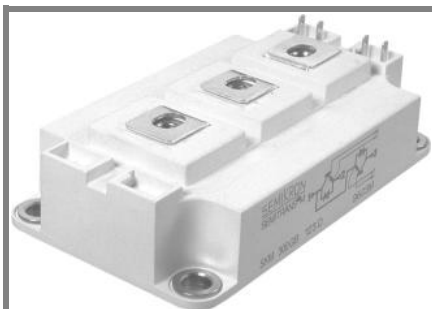


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Trench IGBT Module

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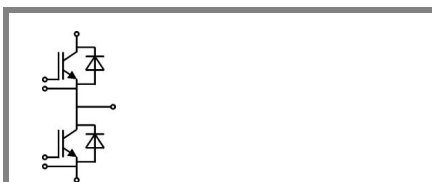
Preliminary Data

Features

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

Typical Applications

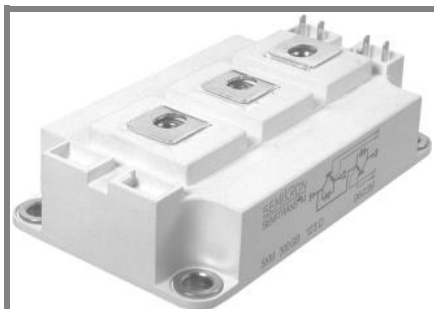
- Electronic welders
- AC inverter drives
- UPS



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Absolute Maximum Ratings		$T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	Values			Units
IGBT					
V_{CES}	$T_j = 25\text{ }^\circ\text{C}$	1200			V
I_C	$T_j = 150\text{ }^\circ\text{C}$	$T_{case} = 25\text{ }^\circ\text{C}$	310		A
		$T_{case} = 80\text{ }^\circ\text{C}$	200		A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	400			A
V_{GES}		± 20			V
t_{psc}	$V_{CC} = 600\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125\text{ }^\circ\text{C}$ $V_{CES} < 1200\text{ V}$	10			μs
Inverse Diode					
I_F	$T_j = 150\text{ }^\circ\text{C}$	$T_{case} = 25\text{ }^\circ\text{C}$	250		A
		$T_{case} = 80\text{ }^\circ\text{C}$	170		A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	400			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.	4000			V

Characteristics		$T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified				
Symbol	Conditions	min.	typ.	max.	Units	
IGBT						
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 8\text{ mA}$	5	5,8	6,5	V	
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$	$T_j = 25\text{ }^\circ\text{C}$		0,1	0,3	mA
V_{CE0}		$T_j = 25\text{ }^\circ\text{C}$		1	1,2	V
		$T_j = 125\text{ }^\circ\text{C}$		0,9	1,1	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ }^\circ\text{C}$		3,5	4,7	m Ω
		$T_j = 125\text{ }^\circ\text{C}$		5,5	6,8	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 200\text{ A}, V_{GE} = 15\text{ V}$	$T_j = 25\text{ }^\circ\text{C}_{chiplev.}$		1,7	2,15	V
		$T_j = 125\text{ }^\circ\text{C}_{chiplev.}$		2	2,45	V
C_{ies}	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		15		nF
C_{oes}				1,2		nF
C_{res}				1,1		nF
Q_G	$V_{GE} = -8\text{ V} - +20\text{ V}$	1800			nC	
R_{Gint}	$T_j = 25\text{ }^\circ\text{C}$	3,8			Ω	
$t_{d(on)}$	$R_{Gon} = 1,5\text{ }^\circ\Omega$	$V_{CC} = 600\text{ V}$ $I_{Cnom} = 200\text{ A}$	280		ns	
t_r			37		ns	
E_{on}	$R_{Goff} = 1,5\text{ }^\circ\Omega$	$T_j = 125\text{ }^\circ\text{C}$ $V_{GE} = \pm 15\text{ V}$	21		mJ	
$t_{d(off)}$			560		ns	
t_f			100		ns	
E_{off}			33		mJ	
$R_{th(j-c)}$	per IGBT	0,12			K/W	



