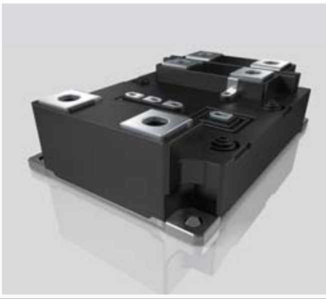
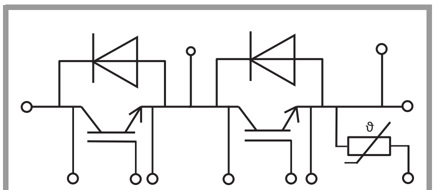


SEMITRANS® 20

SKM450GB33F

Features

- 3.3 kV F-IGBT
- 450A half bridge
- Low V_{ce}, E_{off} and R_{th}
- High power density
- Low inductance module design
- T-sensor
- Easy paralleling and easy power scaling
- For flexible and compact medium voltage inverters



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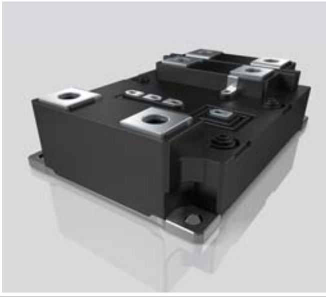
Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}	T_j = 25 °C		3300	V
I_C	T_j = 150 °C	T_c = 25 °C	760	A
		T_c = 80 °C	542	A
I_{Cnom}			450	A
I_{CRM}	$I_{CRM} = 2xI_{Cnom}$		900	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 2200 V, L_s = 40 nH, R_{Gon} = 6.8 Ω, R_{Goff} = 68 Ω, V_{GE} ± 15, T_j = 150 °C, V_{CES} ≤ 3300		10	µs
T_j	Operation		-50 ... 150	°C
Inverse diode				
I_F	T_j = 150 °C	T_c = 25 °C	674	A
		T_c = 80 °C	476	A
I_{Fnom}			450	A
I_{FRM}	$I_{FRM} = 2xI_{Fnom}$		900	A
I_{FSM}	t_p = 10 ms, sin 180°,		t.b.d.	A
T_j	Operation		-50 ... 150	°C
Module				
$I_{t(RMS)}$			1000	A
T_{stg}			-55 ... 150	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		6000	V

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
IGBT						
$V_{CE(sat)}$	I_C = 450 A V_{GE} = 15 V chiplevel	T_j = 25 °C	1.75	2.07	2.37	V
		T_j = 150 °C	2.43	2.86	3.26	V
$V_{GE(th)}$	V_{CE} = 10V, I_C = 450 mA, T_j = 25 °C		5.5	6.5	7.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 3300 V	T_j = 25 °C			0.3	mA
		T_j = 150 °C		15	50	mA
C_{ies}	V_{GE} = 0 V, V_{CE} = 10 V, f = 0.1 MHz, T_{vj} = 25 °C			24.0		nF
Q_G	V_{GE} = -15V ... 15V			1296		nC
R_{Gint}	T_j = 25 °C			6.2		Ω
$t_{d(on)}$	V_{CC} = 1800 V	T_j = 150 °C		326		ns
t_r	I_C = 450 A	T_j = 150 °C		118		ns
E_{on}	V_{GE} = +15/-15 V $R_{G\,on}$ = 6.8 Ω	T_j = 150 °C		601		mJ
$t_{d(off)}$	$R_{G\,off}$ = 12 Ω	T_j = 150 °C		1180		ns
t_f	di/dt_{on} = 3500 A/µs	T_j = 150 °C		291		ns
E_{off}	di/dt_{off} = 3400 A/µs du/dt = 1250 V/µs L_s = 35 nH	T_j = 150 °C		601		mJ
$R_{th(j-c)}$	per IGBT				0.035	K/W



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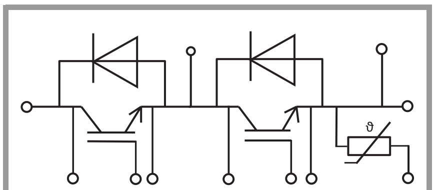

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
V_F	I_F = 450 A, V_{GE} = 0 V, chiplevel		1.75	2.05	2.34	V
		T_j = 150 °C	1.93	2.25	2.57	V
I_{RRM}	I_F = 450 A, di/dt_{off} = 3600 A/µs, V_{GE} = ±15 V, V_{CC} = 1800 V, L_s = 35 nH	T_j = 150 °C		493		A
Q_{rr}		T_j = 150 °C		442		µC
E_{rr}		T_j = 150 °C		542		mJ
t_{rr}		T_j = 150 °C		1.49		µs
$R_{th(j-c)}$	per diode				0.055	K/W
Module						
L_{CE}	Between C_1(main) and E_2 (main)			9		nH
$R_{CC'+EE'}$	measured per switch, $R_{C\ AUX\ C'}$ + $R_{E\ AUX\ E'}$	T_C = 25 °C		t.b.d.		mΩ
		T_C = 125 °C		0.44		mΩ
$R_{th(c-s)}$	per switch			0.02		K/W
M_s	to heat sink M6			5.5	6	Nm
M_t		to terminals M3		0.6	0.8	Nm
		to terminals M8		14.4	15	Nm
Temperature Sensor						
R_{25}	T_c= 25°C			5 ± 5%		kΩ
$B_{25/50}$				3375		K

