

SKM300GA12V



SEMITRANS® 4

SKM300GA12V

Features

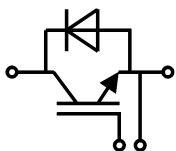
- V-IGBT = 6. Generation Trench V-IGBT (Fuji)
- CAL4 = Soft switching 4. Generation CAL-diode
- Isolated copper baseplate using DBC technology (Direct Copper Bonding)
- UL recognized, file no. E63532
- Increased power cycling capability
- With integrated gate resistor
- Low switching losses at high di/dt

Typical Applications*

- AC inverter drives
- UPS
- Electronic welders
- Switched reluctance motor

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomm.
- $T_{op} = -40 \dots +150^\circ\text{C}$, product rel. results valid for $T_j = 150^\circ$



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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$		1200	V
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	420	A
		$T_c = 80^\circ\text{C}$	319	A
I_{Cnom}			300	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$		900	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 720\text{ V}$ $V_{GE} \leq 20\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 125^\circ\text{C}$	10	μs
T_j			-40 ... 175	$^\circ\text{C}$
Inverse diode				
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	353	A
		$T_c = 80^\circ\text{C}$	264	A
I_{Fnom}			300	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$		900	A
I_{FSM}	$t_p = 10\text{ ms}$, sin 180° , $T_j = 25^\circ\text{C}$		1548	A
T_j			-40 ... 175	$^\circ\text{C}$
Module				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$		500	A
T_{stg}			-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1\text{ min}$		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	$I_C = 300\text{ A}$ $V_{GE} = 15\text{ V}$ chipllevel	$T_j = 25^\circ\text{C}$	1.85	2.30		V
		$T_j = 150^\circ\text{C}$	2.25	2.55		V
V_{CE0}			$T_j = 25^\circ\text{C}$	0.94	1.04	V
			$T_j = 150^\circ\text{C}$	0.88	0.98	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	3.03	4.2		$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	4.57	5.23		$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 12\text{ mA}$		5.5	6	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$	0.1	0.3		mA
		$T_j = 150^\circ\text{C}$				mA
C_{ies}	$V_{CE} = 25\text{ V}$			18		nF
C_{oes}	$V_{GE} = 0\text{ V}$			1.77		nF
C_{res}				1.768		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$			3310		nC
R_{Gint}				2.5		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		340		ns
t_r	$I_C = 300\text{ A}$ $V_{GE} = \pm 15\text{ V}$	$T_j = 150^\circ\text{C}$		48		ns
		$T_j = 150^\circ\text{C}$		23		mJ
E_{on}	$R_{G\ on} = 2.5\ \Omega$			23		mJ
$t_{d(off)}$	$R_{G\ off} = 2.5\ \Omega$			576		ns
t_f	$di/dt_{on} = 7700\text{ A}/\mu\text{s}$ $di/dt_{off} = 3500\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		69		ns
		$T_j = 150^\circ\text{C}$		33		mJ
E_{off}	$du/dt_{off} = 7500\text{ V}/\mu\text{s}$			33		mJ
$R_{th(j-c)}$	per IGBT			0.11		K/W

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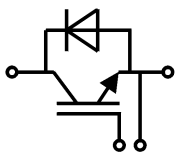
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 300\text{ A}$	$T_j = 25^\circ\text{C}$		2.17	2.49	V
	$V_{GE} = 0\text{ V}$	$T_j = 150^\circ\text{C}$		2.11	2.42	V
	chip					
V_{F0}		$T_j = 25^\circ\text{C}$		1.3	1.5	V
		$T_j = 150^\circ\text{C}$		0.9	1.1	V
r_F		$T_j = 25^\circ\text{C}$		2.9	3.3	m Ω
		$T_j = 150^\circ\text{C}$		4.0	4.4	m Ω
I_{RRM}	$I_F = 300\text{ A}$	$T_j = 150^\circ\text{C}$		350		A
Q_{rr}	$di/dt_{off} = 8500\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		45		μC
E_{rr}	$V_{GE} = \pm 15\text{ V}$	$T_j = 150^\circ\text{C}$		21		mJ
	$V_{CC} = 600\text{ V}$					
$R_{th(j-c)}$	per diode				0.17	K/W
Module						
L_{CE}				15	20	nH
R_{CC+EE}	terminal-chip	$T_C = 25^\circ\text{C}$		0.18		m Ω
		$T_C = 125^\circ\text{C}$		0.22		m Ω
$R_{th(c-s)}$	per module			0.02	0.038	K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6, M4	2.5		5	Nm
w					330	g