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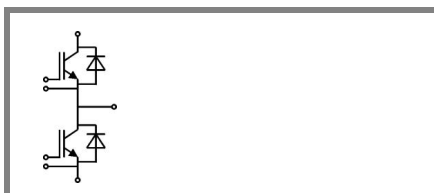
Preliminary Data

Features

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

Typical Applications

- Electronic welders
- AC inverter drives
- UPS



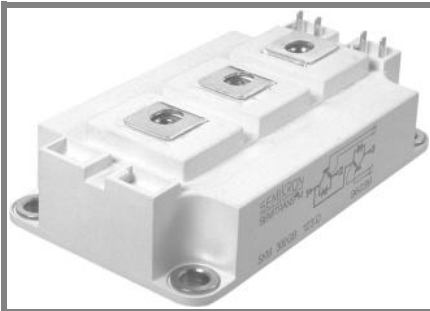
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Characteristics				min.	typ.	max.	Units
Symbol	Conditions						
Inverse diode							
$V_F = V_{EC}$	$I_{Fnom} = 200 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$		1,6	1,8		V
		$T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$		1,6	1,8		V
V_{F0}		$T_j = 25 \text{ }^\circ\text{C}$		1	1,1		V
		$T_j = 125 \text{ }^\circ\text{C}$		0,8	0,9		V
r_F		$T_j = 25 \text{ }^\circ\text{C}$		3	3,5		mΩ
		$T_j = 125 \text{ }^\circ\text{C}$		4	4,5		mΩ
I_{RRM}	$I_{Fnom} = 200 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$		290			A
Q_{rr}	$di/dt = 6200 \text{ A}/\mu\text{s}$			44			μC
E_{rr}	$V_{GE} = -15 \text{ V}; V_{CC} = 600 \text{ V}$			18			mJ
$R_{th(j-c)D}$	per diode				0,25		K/W
Module							
L_{CE}				15	20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25 \text{ }^\circ\text{C}$		0,35			mΩ
		$T_{case} = 125 \text{ }^\circ\text{C}$		0,5			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			2,5	5		Nm
w					325		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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Trench IGBT Module

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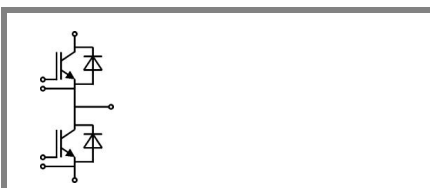
Preliminary Data

