

SKM 800GA176D



SEMITRANS® 4

Trench IGBT Modules

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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 $T_{Terminal} = 100^\circ\text{C}$

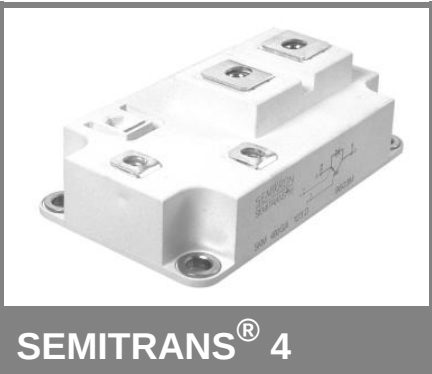
Absolute Maximum Ratings			T _c = 25 °C, unless otherwise specified	
Symbol	Conditions		Values	Units
IGBT				
V _{CES}	T _j = 25 °C		1700	V
I _C	T _j = 150 °C	T _c = 25 °C	830	A
		T _c = 80 °C	590	A
I _{CRM}	I _{CRM} =2xI _{Cnom}		1200	A
V _{GES}			± 20	V
t _{psc}	V _{CC} = 1200 V; V _{GE} ≤ 20 V; T _j = 125 °C V _{CES} < 1700 V		10	μs
Inverse Diode				
I _F	T _j = 150 °C	T _c = 25 °C	630	A
		T _c = 80 °C	440	A
I _{FRM}	I _{FRM} =2xI _{Fnom}		1200	A
I _{FSM}	t _p = 10 ms; sin.	T _j = 150 °C	3600	A
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				4	mA
V _{CE0}			T _j = 25 °C	1	1,2	V
			T _j = 125 °C	0,9	1,1	V
r _{CE}	V _{GE} = 15 V		T _j = 25°C	1,7	2,1	mΩ
			T _j = 125°C	2,5		mΩ
V _{CE(sat)}	I _{Cnom} = 600 A, V _{GE} = 15 V		T _j = 25°C _{chiplev.}	2	2,45	V
			T _j = 125°C _{chiplev.}	2,45	2,9	V
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} = 1200V I _C = 600A	230		ns
t _r				90		ns
E _{on}				335		mJ
t _{d(off)}	R _{Goff} = 3 Ω		T _j = 125 °C V _{GE} = ± 15V	1030		ns
t _f				160		ns
E _{off}				245		mJ
R _{th(j-c)}	per IGBT				0,04	K/W