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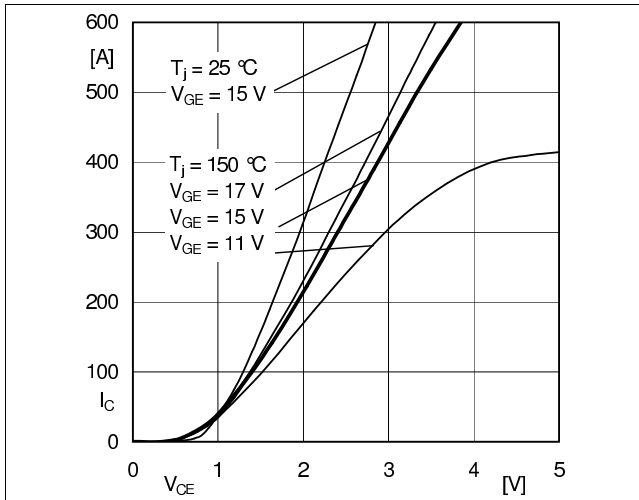


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

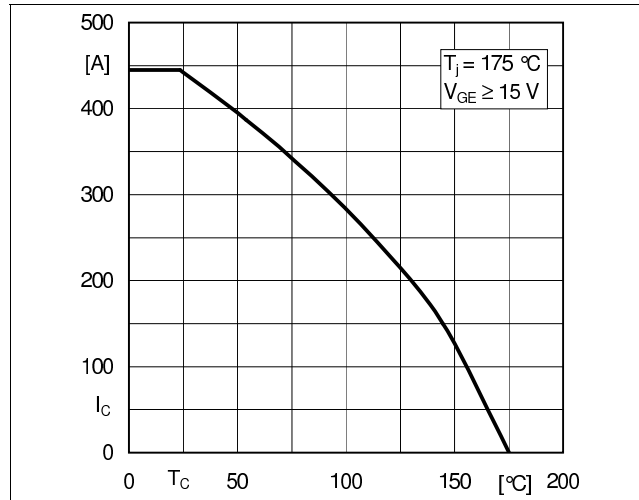


Fig. 2: Rated current vs. temperature $I_c = f(T_c)$

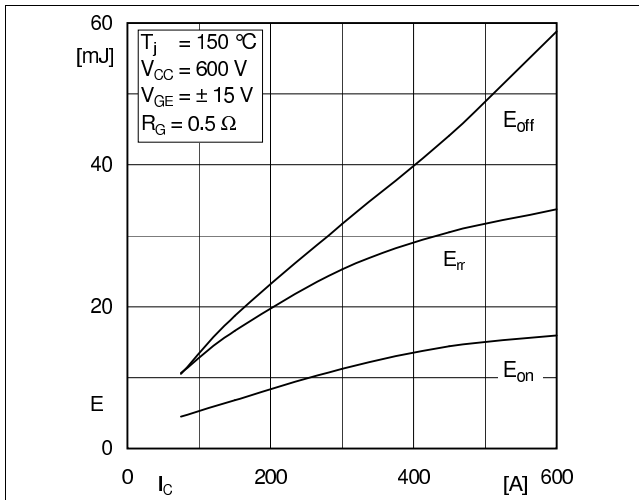


Fig. 3: Typ. turn-on /-off energy = $f(I_c)$

