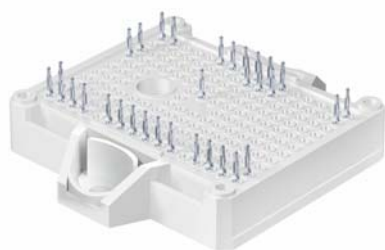


SK35DGD12T7ETE2



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK35DGD12T7ETE2

Features*

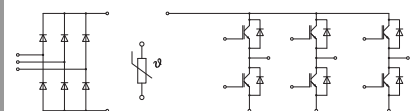
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor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



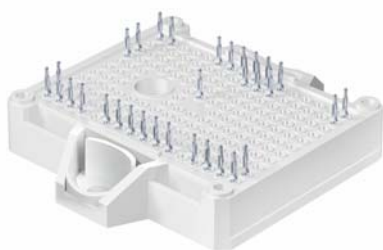
DGD-ET

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 A	T _j = 25 °C		1.60	1.75	V
	V _{GE} = 15 V	T _j = 150 °C		1.78	1.93	V
	chiplevel	T _j = 175 °C		1.82	1.97	V
V _{CE0}		T _j = 25 °C		1.00	1.05	V
	chiplevel	T _j = 150 °C		0.80	0.85	V
		T _j = 175 °C		0.75	0.80	V
r _{CE}		T _j = 25 °C		17	20	mΩ
	V _{GE} = 15 V	T _j = 150 °C		28	31	mΩ
	chiplevel	T _j = 175 °C		31	33	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 0.75 mA		5.15	5.8	6.45	V



SEMITOP®E2

3-phase Converter-Inverter (CI)

SK35DGD12T7ETE2

Features*

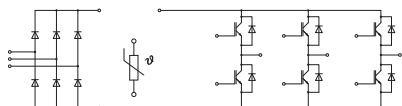
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Generation 7 IGBT (T7)
- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor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

Typical Applications

- Motor drives
- Air conditioning
- Auxiliary Inverters

Remarks

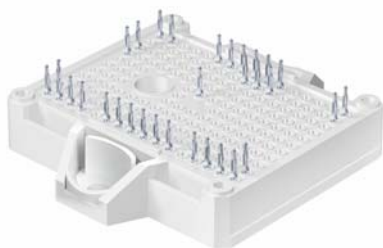
- Recommended $T_{j,op} = -40 \dots +150 \text{ }^{\circ}\text{C}$
- $T_{j,op} > 150 \text{ }^{\circ}\text{C}$ during overload (details in AN19-002)



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*

- 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

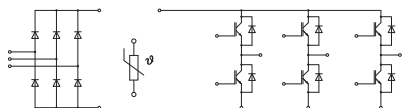
- Motor drives
- Air conditioning
- Auxiliary Inverters

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)

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Rectifier - Diode					
$V_F = V_{EC}$	$I_F = 35 \text{ A}$ chiplevel	$T_j = 25 \text{ }^{\circ}\text{C}$	1.10	1.39	V
		$T_j = 150 \text{ }^{\circ}\text{C}$	1.04	1.33	V
		$T_j = 175 \text{ }^{\circ}\text{C}$	1.04	1.34	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	m Ω
		$T_j = 150 \text{ }^{\circ}\text{C}$	8.8	12	m Ω
		$T_j = 175 \text{ }^{\circ}\text{C}$	10.0	13	m Ω
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}	$T_c = 100^{\circ}\text{C}$ ($R_{25} = 5 \text{ k}\Omega$)		$493 \pm 5\%$		Ω
$B_{25/85}$	$R_{(T)} = R_{25} \cdot \exp[B_{25/85} \cdot (1/T - 1/298)]$, $T[K]$		3420		K



