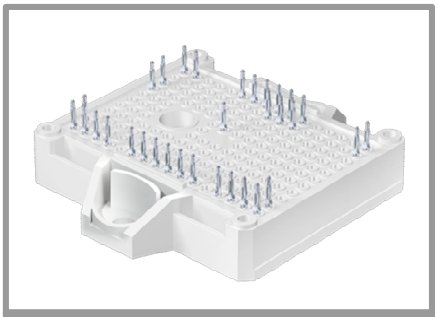
SK30DMD120RM04ETE2



SEMITOP®E2

3-phase Converter-Inverter (Full SiC)

SK30DMD120RM04ETE2

Features*

- Optimized design for superior thermal performance
- Low inductance design
- Press-Fit contact technology
- 1200V Trench Gen4 SiC MOSFET
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor
- UL recognized file no. E 63 532

Typical Applications

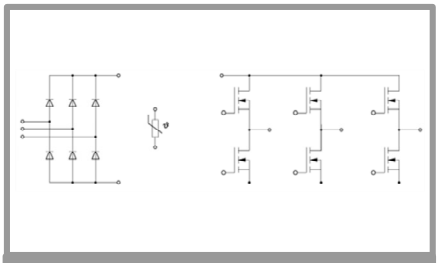
- Motor Drives
- HVAC
- Air conditioning
- Heat pumps

Remarks

- Recommended T_{jop} = -40°C...+150°C
- Recommended turn-off / turn-on gate voltage V_{GS} = 0/18V

Footnotes

[1)] Short Circuit events may have impact on product lifetime

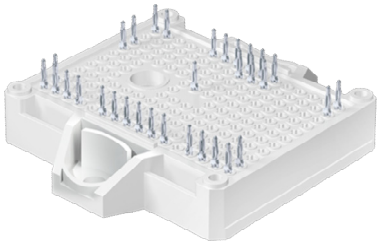


DMD-ET

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
MOSFET				
V_{DSS}	T_j = 25 °C		1200	V
I_D	HPTP / HP-PCM Tj = 175 °C	T_s = 70 °C	29	A
		T_s = 100 °C	25	A
I_{DM}	PW ≤ 10µs, Duty cycle ≤ 1%		84	A
V_{GS}	Transient Gate - Source voltage (t<300ns)		-4 ... +23	V
T_j			-40 ... 175	°C
Integrated body diode				
I_{SM}	PW ≤ 500ns, Duty cycle ≤ 5%		43	A
I_{FSM}	PW ≤ 10µs		84	A
Rectifier - Diode				
V_{RRM}	T_j = 25 °C		1600	V
I_C	HPTP / HP-PCM T_j = 175 °C	T_s = 70 °C	56	A
		T_s = 100 °C	44	A
I_{FSM}	t_p = 10 ms, sin 180°	T_J =25°C	370	A
		T_J =150°C	270	A
I^2t	t_p = 10 ms, sin 180°	T_J =25°C	685	A^2s
		T_J =150°C	365	A^2s
T_j			-40 ... 175	°C

Absolute Maximum Ratings			
Symbol	**Conditions**	**Values**	**Unit**
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	30	A
T_{stg}	module without TIM	-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V

SK30DMD120RM04ETE2



SEMITOP®E2

3-phase Converter-Inverter (Full SiC)

SK30DMD120RM04ETE2

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- Integrated NTC temperature sensor
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Typical Applications

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- HVAC
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- Heat pumps

Remarks

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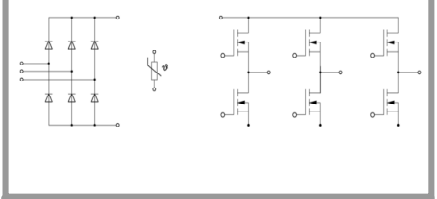
- Recommended turn-off / turn-on gate voltage V_{GS} = 0/18V

