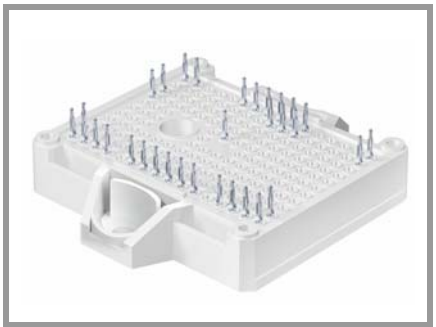
SK50GD12T7ETE2



SEMITOP®E2

Sixpack Open Emitter

Engineering Sample

SK50GD12T7ETE2

Target Data

Features*

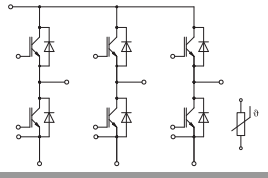
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- Integrated NTC temperature sensor
- UL recognized file no. E 63 532

Typical Applications

- Motor drives
- Servo drives
- Air conditioning
- Auxiliary Inverters
- UPS

Remarks

- Recommended $T_{j,op}$ = -40 ...+150 °C
- $T_{j,op}$ > 150 °C during overload (details on AN19-002)



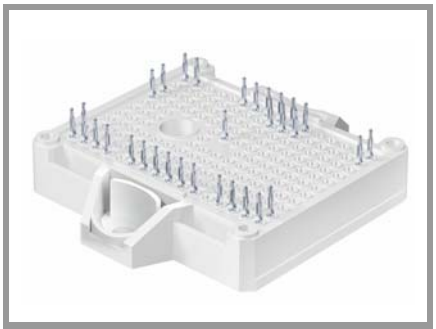
GD-ET

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	λ_{paste}=0.8 W/(mK)	T_s = 70 °C	55	A
	T_j = 175 °C	T_s = 100 °C	45	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 70 °C	69	A
	T_j = 175 °C	T_s = 100 °C	56	A
I_{Cnom}			50	A
I_{CRM}			100	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 175 °C	7	µs
T_j			-40 ... 175	°C
Inverse - Diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	λ_{paste}=0.8 W/(mK)	T_s = 70 °C	44	A
	T_j = 175 °C	T_s = 100 °C	35	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 70 °C	55	A
	T_j = 175 °C	T_s = 100 °C	45	A
I_{FRM}			100	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 150 °C		270	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	, $\Delta T_{terminal}$ at PCB joint = 30 K, per pin		30	A
T_{stg}	module without TIM		-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min		2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
$V_{CE(sat)}$	I_C = 50 A	T_j = 25 °C		1.55	1.70	V
	V_{GE} = 15 V	T_j = 150 °C		1.73	1.88	V
	chiplevel	T_j = 175 °C		1.77	1.92	V
V_{CE0}		T_j = 25 °C		1.00	1.05	V
	chiplevel	T_j = 150 °C		0.80	0.85	V
		T_j = 175 °C		0.75	0.80	V
r_{CE}	V_{GE} = 15 V	T_j = 25 °C		11	13	mΩ
	chiplevel	T_j = 150 °C		19	21	mΩ
		T_j = 175 °C		20	22	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 1.27 mA		5.15	5.8	6.45	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				1	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		10.00		nF
C_{oes}		f = 1 MHz		0.13		nF
C_{res}		f = 1 MHz		0.04		nF
Q_G	V_{GE} = -15 V ... +15 V			798		nC
R_{Gint}	T_j = 25 °C			0		Ω



SEMITOP®E2

Sixpack Open Emitter

Engineering Sample

SK50GD12T7ETE2

Target Data

Features*

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- UL recognized file no. E 63 532

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- Servo drives
- Air conditioning
- Auxiliary Inverters
- UPS

Remarks

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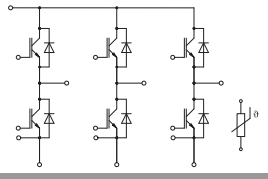
- $T_{j,op}$ > 150 °C during overload (details on AN19-002)



