SK75GARL07S5TD1E1

SEMITOP®E1

Symmetrical Boost

Engineering Sample

SK75GARL07S5TD1E1

Target Data

Features*

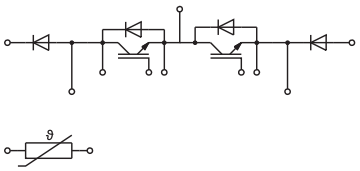
- Optimized design for superior thermal performances
- Low inductive design
- Press-Fit contact technology
- 650V Trench5 IGBT (S5)
- Rapid switching diode technology
- Integrated NTC temperature sensor
- UL recognized file no. E 63 532

Typical Applications

- UPS
- Solar

Remarks

- Recommended T_{jop}= -40 ... +150°C
- Diode1: outer Freewheeling Diodes
- Diode2: inner Antiparalell Diodes



GARL-T

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT 1				
V_{CES}	T_j = 25 °C		650	V
I_C	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	65	A
	T_j = 175 °C	T_s = 70 °C	51	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	79	A
	T_j = 175 °C	T_s = 70 °C	63	A
I_{Cnom}			75	A
I_{CRM}			150	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 360 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 650 V	T_j = 150 °C	not capable	µs
T_j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Diode 1				
V_{RRM}	T_j = 25 °C		650	V
I_F	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	63	A
	T_j = 175 °C	T_s = 70 °C	49	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	75	A
	T_j = 175 °C	T_s = 70 °C	59	A
I_{FRM}			150	A
I_{FSM}	10 ms	T_j = 25 °C	450	A
	sin 180°	T_j = 150 °C	380	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Diode 2				
V_{RRM}	T_j = 25 °C		650	V
I_F	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	21	A
	T_j = 175 °C	T_s = 70 °C	16	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	23	A
	T_j = 175 °C	T_s = 70 °C	18	A
I_{FRM}			30	A
I_{FSM}	10 ms	T_j = 25 °C	-	A
	sin 180°	T_j = 150 °C	-	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings			
Symbol	**Conditions**	**Values**	**Unit**
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	30	A
T_{stg}		-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V

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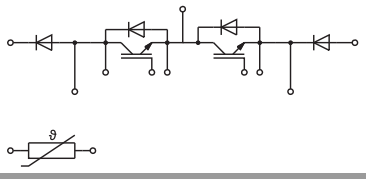

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
$V_{CE(sat)}$	I_C = 75 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.42	1.75	V
		T_j = 150 °C		1.61	2.06	V
V_{CE0}	chiplevel	T_j = 25 °C		0.95	1.05	V
		T_j = 150 °C		0.85	1.00	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		6.3	9.3	mΩ
		T_j = 150 °C		10	14	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 0.75 mA		3.2	4	4.8	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 650 V, T_j = 25 °C				0.2	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		4.5		nF
C_{oes}		f = 1 MHz		0.13		nF
C_{res}		f = 1 MHz		0.017		nF
Q_G	V_{GE} = -15V ... +15V			360		nC
R_{Gint}	T_j = 25 °C			0		Ω
$t_{d(on)}$	V_{CC} = 300 V I_C = 75 A V_{GE} = +15/-15 V $R_{G\ on}$ = 15 Ω $R_{G\ off}$ = 15 Ω di/dt$_{on}$ = 1870 A/µs di/dt$_{off}$ = 1440 A/µs dv/dt = 7220 V/µs	T_j = 150 °C		43		ns
t_r		T_j = 150 °C		34		ns
E_{on}		T_j = 150 °C		1.15		mJ
$t_{d(off)}$		T_j = 150 °C		163		ns
t_f		T_j = 150 °C		33		ns
E_{off}		T_j = 150 °C		1.46		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			1.18		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.87		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V_F	I_F = 75 A	T_j = 25 °C		1.35	1.92	V
	chiplevel	T_j = 150 °C		1.30	1.89	V
V_{F0}	chiplevel	T_j = 25 °C		0.90	1.10	V
		T_j = 150 °C		0.71	0.94	V
r_F	chiplevel	T_j = 25 °C		6.0	11	mΩ
		T_j = 150 °C		7.9	13	mΩ
I_{RRM}	I_F = 75 A di/dt$_{off}$ = 2270 A/µs V_{GE} = -15 V V_{CC} = 300 V	T_j = 150 °C		67		A
Q_{rr}		T_j = 150 °C		4.36		µC
E_{rr}		T_j = 150 °C		0.98		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.39		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			1.06		K/W

