

**SEMITOP®E2**

## Sixpack Open Emitter

### SK75GD12T7ETE2

#### Features\*

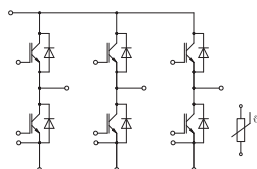
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- Integrated NTC temperature sensor
- UL recognized file no. E 63 532

#### Typical Applications

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

#### Remarks

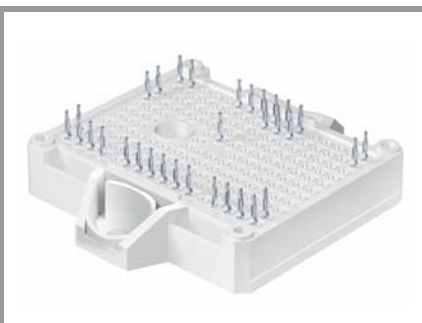
- Recommended  $T_{j,op} = -40 \dots +150 \text{ }^\circ\text{C}$
- $T_{j,op} > 150 \text{ }^\circ\text{C}$  during overload (details on AN19-002)



**GD-ET**

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
<b>Inverter - IGBT</b>				
$V_{CES}$	$T_j = 25 \text{ }^\circ\text{C}$		1200	V
$I_C$	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 70 \text{ }^\circ\text{C}$	75	A
		$T_j = 175 \text{ }^\circ\text{C}$	60	A
$I_C$	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 70 \text{ }^\circ\text{C}$	96	A
		$T_s = 100 \text{ }^\circ\text{C}$	78	A
$I_{Cnom}$			75	A
$I_{CRM}$			150	A
$V_{GES}$			-20 ... 20	V
$t_{psc}$	$V_{CC} = 800 \text{ V}$ $V_{GE} \leq 15 \text{ V}$ $V_{CES} \leq 1200 \text{ V}$	$T_j = 175 \text{ }^\circ\text{C}$	7	$\mu\text{s}$
$T_j$			-40 ... 175	$^\circ\text{C}$
<b>Inverse - Diode</b>				
$V_{RRM}$	$T_j = 25 \text{ }^\circ\text{C}$		1200	V
$I_F$	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 70 \text{ }^\circ\text{C}$	63	A
		$T_j = 175 \text{ }^\circ\text{C}$	50	A
$I_F$	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 70 \text{ }^\circ\text{C}$	81	A
		$T_s = 100 \text{ }^\circ\text{C}$	65	A
$I_{FRM}$			150	A
$I_{FSM}$	$t_p = 10 \text{ ms, sin } 180^\circ, T_j = 150 \text{ }^\circ\text{C}$		430	A
$T_j$			-40 ... 175	$^\circ\text{C}$
<b>Module</b>				
$I_{t(RMS)}$	, $\Delta T_{terminal}$ at PCB joint = 30 K, per pin		30	A
$T_{stg}$	module without TIM		-40 ... 125	$^\circ\text{C}$
$V_{isol}$	AC, sinusoidal, $t = 1 \text{ min}$		2500	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverter - IGBT</b>						
$V_{CE(sat)}$	$I_C = 75 \text{ A}$ $V_{GE} = 15 \text{ V}$ chipelevel	$T_j = 25 \text{ }^\circ\text{C}$	1.55	1.70		V
		$T_j = 150 \text{ }^\circ\text{C}$	1.73	1.88		V
		$T_j = 175 \text{ }^\circ\text{C}$	1.77	1.92		V
$V_{CE0}$	chipelevel	$T_j = 25 \text{ }^\circ\text{C}$	1.00	1.05		V
		$T_j = 150 \text{ }^\circ\text{C}$	0.80	0.85		V
		$T_j = 175 \text{ }^\circ\text{C}$	0.75	0.80		V
$r_{CE}$	$V_{GE} = 15 \text{ V}$ chipelevel	$T_j = 25 \text{ }^\circ\text{C}$	7.3	8.7		m $\Omega$
		$T_j = 150 \text{ }^\circ\text{C}$	12	14		m $\Omega$
		$T_j = 175 \text{ }^\circ\text{C}$	14	15		m $\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1.7 \text{ mA}$		5.15	5.8	6.45	V
$I_{CES}$	$V_{GE} = 0 \text{ V}, V_{CE} = 1200 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$				1	mA
$C_{ies}$				15.10		nF
$C_{oes}$	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$		0.19		nF
$C_{res}$		$f = 1 \text{ MHz}$		0.54		nF
$Q_G$	$V_{GE} = -15\text{V} \dots +15\text{V}$			1218		nC
$R_{Gint}$	$T_j = 25 \text{ }^\circ\text{C}$			2.0		$\Omega$