GD-ET

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverter - IGBT						
$t_{d(on)}$	V_{CC} = 600 V I_C = 50 A $R_{G\ on}$ = 5.1 Ω $R_{G\ off}$ = 5.1 Ω V_{GE} = +15/-15 V (T_j = 150 °C) di/dt_{on} = 1300 A/µs di/dt_{off} = 440 A/µs dv/dt = 4500 V/µs	T_j = 25 °C		39		ns
		T_j = 150 °C		40		ns
		T_j = 175 °C		41		ns
t_r		T_j = 25 °C		37		ns
		T_j = 150 °C		41		ns
		T_j = 175 °C		42		ns
E_{on}		T_j = 25 °C		3.49		mJ
		T_j = 150 °C		5.28		mJ
		T_j = 175 °C		5.93		mJ
$t_{d(off)}$		T_j = 25 °C		204		ns
		T_j = 150 °C		271		ns
		T_j = 175 °C		281		ns
t_f		T_j = 25 °C		41		ns
		T_j = 150 °C		65		ns
		T_j = 175 °C		89		ns
E_{off}		T_j = 25 °C		3.37		mJ
		T_j = 150 °C		5.54		mJ
		T_j = 175 °C		5.87		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.94		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.66		K/W

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse - Diode						
$V_F = V_{EC}$	I_F = 50 A chiplevel	T_j = 25 °C		2.22	2.54	V
		T_j = 150 °C		2.18	2.50	V
		T_j = 175 °C		2.03	2.34	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
		T_j = 175 °C		0.82	0.98	V
r_F	chiplevel	T_j = 25 °C		18	21	mΩ
		T_j = 150 °C		26	28	mΩ
		T_j = 175 °C		24	27	mΩ
I_{RRM}	I_F = 50 A V_{GE} = +15/-15 V V_{CC} = 600 V (T_j = 150 °C) di/dt_{off} = 1400 A/µs	T_j = 25 °C		47		A
		T_j = 150 °C		63		A
		T_j = 175 °C		65		A
Q_{rr}		T_j = 25 °C		2.84		µC
		T_j = 150 °C		8.38		µC
		T_j = 175 °C		9.46		µC
E_{rr}		T_j = 25 °C		0.96		mJ
		T_j = 150 °C		3.43		mJ
		T_j = 175 °C		3.62		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.09		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			0.77		K/W
Module						
L_{CE}				40		nH
M_s	to heatsink		1.6		2.3	Nm
w				35		g

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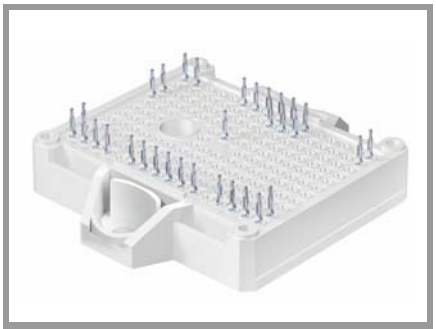

SEMITOP®E2

Sixpack Open Emitter

Engineering Sample

SK50GD12T7ETE2

Target Data

Features*

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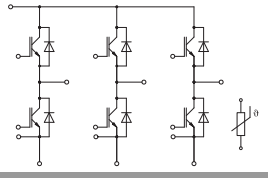
- UPS

Remarks

- Recommended $T_{j,op}$ = -40 ...+150 °C
- $T_{j,op}$ > 150 °C during overload (details on AN19-002)

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Temperature Sensor					
R_{100}	T_c=100°C (R_{25}=5 kΩ)		493 ± 5%		Ω
$B_{25/85}$	$R_{(T)}=R_{25}*\exp[B_{25/85}*(1/T-1/298)]$, T[K]		3420		K



