SEMiX® 5

Trench IGBT Modules

Evaluation Sample

SEMiX155GD12T4

Target Data

Features

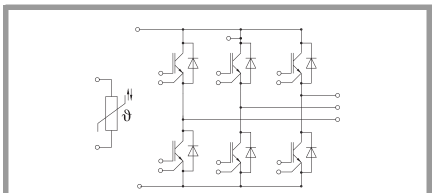
- Solderless assembling solution with PressFIT signal pins and screw power terminals
- IGBT 4 Trench Gate Technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Reliable mechanical design with injection moulded terminals and reliable internal connections
- UL recognized file no. E63532
- NTC temperature sensor inside

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Product reliability results are valid for T_{jop}=150°C
- Dynamic data are estimated
- For storage and case temperature with TIM see document “TP(HALA P8) SEMiX 5p”



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_c = 25 °C	219	A
		T_c = 80 °C	169	A
I_{Cnom}			150	A
I_{CRM}	I_{CRM} = 3xI_{Cnom}		450	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V V_{GE} ≤ 20 V V_{CES} ≤ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_c = 25 °C	175	A
		T_c = 80 °C	131	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		300	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		900	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			280	A
T_{stg}	module without TIM		-40 ... 125	°C
V_{isol}	AC sinus 50Hz, t = 1 min		4000	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	I_C = 150 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.80	2.05	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		6.7	7.7	mΩ
		T_j = 150 °C		10.0	11	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 6 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				2.0	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		9.3		nF
C_{oes}		f = 1 MHz		0.58		nF
C_{res}		f = 1 MHz		0.51		nF
Q_G	V_{GE} = - 15 V...+ 15 V			850		nC
R_{Gint}	T_j = 25 °C			5.0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 150 A V_{GE} = +15/-15 V $R_{G\,on}$ = 1 Ω $R_{G\,off}$ = 1 Ω di/dt$_{on}$ = 3300 A/µs di/dt$_{off}$ = 1000 A/µs	T_j = 150 °C		t.b.d.		ns
t_r		T_j = 150 °C		t.b.d.		ns
E_{on}		T_j = 150 °C		13		mJ
$t_{d(off)}$		T_j = 150 °C		t.b.d.		ns
t_f		T_j = 150 °C		t.b.d.		ns
E_{off}		T_j = 150 °C		21		mJ
$R_{th(j-c)}$	per IGBT				0.21	K/W
$R_{th(c-s)}$	per IGBT (λgrease=0.81 W/mK, thickness 50-100µm)			t.b.d.		K/W
$R_{th(c-s)}$	per IGBT (λ=3.4 W/mK)			t.b.d.		K/W

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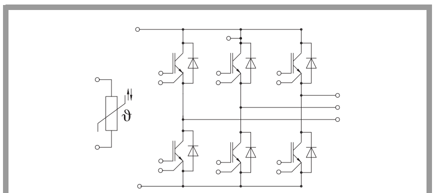

