



SEMITRANS®4

IGBT4 Modules

SKM600GA12E4

Features

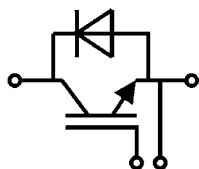
- IGBT4 = 4. Generation (Trench)IGBT
- VCEsat with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_{C\text{NOM}}$
- Soft switching 4. Generation CAL diode (CAL4)

Typical Applications

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomb. $T_{op} = -40 \dots +150^\circ\text{C}$, product rel. results valid for $T_j = 150^\circ$
- Short circuit: Soft Turn-off recommended $R_{Goff} > 20 \Omega$
- With $R_G = 2 \Omega$ the RBSOA is limited to $1 \times I_{C\text{nom}} = 600 \text{ A}$



GA

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			1200	V
I _C	T _j = 175 °C	T _c = 25 °C	916	A
		T _c = 80 °C	704	A
I _{Cnom}			600	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		1800	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	707	A
		T _c = 80 °C	529	A
I _{Fnom}			600	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		1800	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		3240	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}			500	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50Hz, t = 1 min		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _C = 600 A	T _j = 25 °C		1.8	2.05	V
	V _{GE} = 15 V chipllevel	T _j = 150 °C		2.2	2.4	V
V _{CE0}		T _j = 25 °C		0.8	0.9	V
		T _j = 150 °C		0.7	0.8	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		1.7	1.9	mΩ
		T _j = 150 °C		2.5	2.7	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 24 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C		0.1	0.3	mA
	V _{CE} = 1200 V	T _j = 150 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		37.2		nF
C _{oes}		f = 1 MHz		2.32		nF
C _{res}		f = 1 MHz		2.04		nF
Q _G	V _{GE} = - 8 V...+ 15 V			3400		nC
R _{Gint}	T _j = 25 °C			1.3		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		195		ns
t _r	I _C = 600 A	T _j = 150 °C		90		ns
E _{on}	V _{GE} = ±15 V	T _j = 150 °C		74		mJ
t _{d(off)}	R _{G on} = 2 Ω	T _j = 150 °C		690		ns
	R _{G off} = 2 Ω	T _j = 150 °C				
t _f	di/dt _{on} = 6000 A/μs	T _j = 150 °C		130		ns
E _{off}	di/dt _{off} = 5200 A/μs	T _j = 150 °C		84		mJ
R _{th(j-c)}	per IGBT				0.049	K/W



SEMITRANS®4

IGBT4 Modules

SKM600GA12E4

Features

- IGBT4 = 4. Generation (Trench)IGBT
- VCEsat with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_{CNOM}$
- Soft switching 4. Generation CAL diode (CAL4)

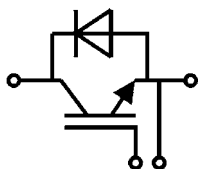
Typical Applications

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

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 $T_j = 150^\circ$
- Short circuit: Soft Turn-off recommended $R_{Goff} > 20 \Omega$
- With $R_G = 2 \Omega$ the RBSOA is limited to $1 \times I_{Cnom} = 600 \text{ A}$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 600 A	T _J = 25 °C		2.14	2.46	V
	V _{GE} = 0 V chip	T _J = 150 °C		2.07	2.38	V
V _{F0}		T _J = 25 °C		1.3	1.5	V
		T _J = 150 °C		0.9	1.1	V
r _F		T _J = 25 °C		1.4	1.6	mΩ
		T _J = 150 °C		1.9	2.1	mΩ
I _{RRM}	I _F = 600 A	T _J = 150 °C		420		A
Q _{rr}	di/dt _{off} = 5500 A/μs	T _J = 150 °C		92		μC
E _{rr}	V _{GE} = ±15 V	T _J = 150 °C		38		mJ
	V _{CC} = 600 V					
R _{th(j-c)}	per diode				0.086	K/W
Module						
L _{CE}				15	20	nH
R _{CC'+EE'}	terminal-chip	T _C = 25 °C		0.18		mΩ
		T _C = 125 °C		0.22		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, M4	2.5		5	Nm
						Nm
w					330	g



