

SK 150 DGL 12T4



SEMITOP® 3

3-phase bridge rectifier +
brake chopper

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Features*

- Compact design
- One screw mounting
- Heat transfer and insulation through direct copper bonded aluminum oxide ceramic (DBC)
- 1200V Trench4 IGBT technology
- CAL diode technology for FWD and APD
- UL file recognized, file no E63-532

Typical Applications

- Rectifier
- Motor Drive

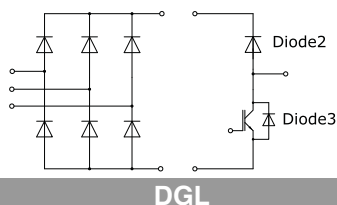
Remarks

- Diode1 = Rectifier Diode
- Diode2 = Free Wheeling Diode
- Diode3 = Anti Parallel Diode

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT 1				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 150 °C	T _s = 25 °C	55	A
		T _s = 70 °C	42	A
I _C	T _j = 175 °C	T _s = 25 °C	61	A
		T _s = 70 °C	50	A
I _{Cnom}			50	A
I _{CRM}			150	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Rectifier				
V _{RSM}	T _j = 25 °C		1300	V
V _{RRM}	T _j = 25 °C		1200	V
I _D	rec 120°	T _s = 25 °C	138	A
	T _j = 150 °C	T _s = 70 °C	105	A
I _{FSM}	sin 180°	T _j = 25 °C	635	A
	10 ms	T _j = 150 °C	490	A
i ² t	sin 180°	T _j = 25 °C	2016	A ² s
	10 ms	T _j = 150 °C	1200	A ² s
T _j			-40 ... 150	°C

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 2				
V _{RRM}	T _j = 25 °C		1200	V
I _F	T _j = 150 °C	T _s = 25 °C	25	A
		T _s = 70 °C	19	A
I _F	T _j = 175 °C	T _s = 25 °C	28	A
		T _s = 70 °C	22	A
I _{FRM}			50	A
I _{FSM}	10 ms	T _j = 25 °C	100	A
	sin 180°	T _j = 150 °C	100	A
T _j			-40 ... 175	°C





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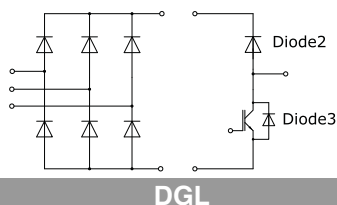
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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 3				
V _{RRM}	T _j = 25 °C		1200	V
I _F	T _j = 150 °C	T _s = 25 °C	13	A
		T _s = 70 °C	10	A
I _F	T _j = 175 °C	T _s = 25 °C	15	A
		T _s = 70 °C	12	A
I _{FRM}			16	A
I _{FSM}	10 ms	T _j = 25 °C	36	A
	sin 180°	T _j = 150 °C	36	A
T _j			-40 ... 175	°C

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
Module			
I _{t(RMS)}	ΔT _{terminal} at PCB joint = 30 K, per pin	60	A
T _{stg}	module without TIM	-40 ... 125	°C
V _{isol}	AC, sinusoidal, t = 1 min	2500	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
V _{CE(sat)}	I _C = 50 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.20	2.40	V
V _{CE0}	chipelevel	T _j = 25 °C		0.80	0.90	V
		T _j = 150 °C		0.70	0.80	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		21	24	mΩ
	chipelevel	T _j = 150 °C		30	32	mΩ
V _{GE(th)}	V _{GE} = V _{GE} = V _{CE} , I _C = 1.7 mA		5	5.8	6.5	V
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			333		nC
R _{Gint}	T _j = 25 °C			4.0		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		130		ns
t _r	I _C = 50 A	T _j = 150 °C		42		ns
E _{on}	V _{GE neg} = -15 V V _{GE pos} = 15 V	T _j = 150 °C		4.8		mJ
t _{d(off)}	R _{G on} = 15 Ω	T _j = 150 °C		330		ns
t _f	R _{G off} = 15 Ω	T _j = 150 °C		65		ns
E _{off}	di/dt _{on} = 2100 A/μs di/dt _{off} = 920 A/μs dv/dt = 4000 V/μs	T _j = 150 °C		5		mJ
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			0.85		K/W