DGD-ET

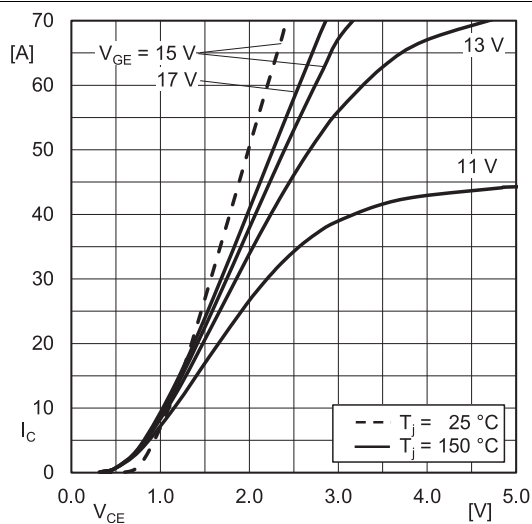


Fig. 1: Typ. IGBT output characteristic, incl. $R_{CC+EE'}$

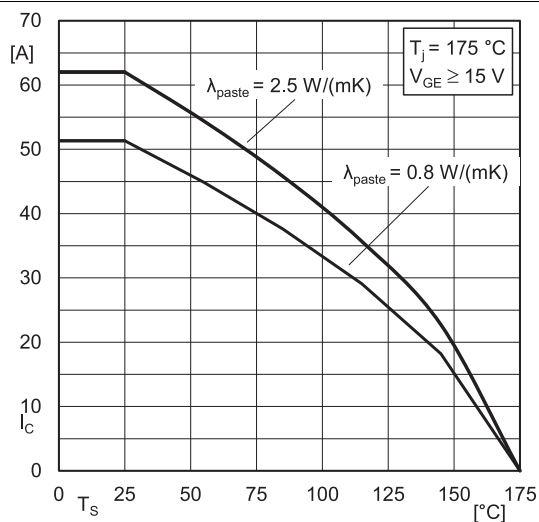


Fig. 2: IGBT rated current vs. temperature $I_C=f(T_s)$

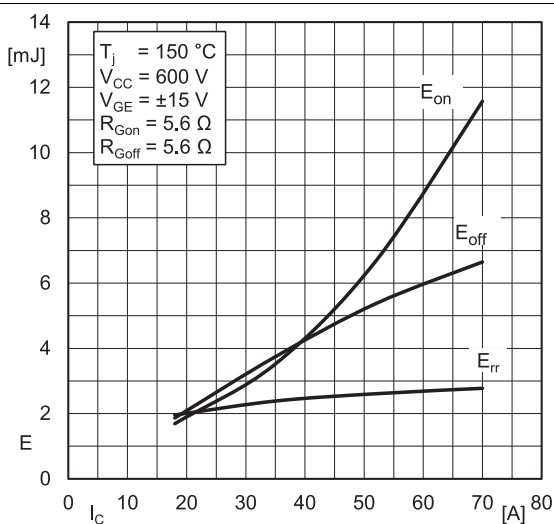


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

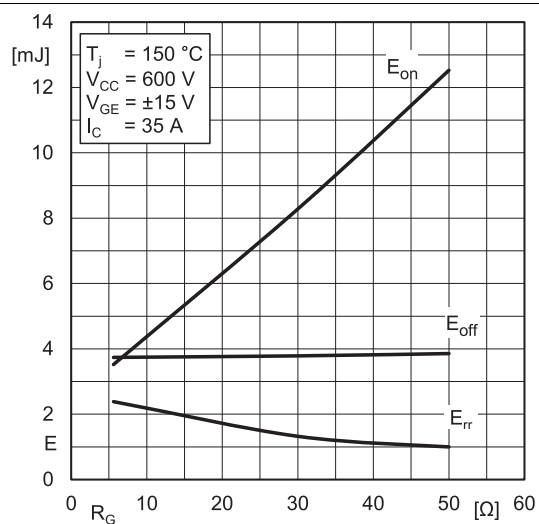


