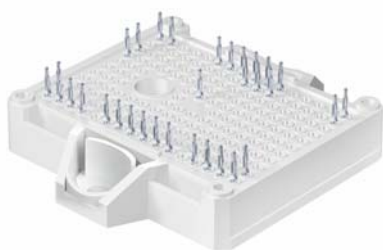


SK25DGD12T7ETE2



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK25DGD12T7ETE2

Features*

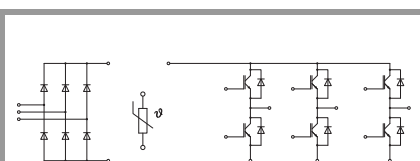
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor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

Typical Applications

- Motor drives
- Air conditioning
- Auxiliary Inverters

Remarks

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



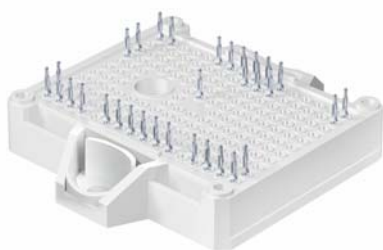
DGD-ET

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}			1200	V
I _C	P12	T _s = 70 °C	33	A
	T _j = 175 °C	T _s = 100 °C	27	A
I _C	HPTP / HP-PCM	T _s = 70 °C	38	A
	T _j = 175 °C	T _s = 100 °C	31	A
I _{Cnom}			25	A
I _{CRM}			50	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 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	P12	T _s = 70 °C	24	A
	T _j = 175 °C	T _s = 100 °C	20	A
I _F	HPTP / HP-PCM	T _s = 70 °C	28	A
	T _j = 175 °C	T _s = 100 °C	23	A
I _{FRM}			50	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		100	A
T _j			-40 ... 175	°C
Rectifier - Diode				
V _{RRM}	T _j = 25 °C		1600	V
I _F	P12	T _s = 70 °C	47	A
	T _j = 175 °C	T _s = 100 °C	37	A
I _F	HPTP / HP-PCM	T _s = 70 °C	57	A
	T _j = 175 °C	T _s = 100 °C	45	A
I _{FSM}	t _p = 10 ms	T _j = 25 °C	370	A
	sin 180°	T _j = 150 °C	270	A
i ² t	t _p = 10 ms	T _j = 25 °C	685	A ² s
	sin 180°	T _j = 150 °C	365	A ² s
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	, ΔT _{terminal} at PCB joint = 30 K, per pin		30	A
T _{stg}	module without TIM		-40 ... 125	°C
V _{isol}	AC, sinusoidal, 1 min		2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
V _{CE(sat)}	I _C = 25 A	T _j = 25 °C		1.60	1.75	V
	V _{GE} = 15 V chiplevel	T _j = 150 °C		1.78	1.93	V
		T _j = 175 °C		1.82	1.97	V
V _{CE0}	chiplevel	T _j = 25 °C		1.00	1.05	V
		T _j = 150 °C		0.80	0.85	V
		T _j = 175 °C		0.75	0.80	V
r _{CE}	V _{GE} = 15 V chiplevel	T _j = 25 °C		24	28	mΩ
		T _j = 150 °C		39	43	mΩ
		T _j = 175 °C		43	47	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 0.53 mA		5.15	5.8	6.45	V



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK25DGD12T7ETE2

Features*

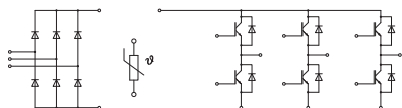
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor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

Typical Applications

- Motor drives
- Air conditioning
- Auxiliary Inverters

Remarks

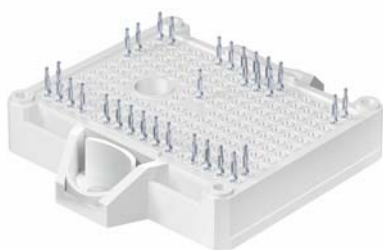
- Recommended $T_{j,op} = -40 \dots +150 \text{ }^{\circ}\text{C}$
- $T_{j,op} > 150 \text{ }^{\circ}\text{C}$ during overload (details in AN19-002)



