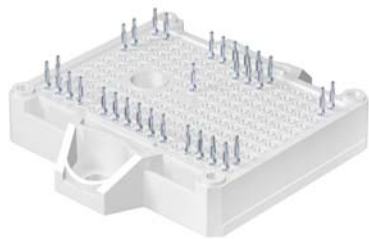


# SK75GD12T4ETE2



SEMITOP®E2

## IGBT module

### SK75GD12T4ETE2

#### Features\*

- Low inductive design
- Press-Fit contact technology
- Rugged mounting due to integrated mounting clamps
- Heat transfer and insulation through direct copper bonded aluminium oxide ceramic (DBC)
- Trench4 IGBT technology
- 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

#### Absolute Maximum Ratings

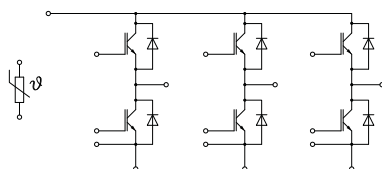
Symbol	Conditions		Values	Unit
IGBT 1				
V <sub>CES</sub>	T <sub>j</sub> = 25 °C		1200	V
I <sub>C</sub>	λ <sub>paste</sub> =0.8 W/(mK)	T <sub>s</sub> = 25 °C	88	A
	T <sub>j</sub> = 175 °C	T <sub>s</sub> = 70 °C	71	A
I <sub>C</sub>	λ <sub>paste</sub> =2.5 W/(mK)	T <sub>s</sub> = 25 °C	113	A
	T <sub>j</sub> = 175 °C	T <sub>s</sub> = 70 °C	92	A
I <sub>Cnom</sub>			75	A
I <sub>CRM</sub>	I <sub>CRM</sub> = 3 x I <sub>Cnom</sub>		225	A
V <sub>GES</sub>			-20 ... 20	V
t <sub>psc</sub>	V <sub>CC</sub> = 800 V V <sub>GE</sub> ≤ 15 V V <sub>CES</sub> ≤ 1200 V	T <sub>j</sub> = 150 °C	10	μs
T <sub>j</sub>			-40 ... 175	°C

#### Absolute Maximum Ratings

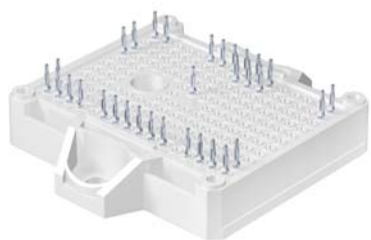
Symbol	Conditions		Values	Unit
Diode 1				
V <sub>RRM</sub>	T <sub>j</sub> = 25 °C		1200	V
I <sub>F</sub>	λ <sub>paste</sub> =0.8 W/(mK)	T <sub>s</sub> = 25 °C	79	A
	T <sub>j</sub> = 175 °C	T <sub>s</sub> = 70 °C	62	A
I <sub>F</sub>	λ <sub>paste</sub> =2.5 W/(mK)	T <sub>s</sub> = 25 °C	101	A
	T <sub>j</sub> = 175 °C	T <sub>s</sub> = 70 °C	81	A
I <sub>Fnom</sub>			75	A
I <sub>FRM</sub>	I <sub>FRM</sub> = 2 x I <sub>Fnom</sub>		150	A
I <sub>FSM</sub>	10 ms	T <sub>j</sub> = 25 °C	430	A
	sin 180°	T <sub>j</sub> = 150 °C	430	A
T <sub>j</sub>			-40 ... 175	°C

#### Absolute Maximum Ratings

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



GD-ET



SEMITOP®E2

## IGBT module

### SK75GD12T4ETE2

#### Features\*

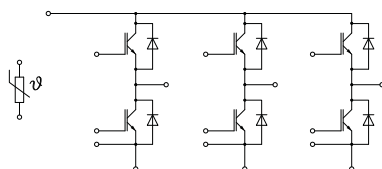
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#### Typical Applications