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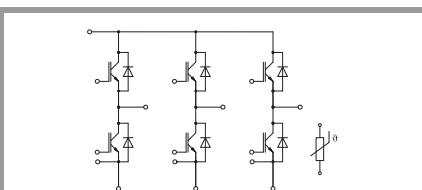
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#### Remarks

- Recommended  $T_{j,op} = -40 \dots +150 \text{ }^\circ\text{C}$
- $T_{j,op} > 150 \text{ }^\circ\text{C}$  during overload (details on AN19-002)



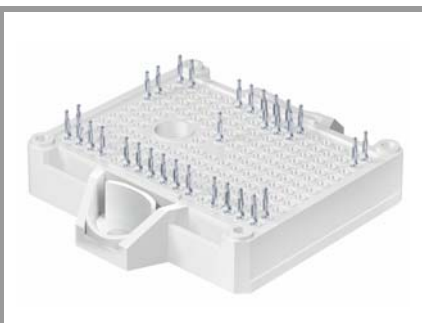
**GD-ET**

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverter - IGBT</b>						
$t_{d(on)}$		$T_j = 25 \text{ }^\circ\text{C}$		111		ns
		$T_j = 150 \text{ }^\circ\text{C}$		126		ns
		$T_j = 175 \text{ }^\circ\text{C}$		131		ns
$t_r$		$T_j = 25 \text{ }^\circ\text{C}$		25		ns
		$T_j = 150 \text{ }^\circ\text{C}$		31		ns
		$T_j = 175 \text{ }^\circ\text{C}$		33		ns
$E_{on}$	$V_{CC} = 600 \text{ V}$ $I_C = 75 \text{ A}$ $R_{G on} = 2.2 \text{ } \Omega$ $R_{G off} = 2.2 \text{ } \Omega$ $V_{GE} = +15/-15 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}$		4.06		mJ
		$T_j = 150 \text{ }^\circ\text{C}$		7.06		mJ
		$T_j = 175 \text{ }^\circ\text{C}$		7.81		mJ
		$T_j = 25 \text{ }^\circ\text{C}$		231		ns
$t_{d(off)}$	$(T_j = 150 \text{ }^\circ\text{C})$ $di/dt_{on} = 2400 \text{ A}/\mu\text{s}$ $di/dt_{off} = 700 \text{ A}/\mu\text{s}$	$T_j = 150 \text{ }^\circ\text{C}$		307		ns
		$T_j = 175 \text{ }^\circ\text{C}$		325		ns
		$T_j = 25 \text{ }^\circ\text{C}$		49		ns
$t_f$	$dv/dt = 4000 \text{ V}/\mu\text{s}$	$T_j = 150 \text{ }^\circ\text{C}$		73		ns
		$T_j = 175 \text{ }^\circ\text{C}$		76		ns
		$T_j = 25 \text{ }^\circ\text{C}$		4.62		mJ
$E_{off}$		$T_j = 150 \text{ }^\circ\text{C}$		7.85		mJ
		$T_j = 175 \text{ }^\circ\text{C}$		8.65		mJ
		$T_j = 25 \text{ }^\circ\text{C}$		0.73		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8 \text{ W}/(\text{mK})$					K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 2.5 \text{ W}/(\text{mK})$					K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverse - Diode</b>						
$V_F = V_{EC}$	$I_F = 75 \text{ A}$	$T_j = 25 \text{ }^\circ\text{C}$		2.17	2.49	V
		$T_j = 150 \text{ }^\circ\text{C}$		2.11	2.42	V
		chiplevel	$T_j = 175 \text{ }^\circ\text{C}$		1.96	2.27
$V_{F0}$	chiplevel	$T_j = 25 \text{ }^\circ\text{C}$		1.30	1.50	V
		$T_j = 150 \text{ }^\circ\text{C}$		0.90	1.10	V
		$T_j = 175 \text{ }^\circ\text{C}$		0.82	0.98	V
$r_F$	chiplevel	$T_j = 25 \text{ }^\circ\text{C}$		12	13	m $\Omega$
		$T_j = 150 \text{ }^\circ\text{C}$		16	18	m $\Omega$
		$T_j = 175 \text{ }^\circ\text{C}$		15	17	m $\Omega$
$I_{RRM}$		$T_j = 25 \text{ }^\circ\text{C}$		97		A
		$T_j = 150 \text{ }^\circ\text{C}$		136		A
		$T_j = 175 \text{ }^\circ\text{C}$		143		A
$Q_{rr}$	$I_F = 75 \text{ A}$ $V_{GE} = +15/-15 \text{ V}$ $V_{CC} = 600 \text{ V}$ $(T_j = 150 \text{ }^\circ\text{C})$	$T_j = 25 \text{ }^\circ\text{C}$		5.54		$\mu\text{C}$
		$T_j = 150 \text{ }^\circ\text{C}$		13.97		$\mu\text{C}$
		$T_j = 175 \text{ }^\circ\text{C}$		16.11		$\mu\text{C}$
$E_{rr}$	$di/dt_{off} = 2600 \text{ A}/\mu\text{s}$	$T_j = 25 \text{ }^\circ\text{C}$		2.48		mJ
		$T_j = 150 \text{ }^\circ\text{C}$		6.44		mJ
		$T_j = 175 \text{ }^\circ\text{C}$		7.35		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8 \text{ W}/(\text{mK})$			0.82		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 2.5 \text{ W}/(\text{mK})$			0.55		K/W