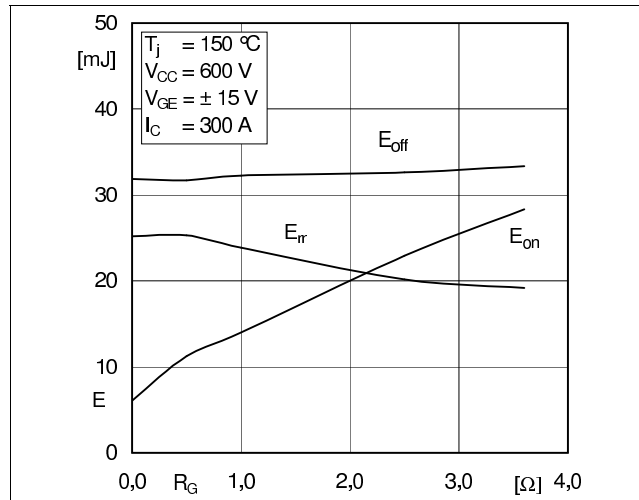


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

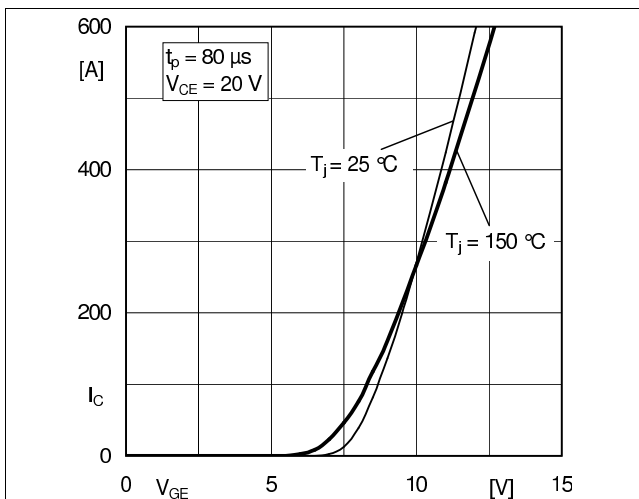


Fig. 5: Typ. transfer characteristic

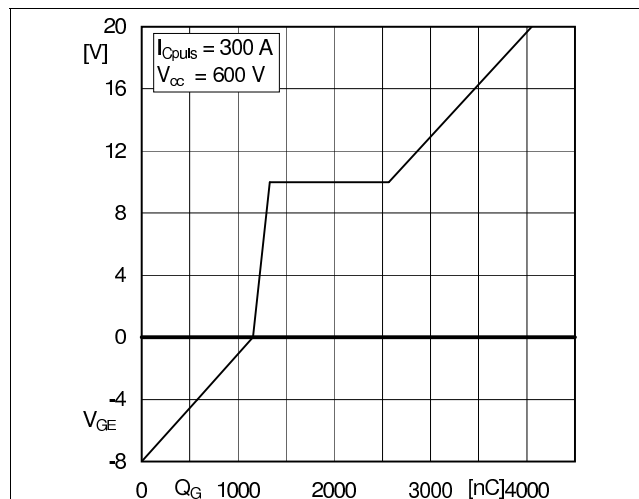


Fig. 6: Typ. gate charge characteristic

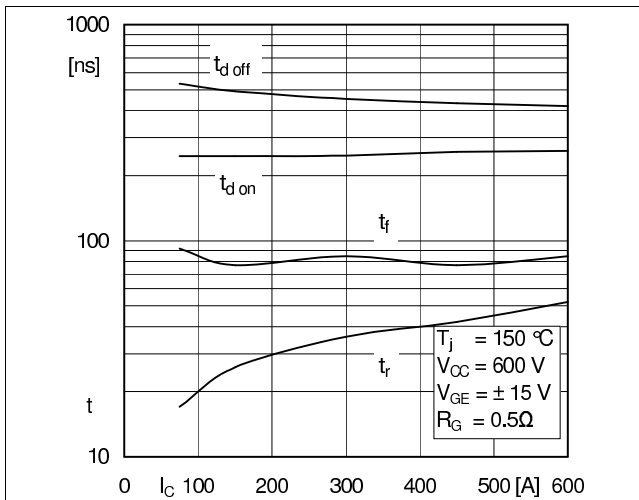


Fig. 7: Typ. switching times vs. I_C