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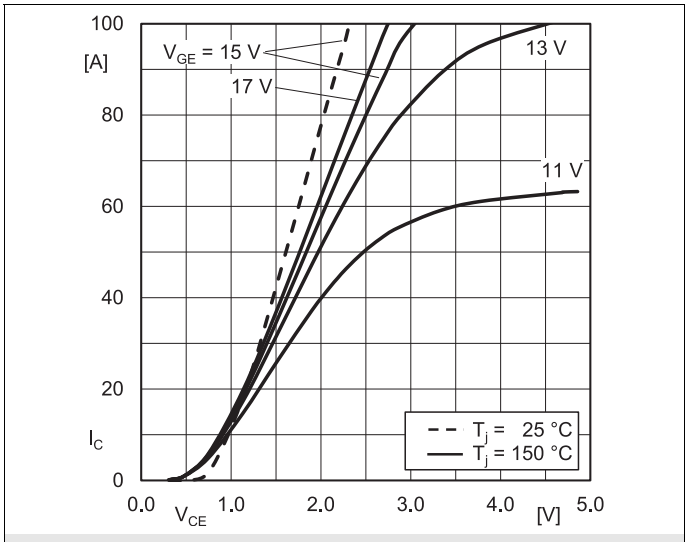

Fig. 1: Typ. IGBT output characteristic, incl. $R_{CC+ EE'}$

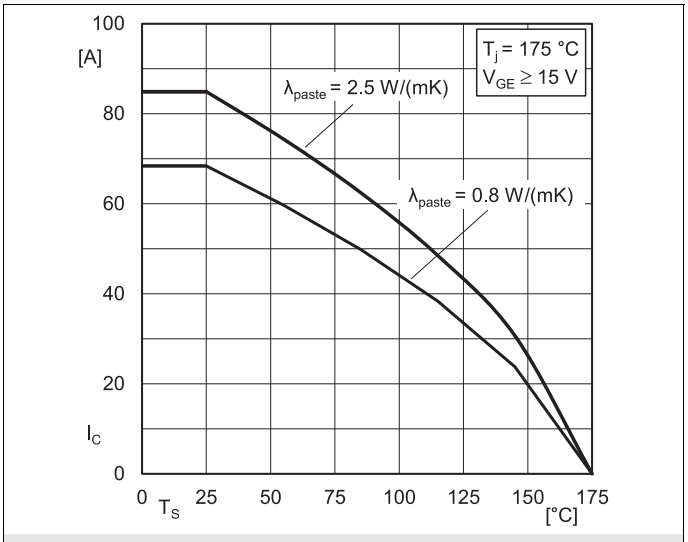

Fig. 2: IGBT rated current vs. temperature Ic=f(Ts)

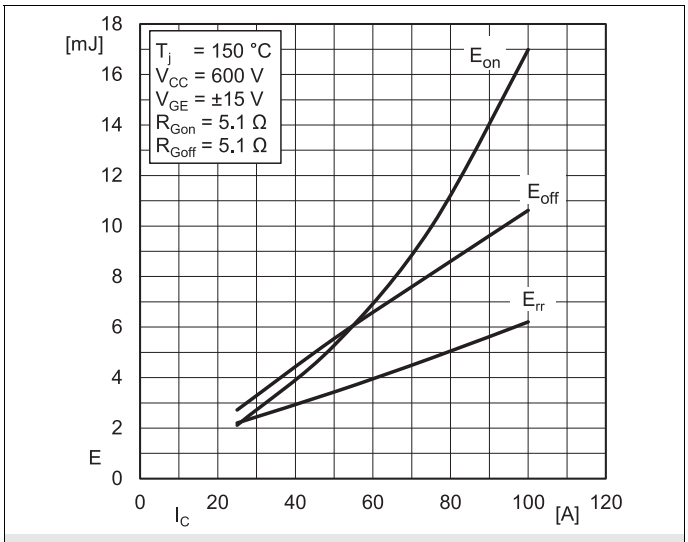

Fig. 3: Typ. turn-on /-off energy = f (I_C)