Module						
$L_{CE}$				40		nH
$M_s$	to heatsink		1.6		2.3	Nm
w				35		g

# SK75GD12T7ETE2



SEMITOP®E2

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Temperature Sensor</b>					
R <sub>100</sub>	T <sub>c</sub> =100°C (R <sub>25</sub> =5 kΩ)		493 ± 5%		Ω
B <sub>25/85</sub>	R <sub>(T)</sub> =R <sub>25</sub> *exp[B <sub>25/85</sub> *(1/T-1/298)], T[K]		3420		K

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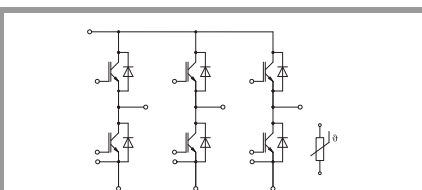
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#### Remarks

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- T<sub>j,op</sub> > 150 °C during overload (details on AN19-002)



GD-ET

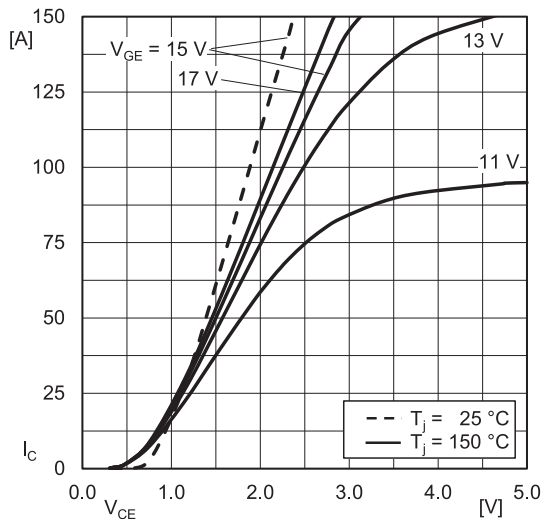


Fig. 1: Typ. IGBT output characteristic, incl.  $R_{CC+EE'}$

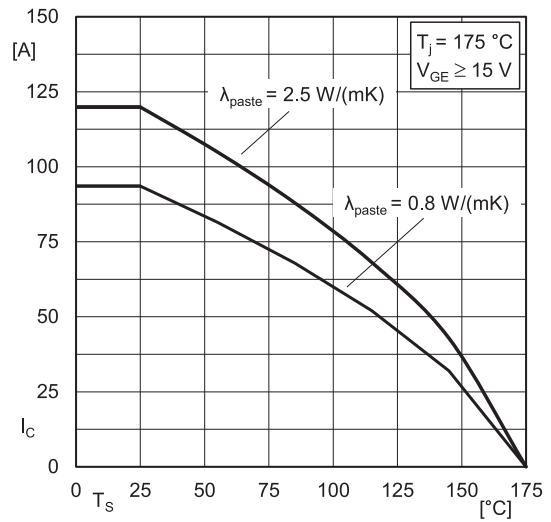


Fig. 2: IGBT rated current vs. temperature  $I_c=f(T_s)$

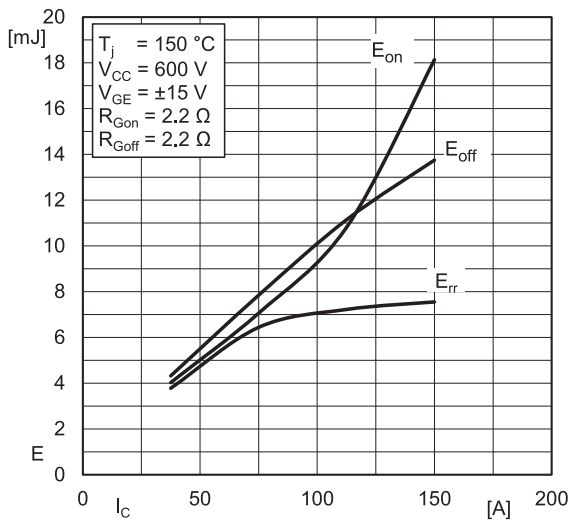


Fig. 3: Typ. turn-on /-off energy =  $f(I_c)$

