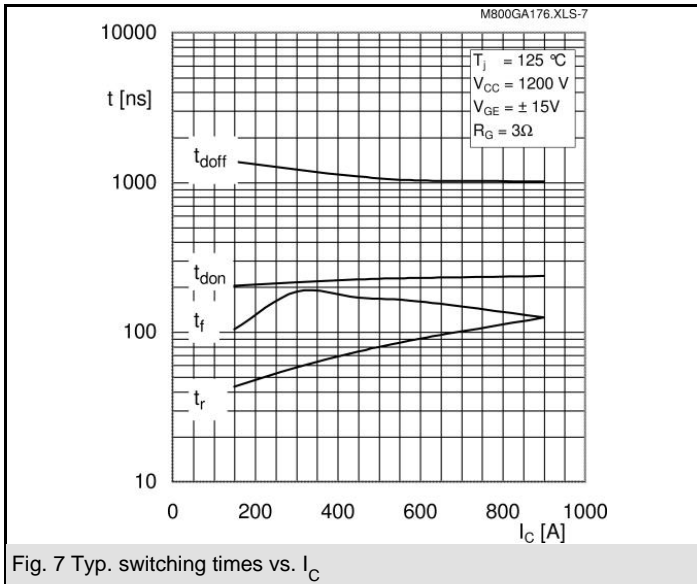


Fig. 7 Typ. switching times vs. I_C

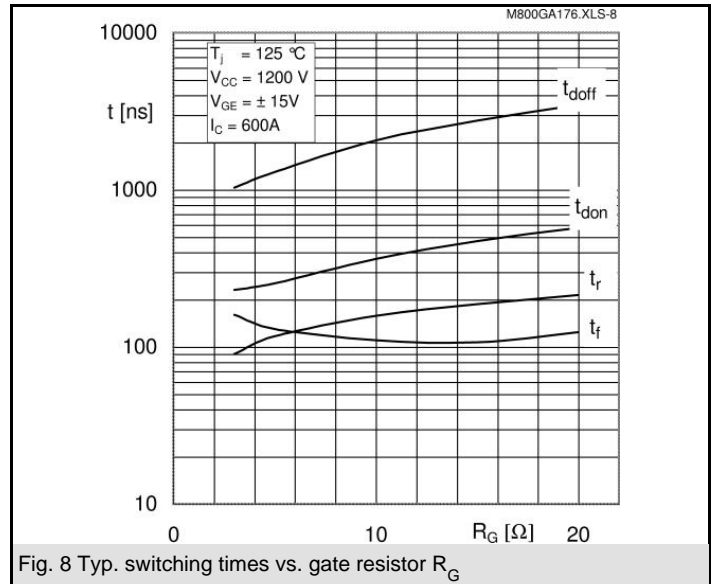


Fig. 8 Typ. switching times vs. gate resistor R_G

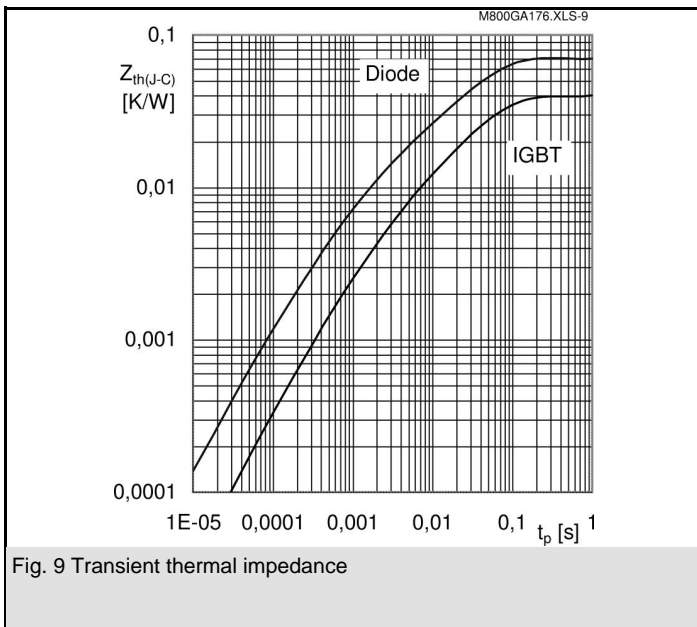


Fig. 9 Transient thermal impedance

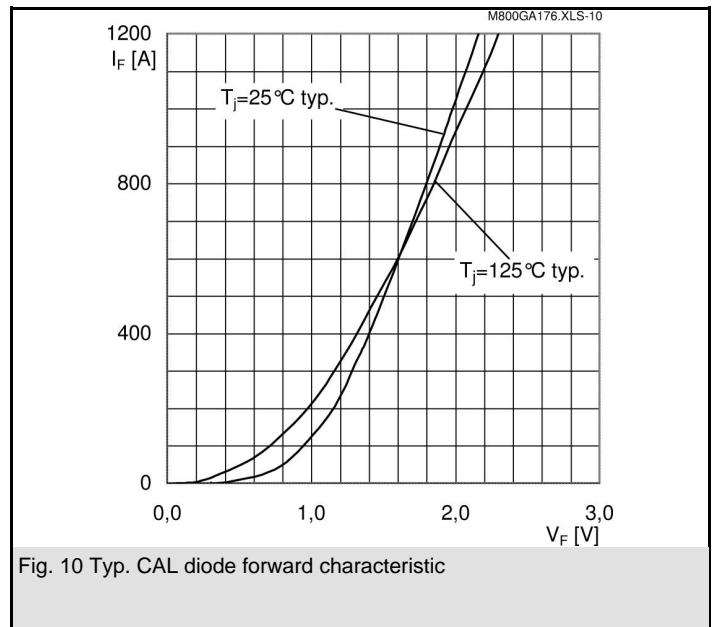


Fig. 10 Typ. CAL diode forward characteristic

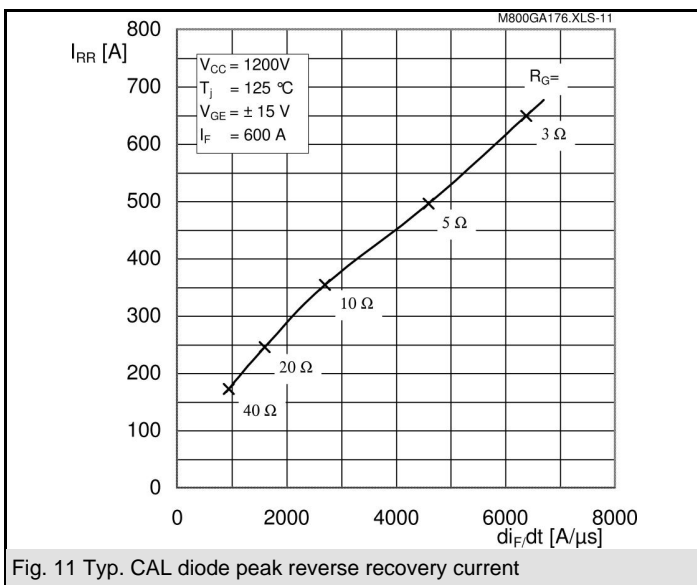