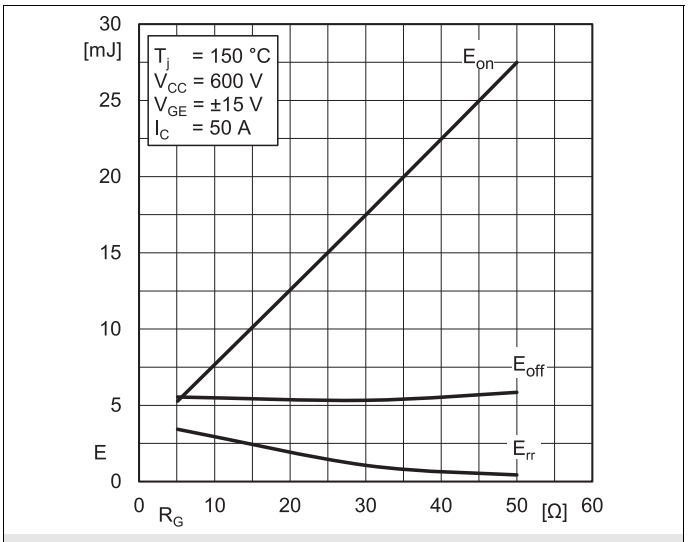

Fig. 4: Typ. turn-on /-off energy = f (R_G)

