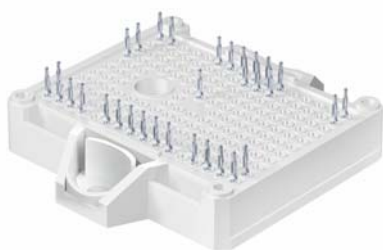


SK35DGD12T7ETE2



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK35DGD12T7ETE2

Features*

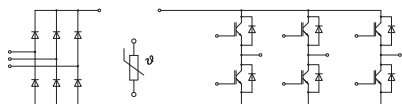
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor
- 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)



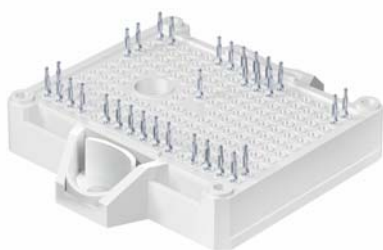
DGD-ET

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}			1200	V
I _C	P12	T _s = 70 °C	41	A
	T _j = 175 °C	T _s = 100 °C	34	A
I _C	HPTP / HP-PCM	T _s = 70 °C	50	A
	T _j = 175 °C	T _s = 100 °C	41	A
I _{Cnom}			35	A
I _{CRM}			70	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	33	A
	T _j = 175 °C	T _s = 100 °C	27	A
I _F	HPTP / HP-PCM	T _s = 70 °C	39	A
	T _j = 175 °C	T _s = 100 °C	32	A
I _{FRM}			70	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		170	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 sin 180°	T _j = 25 °C	370	A
		T _j = 150 °C	270	A
i ² t	t _p = 10 ms sin 180°	T _j = 25 °C	685	A ² s
		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						
$V_{CE(sat)}$	$I_C = 35\text{ A}$	$T_j = 25\text{ }^{\circ}\text{C}$		1.60	1.75	V
	$V_{GE} = 15\text{ V}$	$T_j = 150\text{ }^{\circ}\text{C}$		1.78	1.93	V
	chiplevel	$T_j = 175\text{ }^{\circ}\text{C}$		1.82	1.97	V
V_{CE0}		$T_j = 25\text{ }^{\circ}\text{C}$		1.00	1.05	V
	chiplevel	$T_j = 150\text{ }^{\circ}\text{C}$		0.80	0.85	V
		$T_j = 175\text{ }^{\circ}\text{C}$		0.75	0.80	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ }^{\circ}\text{C}$		17	20	mΩ
	chiplevel	$T_j = 150\text{ }^{\circ}\text{C}$		28	31	mΩ
		$T_j = 175\text{ }^{\circ}\text{C}$		31	33	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 0.75\text{ mA}$		5.15	5.8	6.45	V



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK35DGD12T7ETE2

Features*

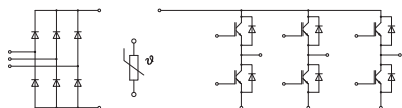
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor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

Typical Applications

- Motor drives
- Air conditioning
- Auxiliary Inverters

Remarks

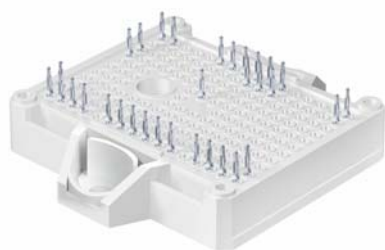
- Recommended $T_{j,op} = -40 \dots +150 \text{ }^{\circ}\text{C}$
- $T_{j,op} > 150 \text{ }^{\circ}\text{C}$ during overload (details in AN19-002)