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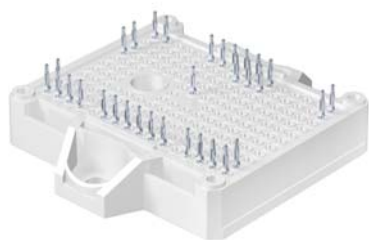
Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
V <sub>CE(sat)</sub>	I <sub>C</sub> = 75 A	T <sub>j</sub> = 25 °C		1.85	2.10	V
	V <sub>GE</sub> = 15 V chiplevel	T <sub>j</sub> = 150 °C		2.25	2.45	V
V <sub>CE0</sub>	chiplevel	T <sub>j</sub> = 25 °C		0.80	0.90	V
		T <sub>j</sub> = 150 °C		0.70	0.80	V
r <sub>CE</sub>	V <sub>GE</sub> = 15 V	T <sub>j</sub> = 25 °C		14	16	mΩ
	chiplevel	T <sub>j</sub> = 150 °C		21	22	mΩ
V <sub>GE(th)</sub>	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 3 mA		5	5.8	6.5	V
I <sub>CES</sub>	V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 1200 V, T <sub>j</sub> = 25 °C				1	mA
C <sub>ies</sub>	V <sub>CE</sub> = 25 V V <sub>GE</sub> = 0 V	f = 1 MHz		4.4		nF
C <sub>oes</sub>		f = 1 MHz		0.29		nF
C <sub>res</sub>		f = 1 MHz		0.235		nF
Q <sub>G</sub>	V <sub>GE</sub> = -15V ... +15V			553		nC
R <sub>Gint</sub>	T <sub>j</sub> = 25 °C			10		Ω
t <sub>d(on)</sub>	V <sub>CC</sub> = 600 V	T <sub>j</sub> = 150 °C		129		ns
t <sub>r</sub>	I <sub>C</sub> = 75 A	T <sub>j</sub> = 150 °C		42		ns
E <sub>on</sub>	V <sub>GE</sub> = +15/-15 V R <sub>G on</sub> = 1.1 Ω	T <sub>j</sub> = 150 °C		6.62		mJ
t <sub>d(off)</sub>	R <sub>G off</sub> = 1.1 Ω	T <sub>j</sub> = 150 °C		333		ns
t <sub>f</sub>	di/dt <sub>on</sub> = 2410 A/μs	T <sub>j</sub> = 150 °C		65		ns
E <sub>off</sub>	di/dt <sub>off</sub> = 593 A/μs dv/dt = 4035 V/μs	T <sub>j</sub> = 150 °C		7.11		mJ
R <sub>th(j-s)</sub>	per IGBT, λ <sub>paste</sub> =0.8 W/(mK)			0.61		K/W
R <sub>th(j-s)</sub>	per IGBT, λ <sub>paste</sub> =2.5 W/(mK)			0.39		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V <sub>F</sub>	I <sub>F</sub> = 75 A	T <sub>j</sub> = 25 °C		2.17	2.49	V
	chiplevel	T <sub>j</sub> = 150 °C		2.11	2.42	V
V <sub>F0</sub>	chiplevel	T <sub>j</sub> = 25 °C		1.30	1.50	V
		T <sub>j</sub> = 150 °C		0.90	1.10	V
r <sub>F</sub>	chiplevel	T <sub>j</sub> = 25 °C		12	13	mΩ
		T <sub>j</sub> = 150 °C		16	18	mΩ
I <sub>RRM</sub>	I <sub>F</sub> = 75 A	T <sub>j</sub> = 150 °C		114		A
Q <sub>rr</sub>	di/dt <sub>off</sub> = 2410 A/μs	T <sub>j</sub> = 150 °C		11.22		μC
E <sub>rr</sub>	V <sub>GE</sub> = -15 V V <sub>CC</sub> = 600 V	T <sub>j</sub> = 150 °C		4.41		mJ
R <sub>th(j-s)</sub>	per Diode, λ <sub>paste</sub> =0.8 W/(mK)			0.82		K/W
R <sub>th(j-s)</sub>	per Diode, λ <sub>paste</sub> =2.5 W/(mK)			0.55		K/W



GD-ET

# SK75GD12T4ETE2



**SEMITOP®E2**

## IGBT module

### SK75GD12T4ETE2

#### Features\*

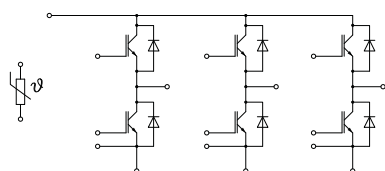
- Low inductive design
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#### Typical Applications

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

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Module</b>					
$M_s$	to heatsink	1.6		2.3	Nm
w	weight		35		g