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

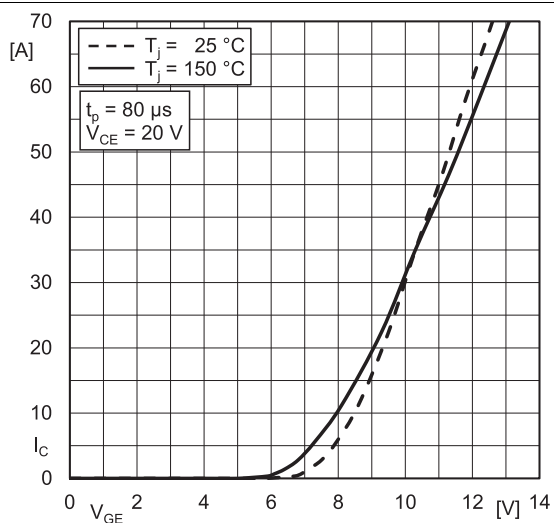


Fig. 5: Typ. IGBT transfer characteristic

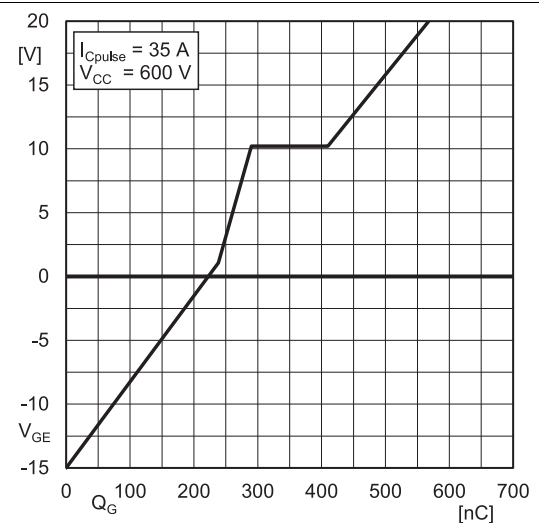


Fig. 6: Typ. IGBT gate charge characteristic

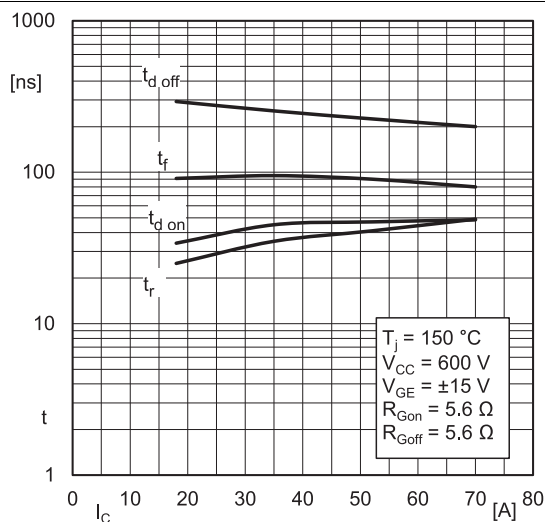


Fig. 7: Typ. switching times = f (I_C)

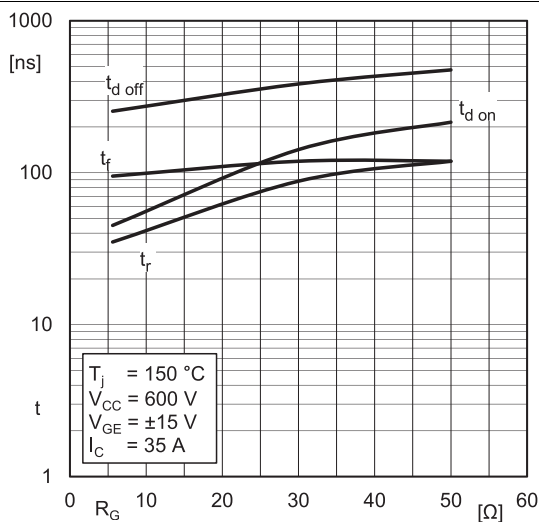


Fig. 8: Typ. switching times = f (R_G)