DGD-ET

Characteristics							
Symbol	Conditions		min.	typ.	max.	Unit	
Inverter - IGBT							
I _{CES}	V _{GE} = 0 V, V _{CE} = 1200 V, T _j = 25 °C				1	mA	
C _{ies}	V _{CE} = 25 V	f = 1 MHz		4.80		nF	
C _{oes}		f = 1 MHz		0.06		nF	
C _{res}		f = 1 MHz		0.02		nF	
Q _G	V _{GE} = -15 V ... +15 V			354		nC	
R _{Gint}	T _j = 25 °C			0		Ω	
t _{d(on)}	V _{CC} = 600 V I _C = 25 A R _{G on} = 6.2 Ω R _{G off} = 6.2 Ω	T _j = 25 °C		28		ns	
		T _j = 150 °C		30		ns	
		T _j = 175 °C		32		ns	
t _r		T _j = 25 °C		23		ns	
		T _j = 150 °C		25		ns	
		T _j = 175 °C		26		ns	
E _{on}		T _j = 25 °C		1.65		mJ	
		T _j = 150 °C		2.42		mJ	
		T _j = 175 °C		2.72		mJ	
t _{d(off)}		V _{GE} = +15/-15 V (T _j = 150 °C) di/dt _{on} = 880 A/μs di/dt _{off} = 210 A/μs dv/dt = 5400 V/μs	T _j = 25 °C		191		ns
			T _j = 150 °C		231		ns
			T _j = 175 °C		251		ns
t _f			T _j = 25 °C		66		ns
			T _j = 150 °C		101		ns
			T _j = 175 °C		108		ns
E _{off}	T _j = 25 °C			2.04		mJ	
	T _j = 150 °C			2.71		mJ	
	T _j = 175 °C			3.09		mJ	
R _{th(j-s)}	per IGBT, P12 (Reference)			1.32		K/W	
R _{th(j-s)}	per IGBT, HPTP / HP-PCM			1.06		K/W	
Inverse - Diode							
V _F = V _{EC}	I _F = 25 A	T _j = 25 °C		2.41	2.74	V	
	chiplevel	T _j = 150 °C		2.45	2.79	V	
		T _j = 175 °C		2.30	2.62	V	
V _{F0}		T _j = 25 °C		1.30	1.50	V	
	chiplevel	T _j = 150 °C		0.90	1.10	V	
		T _j = 175 °C		0.82	0.98	V	
r _F		T _j = 25 °C		44	50	mΩ	
	chiplevel	T _j = 150 °C		62	68	mΩ	
		T _j = 175 °C		59	66	mΩ	
I _{RRM}		T _j = 25 °C		20		A	
	I _F = 25 A V _{GE} = -15 V V _{CC} = 600 V (T _j = 150 °C) di/dt _{off} = 1050 A/μs	T _j = 150 °C		28		A	
		T _j = 175 °C		30		A	
Q _{rr}		T _j = 25 °C		1.41		μC	
		T _j = 150 °C		3.71		μC	
		T _j = 175 °C		4.19		μC	
E _{rr}		T _j = 25 °C		0.51		mJ	
		T _j = 150 °C		1.61		mJ	
		T _j = 175 °C		2.46		mJ	
R _{th(j-s)}		per Diode, P12 (Reference)			1.66		K/W
R _{th(j-s)}	per Diode, HPTP / HP-PCM			1.29		K/W	

SK25DGD12T7ETE2



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK25DGD12T7ETE2

Features*

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- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor
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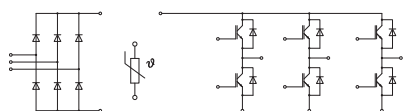
Typical Applications