Footnotes

[1] Short Circuit events may have impact on product lifetime



DMD-ET

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
MOSFET						
$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 9.2 mA, T_j = 25 °C		1200			V
$V_{GS(th)}$	V_{DS} = 10V, I_D = 11.1 mA, T_j = 25 °C		2.8		4.8	V
I_{DSS}	V_{GS} = 0 V, V_{DS} = 1200 V, T_j = 25 °C				0.2	mA
I_{GSS}	V_{DS} = 0 V, V_{GS} = 21 V, T_j = 25 °C				400	nA
$R_{DS(on)}$	V_{GS} = 18 V, I_D = 21 A, chiplevel	T_j = 25 °C		36	45	mΩ
		T_j = 150 °C		72		mΩ
C_{iss}	V_{GS} = 0 V, V_{DS} = 800 V, T_j = 25 °C	f = 1 MHz		2335		pF
C_{oss}		f = 1 MHz		70		pF
C_{rss}		f = 1 MHz		5		pF
Q_G	V_{GS} = 0…18V, V_{DS} = 800V, I_D = 21 A			91		nC
R_{Gint}	T_j = 25 °C			1.0		Ω
$t_{d(on)}$	V_{DD} = 600 V I_D = 30A V_{GS} = 0/18 V R_{Gon} = 3.3 Ω R_{Goff} = 3.3 Ω di/dt_{on} = 2.9 kA/µs di/dt_{off} = 1.7 kA/µs dv/dt_{on} = 29 kV/µs dv/dt_{off} = 29 kV/µs Lσ = 14 nH	T_j = 150 °C		10		ns
t_r		T_j = 150 °C		9		ns
$t_{d(off)}$		T_j = 150 °C		52		ns
t_f		T_j = 150 °C		30		ns
E_{on}		T_j = 150 °C		0.32		mJ
E_{off}		T_j = 150 °C		0.26		mJ
t_{psc} [1]	V_{DD} ≤ 720 V V_{DSS} < 1200 V V_{GS} = 0/18 V E_{sc} ≤ 280 mJ	T_j = 150 °C	2			µs
$R_{th(j-s)}$	per MOSFET, HPTP / HP-PCM			1.25		K/W
Integrated body diode						
$V_F = V_{SD}$	$-I_D$ = 21 A V_{GS} = 0 V chiplevel	T_j = 25 °C		3.30		V
		T_j = 150 °C		3.60		V
$V_{F0} = V_{SD0}$	chiplevel	T_j = 25 °C		2.25		V
		T_j = 150 °C		2.10		V
$r_F = r_{SD}$	chiplevel	T_j = 25 °C		50		mΩ
		T_j = 150 °C		71		mΩ
t_{rr}	V_{DD} = 600 V I_D = 30 A V_{GS} = 0 V di/dt_{off} = 2.8 kA/µs	T_j = 150 °C		54		ns
Q_{rr}		T_j = 150 °C		1		µC
I_{rr}		T_j = 150 °C		37		A
E_{rr}		T_j = 150 °C		0.39		mJ

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Rectifier diode						
V_F	I_F = 30 A chiplevel	T_j = 25 °C		1.07	1.34	V
		T_j = 150 °C		0.99	1.27	V
V_{F0}	chiplevel	T_j = 25 °C		0.89	1.09	V
		T_j = 150 °C		0.73	0.92	V
r_F	chiplevel	T_j = 25 °C		6.2	8.5	mΩ
		T_j = 150 °C		8.8	12	mΩ
I_R	Tj = 150 °C, V_{RRM}				2	mA
$R_{th(j-s)}$	per Diode, HPTP / HP-PCM			1.21		K/W

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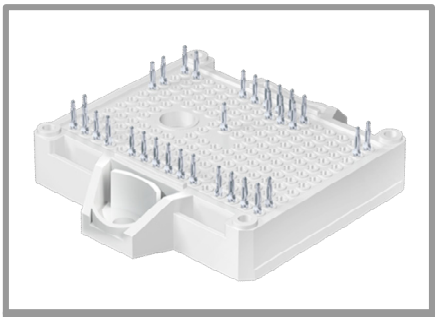

