

SKM300GM12T4



SEMITRANS® 3

Fast IGBT4 Modules

SKM300GM12T4

Features

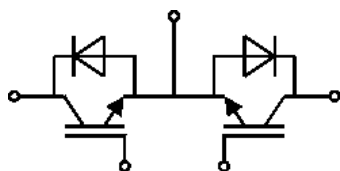
- IGBT4 = 4. generation fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. generation CAL-diode
- Isolated copper baseplate using DBC technology (Direct Bonded Copper)
- Increased power cycling capability
- With integrated gate resistor
- For higher switching frequencies up to 20kHz
- UL recognized, file no. E63532

Typical Applications*

- Matrix Inverter
- Bidirectional switch

Remarks

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



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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 175 °C	T _c = 25 °C	422	A
		T _c = 80 °C	324	A
I _{Cnom}			300	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		900	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	353	A
		T _c = 80 °C	264	A
I _{Fnom}			300	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		900	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		1548	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C		500	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _C = 300 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chiplevel	T _j = 150 °C		2.25	2.45	V
V _{CE0}	chiplevel	T _j = 25 °C		0.8	0.9	V
		T _j = 150 °C		0.7	0.8	V
r _{CE}	V _{GE} = 15 V chiplevel	T _j = 25 °C		3.50	4.00	mΩ
		T _j = 150 °C		5.17	5.50	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 12 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C			4.0	mA
	V _{CE} = 1200 V	T _j = 150 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		17.6		nF
C _{oes}		f = 1 MHz		1.16		nF
C _{res}		f = 1 MHz		0.94		nF
Q _G	V _{GE} = - 8 V...+ 15 V			1700		nC
R _{Gint}	T _j = 25 °C			2.5		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		200		ns
t _r	I _C = 300 A	T _j = 150 °C		44		ns
E _{on}	V _{GE} = ±15 V	T _j = 150 °C		27		mJ
t _{d(off)}	R _{G on} = 1.5 Ω	T _j = 150 °C		450		ns
t _f	di/dt _{on} = 7500 A/μs	T _j = 150 °C		90		ns
E _{off}	di/dt _{off} = 3350 A/μs	T _j = 150 °C		29		mJ
R _{th(j-c)}	per IGBT				0.11	K/W



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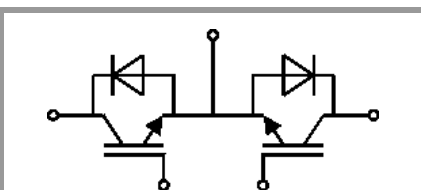
Typical Applications*

- Matrix Inverter
- Bidirectional switch

Remarks

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

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 300 A	T _j = 25 °C		2.17	2.49	V
	V _{GE} = 0 V chipllevel	T _j = 150 °C		2.11	2.42	V
V _{F0}	chipllevel	T _j = 25 °C		1.3	1.5	V
		T _j = 150 °C		0.9	1.1	V
r _F	chipllevel	T _j = 25 °C		2.9	3.3	mΩ
		T _j = 150 °C		4.0	4.4	mΩ
I _{RRM}	I _F = 300 A	T _j = 150 °C		345		A
Q _{rr}	di/dt _{off} = 7300 A/μs	T _j = 150 °C		54		μC
E _{rr}	V _{GE} = ±15 V V _{CC} = 600 V	T _j = 150 °C		23		mJ
R _{th(j-c)}	per diode				0.17	K/W
Module						
L _{CE}				15	20	nH
R _{CC'+EE'}	terminal-chip	T _C = 25 °C		0.25		mΩ
		T _C = 125 °C		0.5		mΩ
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	2.5		5	Nm
						Nm
w					325	g



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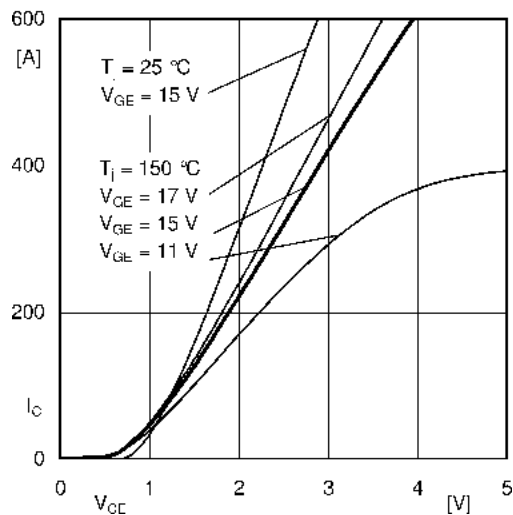