- Motor drives
- Air conditioning
- Auxiliary Inverters

Remarks

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

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Rectifier - Diode						
$V_F = V_{EC}$	$I_F = 25\text{ A}$ chiplevel	$T_j = 25\text{ }^{\circ}\text{C}$		1.04	1.30	V
		$T_j = 150\text{ }^{\circ}\text{C}$		0.95	1.21	V
		$T_j = 175\text{ }^{\circ}\text{C}$		0.94	1.21	V
V_{F0}	chiplevel	$T_j = 25\text{ }^{\circ}\text{C}$		0.89	1.09	V
		$T_j = 150\text{ }^{\circ}\text{C}$		0.73	0.92	V
		$T_j = 175\text{ }^{\circ}\text{C}$		0.69	0.88	V
r_F	chiplevel	$T_j = 25\text{ }^{\circ}\text{C}$		6.2	8.5	mΩ
		$T_j = 150\text{ }^{\circ}\text{C}$		8.8	12	mΩ
		$T_j = 175\text{ }^{\circ}\text{C}$		10.0	13	mΩ
I_R	$T_j = 150\text{ }^{\circ}\text{C}, V_{RRM}$			2		mA
$R_{th(j-s)}$	per Diode, P12 (Reference)			1.48		K/W
$R_{th(j-s)}$	per Diode, HPTP / HP-PCM			1.14		K/W
Module						
M_s	to heatsink		1.6		2.3	Nm
w				35		g
L_{CE}				30		nH
Temperature Sensor						
R_{100}	$T_c=100^{\circ}\text{C}$ ($R_{25}=5\text{ k}\Omega$)			493 ± 5%		Ω
$B_{25/85}$	$R_{(T)}=R_{25}*\exp[B_{25/85}*(1/T-1/298)]$, T[K]			3420		K