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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		$T_j = 25\text{ }^{\circ}\text{C}_{chiplev.}$	1,6	V
			$T_j = 125\text{ }^{\circ}\text{C}_{chiplev.}$	1,6	V
V_{F0}	$T_j = 25\text{ }^{\circ}\text{C}$		1,1	1,3	V
r_F	$T_j = 25\text{ }^{\circ}\text{C}$		0,83	1	mΩ
I_{RRM}	$I_F = 600$ A $di/dt = 6400$ A/μs $V_{GE} = -15$ V; $V_{CC} = 1200$ V		$T_j = 125\text{ }^{\circ}\text{C}$	650	A
Q_{rr}				230	μC
E_{rr}				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		$T_{case} = 25\text{ }^{\circ}\text{C}$	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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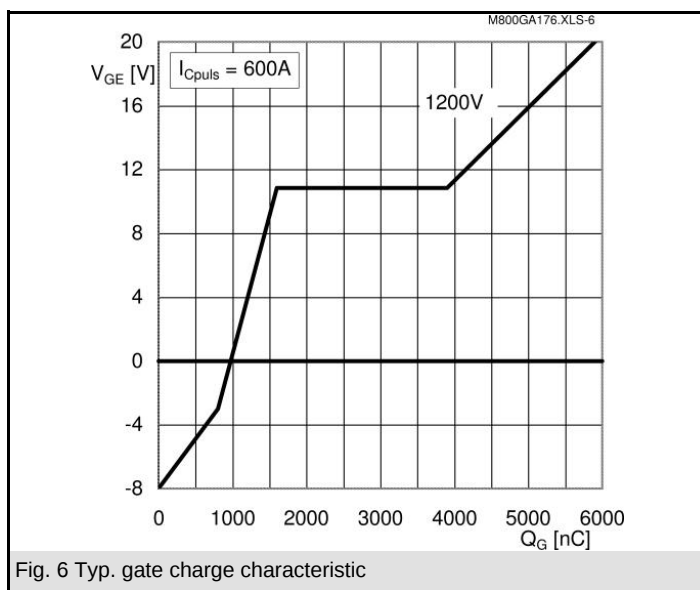