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + EE'$

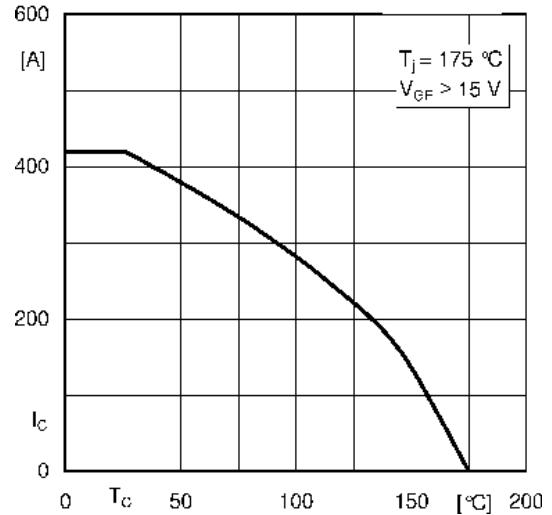


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

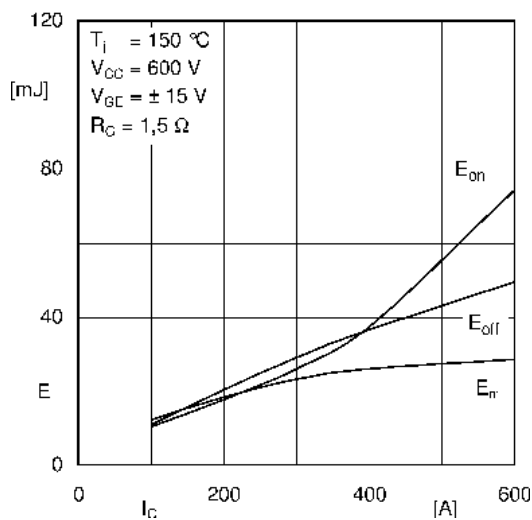


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

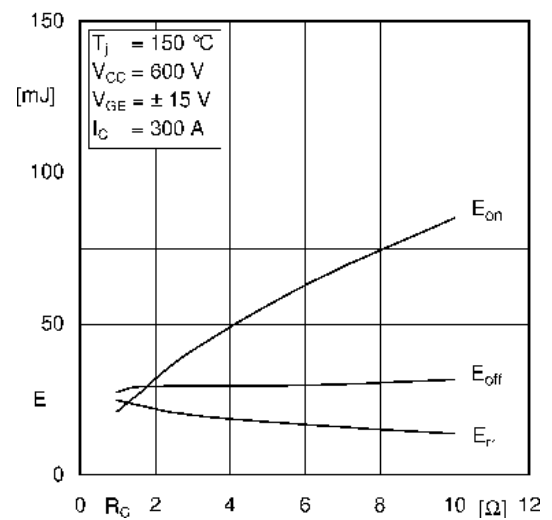


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

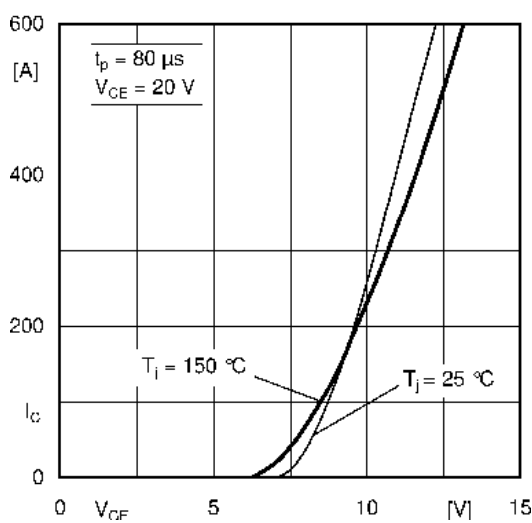


Fig. 5: Typ. transfer characteristic

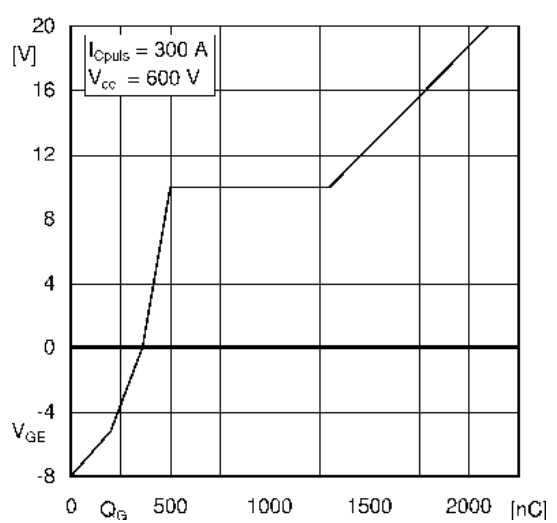


Fig. 6: Typ. gate charge characteristic

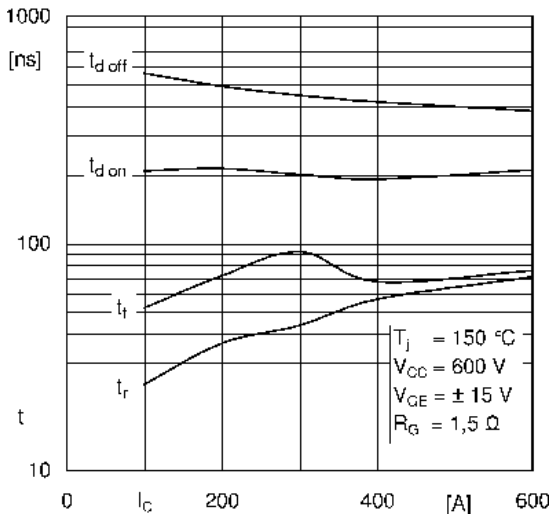


Fig. 7: Typ. switching times vs. I_C

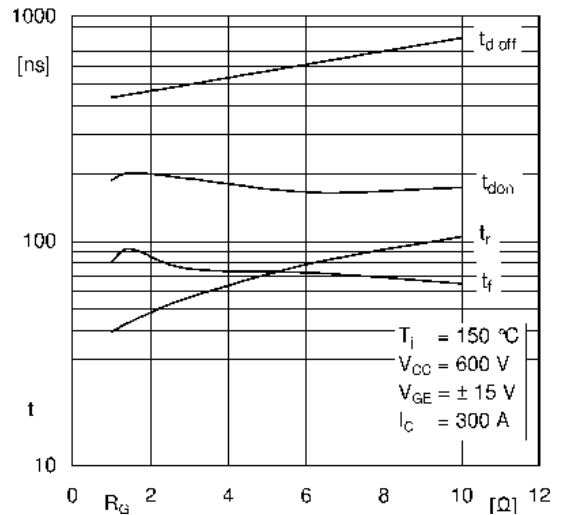


Fig. 8: Typ. switching times vs. gate resistor R_G

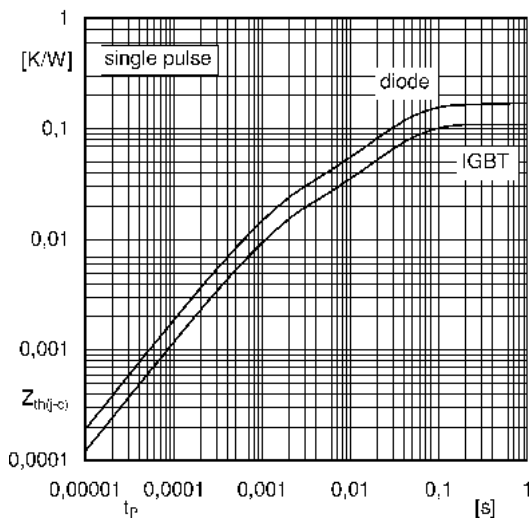


Fig. 9: Transient thermal impedance

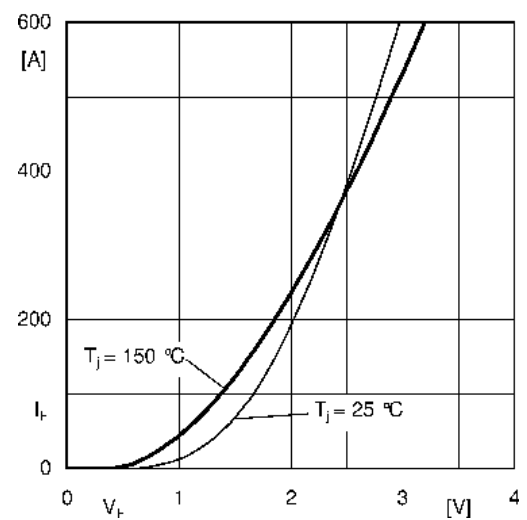


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC}'+EE'$

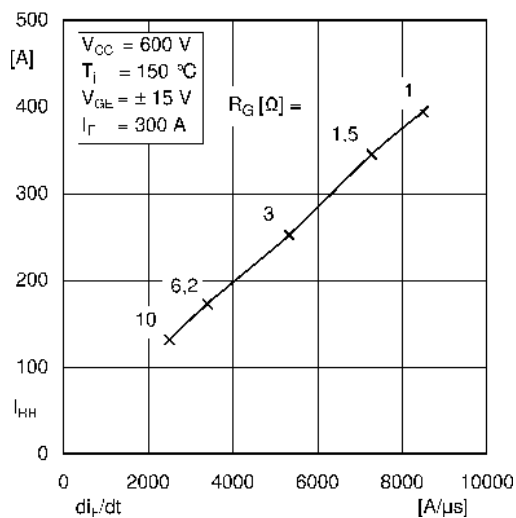


Fig. 11: CAL diode peak reverse recovery current

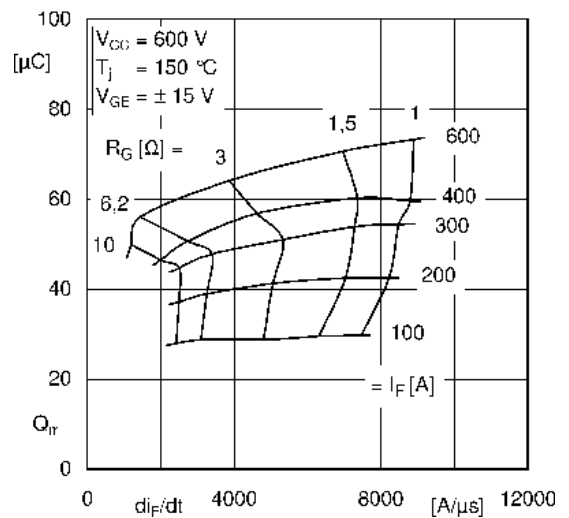