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Temperature Sensor</b>					
$R_{100}$	$T_r = 100\text{ °C}$		$493 \pm 5\%$		$\Omega$
$B_{100/125}$	$R(T) = R_{100} \exp[B_{100/125}(1/T - 1/T_{100})]$ ; $T[K]$		$3550 \pm 2\%$		K



**GD-ET**

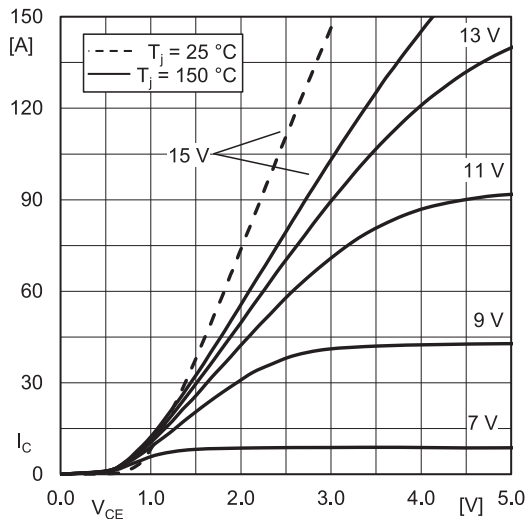


Fig. 1: Typ. IGBT output characteristic, incl.  $R_{CC}'+EE'$

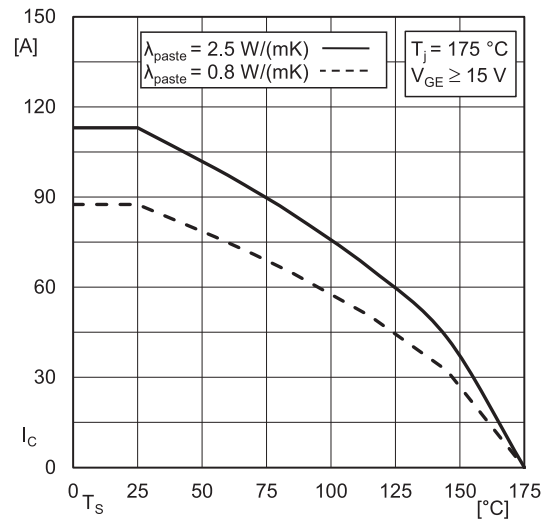


Fig. 2: IGBT rated current vs. temperature  $I_C=f(T_s)$

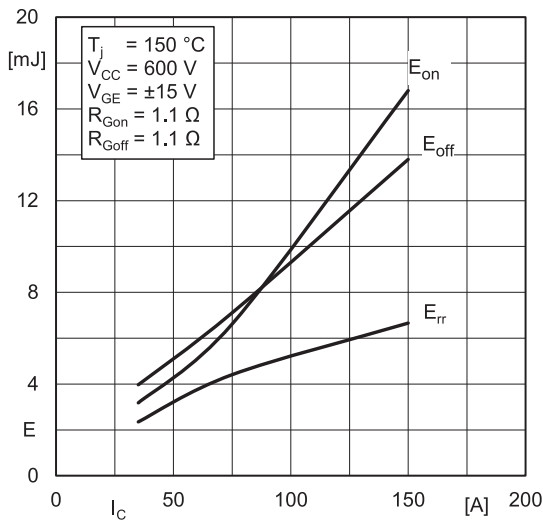