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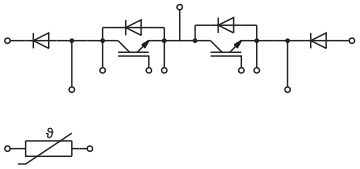

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 2						
V_F	I_F = 15 A	T_j = 25 °C		1.55	1.87	V
	chiplevel	T_j = 150 °C		1.45	1.74	V
V_{F0}	chiplevel	T_j = 25 °C		1.10	1.32	V
		T_j = 150 °C		0.95	1.14	V
r_F	chiplevel	T_j = 25 °C		30	37	mΩ
		T_j = 150 °C		33	40	mΩ
I_{RRM}	I_F = 15 A			-		A
Q_{rr}				-		µC
E_{rr}				-		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			3.62		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			3.27		K/W

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
M_s	to heatsink	1.6		2.3	Nm
w	weight		25		g

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Temperature Sensor					
R_{25}	T_r=25°C		22 ±5%		kΩ
$B_{25/50}$	$R(T)=R_{25}\exp[B_{25/50}(1/T-1/T_{25})]$; T[K]		3950 ±3%		K

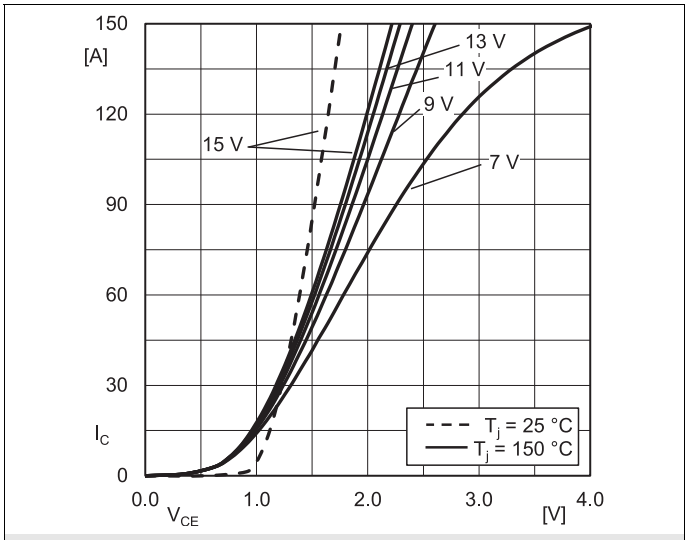


Fig. 1: Typ. IGBT output characteristic, incl. $R_{CC+ EE'}$

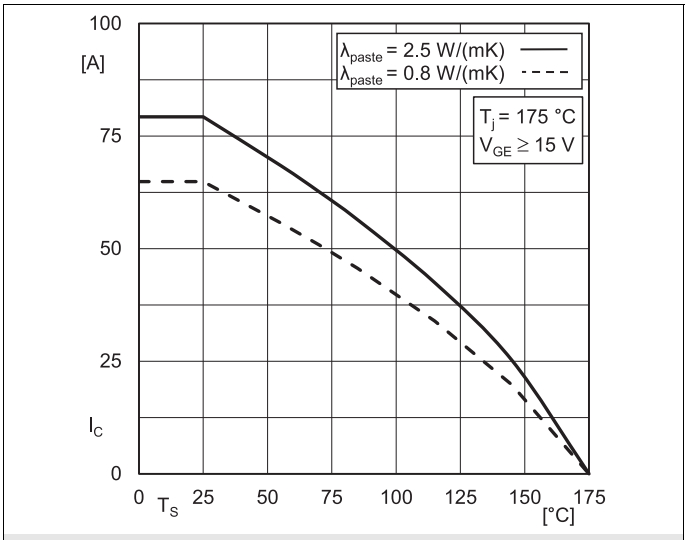


Fig. 2: IGBT rated current vs. temperature $I_c=f(T_s)$

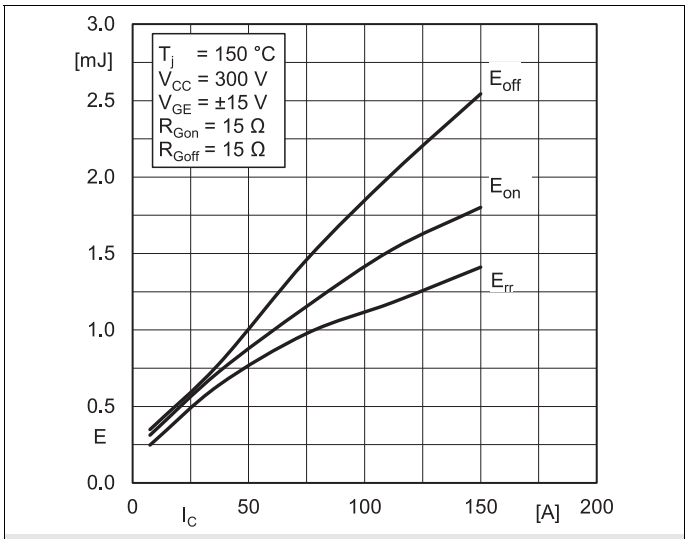


Fig. 3: Typ. turn-on /-off energy = f (I_C)

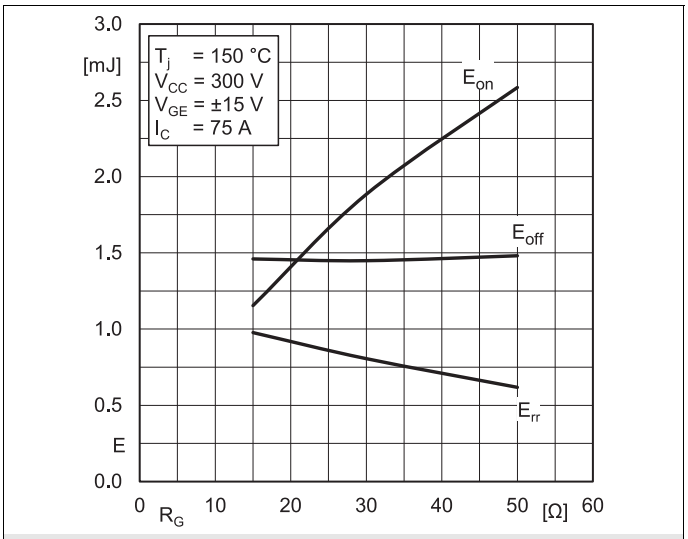


Fig. 4: Typ. turn-on /-off energy = f (R_G)