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		6.60		nF
C _{oes}		f = 1 MHz		0.09		nF
C _{res}		f = 1 MHz		0.02		nF
Q _G	V _{GE} = -15 V ... +15 V			487		nC
R _{Gint}	T _j = 25 °C			0		Ω
t _{d(on)}	V _{CC} = 600 V I _C = 35 A R _{G on} = 5.6 Ω R _{G off} = 5.6 Ω V _{GE} = +15/-15 V (T _j = 150 °C) di/dt _{on} = 1160 A/μs di/dt _{off} = 620 A/μs dv/dt = 4600 V/μs	T _j = 25 °C		43		ns
		T _j = 150 °C		45		ns
		T _j = 175 °C		46		ns
t _r		T _j = 25 °C		30		ns
		T _j = 150 °C		35		ns
		T _j = 175 °C		37		ns
E _{on}		T _j = 25 °C		2.51		mJ
		T _j = 150 °C		3.52		mJ
		T _j = 175 °C		3.96		mJ
t _{d(off)}		T _j = 25 °C		183		ns
		T _j = 150 °C		254		ns
		T _j = 175 °C		274		ns
t _f		T _j = 25 °C		62		ns
		T _j = 150 °C		95		ns
		T _j = 175 °C		102		ns
E _{off}	T _j = 25 °C		2.83		mJ	
	T _j = 150 °C		3.74		mJ	
	T _j = 175 °C		4.29		mJ	
R _{th(j-s)}	per IGBT, P12 (Reference)			1.17		K/W
R _{th(j-s)}	per IGBT, HPTP / HP-PCM			0.85		K/W
Inverse - Diode						
V _F = V _{EC}	I _F = 35 A	T _j = 25 °C		2.30	2.62	V
	chiplevel	T _j = 150 °C		2.29	2.62	V
		T _j = 175 °C		2.14	2.46	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		29	32	mΩ
	chiplevel	T _j = 150 °C		40	43	mΩ
		T _j = 175 °C		38	42	mΩ
I _{RRM}		T _j = 25 °C		25		A
	I _F = 35 A V _{GE} = -15 V V _{CC} = 600 V (T _j = 150 °C) di/dt _{off} = 1030 A/μs	T _j = 150 °C		31		A
		T _j = 175 °C		37		A
Q _{rr}		T _j = 25 °C		2.15		μC
		T _j = 150 °C		4.85		μC
		T _j = 175 °C		5.48		μC
E _{rr}		T _j = 25 °C		1.46		mJ
		T _j = 150 °C		2.39		mJ
		T _j = 175 °C		3.65		mJ
R _{th(j-s)}		per Diode, P12 (Reference)			1.34	
R _{th(j-s)}	per Diode, HPTP / HP-PCM			1.01		K/W

SK35DGD12T7ETE2



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK35DGD12T7ETE2

Features*

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- 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

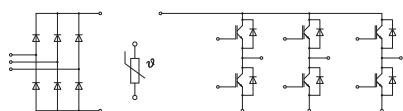
Typical Applications

- 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)

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Rectifier - Diode						
V _F = V _{EC}	I _F = 35 A chiplevel	T _j = 25 °C		1.10	1.39	V
		T _j = 150 °C		1.04	1.33	V
		T _j = 175 °C		1.04	1.34	V
V _{F0}	chiplevel	T _j = 25 °C		0.89	1.09	V
		T _j = 150 °C		0.73	0.92	V
		T _j = 175 °C		0.69	0.88	V
r _F	chiplevel	T _j = 25 °C		6.2	8.5	mΩ
		T _j = 150 °C		8.8	12	mΩ
		T _j = 175 °C		10.0	13	mΩ
I _R	T _j = 150 °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°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



