SK150DGL12T4TE1

SEMITOP®E1

3-phase Bridge Rectifier with Chopper

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Features*

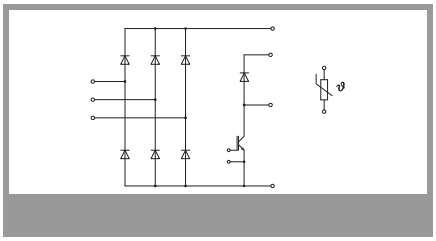
- Optimized design for superior thermal performance
- Low inductive design
- Press-Fit contact technology
- 1200V Trench IGBT4 (T4)
- Robust and soft switching CAL4F diode technology
- PEP rectifier diode technology for enhanced power and environmental robustness
- Integrated NTC temperature sensor
- UL recognized file no. E 63 532

Typical Applications

- Motor drives
- Air conditioning
- Auxiliary Inverters

Remarks

- Recommended $T_{j,op}$=-40 ...+150 °C



Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Chopper - IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	P12 T_j = 175 °C	T_s = 70 °C	53	A
		T_s = 100 °C	43	A
I_C	HPTP / HP-PCM T_j = 175 °C	T_s = 70 °C	66	A
		T_s = 100 °C	55	A
I_{Cnom}			50	A
I_{CRM}			100	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V V_{GE} = V_{GE} ≤ 15 V V_{CES} = V_{CES} ≤ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Freewheeling - Diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	P12 T_j = 175 °C	T_s = 70 °C	17	A
		T_s = 100 °C	14	A
I_F	HPTP / HP-PCM T_j = 175 °C	T_s = 70 °C	20	A
		T_s = 100 °C	16	A
I_{FRM}			30	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	65	A
		T_j = 150 °C	65	A
T_j			-40 ... 175	°C
Rectifier - Diode				
V_{RRM}	T_j = 25 °C		1600	V
I_D	P12 T_j = 175 °C	T_s = 70 °C	158	A
		T_s = 100 °C	127	A
I_D	HPTP / HP-PCM T_j = 175 °C	T_s = 70 °C	196	A
		T_s = 100 °C	158	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	635	A
		T_j = 150 °C	490	A
i^2t	10 ms sin 180°	T_j = 25 °C	2020	A^2s
		T_j = 150 °C	1200	A^2s
T_j			-40 ... 175	°C
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, 1 min		2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT - Chopper						
$V_{CE(sat)}$	I_C = 50 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.10	V
		T_j = 150 °C		2.20	2.40	V
V_{CE0}	chiplevel	T_j = 25 °C		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		21	24	mΩ
		T_j = 150 °C		30	32	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 1.7 mA		5	5.8	6.5	V

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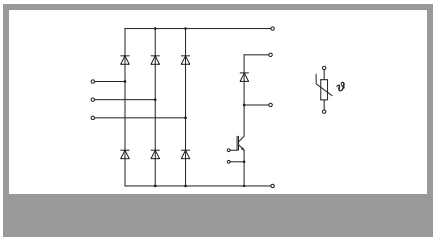


Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
IGBT - Chopper						
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C			-	1	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		2.77		nF
C_{oes}		f = 1 MHz		0.21		nF
C_{res}		f = 1 MHz		0.16		nF
Q_G	V_{GE} = -15 V ... +15 V			366		nC
R_{Gint}	T_j = 25 °C			4.0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 50 A V_{GE} = +15/-15 V $R_{G\ on}$ = 15 Ω $R_{G\ off}$ = 15 Ω di/dt_{on} = 2100 A/µs di/dt_{off} = 530 A/µs dv/dt = 4000 V/µs	T_j = 150 °C		129		ns
t_r		T_j = 150 °C		42		ns
E_{on}		T_j = 150 °C		4.8		mJ
$t_{d(off)}$		T_j = 150 °C		333		ns
t_f		T_j = 150 °C		65		ns
E_{off}		T_j = 150 °C		5		mJ
$R_{th(j-s)}$	per IGBT, P12			0.77		K/W
$R_{th(j-s)}$	per IGBT, HPTP / HP-PCM			0.52		K/W
Freewheeling - Diode						
$V_F = V_{EC}$	I_F = 15 A	T_j = 25 °C		2.38	2.71	V
	chiplevel	T_j = 150 °C		2.44	2.77	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		72	81	mΩ
		T_j = 150 °C		103	111	mΩ
I_{RRM}	I_F = 15 A di/dt_{off} = 890 A/µs V_{GE} = -15 V V_R = 600 V	T_j = 150 °C		16		A
Q_{rr}		T_j = 150 °C		2.3		µC
E_{rr}		T_j = 150 °C		0.97		mJ
$R_{th(j-s)}$	per Diode, P12			2.13		K/W
$R_{th(j-s)}$	per Diode, HPTP / HP-PCM			1.74		K/W
Rectifier - Diode						
$V_F = V_{EC}$	I_F = 26 A	T_j = 25 °C		0.97	1.20	V
	chiplevel	T_j = 150 °C		0.84	1.07	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		3.1	4.2	mΩ
		T_j = 150 °C		4.4	5.9	mΩ
I_R	T_j = 150 °C, V_{RRM}				2	mA
$R_{th(j-s)}$	per Diode, P12			1.06		K/W
$R_{th(j-s)}$	per Diode, HPTP / HP-PCM			0.76		K/W
Module						
L_{CE}				-		nH
M_s	to heatsink		1.6		2.3	Nm
w	weight			25		g
Temperature Sensor						
R_{100}	T_c=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

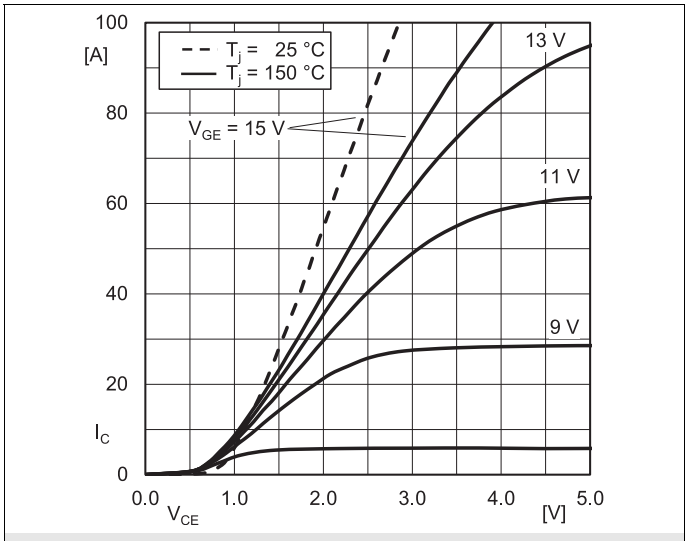


Fig. 1: Typ. IGBT output characteristic, incl. $R_{CC+ EE'}$

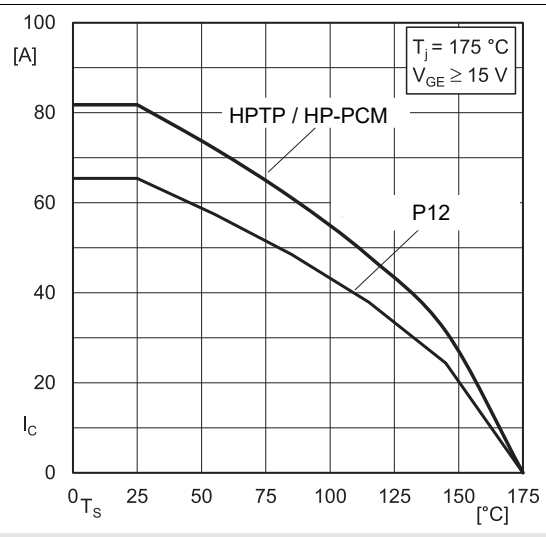


Fig. 2: IGBT rated current vs. temperature Ic=f(Ts)