GA

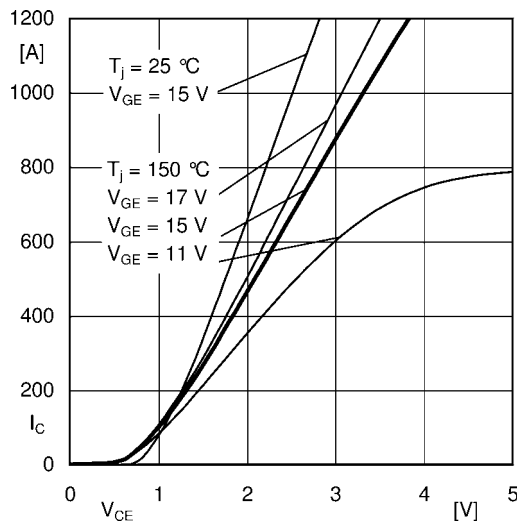


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

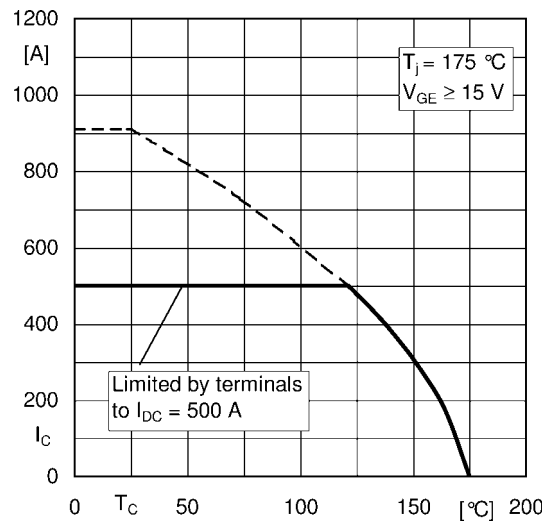


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

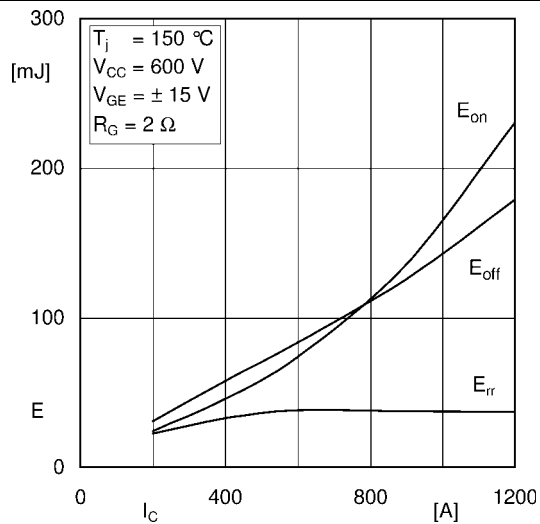