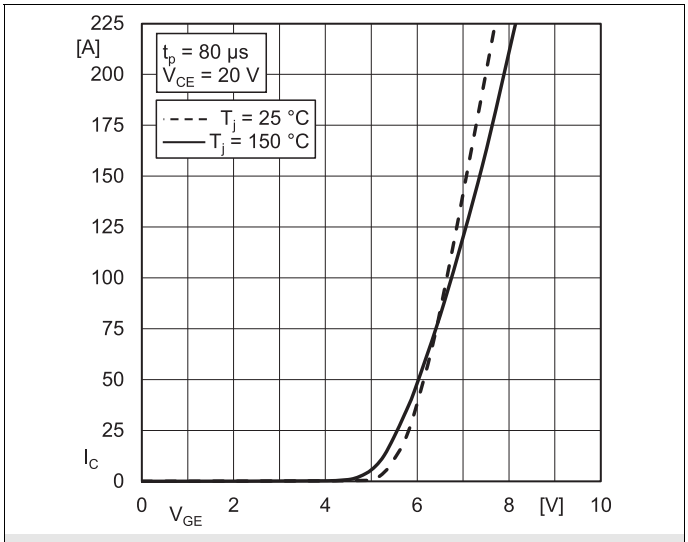


Fig. 5: Typ. IGBT transfer characteristic

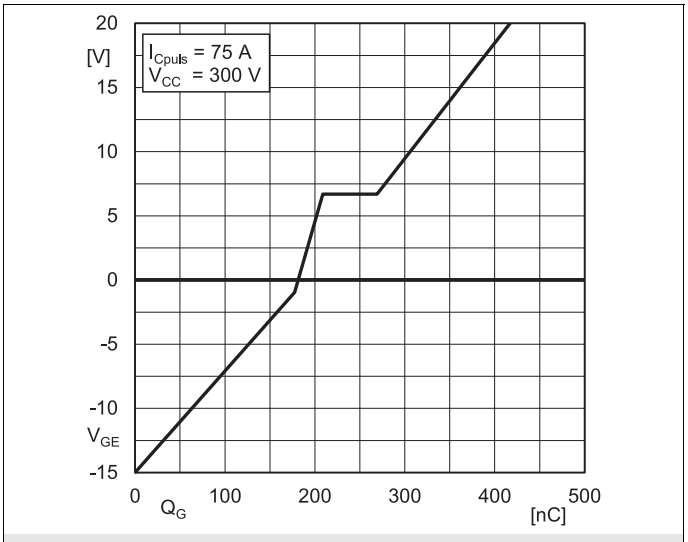


Fig. 6: Typ. IGBT gate charge characteristic

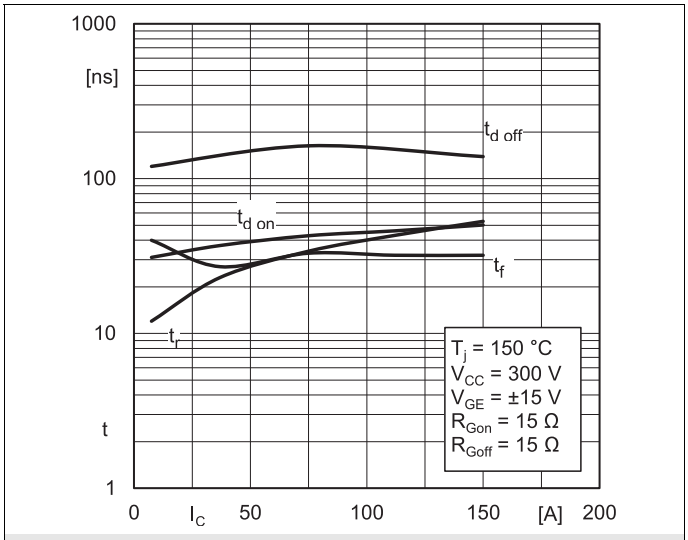


Fig. 7: Typ. switching times = f (I_C)

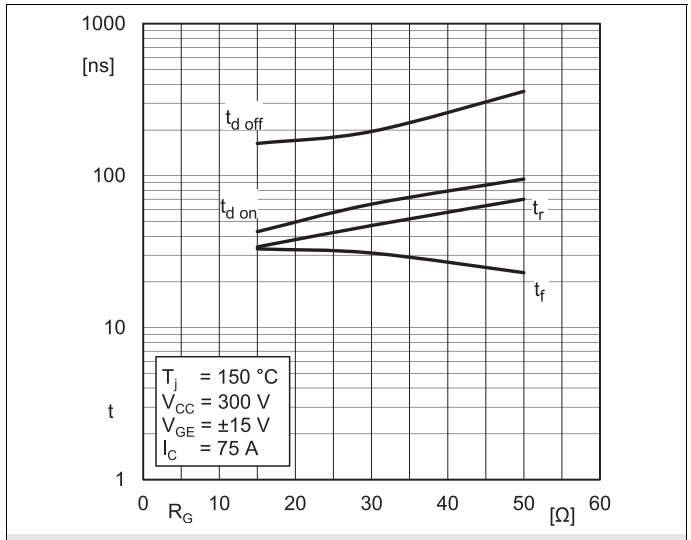


Fig. 8: Typ. switching times = f (R_G)