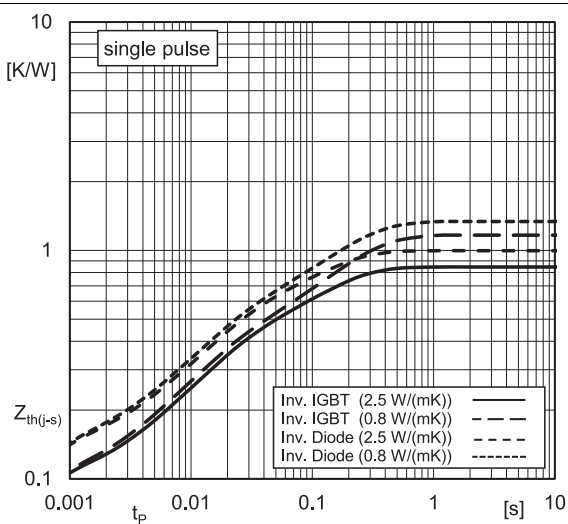


Fig. 9: Typ. transient thermal impedance

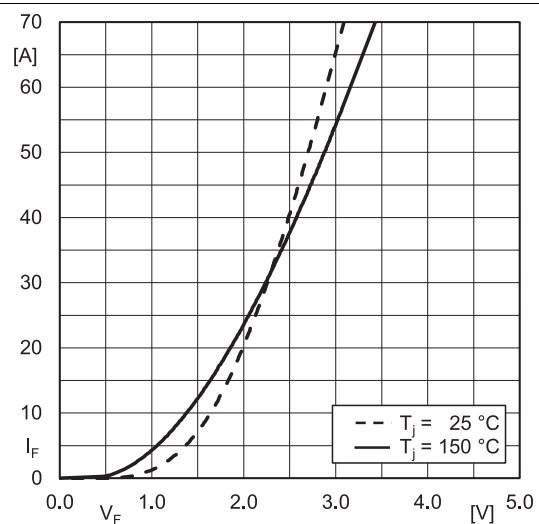


Fig. 10: Typ. Inv. diode forward charact., incl. R_{CC'+EE'}

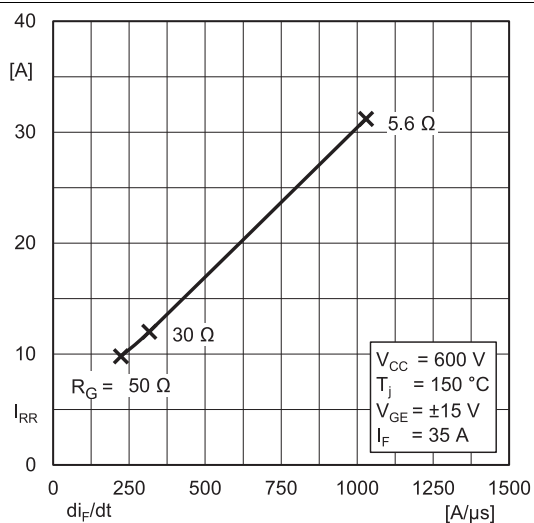


Fig. 11: Typ. Inv. diode peak reverse recovery current

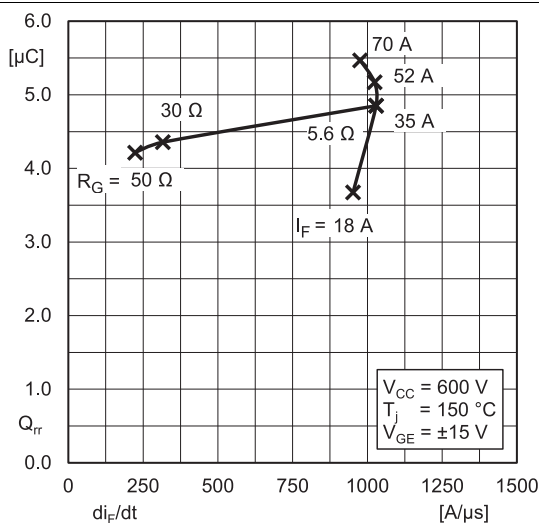


Fig. 12: Typ. Inv. diode reverse recovery charge