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

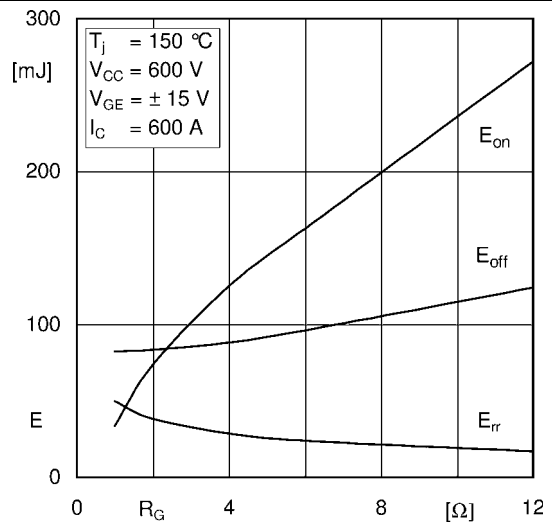


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

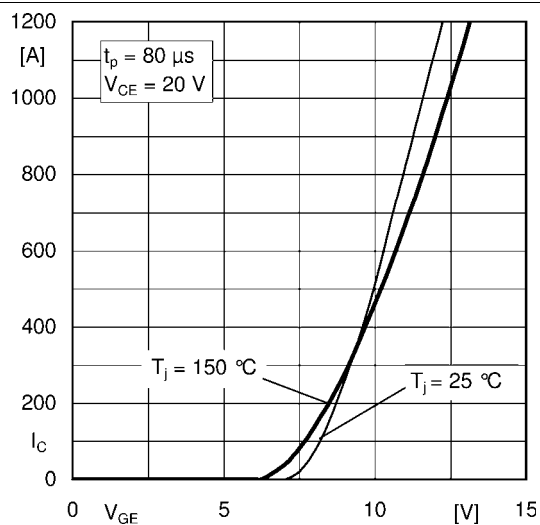


Fig. 5: Typ. transfer characteristic