Features

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

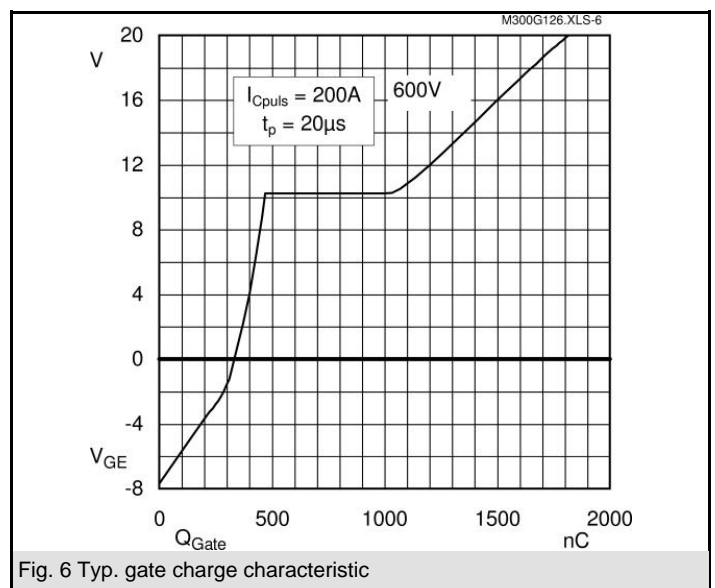
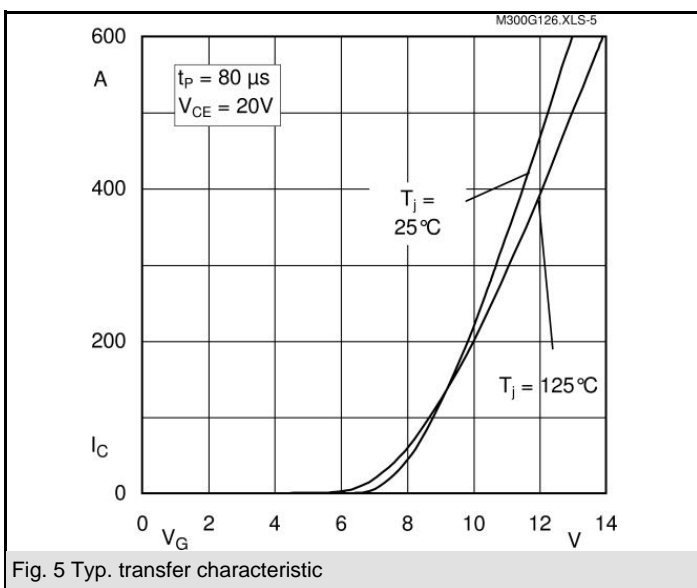
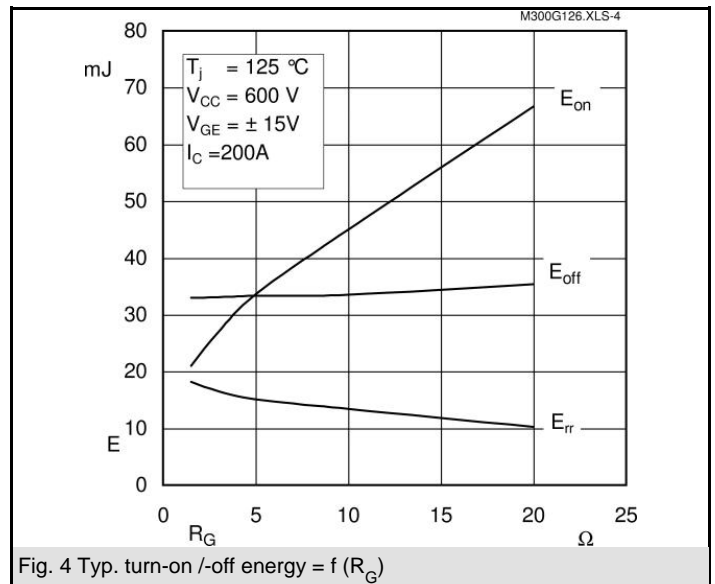
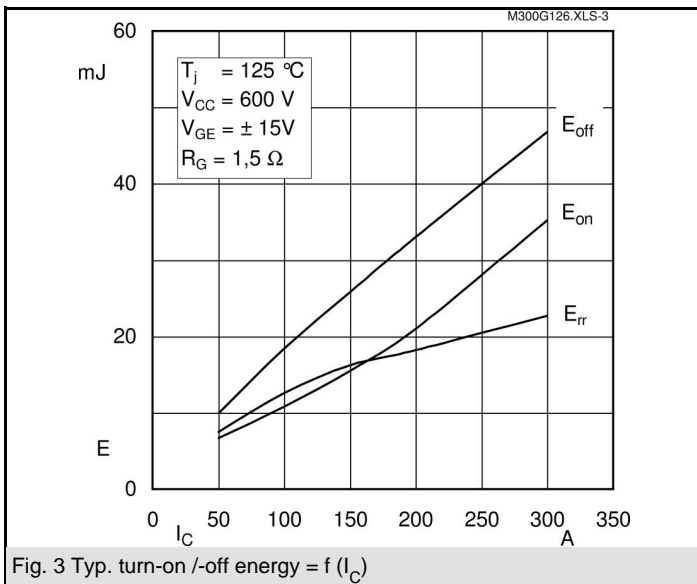
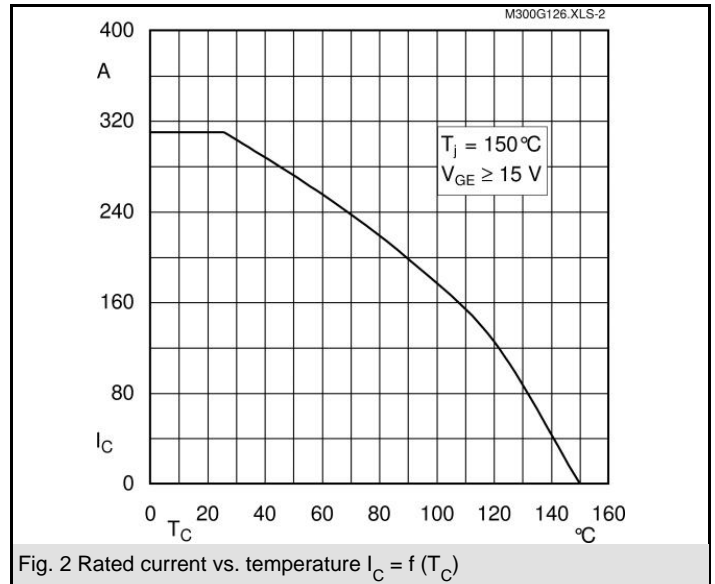
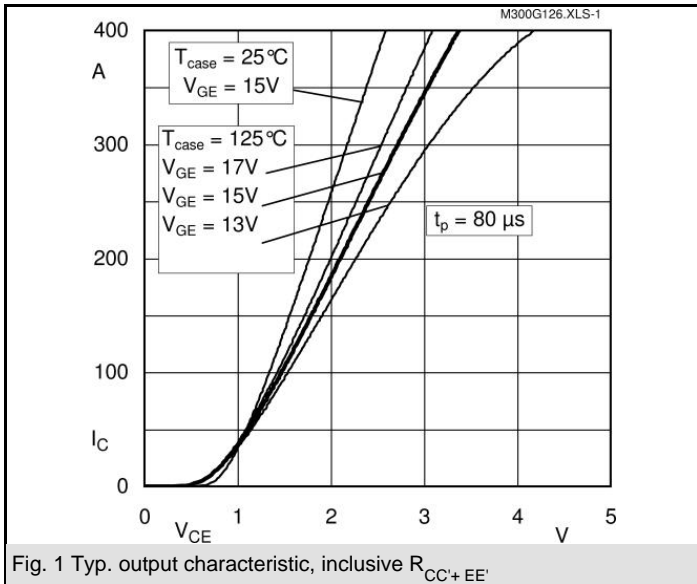
Typical Applications