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

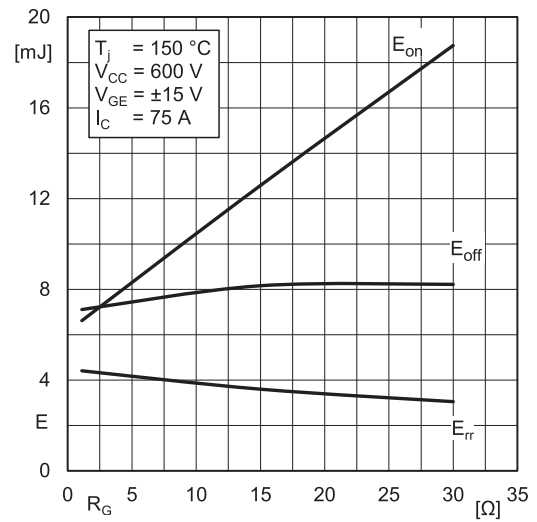


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

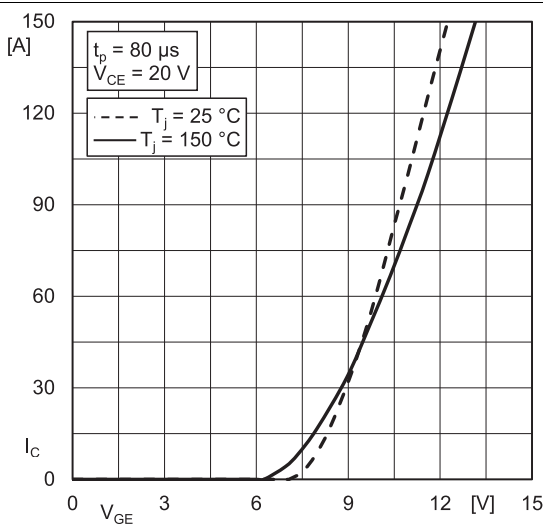


Fig. 5: Typ. IGBT transfer characteristic

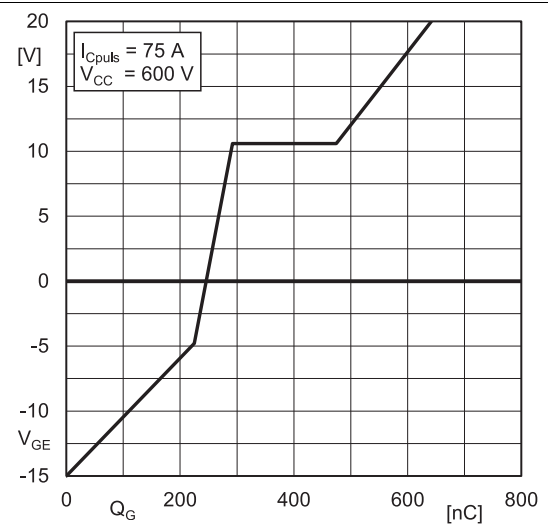


Fig. 6: Typ. IGBT gate charge characteristic

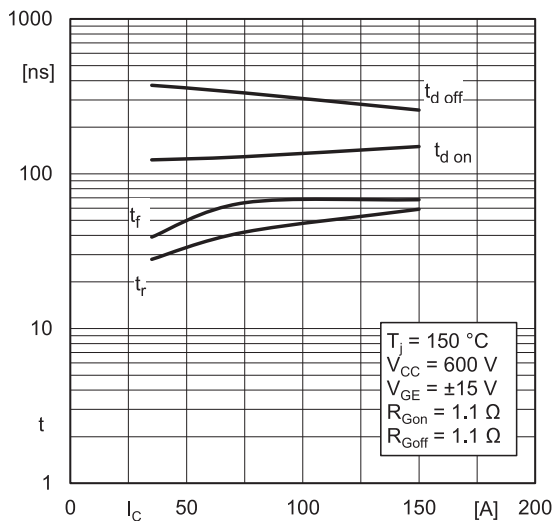


Fig. 7: Typ. switching times = f(I<sub>C</sub>)

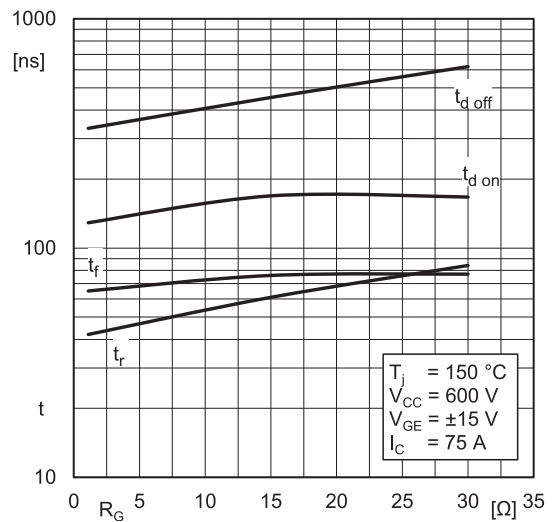


Fig. 8: Typ. switching times = f(R<sub>G</sub>)