DGD-ET

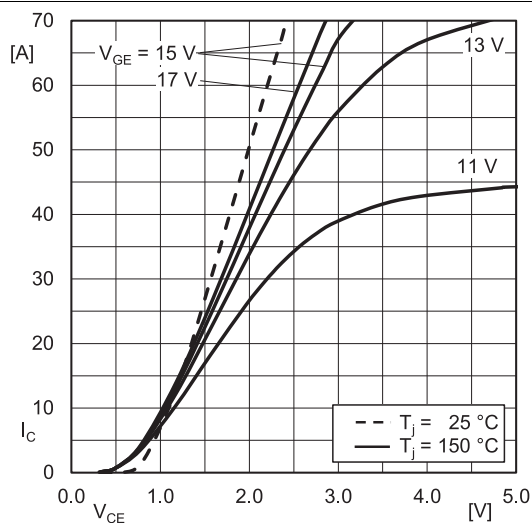


Fig. 1: Typ. IGBT output characteristic, incl. $R_{CC+EE'}$

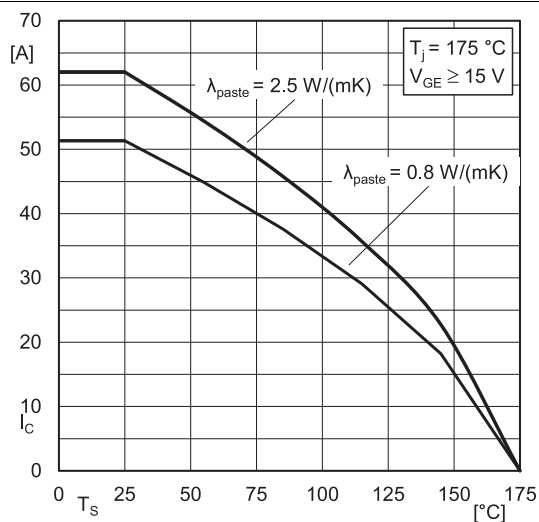


Fig. 2: IGBT rated current vs. temperature $I_C=f(T_s)$

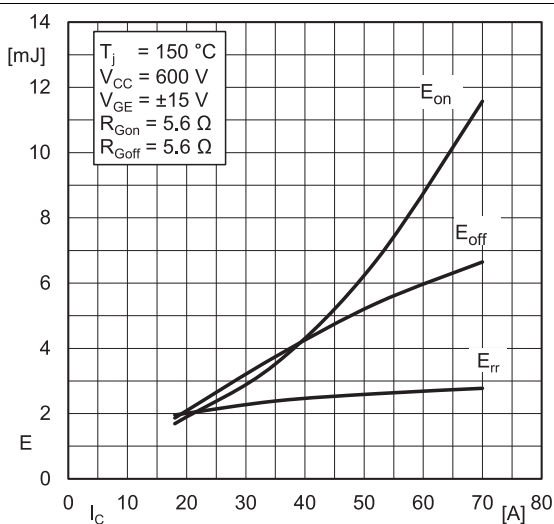


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

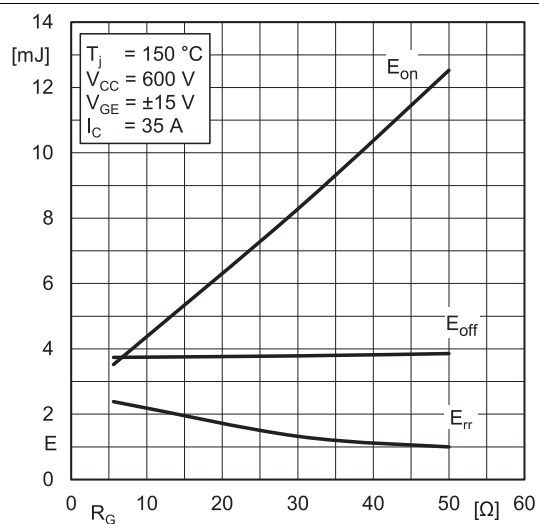