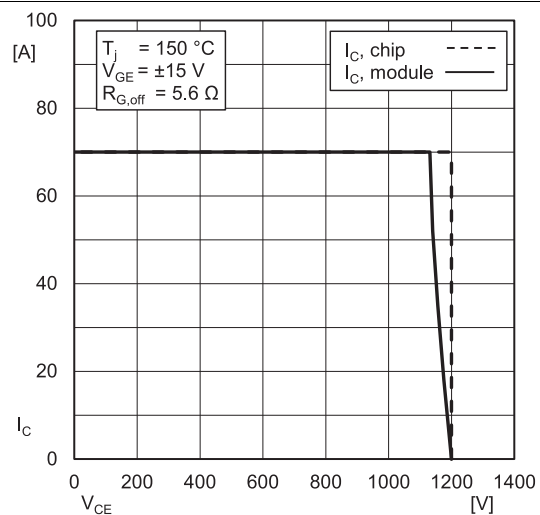


Fig. 13: IGBT Reverse Bias Safe Operating Area (RBSOA)

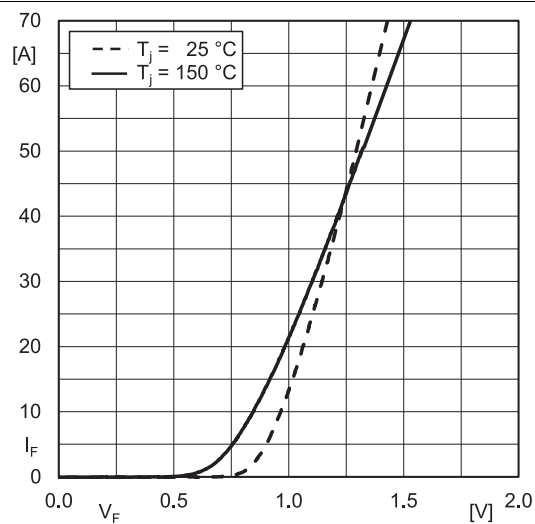
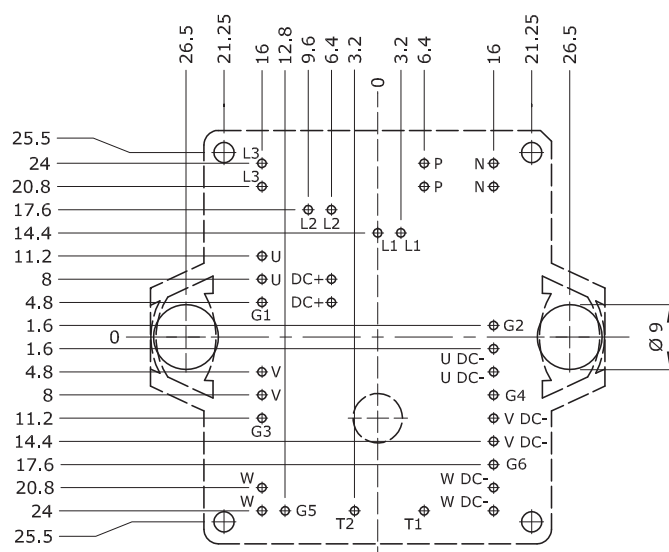
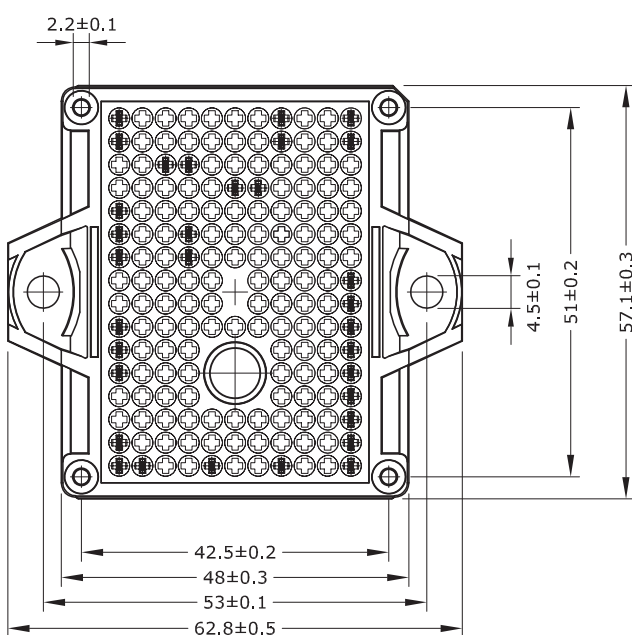
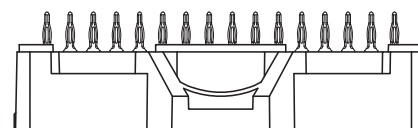
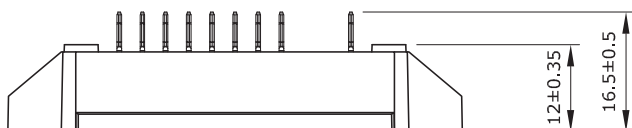
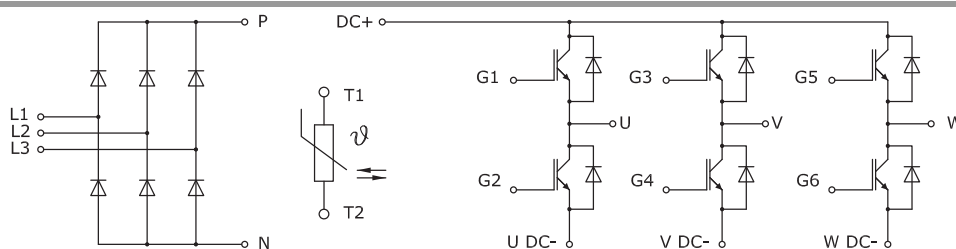