DGD-ET

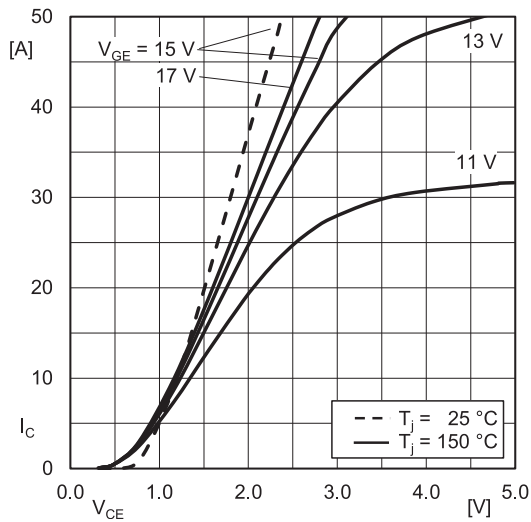


Fig. 1: Typ. IGBT output characteristic, incl. $R_{CC+EE'}$

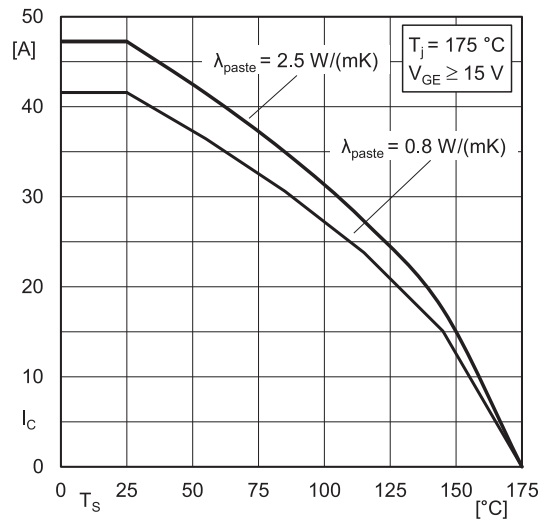


Fig. 2: IGBT rated current vs. temperature $I_C=f(T_s)$

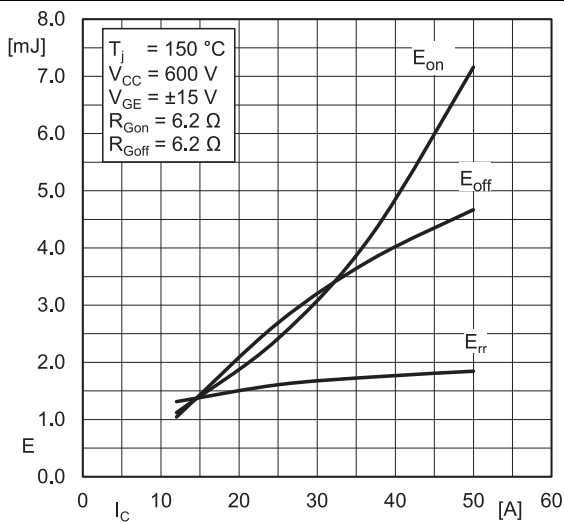


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

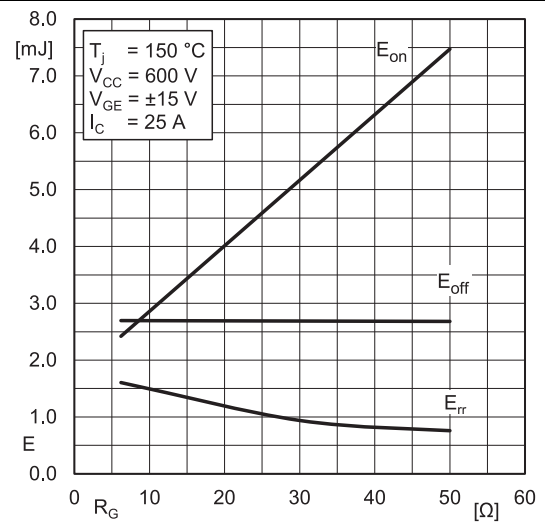


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