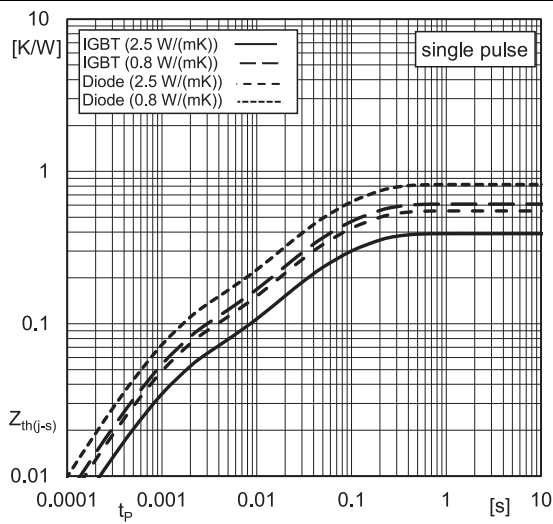


Fig. 9: Typ. transient thermal impedance

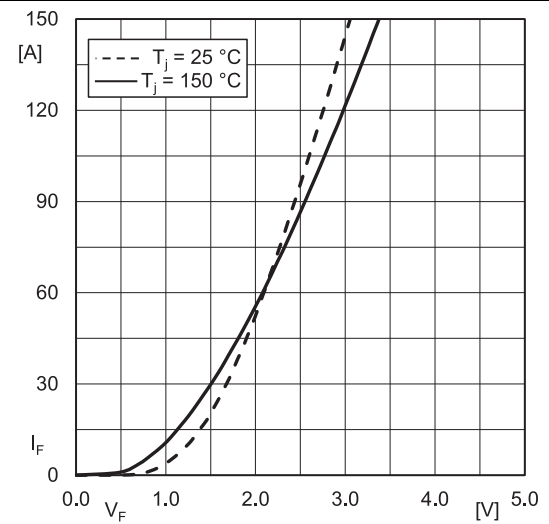


Fig. 10: Typ. Diode forward charact., incl. R<sub>CC'+EE'</sub>

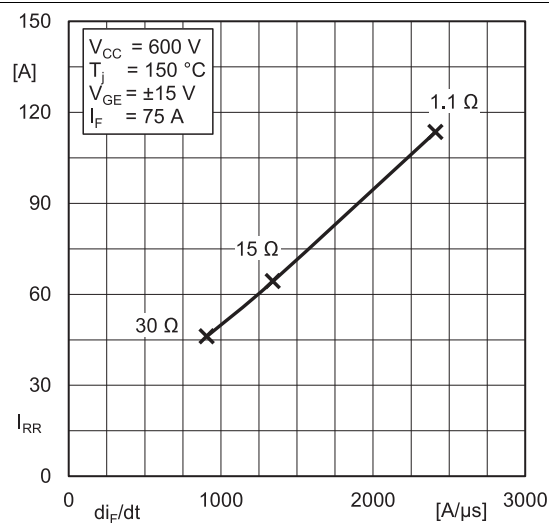


Fig. 11: Typ. Diode peak reverse recovery current

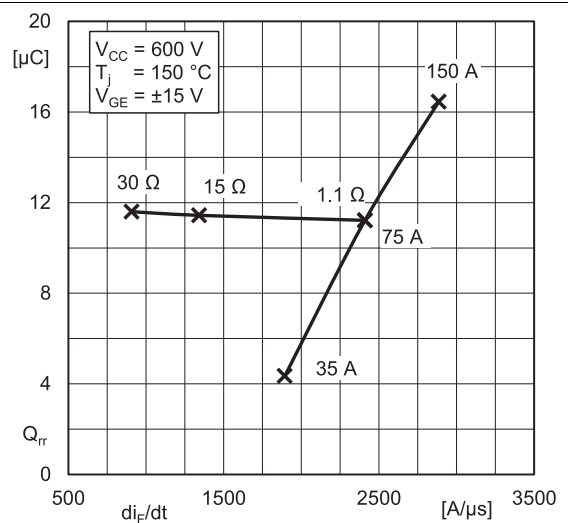


Fig. 12: Typ. Diode reverse recovery charge

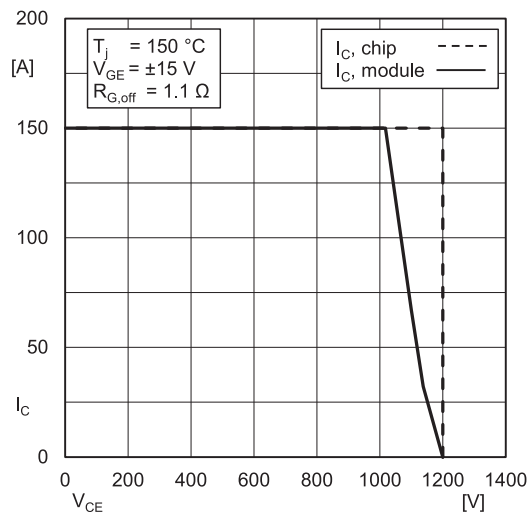
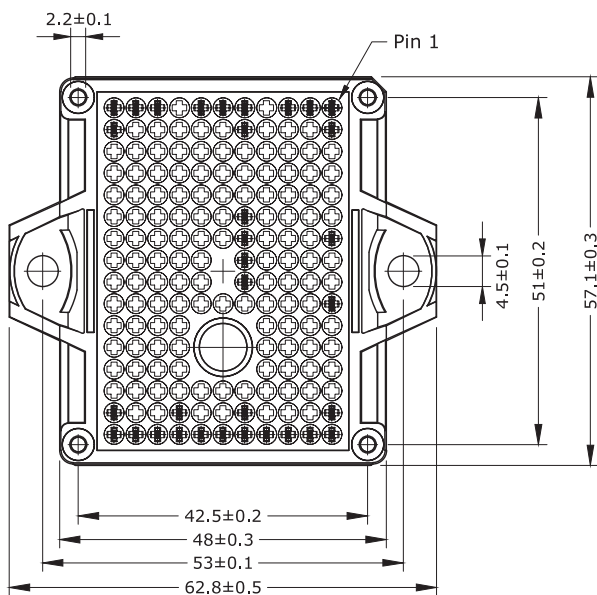
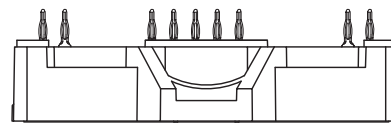
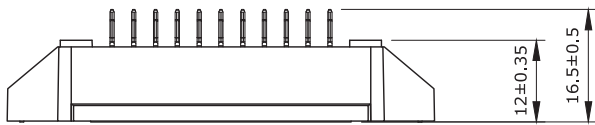