Fig. 14: Typ. Rect. diode forward charact., incl. $R_{CC'+EE'}$



- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern $\Phi \pm 0.1$
- Diameters of drill $\Phi 1.15\text{mm}$
- 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.

*The specifications of Semikron Danfoss products may not be considered as any guarantee or assurance of product characteristics ("Beschaffenheitsgarantie"). The specifications of Semikron Danfoss products describe only the usual characteristics of Semikron Danfoss products to be expected in typical applications, which may still vary depending on the specific application. Therefore, products must be tested for the respective application in advance. Resulting from this, application adjustments of any kind may be necessary. Any user of Semikron Danfoss products is responsible for the safety of their applications embedding Semikron Danfoss products and must take adequate safety measures to prevent the applications from causing any physical injury, fire or other problem, also if any Semikron Danfoss product becomes faulty. Any user is responsible for making sure that the application design and realization are compliant with all laws, regulations, norms and standards applicable to the scope of application. Unless otherwise explicitly approved by Semikron Danfoss in a written document signed by authorized representatives of Semikron Danfoss, Semikron Danfoss products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. No representation or warranty is given and no liability is assumed with respect to the accuracy, completeness and/or use of any information herein, including without limitation, warranties of non-infringement of intellectual property rights of any third party. Semikron Danfoss does not convey any license under its or a third party's patent rights, copyrights, trade secrets or other intellectual property rights, neither does it make any representation or warranty of non-infringement of intellectual property rights of any third party which may arise from a user's applications.