- Electronic welders
- AC inverter drives
- UPS



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Z_{th}		Conditions	Values	Units
$Z_{th(j-c)I}$				
$R_{\theta j-c}$	$i = 1$		80	mk/W
$R_{\theta j-c}$	$i = 2$		30	mk/W
$R_{\theta j-c}$	$i = 3$		8,5	mk/W
$R_{\theta j-c}$	$i = 4$		1,5	mk/W
$\tau_{th(j-c)}$	$i = 1$		0,0576	s
$\tau_{th(j-c)}$	$i = 2$		0,01	s
$\tau_{th(j-c)}$	$i = 3$		0,002	s
$\tau_{th(j-c)}$	$i = 4$		0,0002	s
$Z_{th(j-c)D}$				
$R_{\theta j-c}$	$i = 1$		150	mk/W
$R_{\theta j-c}$	$i = 2$		75	mk/W
$R_{\theta j-c}$	$i = 3$		22	mk/W
$R_{\theta j-c}$	$i = 4$		3	mk/W
$\tau_{th(j-c)}$	$i = 1$		0,0331	s
$\tau_{th(j-c)}$	$i = 2$		0,0113	s
$\tau_{th(j-c)}$	$i = 3$		0,0012	s
$\tau_{th(j-c)}$	$i = 4$		0,001	s