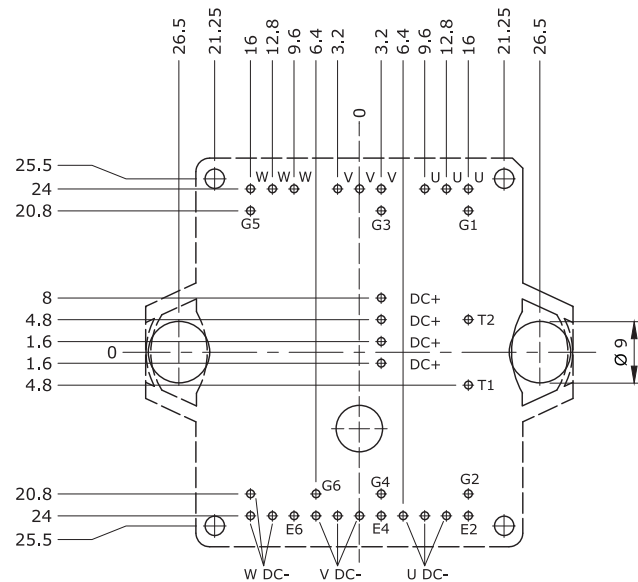


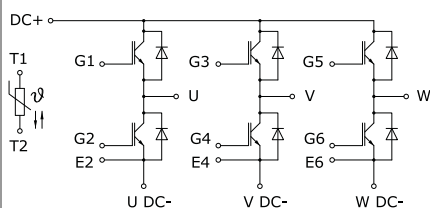
Fig. 13: IGBT Reverse Bias Safe Operating Area (RBSOA)



- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern  $\Phi 0.025$
- Diameters of drill  $\Phi 1.15\text{mm}$
- Copper thickness in hole 25 - 50  $\mu\text{m}$
- Hole specification for contacts: refer to SEMITOP E1, E2 mounting instructions



SEMITOP®E2



GD-ET

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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

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