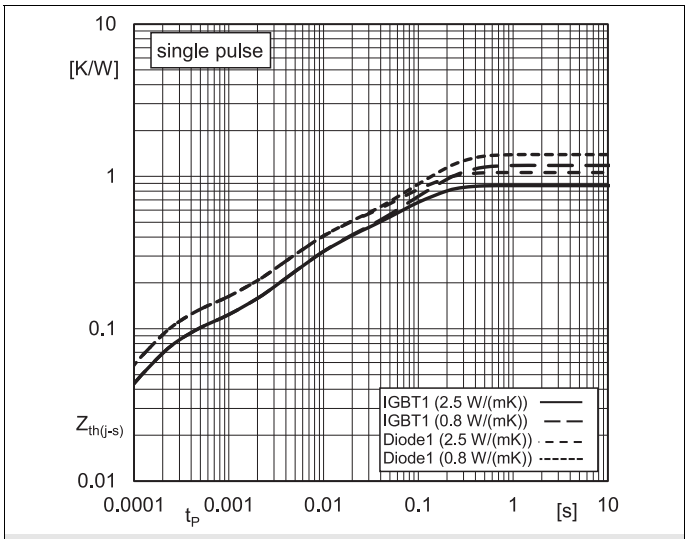


Fig. 9: Typ. transient thermal impedance

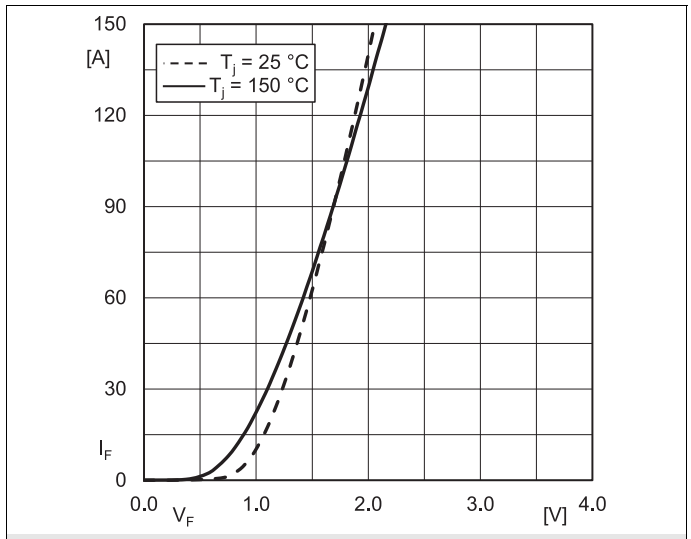


Fig. 10: Typ. Diode1 forward characteristic, incl. $R_{CC'+EE'}$

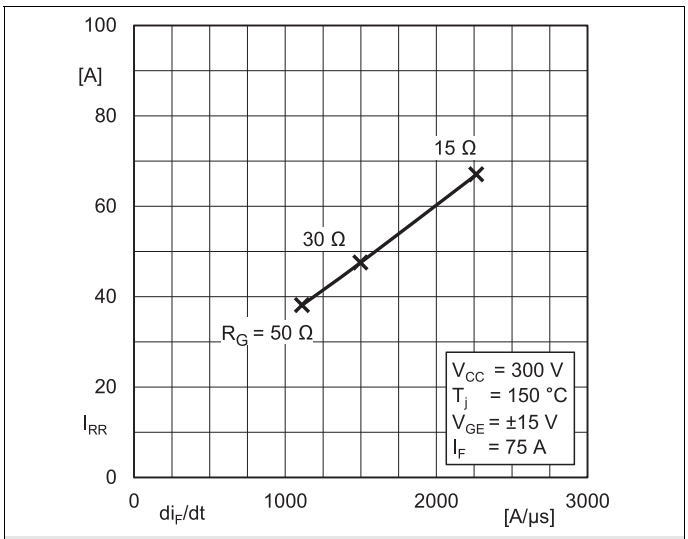


Fig. 11: Typ. Diode peak reverse recovery current

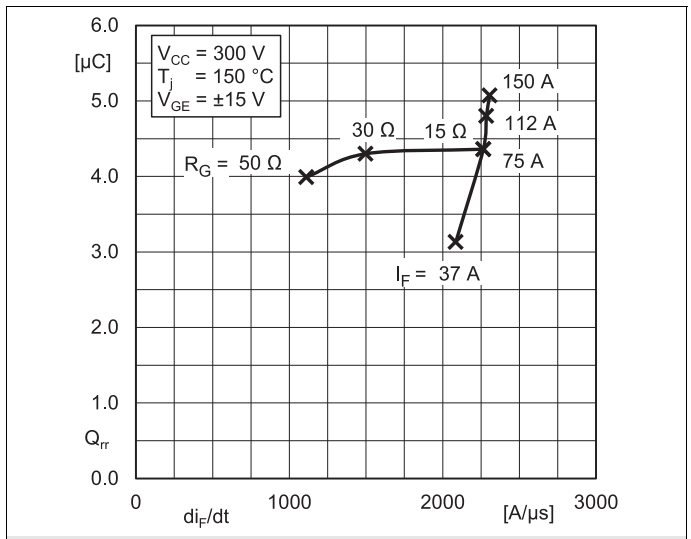