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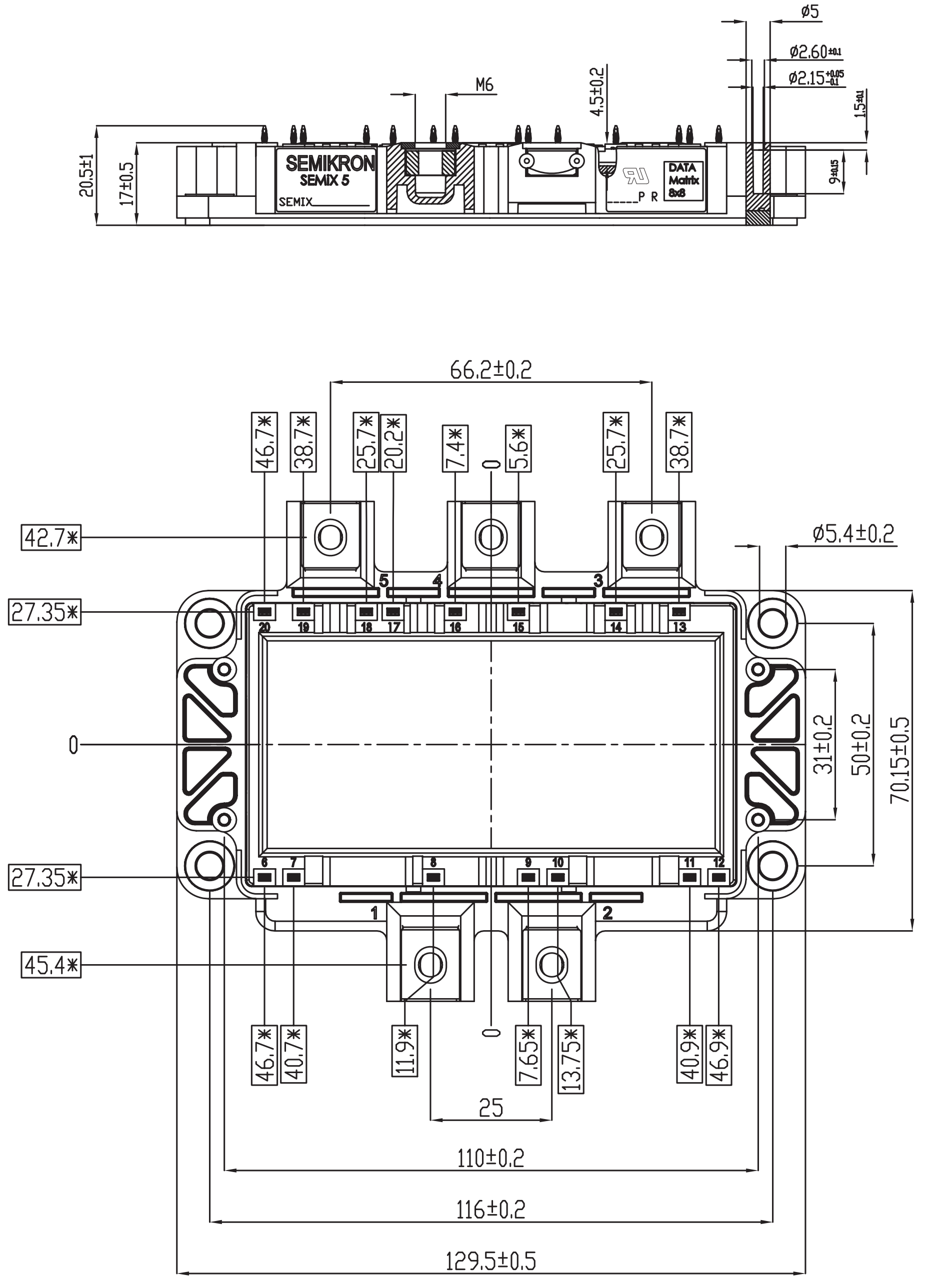
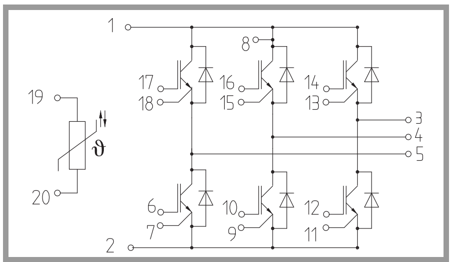
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.14	2.46	V
		T_j = 150 °C		2.07	2.38	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		5.6	6.4	mΩ
		T_j = 150 °C		7.8	8.5	mΩ
I_{RRM}	I_F = 150 A di/dt$_{off}$ = 3300 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		-		A
Q_{rr}		T_j = 150 °C		-		µC
E_{rr}		T_j = 150 °C		14		mJ
$R_{th(j-c)}$	per diode				0.35	K/W
$R_{th(c-s)}$	per diode (λgrease=0.81 W/mK, thickness 50-100µm)			t.b.d.		K/W
$R_{th(c-s)}$	per diode (λ=3.4 W/mK)			t.b.d.		K/W
Module						
L_{CE}				20		nH
$R_{CC'+EE'}$	measured per switch	T_C = 25 °C		1.2		mΩ
		T_C = 125 °C		1.65		mΩ
$Rth_{(c-s)1}$	calculated without thermal coupling			t.b.d.		K/W
$Rth_{(c-s)2}$	including thermal coupling, Ts underneath module ($λ_{grease}$=0.81 W/(m*K))			t.b.d.		K/W
$Rth_{(c-s)2}$	including thermal coupling, Ts underneath module, pre-applied phase change material			t.b.d.		K/W
M_s	to heat sink (M5)		3		6	Nm
M_t		to terminals (M6)	3		6	Nm
						Nm
w				398		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



* = All dimension with tolerance of ⌖ Ø 0.4

For technical details please refer
to SEMiX(R)5 Mounting Instruction

SEMiX5p



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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.