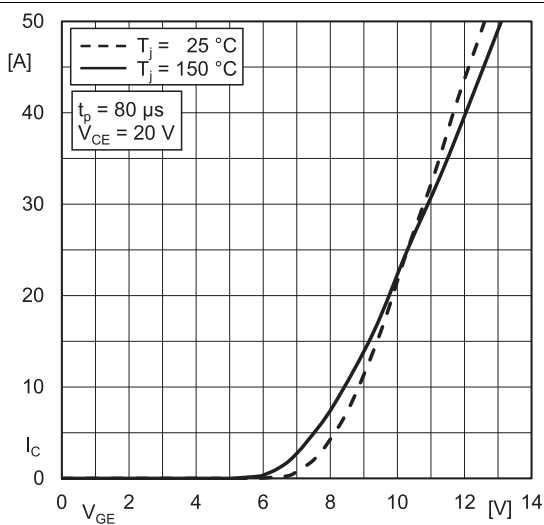


Fig. 5: Typ. IGBT transfer characteristic

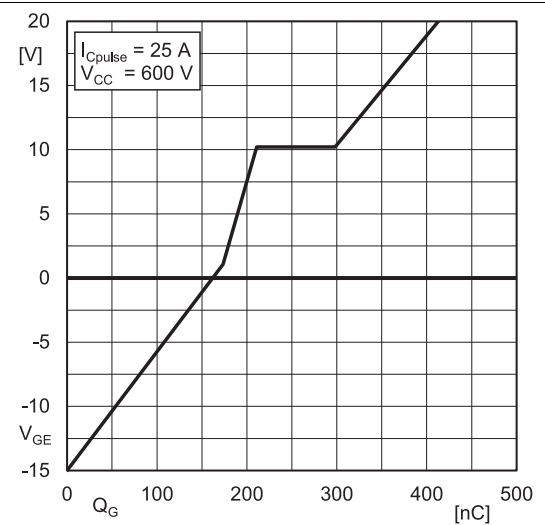


Fig. 6: Typ. IGBT gate charge characteristic

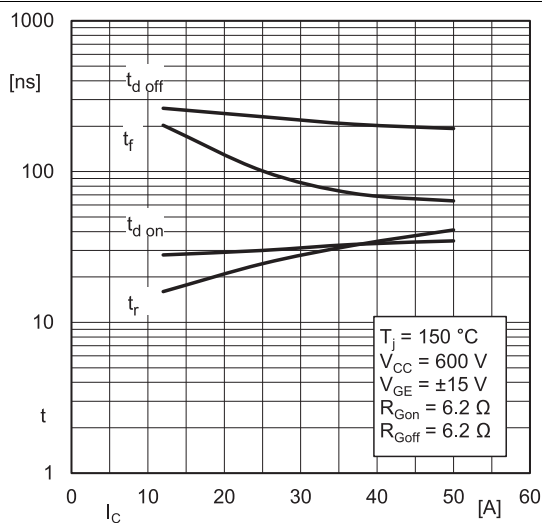


Fig. 7: Typ. switching times = $f(I_C)$

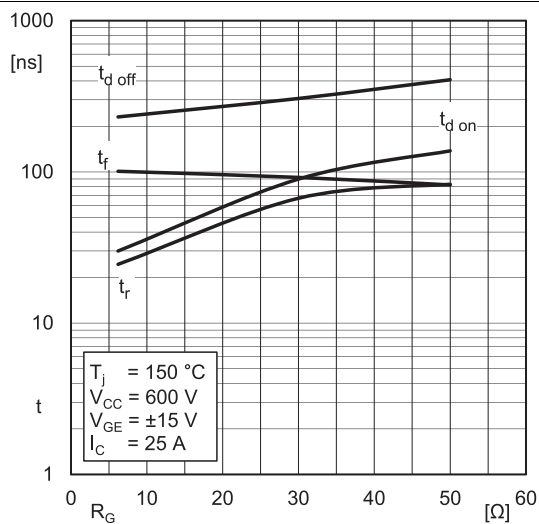


Fig. 8: Typ. switching times = $f(R_G)$

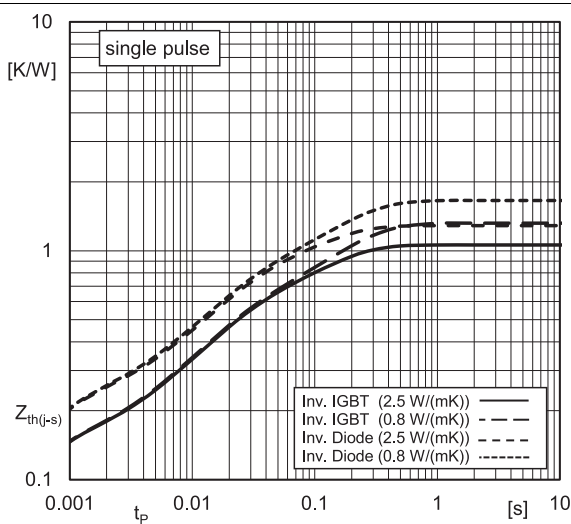


Fig. 9: Typ. transient thermal impedance