Fig. 12: Typ. CAL diode peak reverse recovery charge

Technical drawing of a mechanical part, showing two views: a side elevation and a top plan view.

Side Elevation View (Top):

- Overall height: 26
- Height of the main body: 23
- Thickness of the base: 5
- Distance between the first two mounting points: 28
- Distance between the second and third mounting points: 28
- Distance from the third mounting point to the right edge: 20
- Mounting hole specification: M6
- Mounting hole diameter: 2.8×0.5
- Distance from the base to the mounting points: 7
- Distance from the base to the top of the main body: 10
- Overall width: 30
- Overall depth: 30.5

Top Plan View (Bottom):

- Overall width: 61.4
- Overall depth: 48
- Distance from the left edge to the first mounting point: 14
- Distance between the first and second mounting points: 22.5
- Distance between the second and third mounting points: 6
- Distance between the third and fourth mounting points: 22
- Distance between the fourth and fifth mounting points: 6
- Distance from the fifth mounting point to the right edge: 22.5
- Distance from the left edge to the first mounting point (center-to-center): 11
- Distance between the first and second mounting points (center-to-center): 10
- Distance between the second and third mounting points (center-to-center): 8
- Distance between the third and fourth mounting points (center-to-center): 9
- Distance between the fourth and fifth mounting points (center-to-center): 7
- Distance from the fifth mounting point to the right edge (center-to-center): 6
- Distance from the left edge to the first mounting point (inner): 4
- Distance between the first and second mounting points (inner): 5
- Distance between the second and third mounting points (inner): 15
- Distance between the third and fourth mounting points (inner): 27
- Distance from the fourth mounting point to the right edge (inner): 30
- Overall width (inner): 93
- Overall depth (inner): 106.4
- Labels 1, 2, and 3 indicate specific features or sections.

* 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.