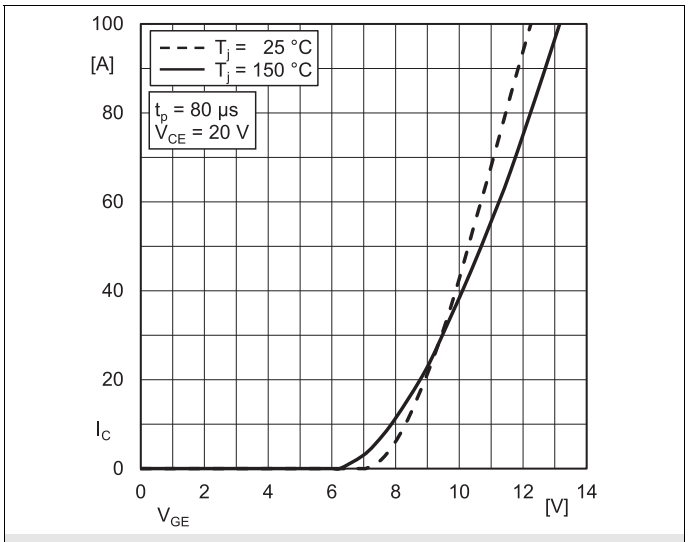


Fig. 5: Typ. IGBT transfer characteristic

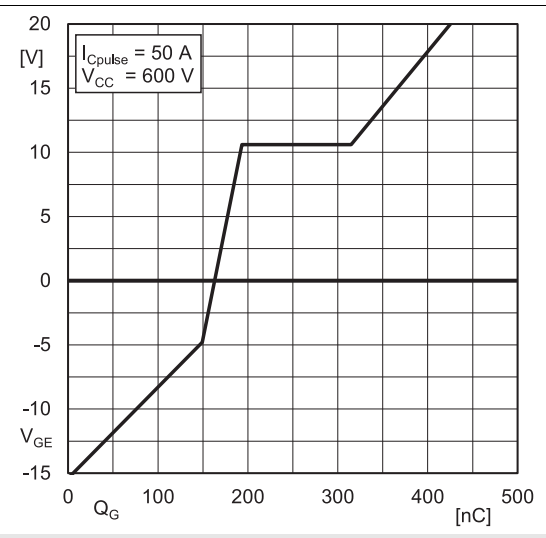


Fig. 6: Typ. IGBT gate charge characteristic

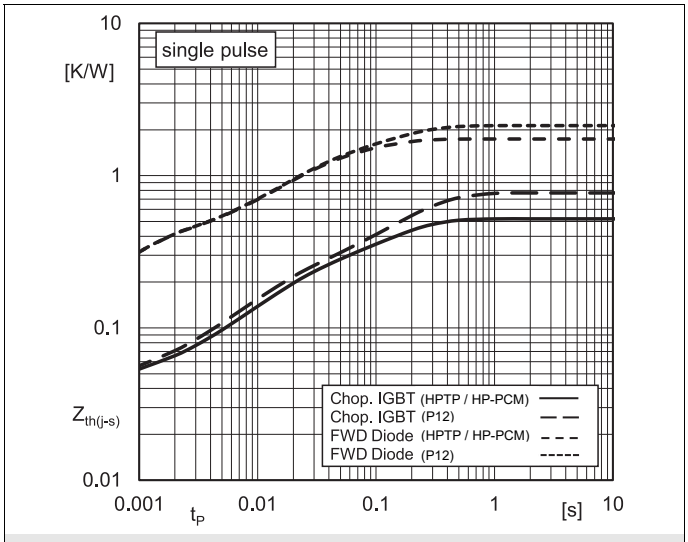


Fig. 9: Typ. transient thermal impedance

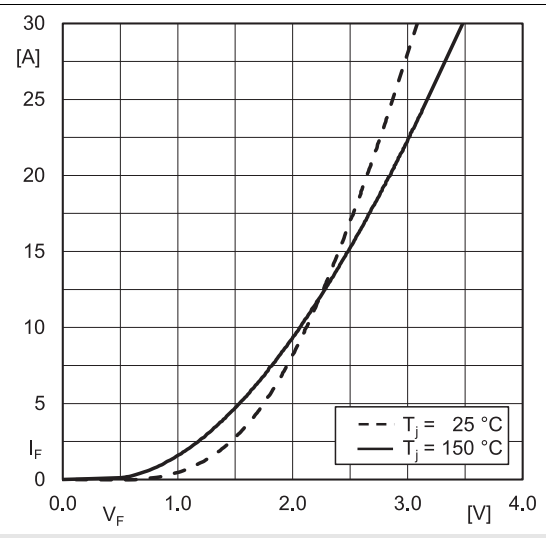


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

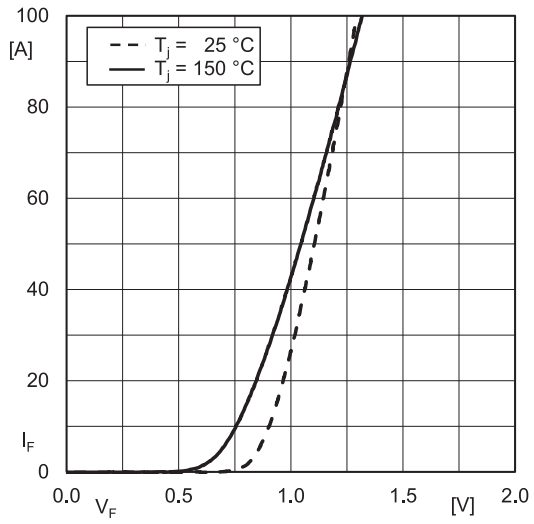
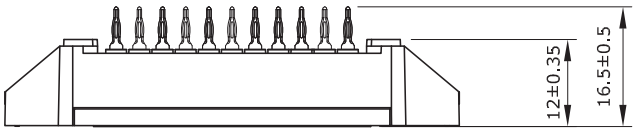
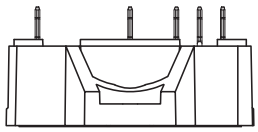
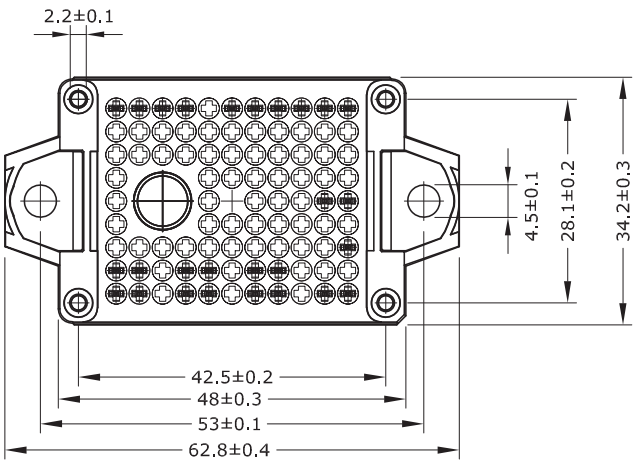