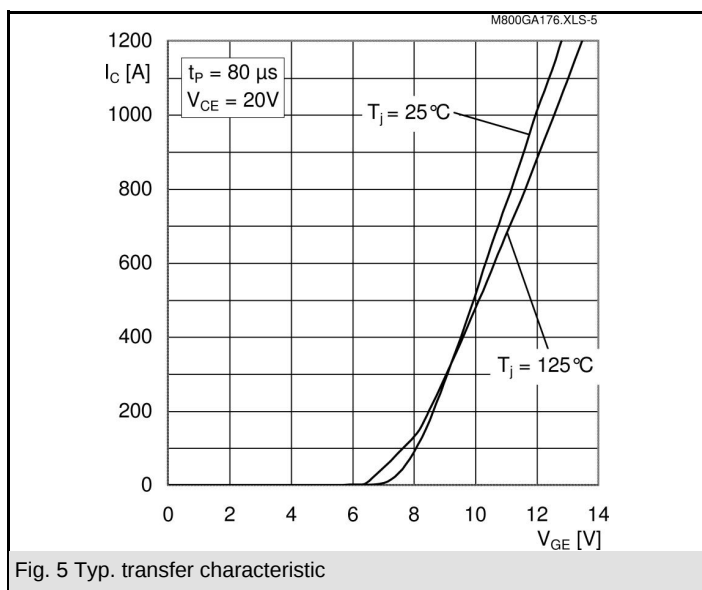
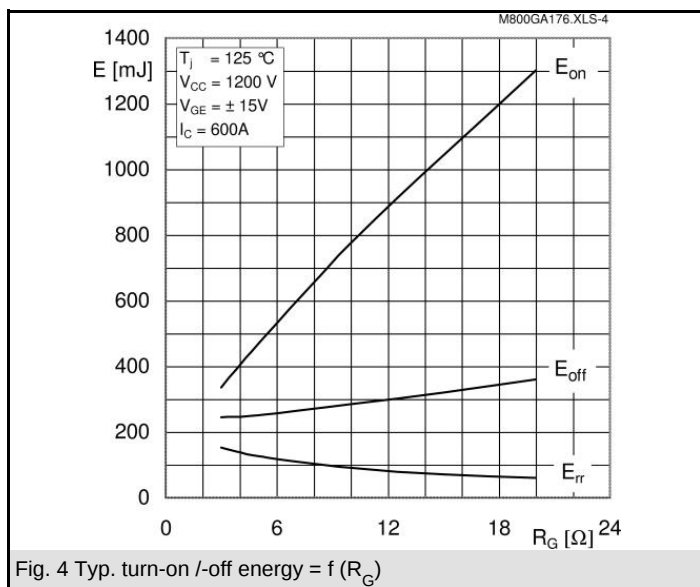
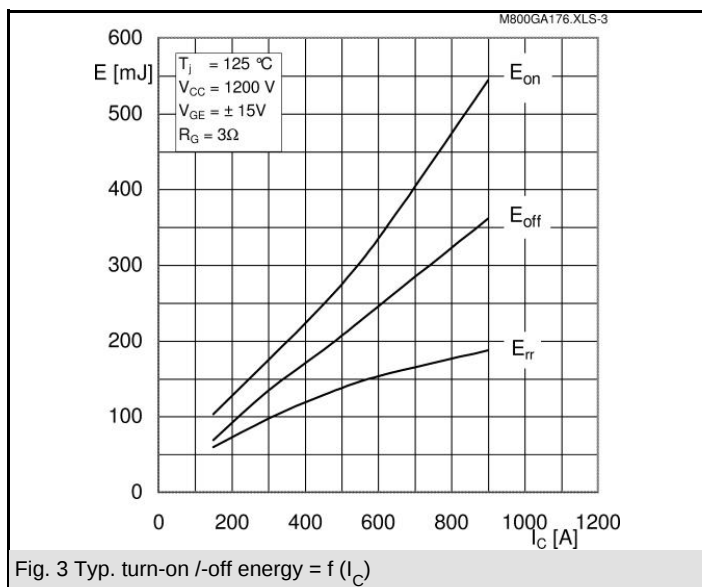
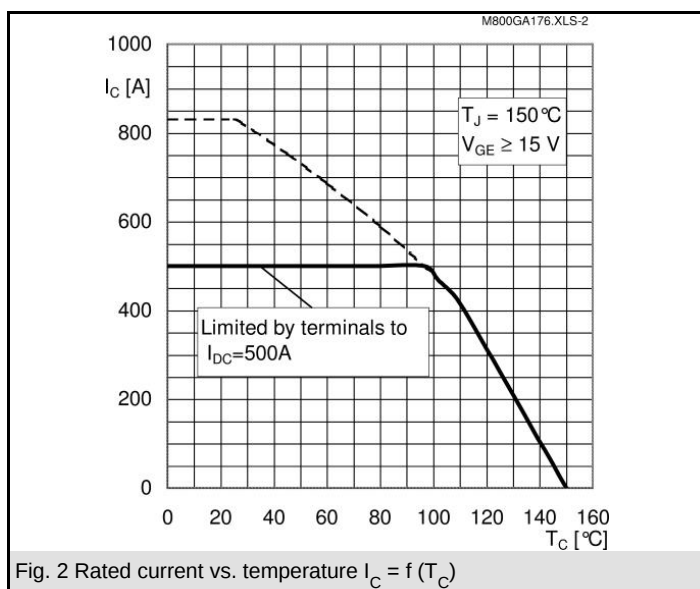
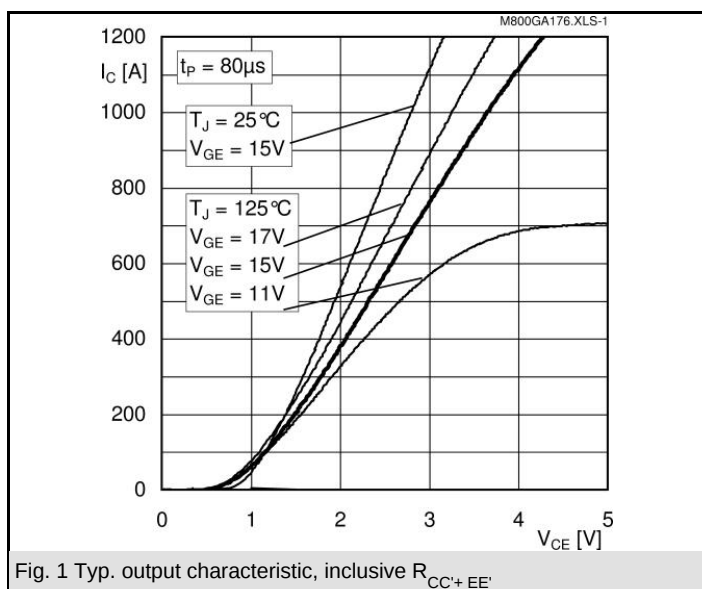
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Z_{th}			
Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	$i = 1$	28	mk/W
R_i	$i = 2$	9,5	mk/W
R_i	$i = 3$	2,17	mk/W
R_i	$i = 4$	0,33	mk/W
τ_{ui}	$i = 1$	0,0447	s
τ_{ui}	$i = 2$	0,02	s
τ_{ui}	$i = 3$	0,0015	s
τ_{ui}	$i = 4$	0,0025	s
$Z_{th(j-c)D}$			
R_i	$i = 1$	46	mk/W
R_i	$i = 2$	17	mk/W
R_i	$i = 3$	5,9	mk/W
R_i	$i = 4$	1,1	mk/W
τ_{ui}	$i = 1$	0,05	s
τ_{ui}	$i = 2$	0,0075	s
τ_{ui}	$i = 3$	0,002	s
τ_{ui}	$i = 4$	0,0002	s