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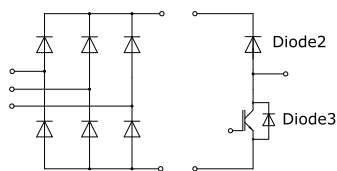
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- Diode3 = Anti Parallel Diode

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V _F	I _F = 25 A	T _j = 25 °C		1.00	1.21	V
	chiplevel	T _j = 125 °C		0.90	1.10	V
V _{F0}		chiplevel	T _j = 25 °C	0.88	0.98	V
	T _j = 125 °C		0.73	0.83	V	
r _F	chiplevel	T _j = 25 °C		4.8	9.2	mΩ
		T _j = 125 °C		6.8	11	mΩ
I _R	T _j = 145 °C, V _{RRM}				2	mA
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			1.2		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 2						
V _F	I _F = 25 A	T _j = 25 °C		2.41	2.74	V
	chiplevel	T _j = 150 °C		2.45	2.79	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		44	50	mΩ
		T _j = 150 °C		62	68	mΩ
I _{RRM}	I _F = 50 A	T _j = 150 °C		45		A
Q _{rr}	di/dt _{off} = 2100 A/μs	T _j = 150 °C		1.8		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		1		mJ
	V _{CC} = 600 V					
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			1.9		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 3						
V _F	I _F = 8 A	T _j = 25 °C		2.33	2.65	V
	chiplevel	T _j = 150 °C		2.35	2.68	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		129	144	mΩ
		T _j = 150 °C		181	198	mΩ
I _{RRM}	I _F = 8 A			-		A
Q _{rr}				-		μC
E _{rr}	V _{CC} = 600 V			-		mJ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			2.7		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Module					
M _s	to heatsink	2.25		2.5	Nm
w	weight		29		g