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

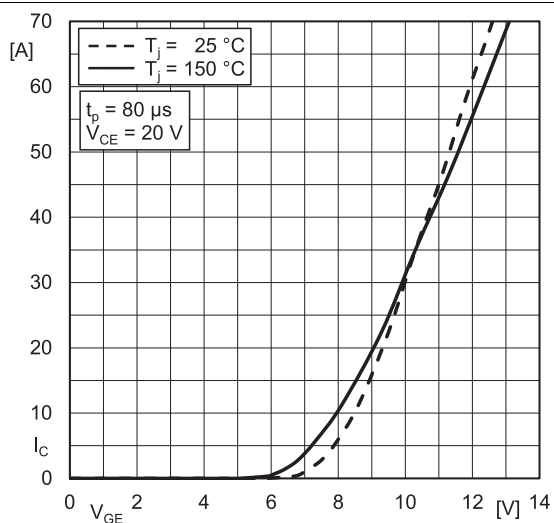


Fig. 5: Typ. IGBT transfer characteristic

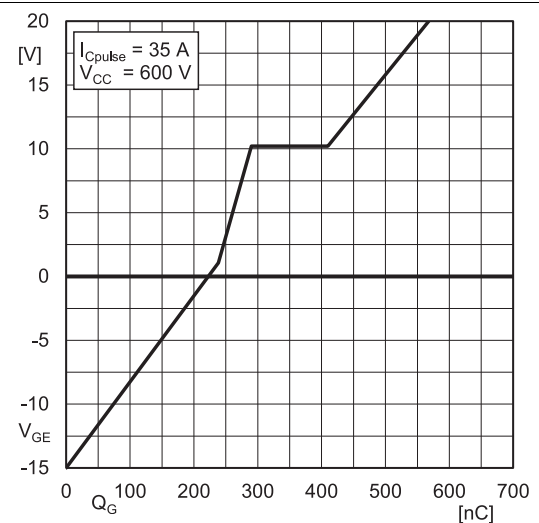


Fig. 6: Typ. IGBT gate charge characteristic

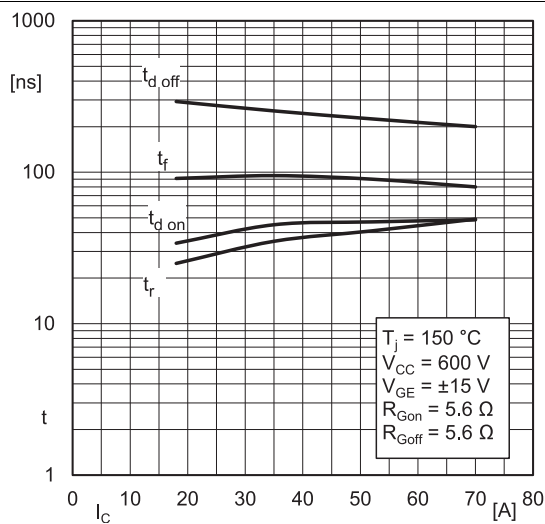


Fig. 7: Typ. switching times = f (I_C)

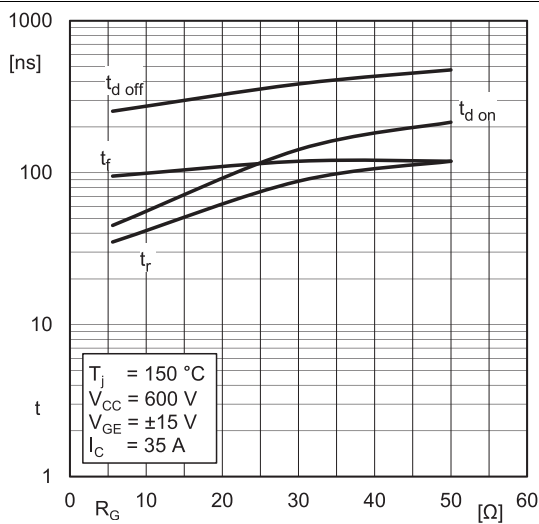


Fig. 8: Typ. switching times = f (R_G)