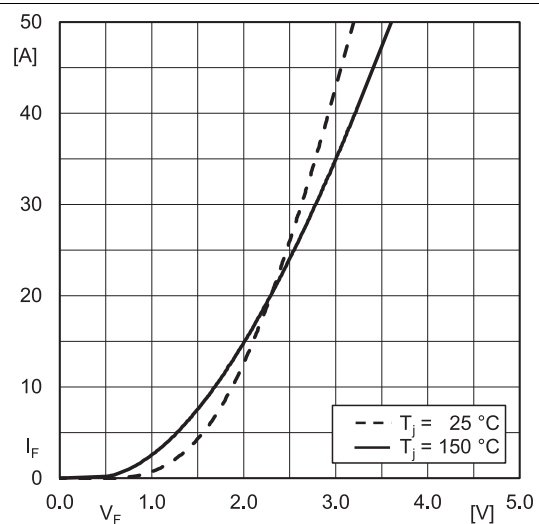


Fig. 10: Typ. Inv. diode forward charact., incl. $R_{GG} + EE'$

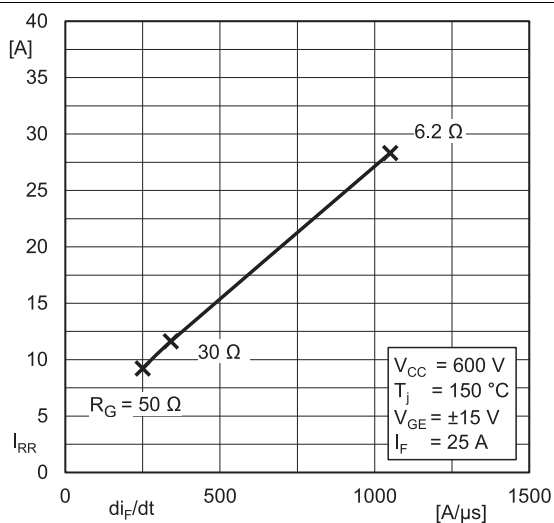


Fig. 11: Typ. Inv. diode peak reverse recovery current

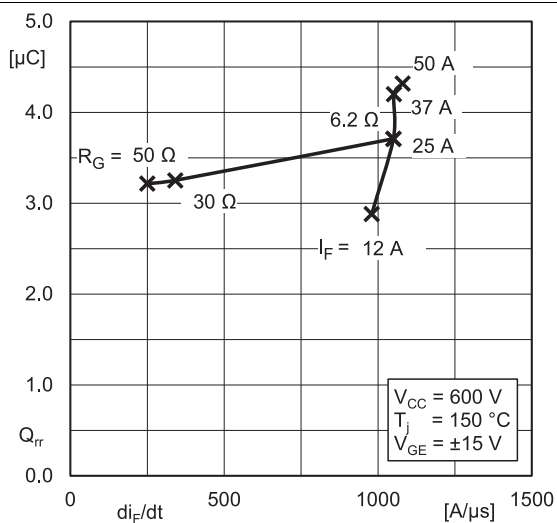


Fig. 12: Typ. Inv. diode reverse recovery charge

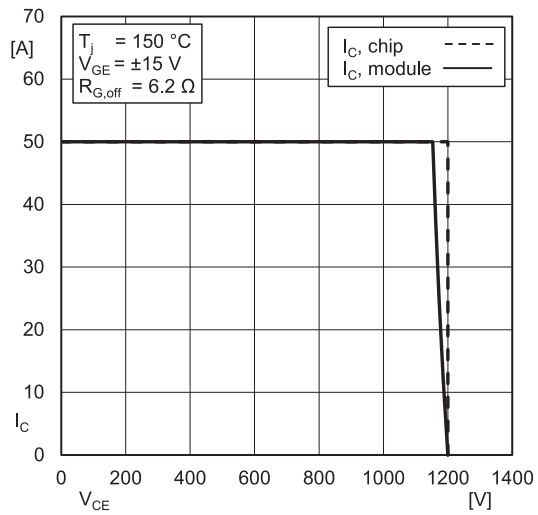


Fig. 13: IGBT Reverse Bias Safe Operating Area (RBSOA)