DGL

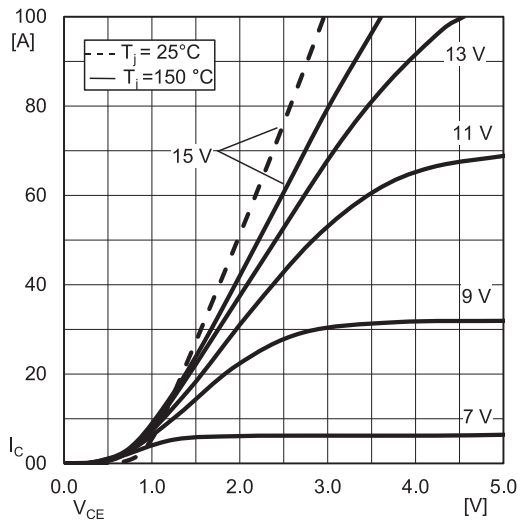


Fig. 1: Typ. IGBT1 output characteristic, incl. $R_{CC'+EE'}$

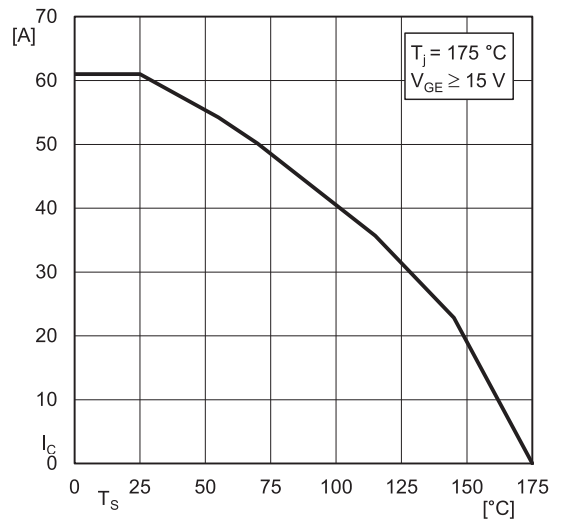


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_s)$

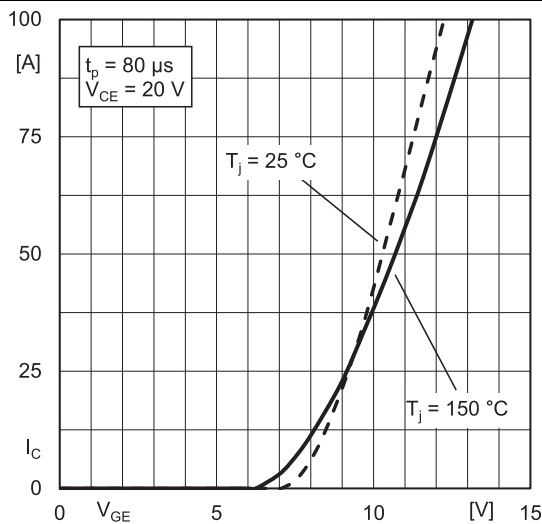


Fig. 5: Typ. transfer characteristic

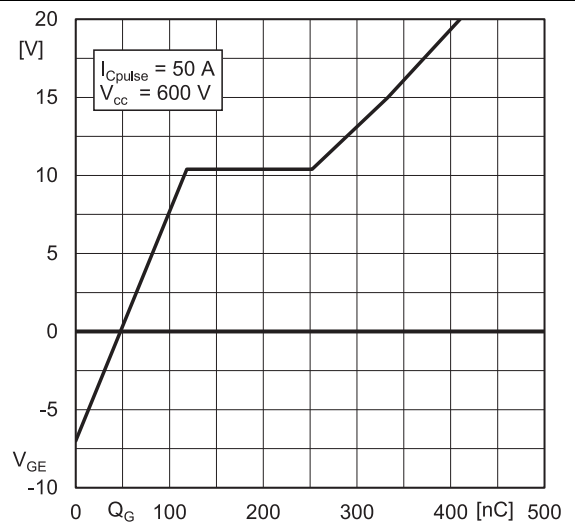


Fig. 6: Typ. gate charge characteristic

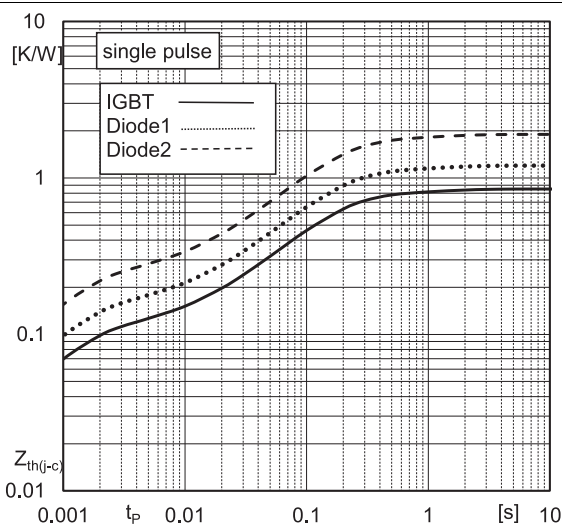


Fig. 9: Typ. Transient thermal impedance of IGBT1 & Diode2

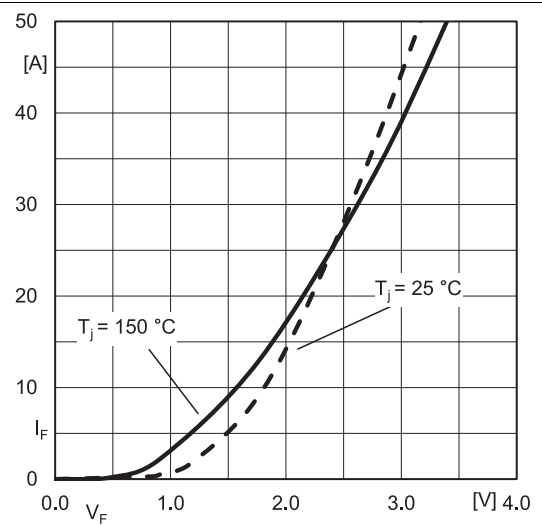