SEMITOP®E2

3-phase Converter-Inverter (Full SiC)

SK30DMD120RM04ETE2

Features*

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Typical Applications

- Motor Drives
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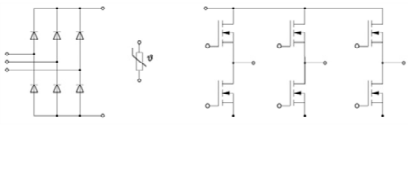


DMDL-ET

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
L_{CE}			30		nH
M_s	to heatsink	1.6		2.3	Nm
w	weight		35		g

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Temperature Sensor					
R_{100}	T_r = 100 °C (R_{25} = 5 kΩ)		493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}*(1/T-1/T_{100})]$, T[K];		3550 ± 2%		K

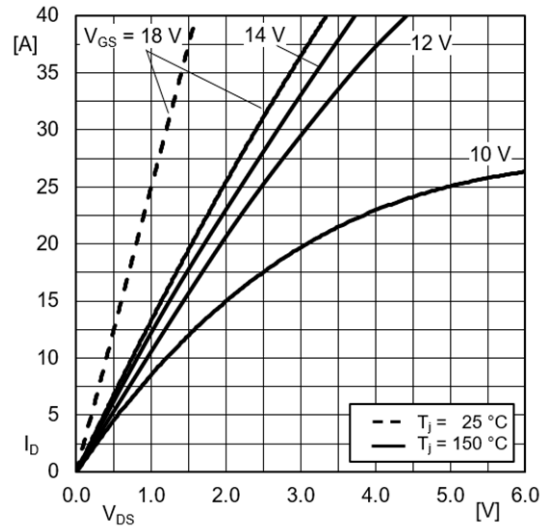


Fig.1: Typ. MOSFET forward output characteristic, incl. $R_{DD'+SS'}$

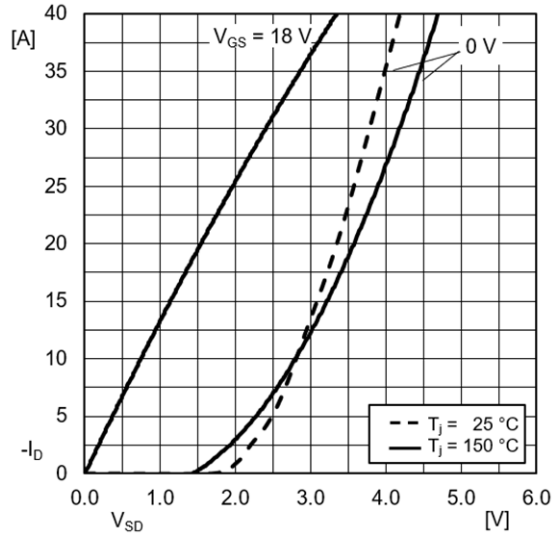


Fig. 1a: Typ. MOSFET reverse output characteristic, incl. $R_{DD'+SS'}$

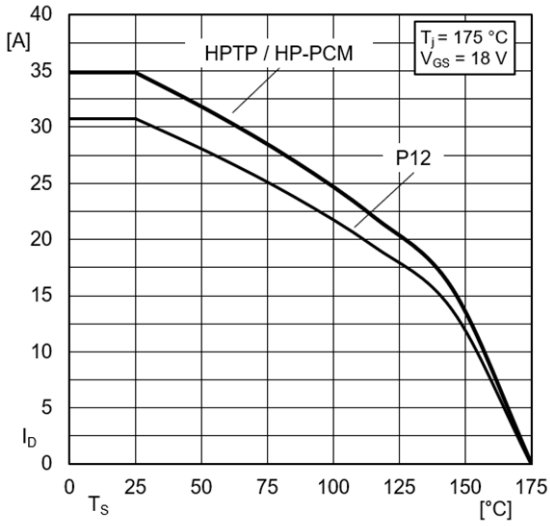


Fig. 2: MOSFET Rated current vs. temperature $I_D = f(T_S)$

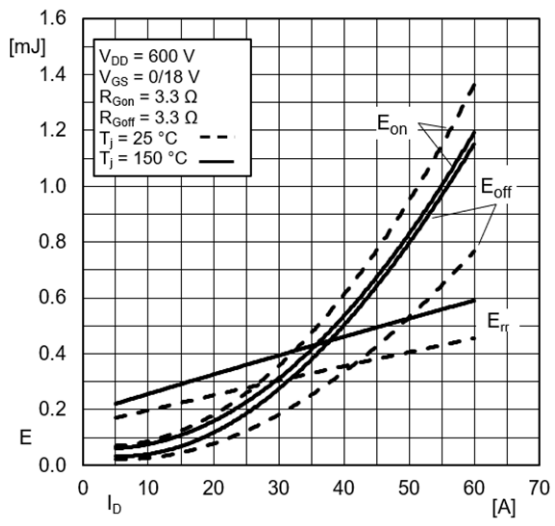