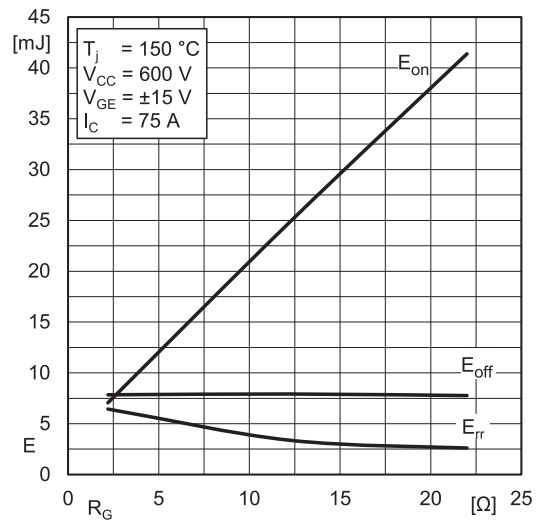


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

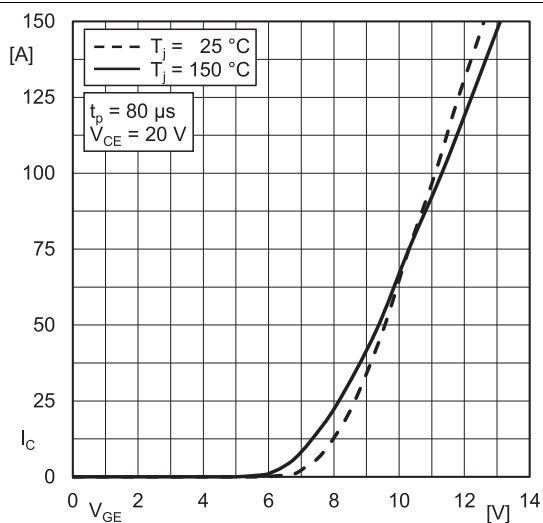


Fig. 5: Typ. IGBT transfer characteristic

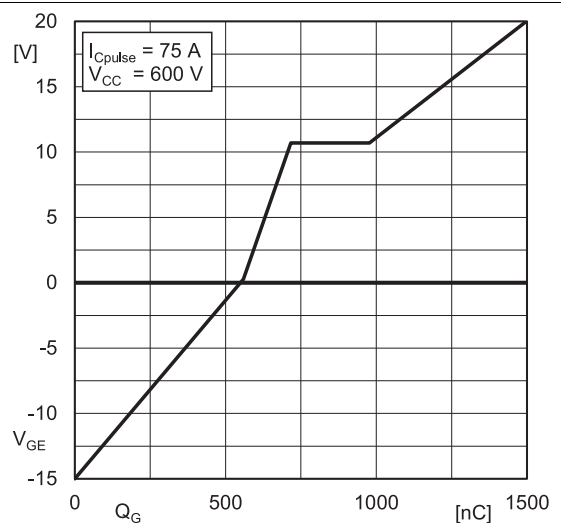


Fig. 6: Typ. IGBT gate charge characteristic

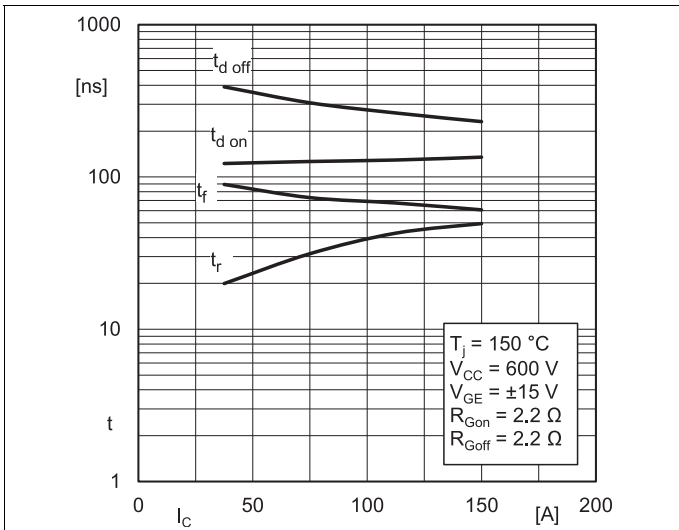


Fig. 7: Typ. switching times =  $f(I_C)$

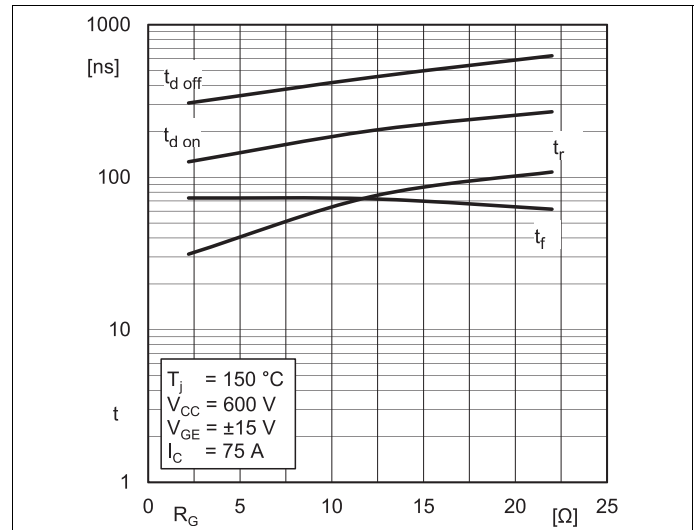


Fig. 8: Typ. switching times =  $f(R_G)$

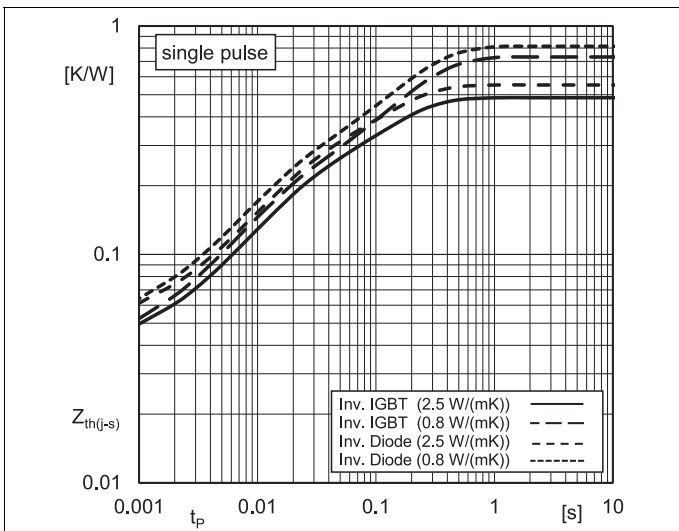