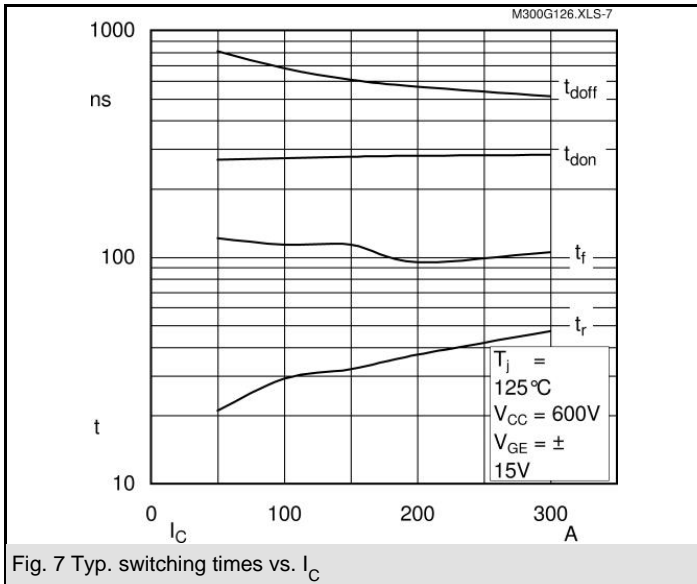


Fig. 7 Typ. switching times vs. I_C

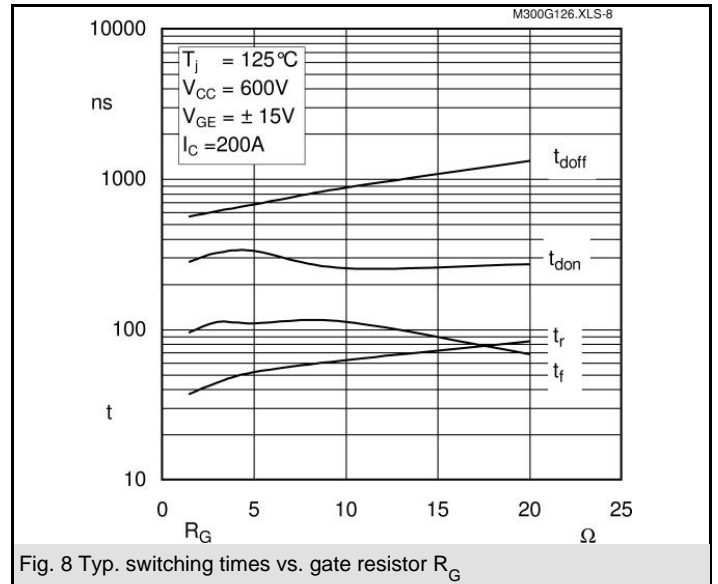


Fig. 8 Typ. switching times vs. gate resistor R_G

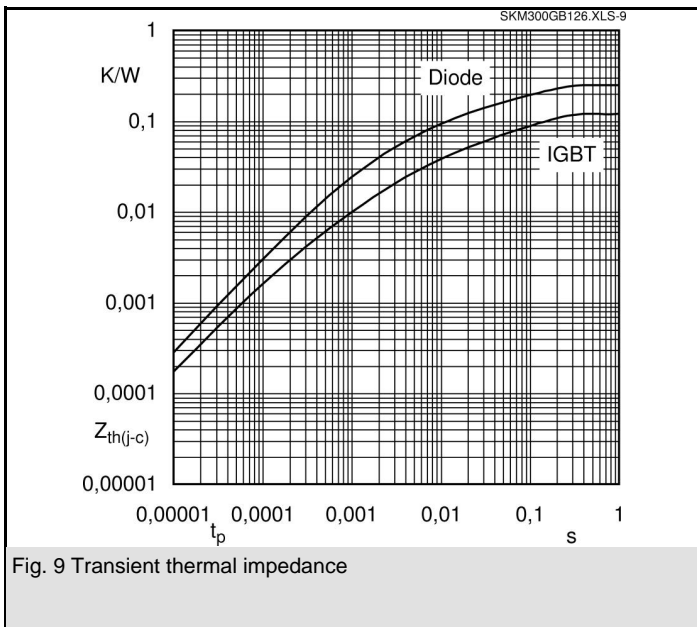


Fig. 9 Transient thermal impedance

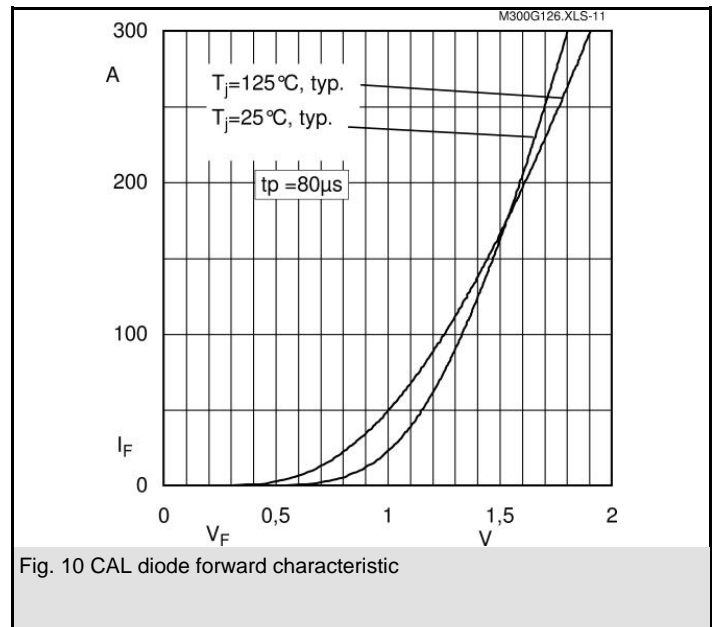


Fig. 10 CAL diode forward characteristic