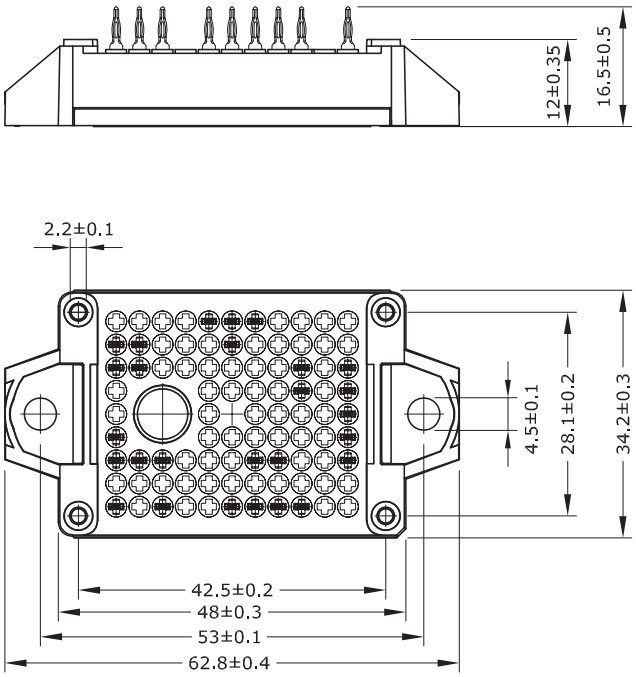
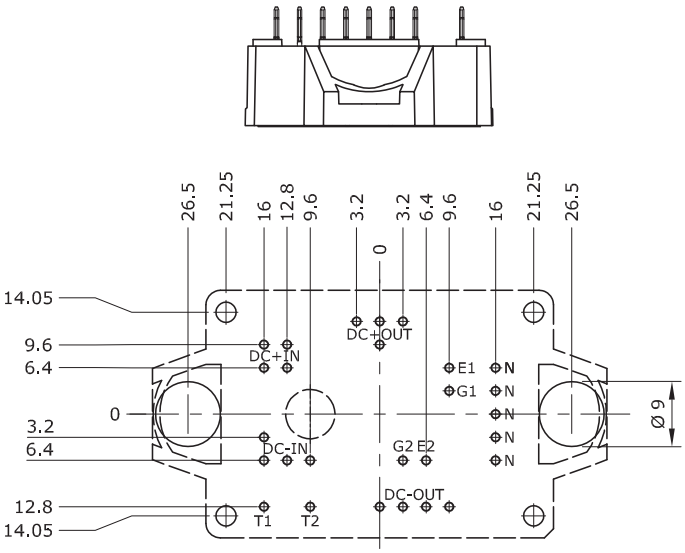


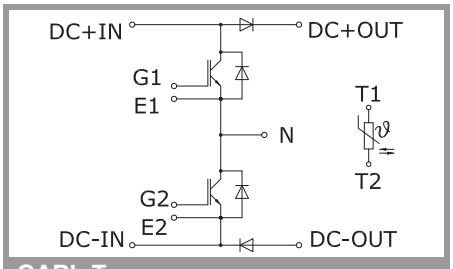
Fig. 12: Typ. Diode reverse recovery charge





- 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®E1



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

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