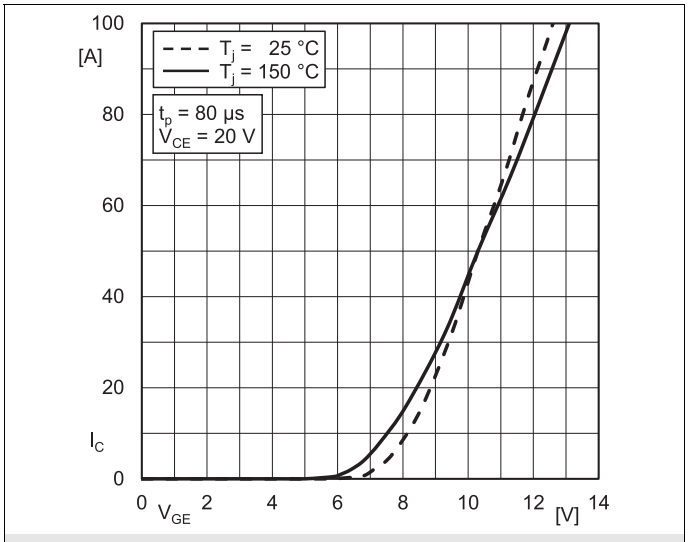

Fig. 5: Typ. IGBT transfer characteristic

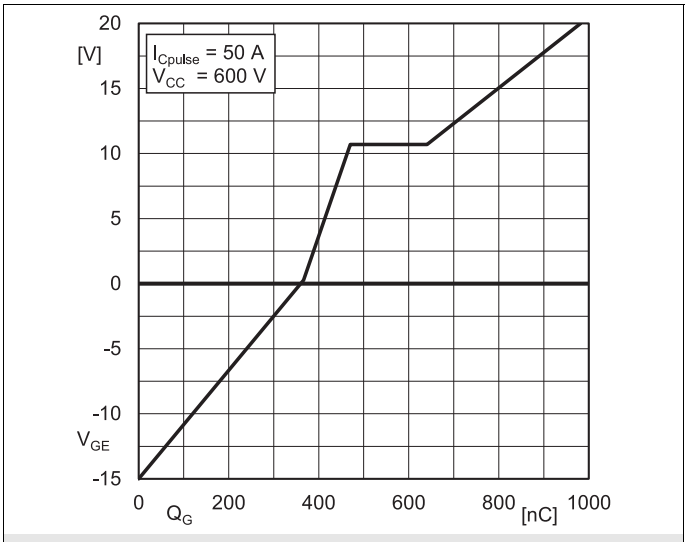

Fig. 6: Typ. IGBT gate charge characteristic

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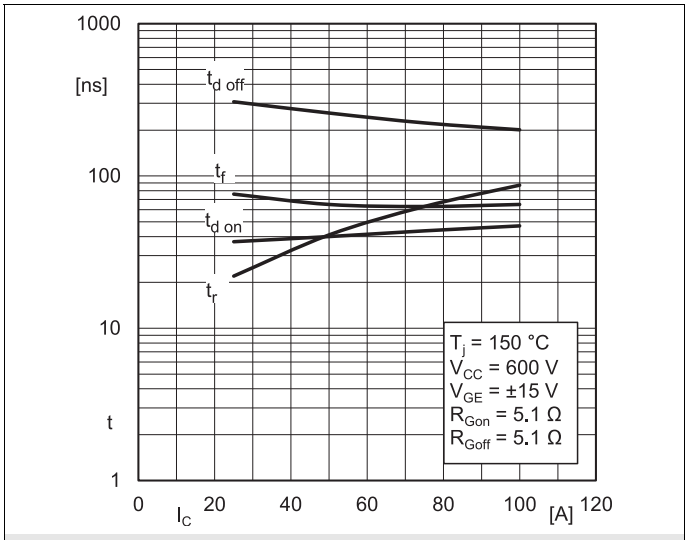

Fig. 7: Typ. switching times = f (I_C)

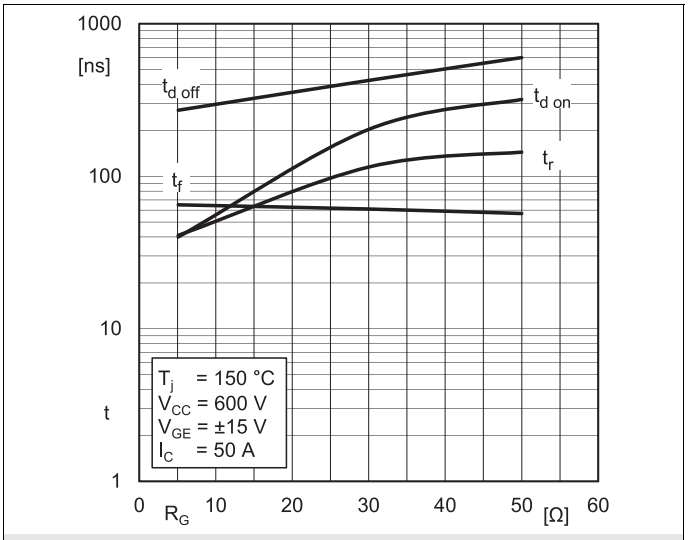

Fig. 8: Typ. switching times = f (R_G)