Fig. 11 Typ. CAL diode peak reverse recovery current

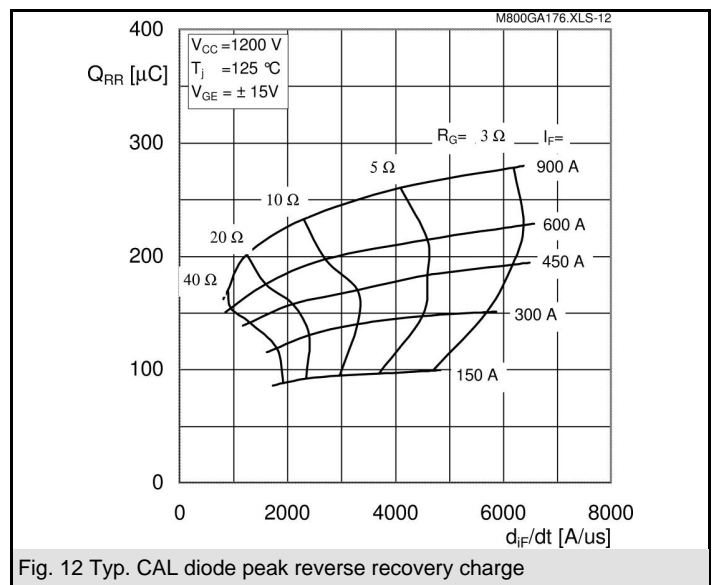
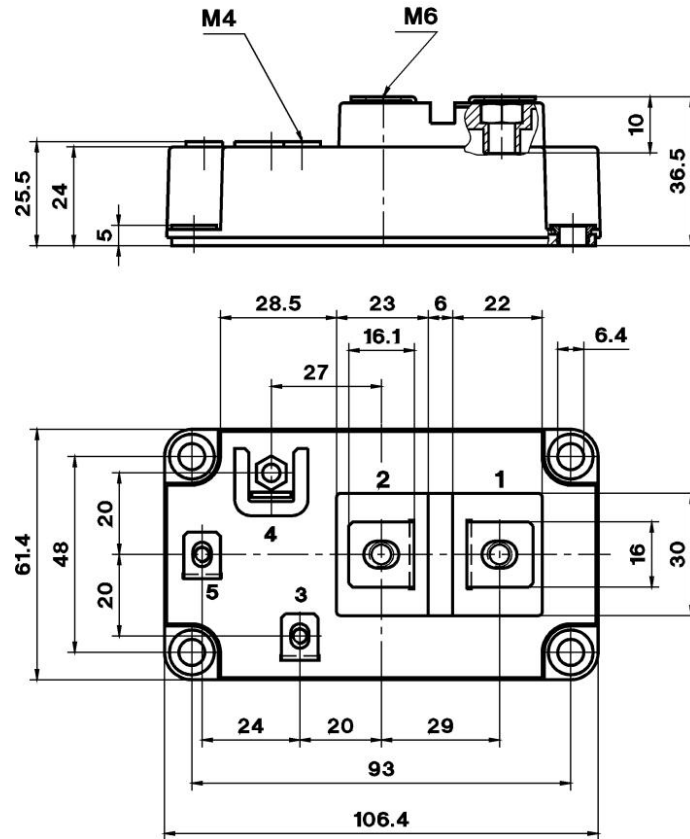


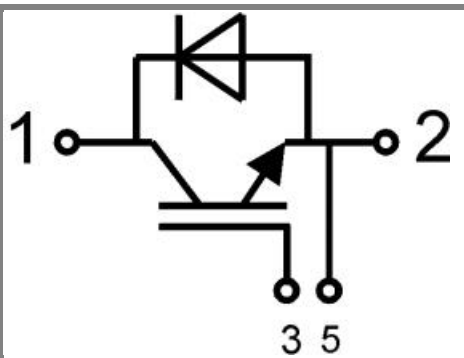
Fig. 12 Typ. CAL diode peak reverse recovery charge

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CASED59



Case D 59



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Case D 59