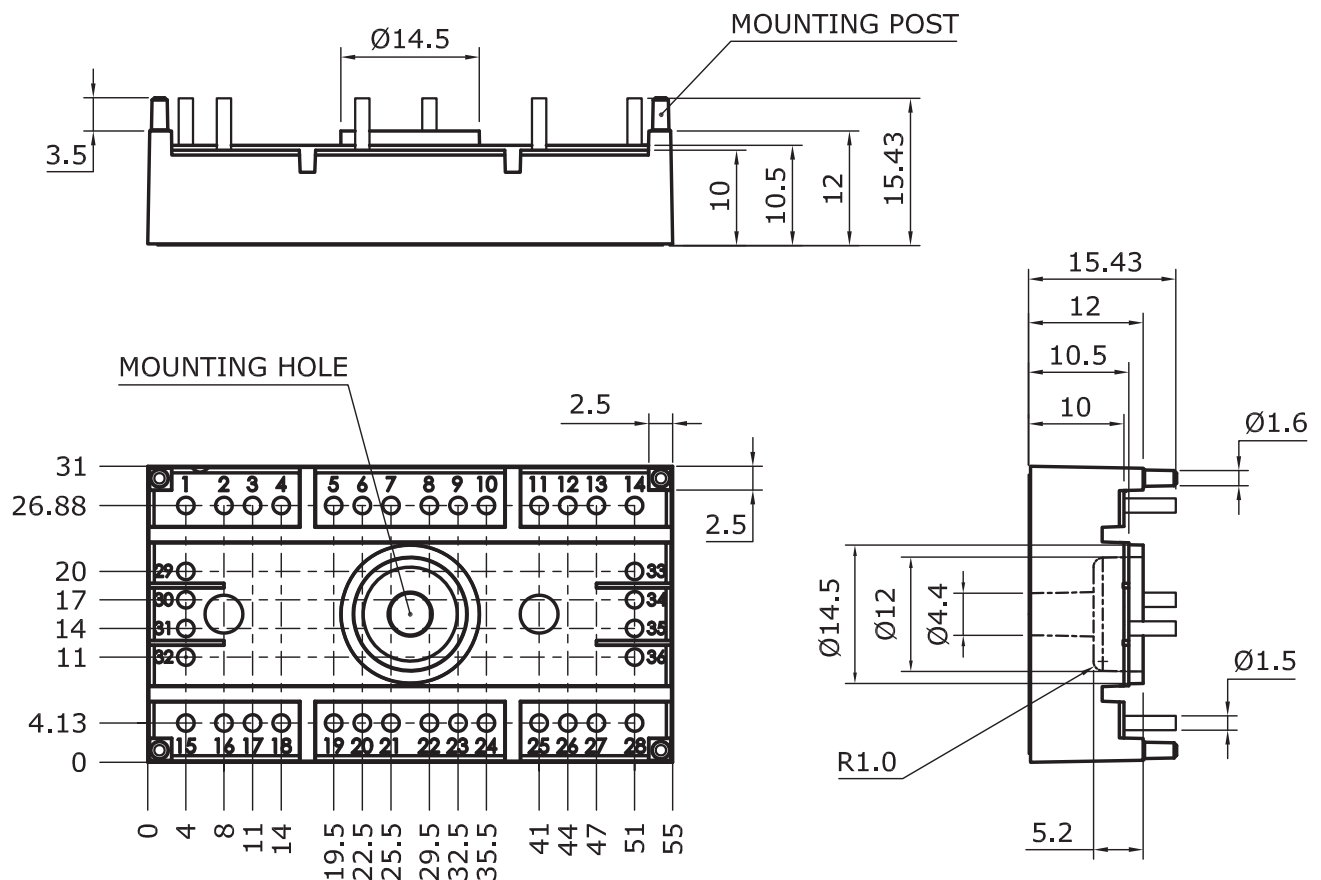


Fig. 10: Typ. Diode2 forward characteristic, incl. $R_{CC'+EE'}$

Dimensions: mm

Tolerance system: ISO 2768-m

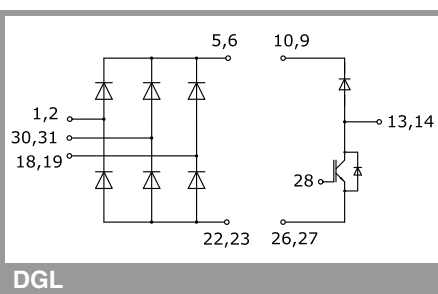


Suggested drilled hole diameter for terminal pins in the circuit board:

- refer Mounting Instruction SEMITOP® Classic

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SEMITOP®3



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

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