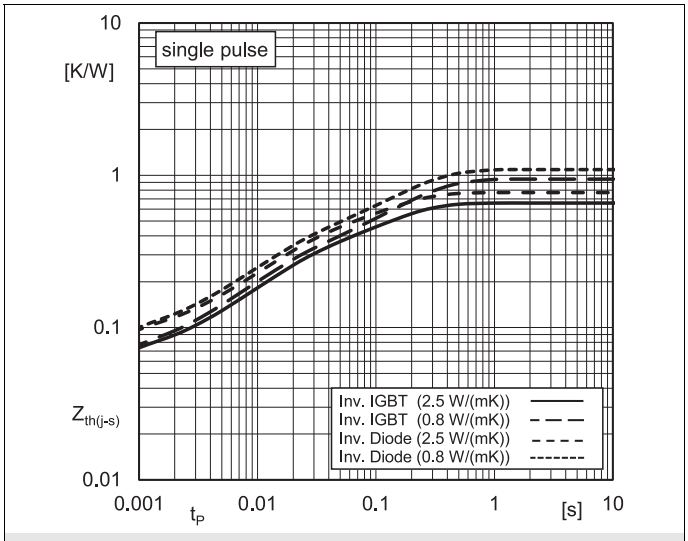

Fig. 9: Typ. transient thermal impedance

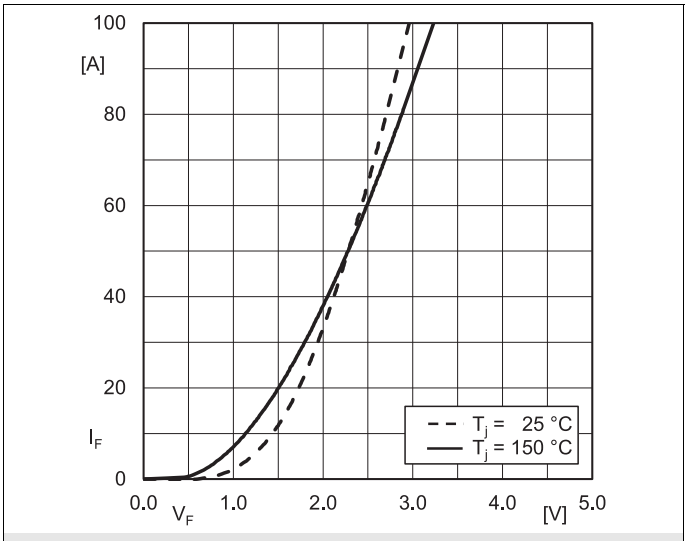

Fig. 10: Typ. Inv. diode forward charact., incl. $R_{CC'+EE'}$

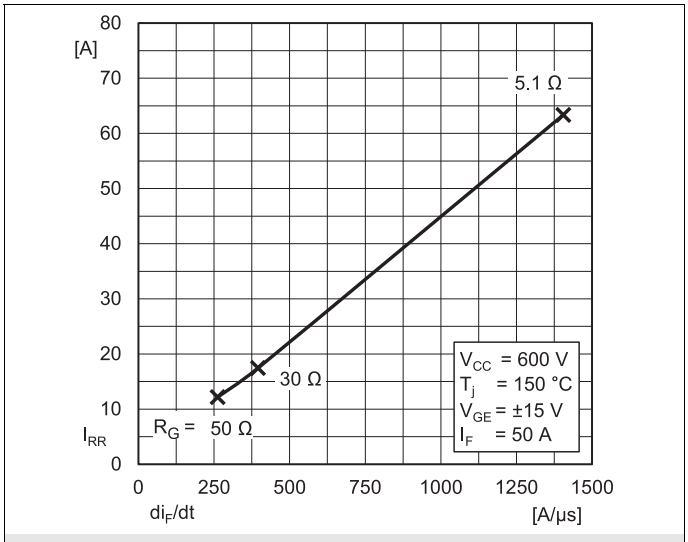

Fig. 11: Typ. Inv. diode peak reverse recovery current

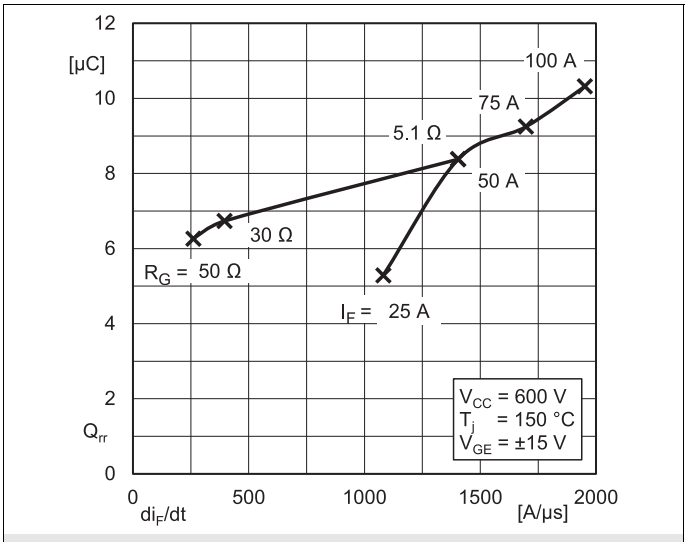

Fig. 12: Typ. Inv. diode reverse recovery charge

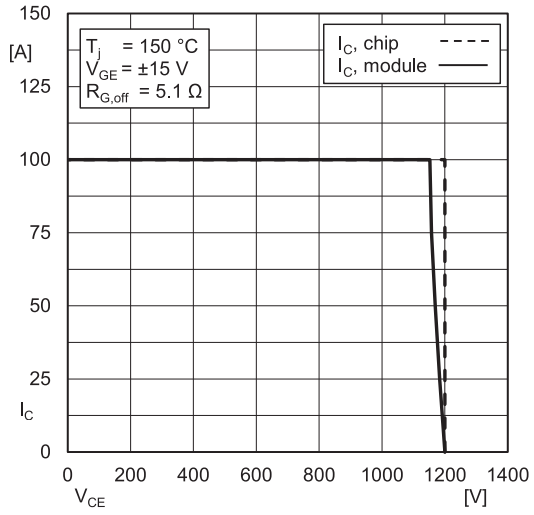

Fig. 13: IGBT Reverse Bias Safe Operating Area (RBSOA)