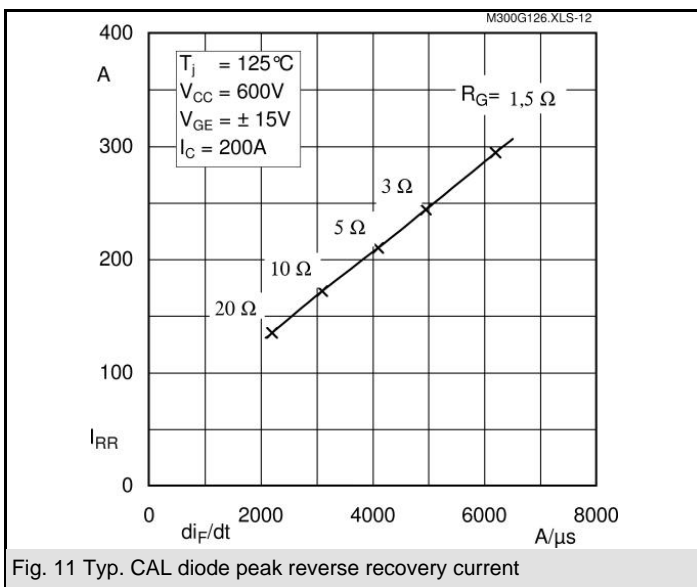


Fig. 11 Typ. CAL diode peak reverse recovery current

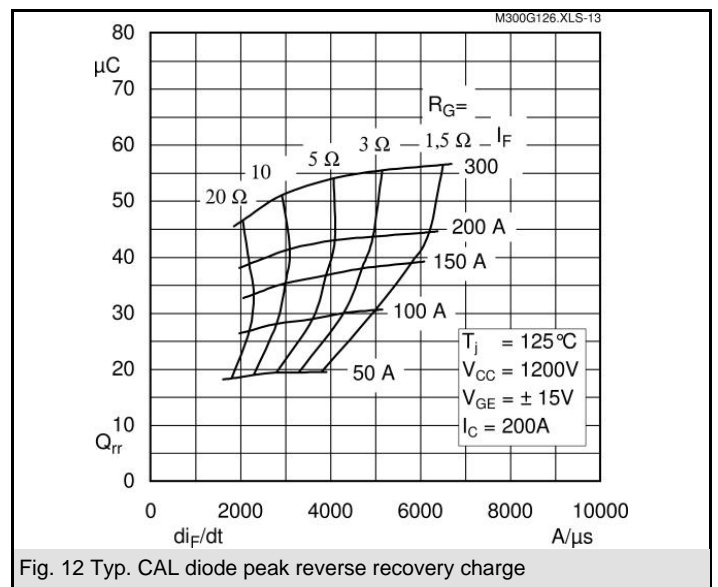


Fig. 12 Typ. CAL diode peak reverse recovery charge

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Case D 56



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