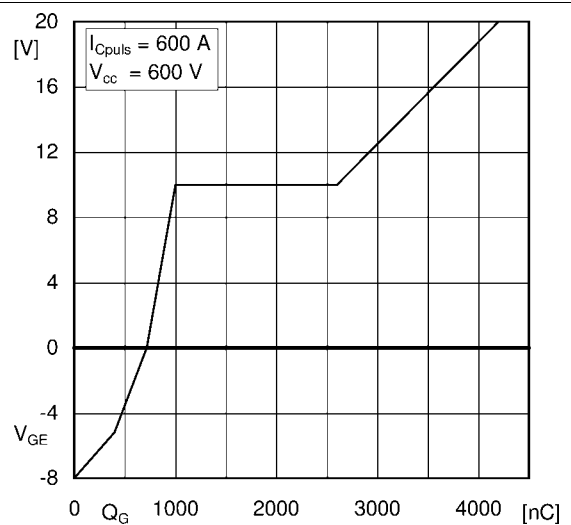
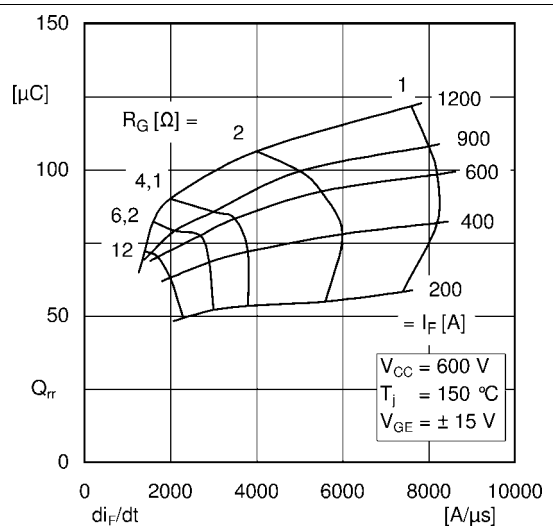
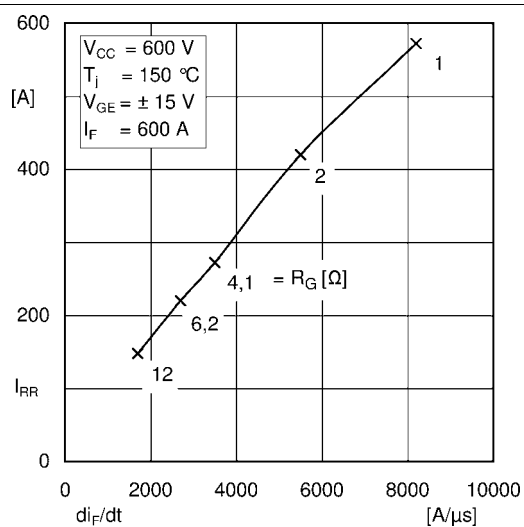
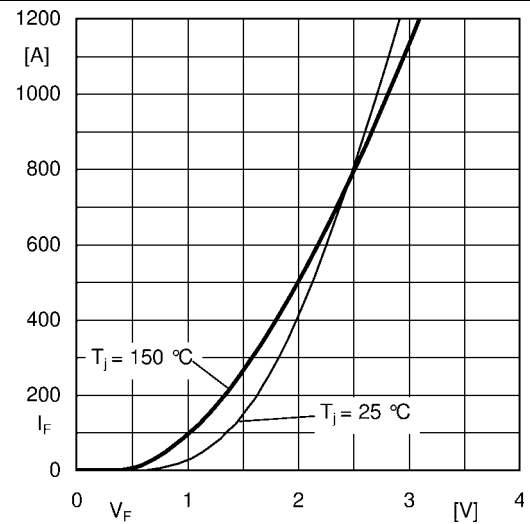
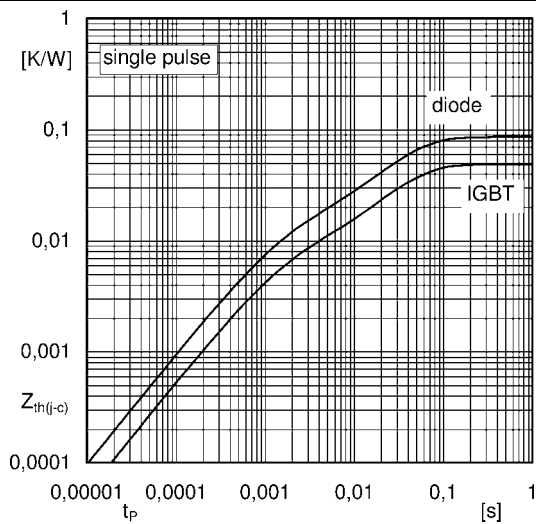
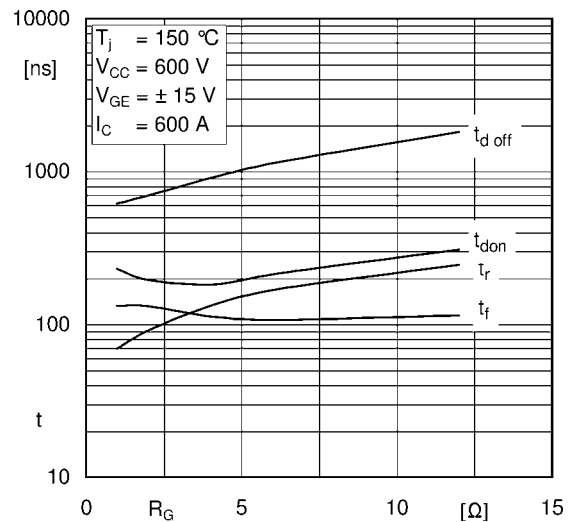