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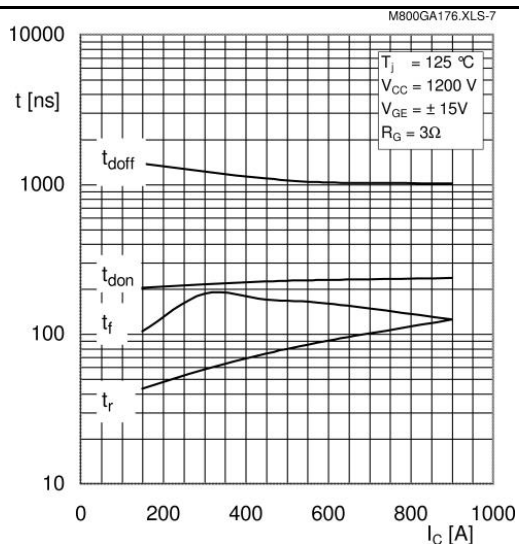


Fig. 7 Typ. switching times vs. I_C

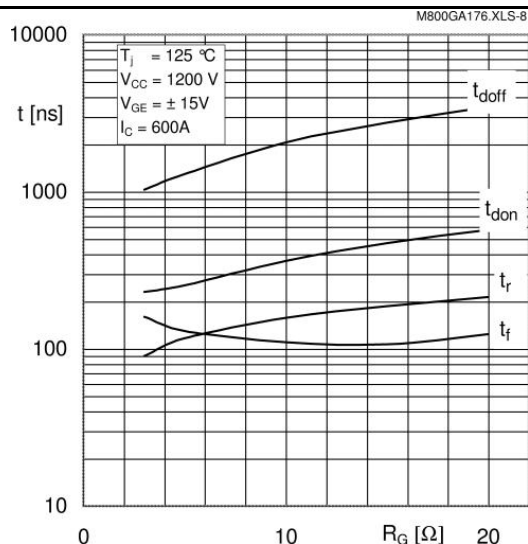


Fig. 8 Typ. switching times vs. gate resistor R_G

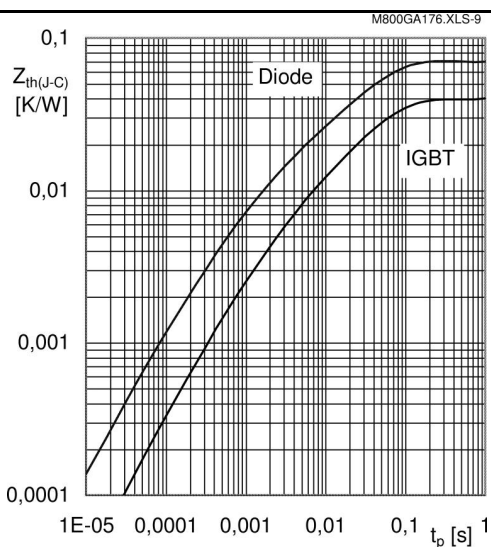


Fig. 9 Transient thermal impedance

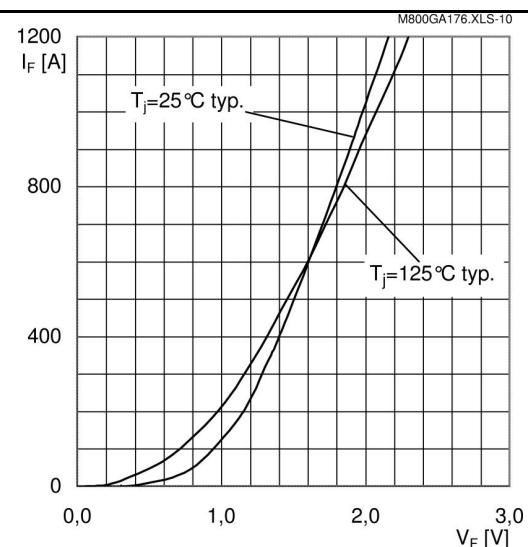