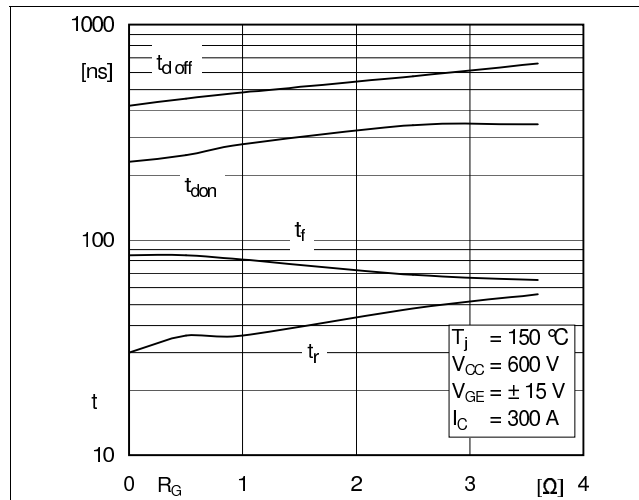


Fig. 8: Typ. switching times vs. gate resistor R_G

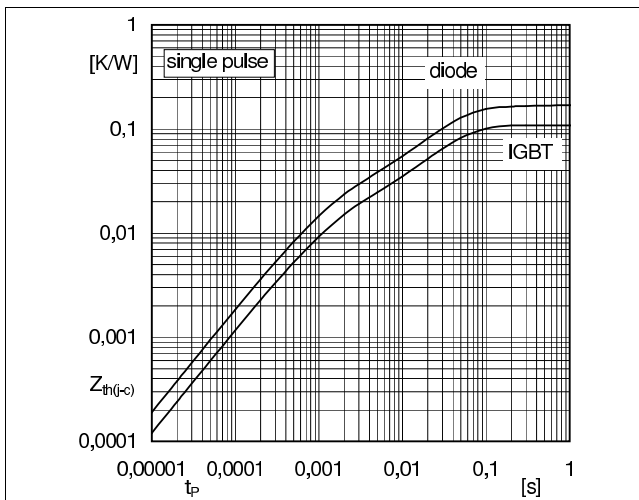


Fig. 9: Transient thermal impedance

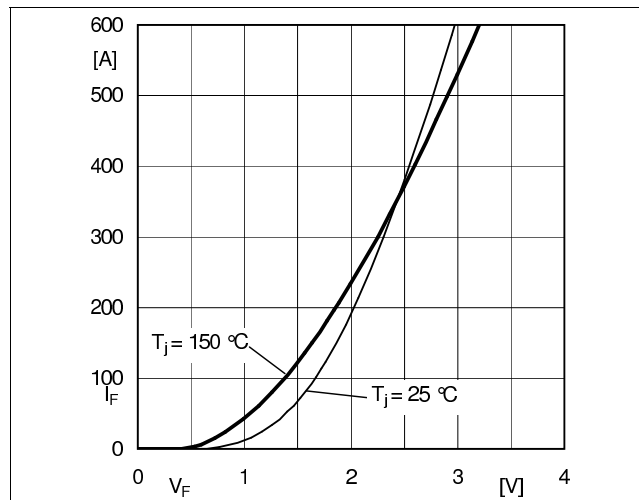


Fig. 10: Typ. CAL diode forward charact., incl. R_{CC+EE}

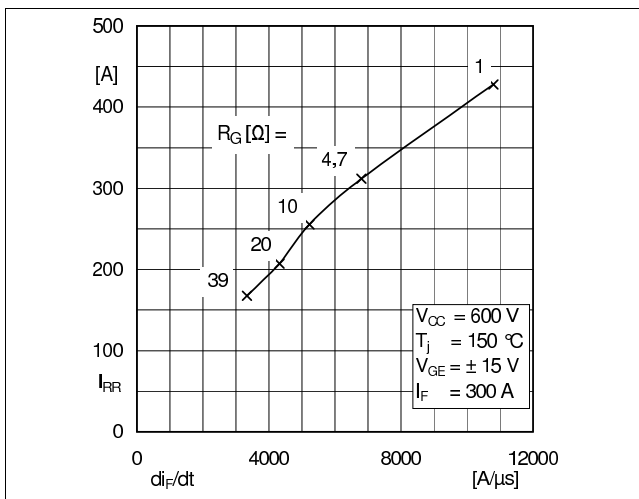