Fig. 3: Typ. MOSFET switching energy $E = f(I_D)$

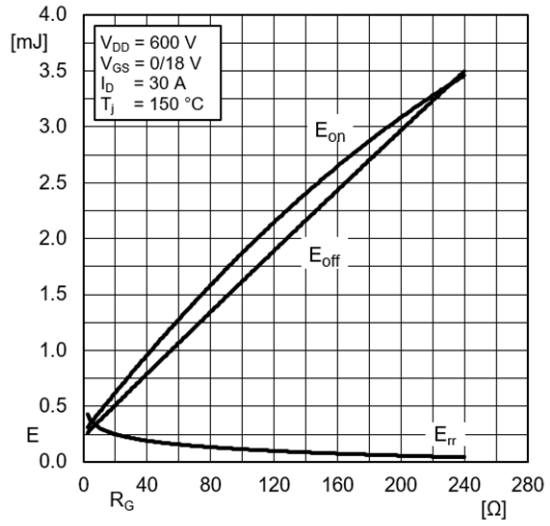


Fig. 4: Typ. MOSFET switching energy $E = f(R_G)$

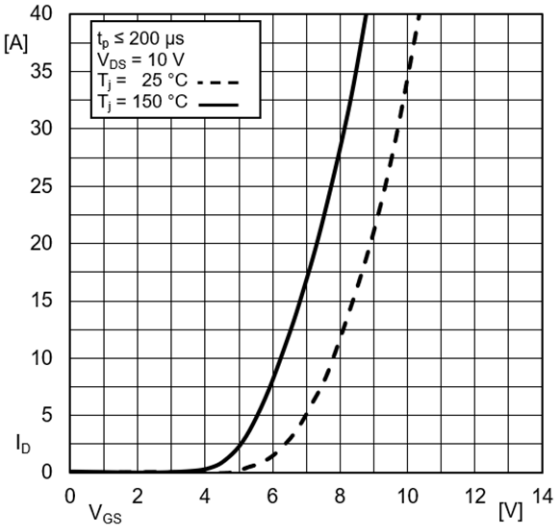


Fig. 5: Typ. MOSFET transfer characteristic

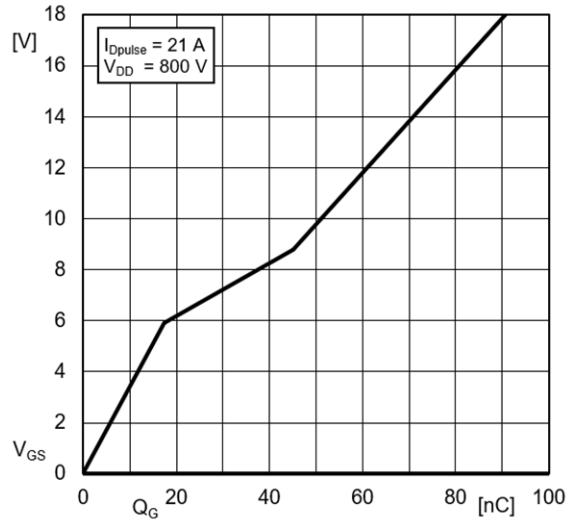


Fig. 6: Typ. MOSFET gate charge characteristic

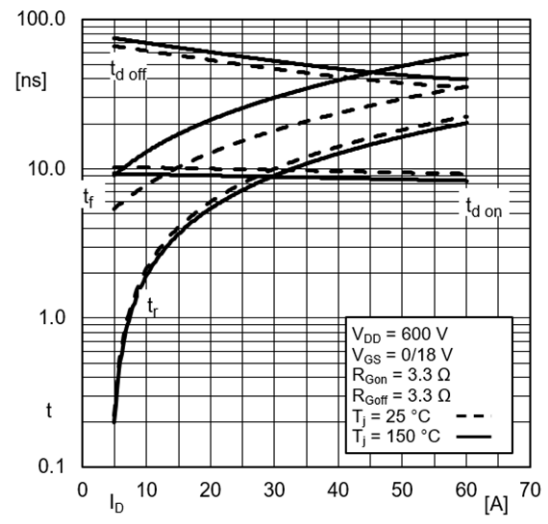


Fig. 7: Typ. MOSFET switching times t = f (I_D)

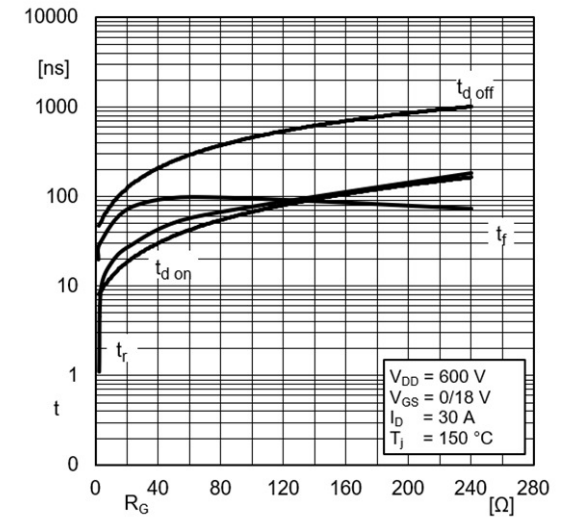


Fig. 8: Typ. MOSFET switching times t = f (R_G)