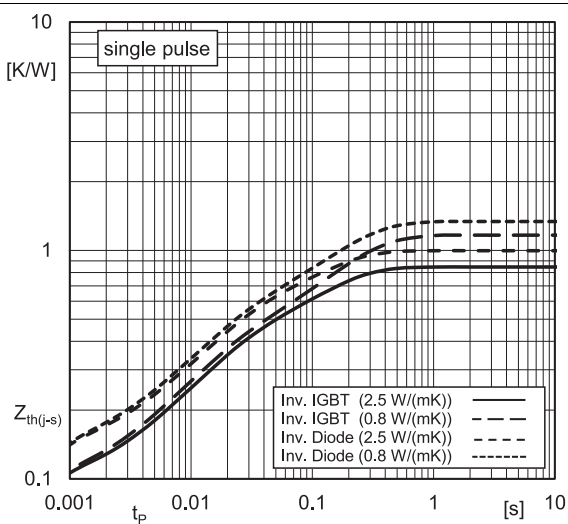


Fig. 9: Typ. transient thermal impedance

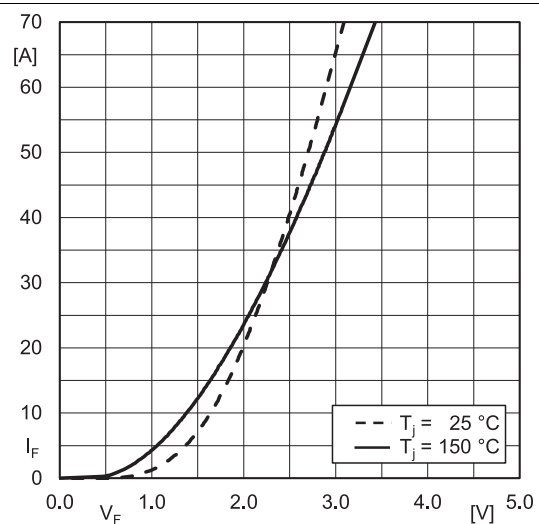


Fig. 10: Typ. Inv. diode forward charact., incl. R_{CC'+EE'}

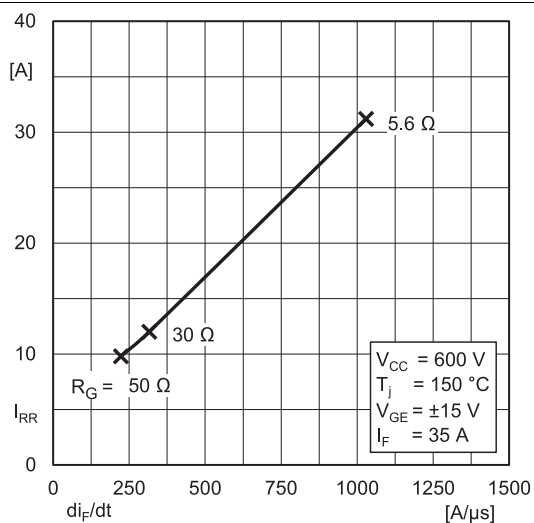


Fig. 11: Typ. Inv. diode peak reverse recovery current

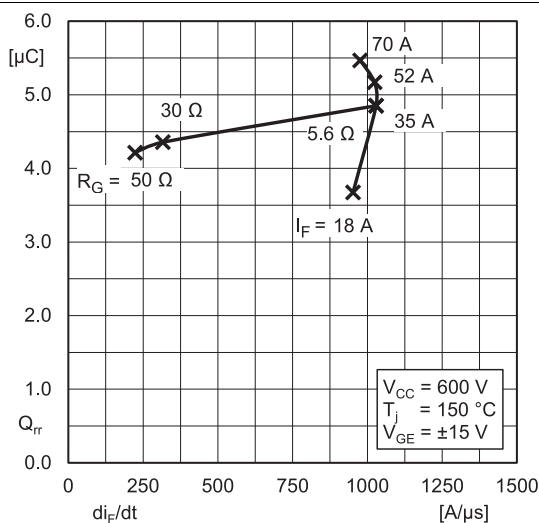


Fig. 12: Typ. Inv. diode reverse recovery charge

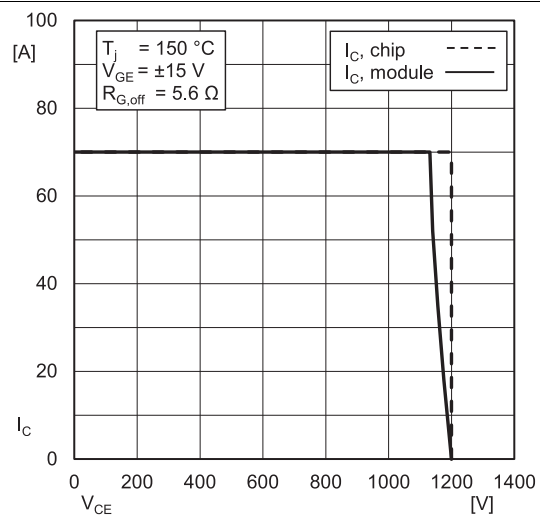


Fig. 13: IGBT Reverse Bias Safe Operating Area (RBSOA)