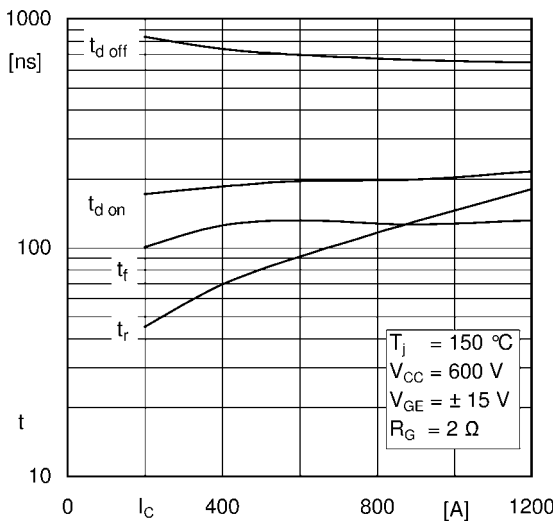
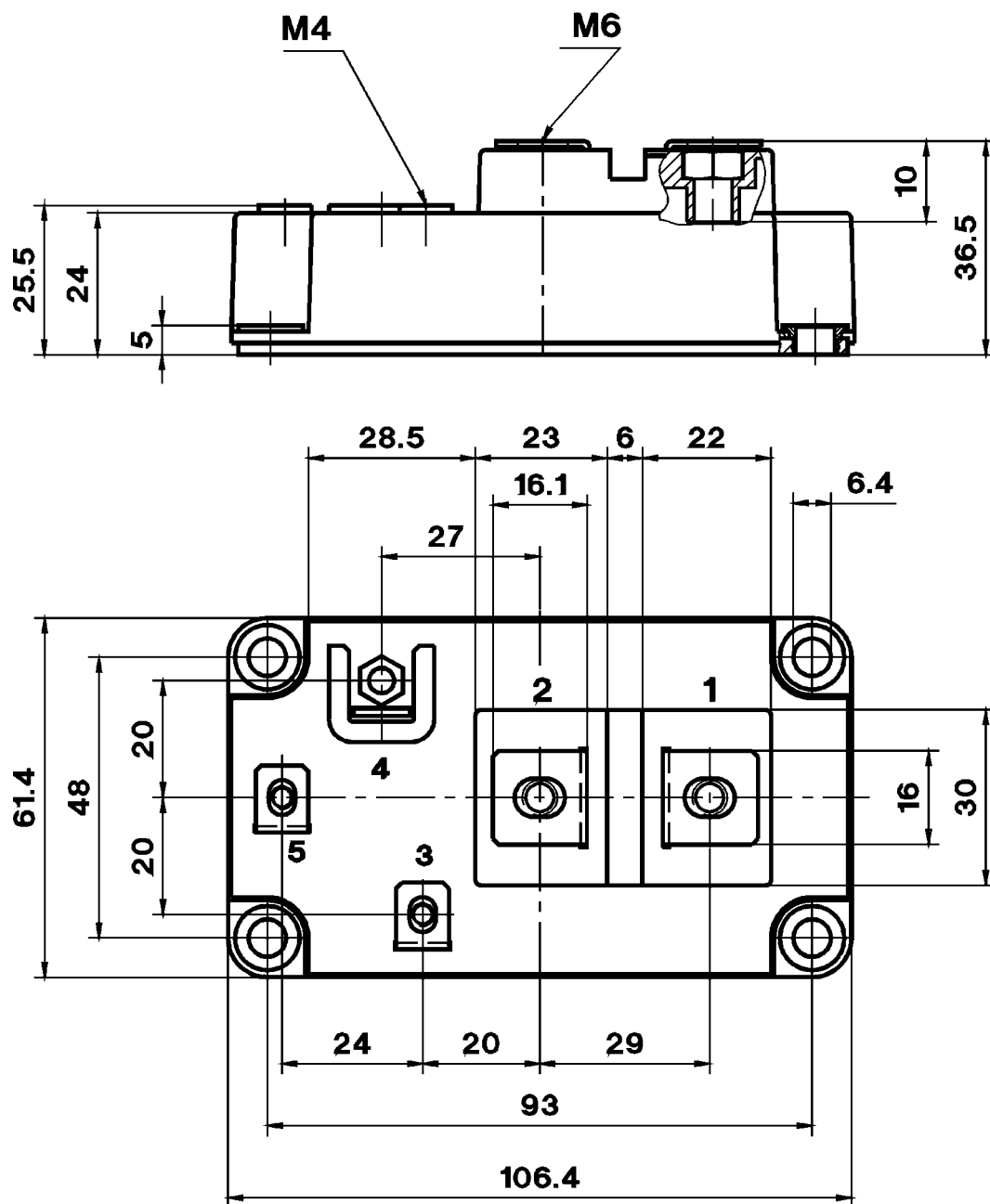
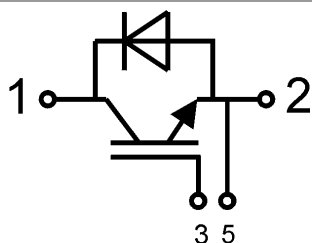


Fig. 6: Typ. gate charge characteristic





Semitrans 4



GA

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.