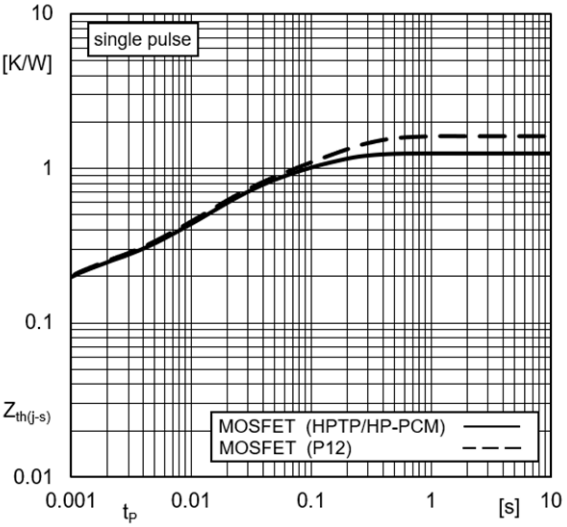


Fig. 9: Typ. transient thermal impedance

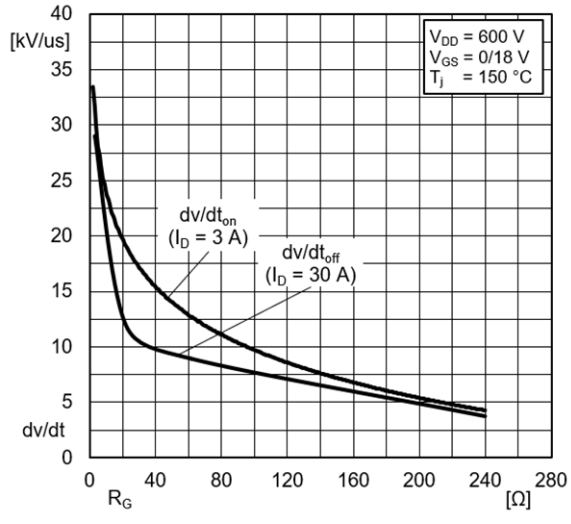


Fig. 10: Typ. MOSFET dv/dt = f (R_G)

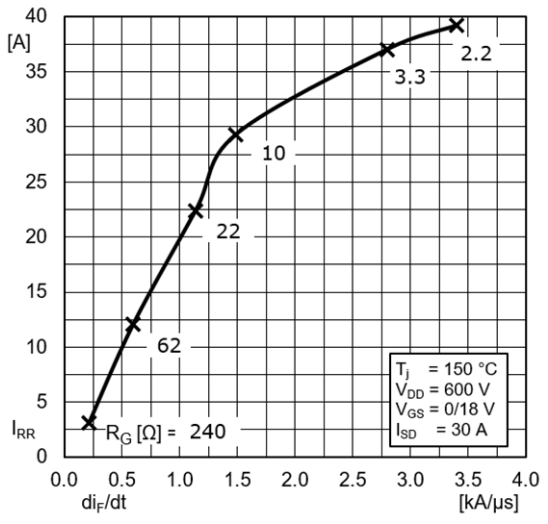


Fig. 11: Typ. body diode peak reverse recovery current I_{RR} = f (di_F/dt)

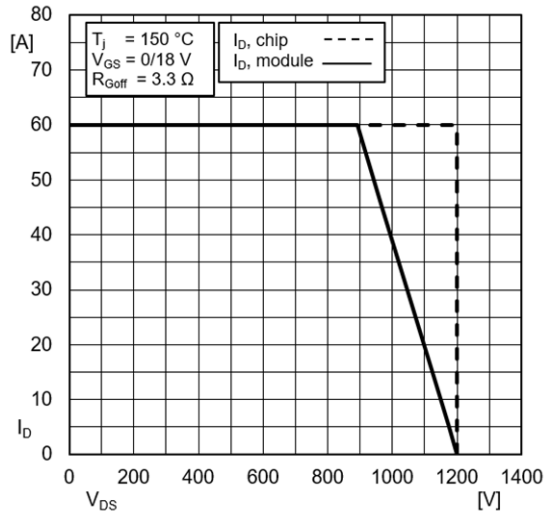


Fig. 13: MOSFET Reverse Bias Safe Operating Area (RBSOA)