Fig. 9: Typ. transient thermal impedance

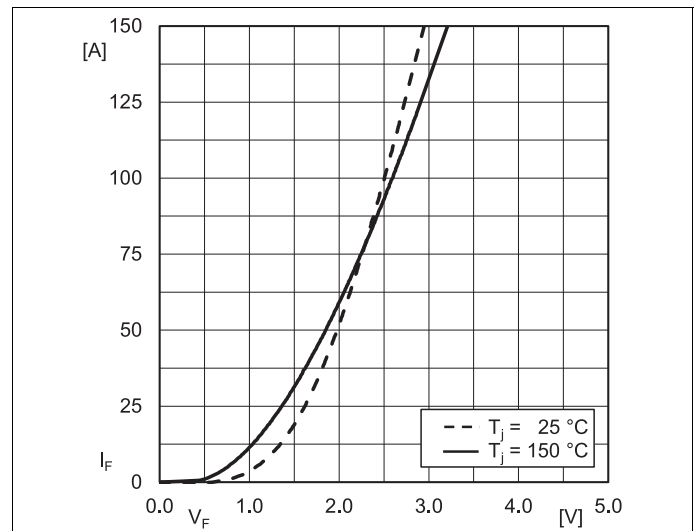


Fig. 10: Typ. Inv. diode forward charact., incl.  $R_{CC+EE'}$

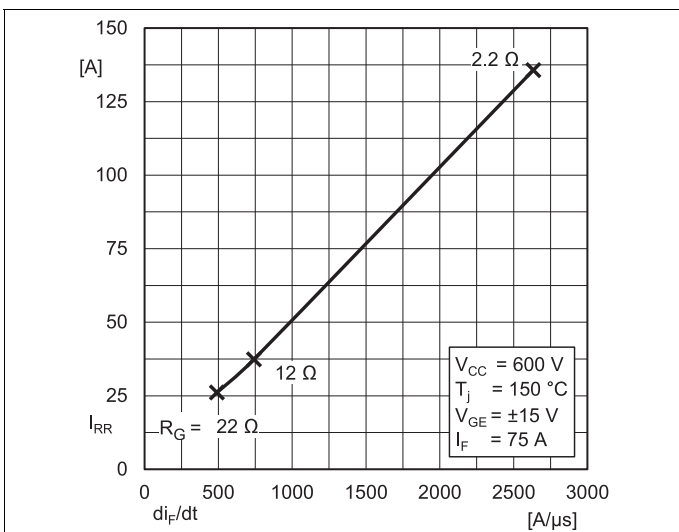


Fig. 11: Typ. Inv. diode peak reverse recovery current

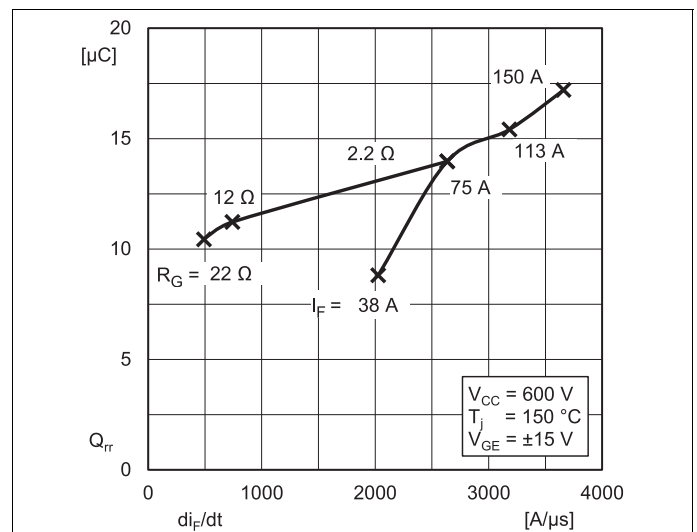
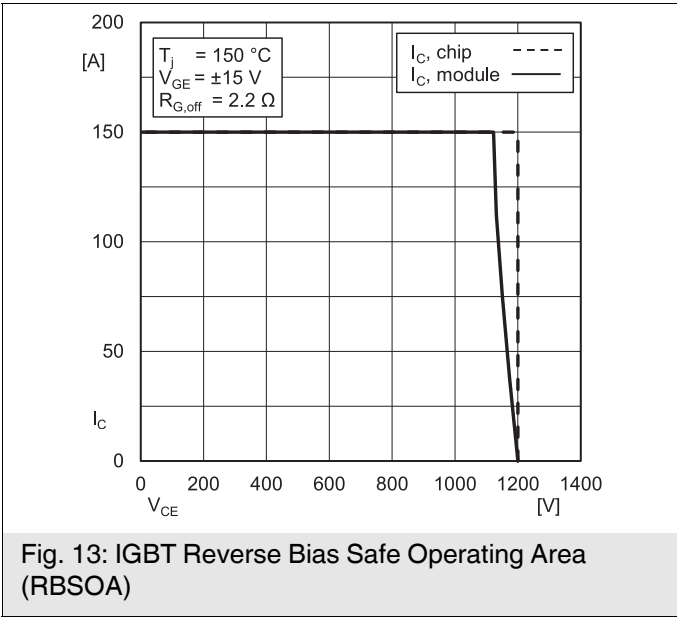
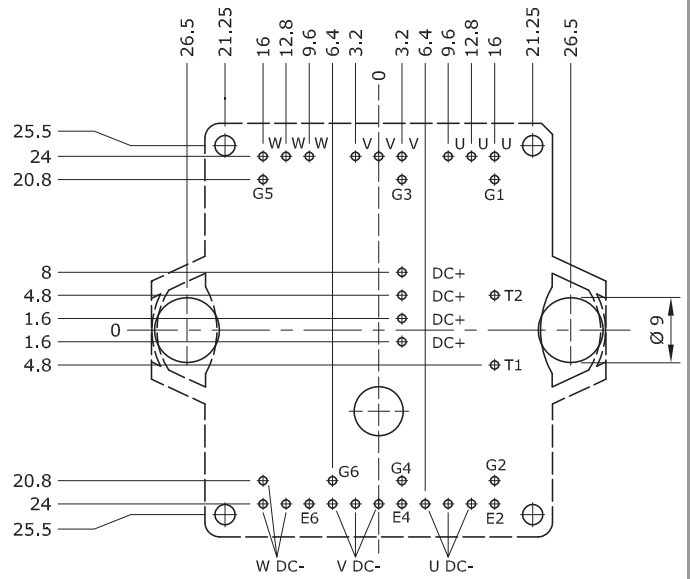
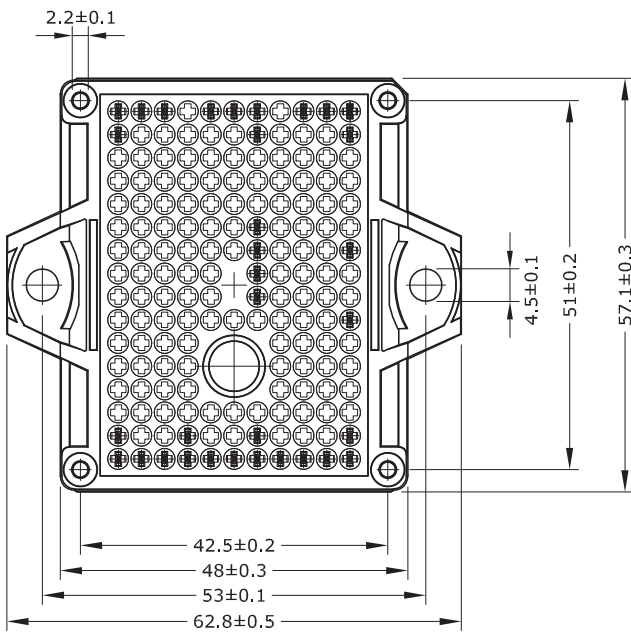
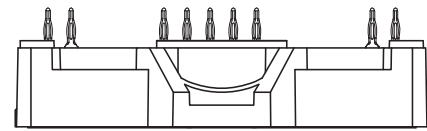
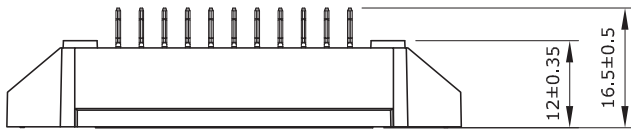


Fig. 12: Typ. Inv. diode reverse recovery charge

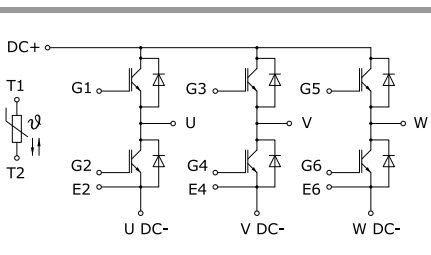


# SK75GD12T7ETE2



- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern  $\pm 0.1$
- Diameters of drill  $\varnothing 1.15\text{mm}$
- Copper thickness in hole 25 - 50  $\mu\text{m}$
- 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.

## **\*IMPORTANT INFORMATION AND WARNINGS**

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