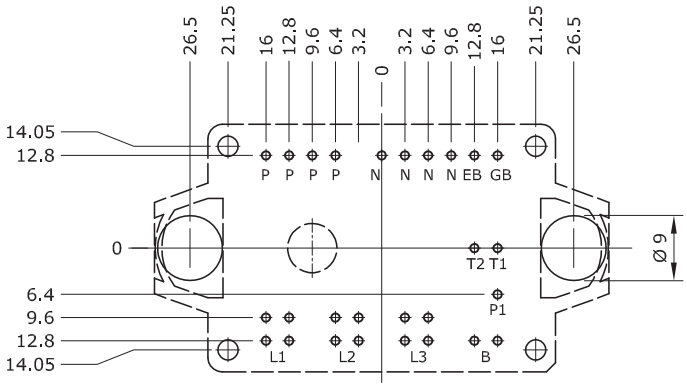


Fig. 14: Typ. Rect. diode forward charact., incl. $R_{CC'+EE'}$



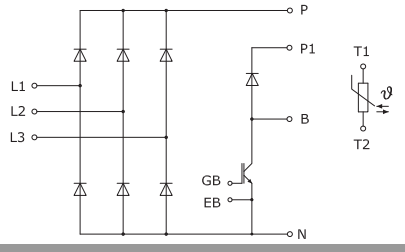






- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern ⌖ Ø0.1
- Diameters of drill ∅ 1.15mm
- Copper thickness in hole 25 - 50 µm
- Hole specification for contacts:
  refer to SEMITOP E1/E2 Mounting Instruction

SEMITOP®E1



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

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