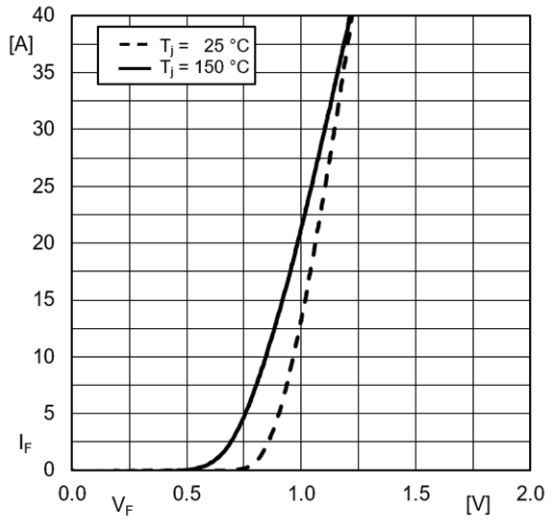
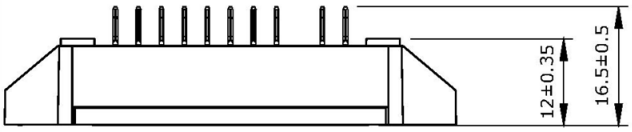
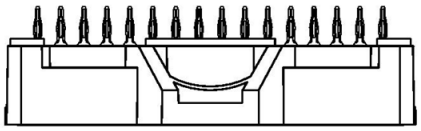
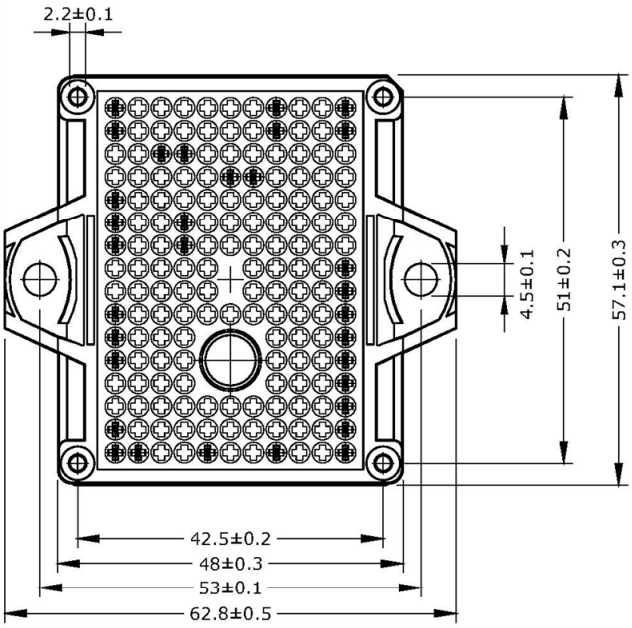
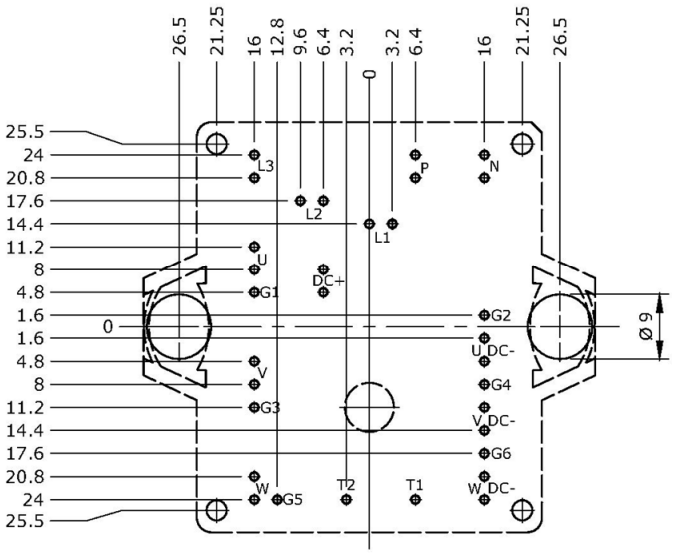


Fig. 14: Typ. Rectifier diode forward characteristic, incl. $R_{CC'+EE'}$



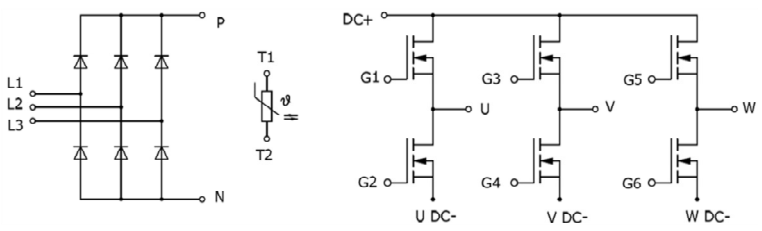






- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern ⌖ Ø0.1
- Diameters of drill ∅ 1.15mm
- Copper thickness in hole 25 - 50 µm
- Hole specification for contacts:
  refer to SEMITOP E1/E2 Mounting Instruction

Pinout and Dimensions



DMDL - ET

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

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