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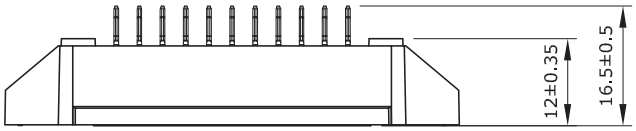
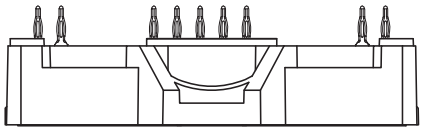
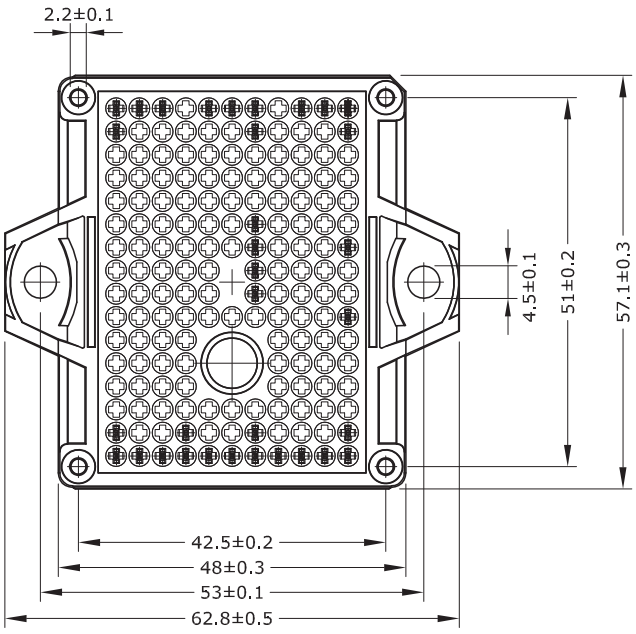
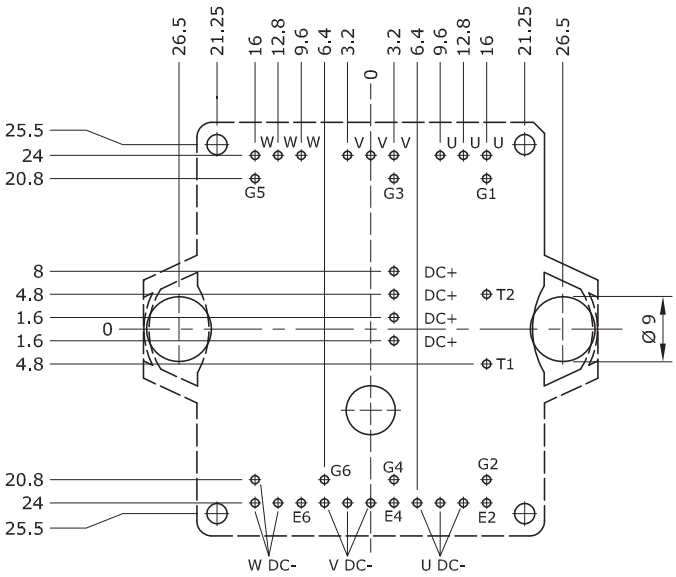


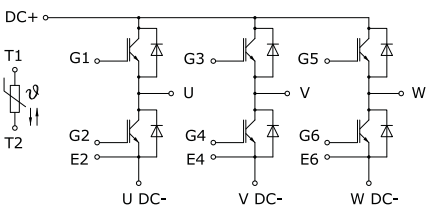






- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern ⌖ Ø0.1
- Diameters of drill ∅ 1.15mm
- Copper thickness in hole 25 - 50 µm
- Hole specification for contacts:
  refer to SEMITOP E1/E2 Mounting Instruction

SEMITOP®E2



GD-ET

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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