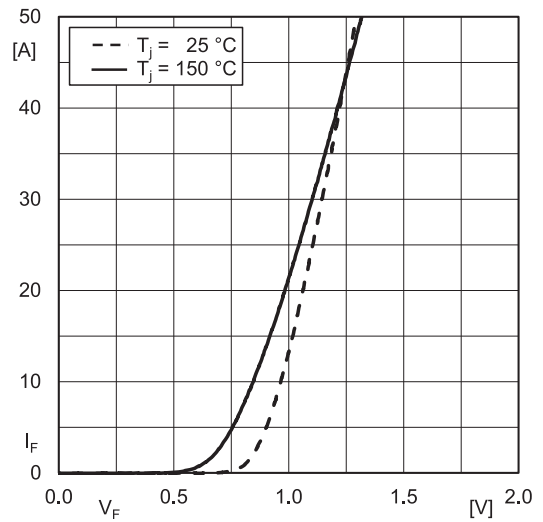
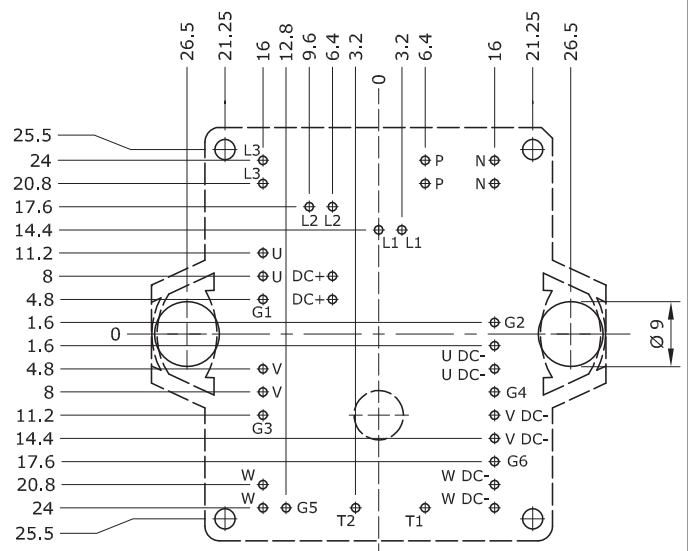
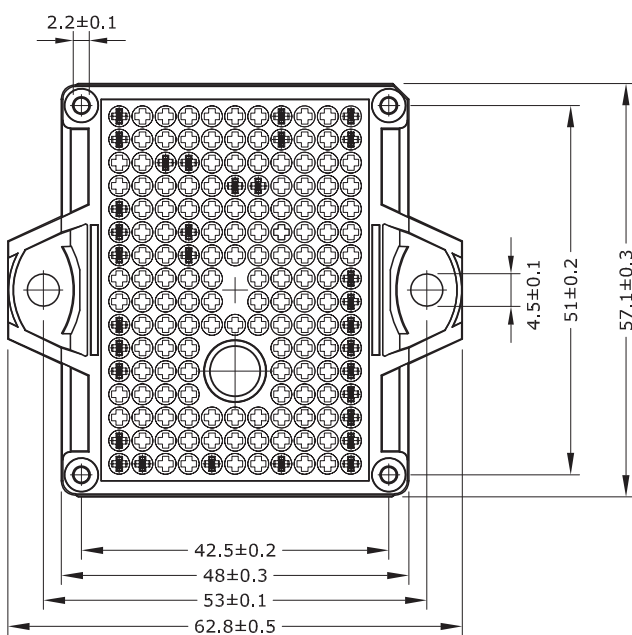
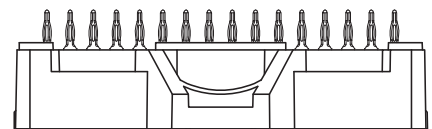
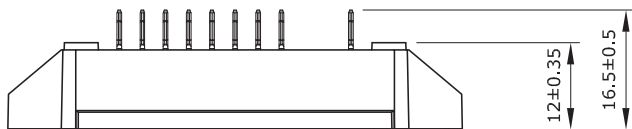
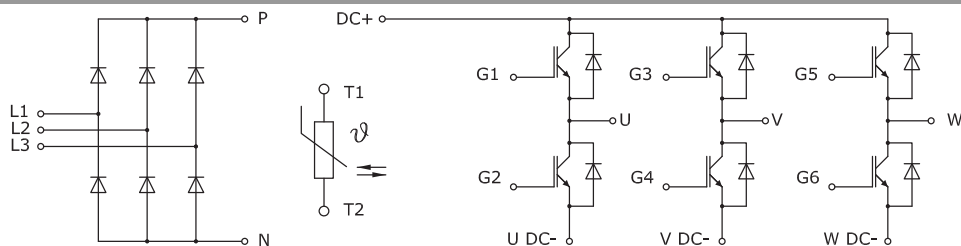


Fig. 14: Typ. Rect. diode forward charact., incl. $R_{CC'+EE'}$



- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern $\Phi \pm 0.1$
- Diameters of drill $\Phi 1.15\text{mm}$
- Copper thickness in hole 25 - 50 μm
- Hole specification for contacts:
refer to SEMITOP E1/E2 Mounting Instruction

SEMITOP®E2



DGD-ET

IMPORTANT INFORMATION AND WARNINGS

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

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