Fig. 10 Typ. CAL diode forward characteristic

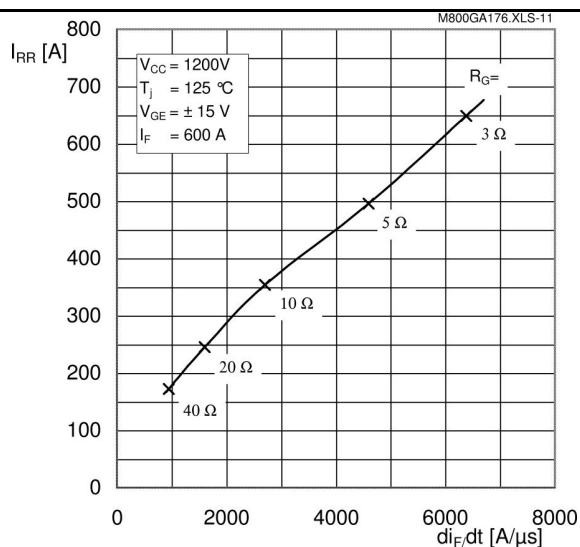


Fig. 11 Typ. CAL diode peak reverse recovery current

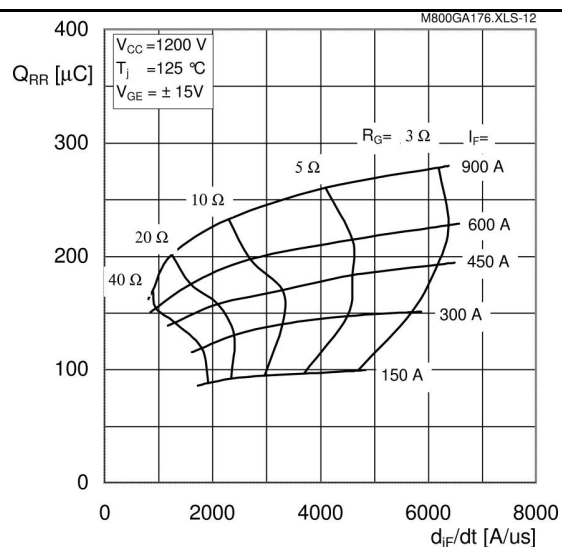
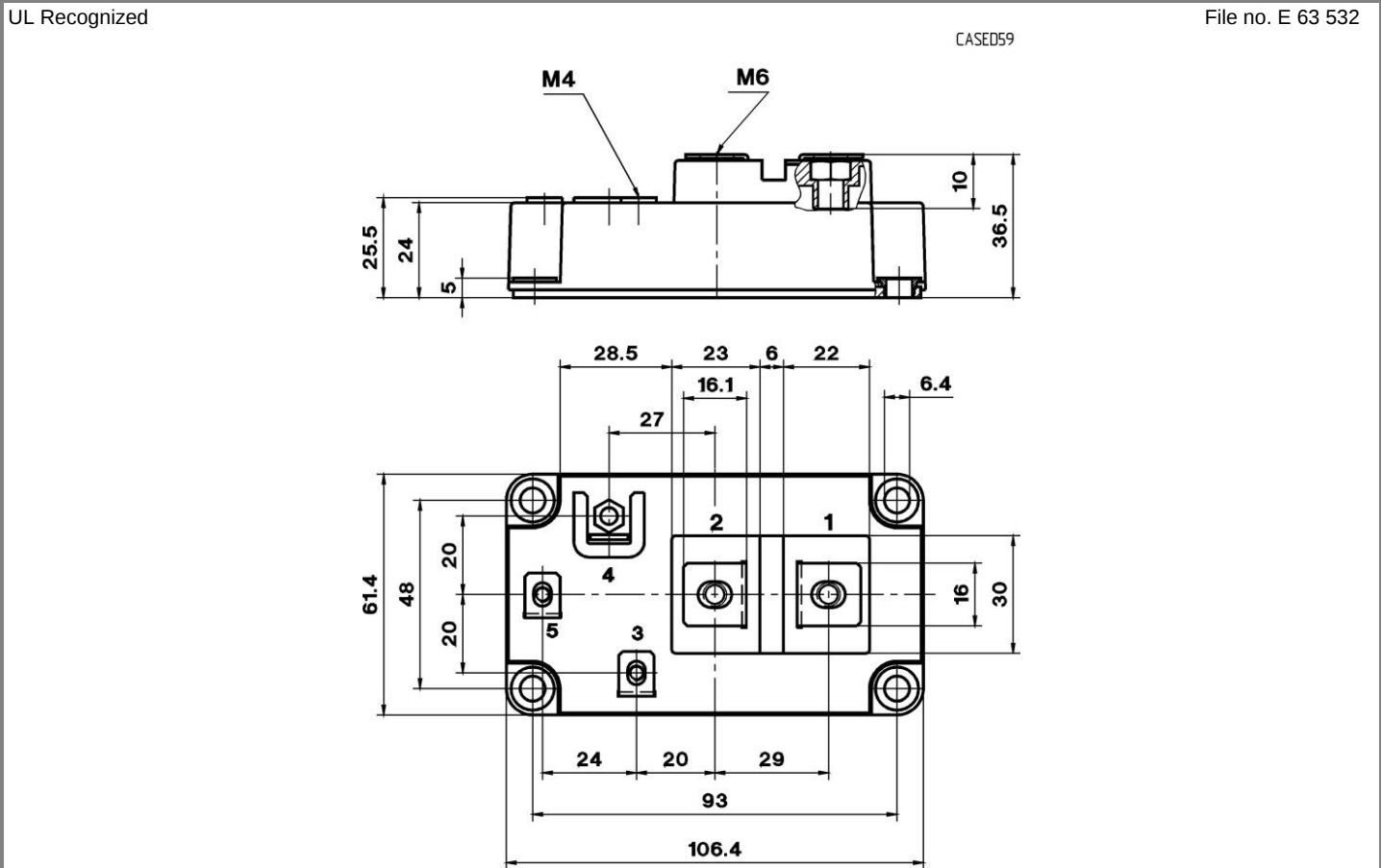


Fig. 12 Typ. CAL diode peak reverse recovery charge

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Case D 59