Fig. 11: CAL diode peak reverse recovery current

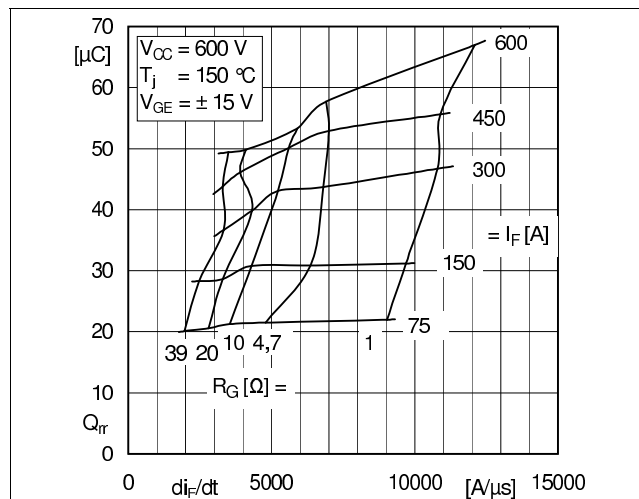
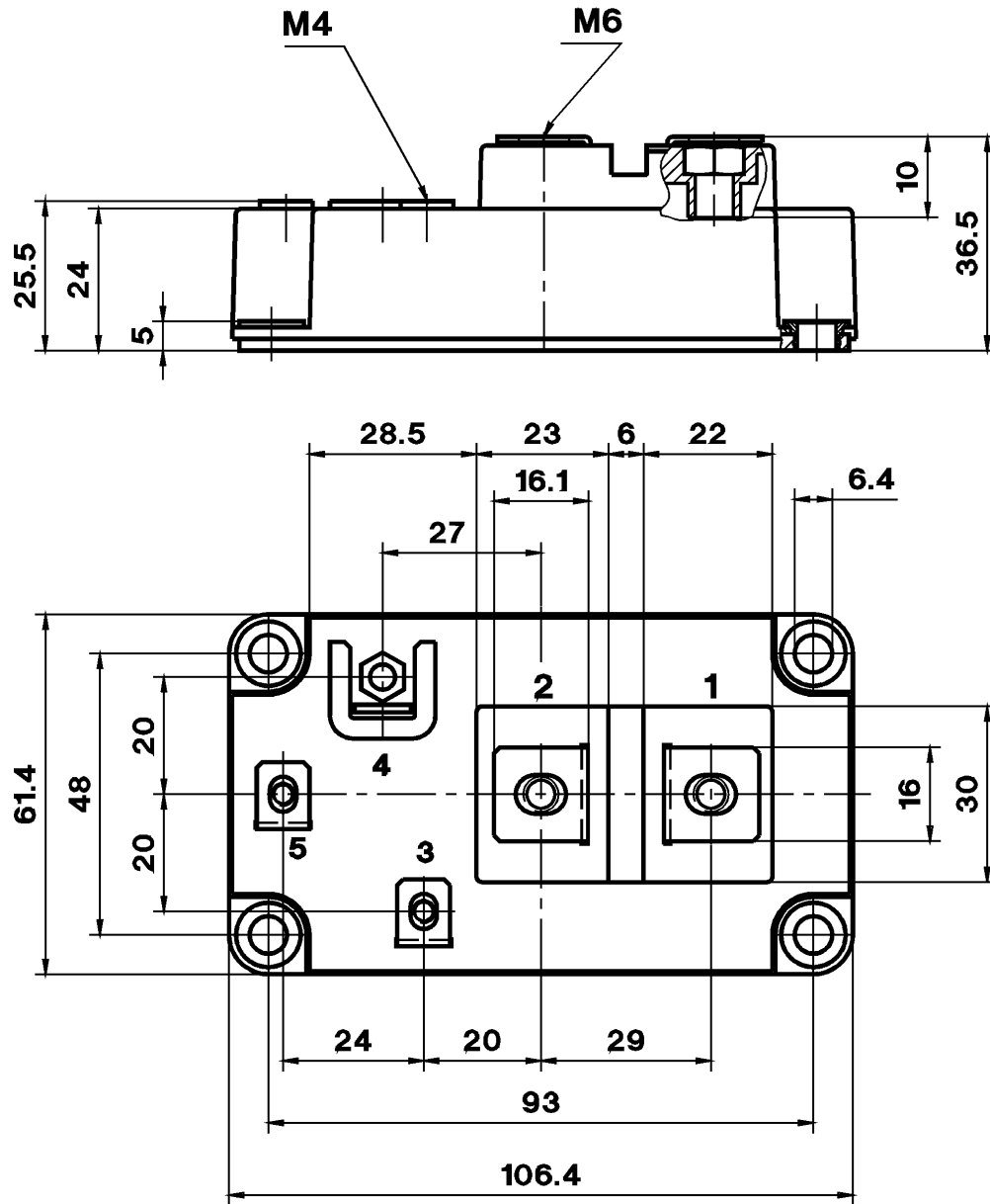
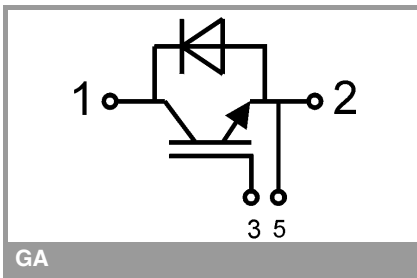


Fig. 12: Typ. CAL diode peak reverse recovery charge



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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 staff.