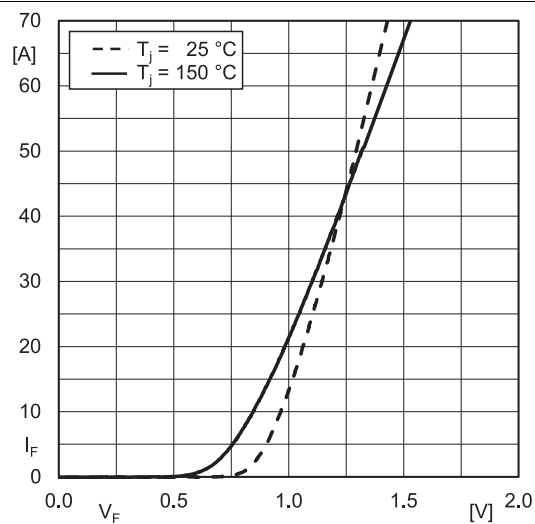
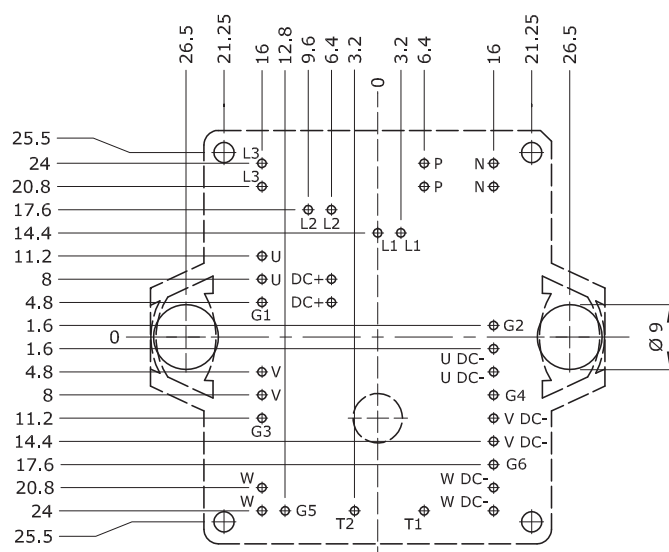
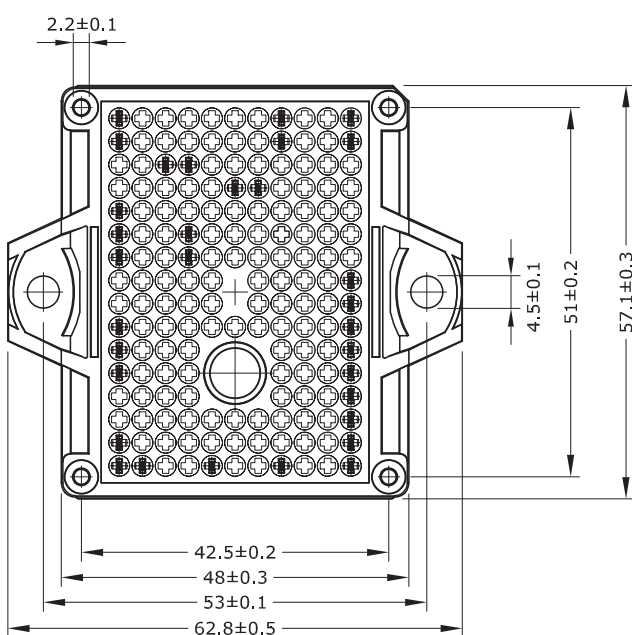
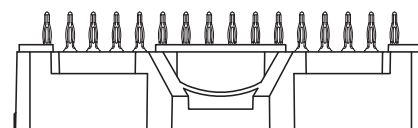
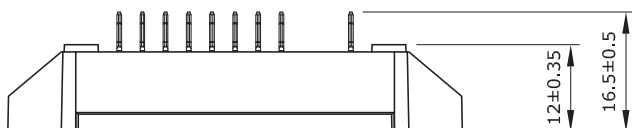
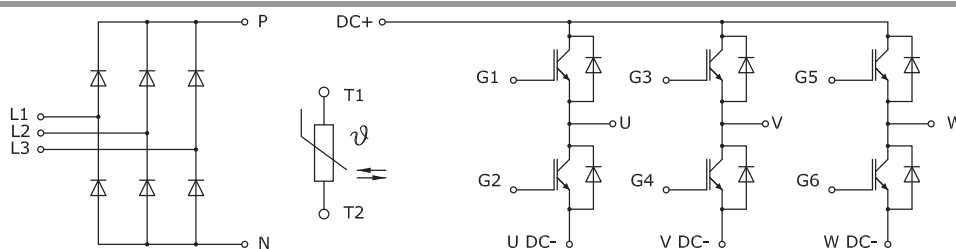


Fig. 14: Typ. Rect. diode forward charact., incl. $R_{CC'+EE'}$



- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern $\Phi \pm 0.1$
- Diameters of drill $\Phi 1.15$ mm
- Copper thickness in hole 25 - 50 μ m
- 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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