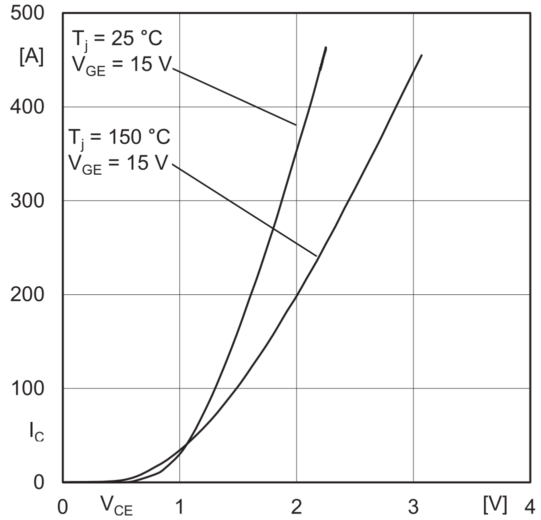


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

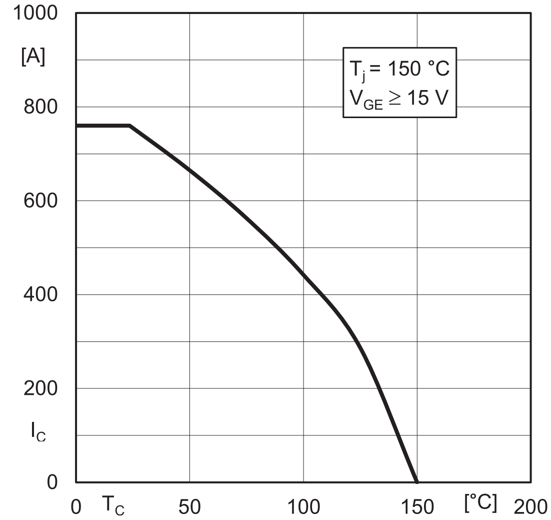


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

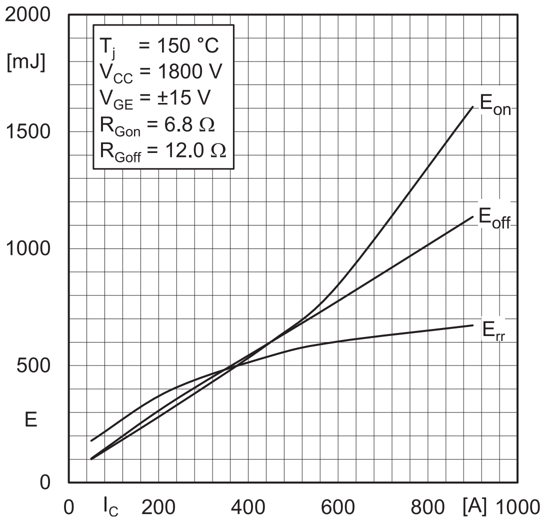


Fig. 3: Typ. turn-on /-off energy = f (I_C)

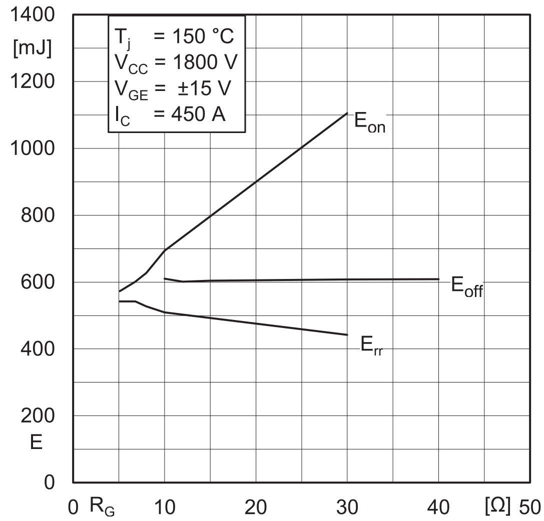


Fig. 4: Typ. turn-on /-off energy = f (R_G)

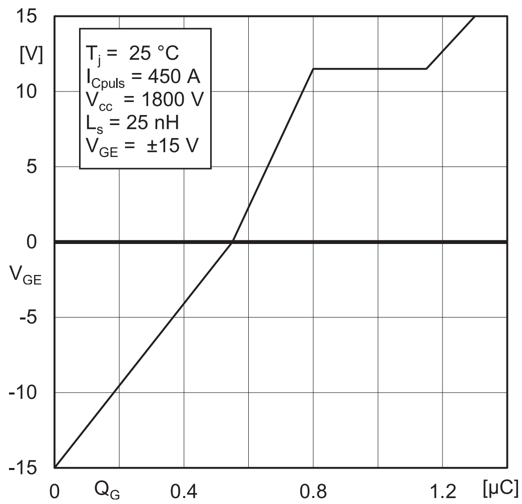


Fig. 6: Typ. gate charge characteristic

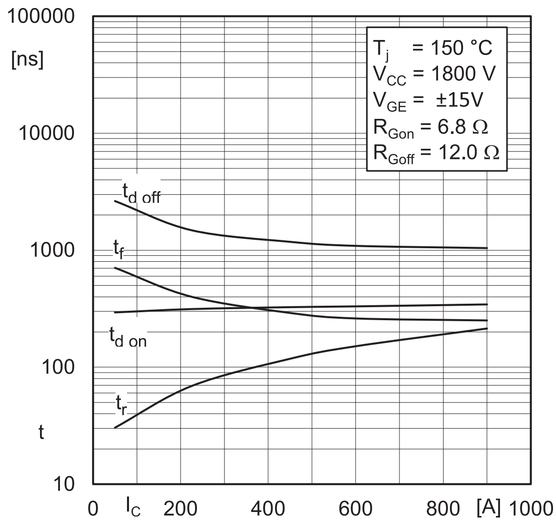


Fig. 7: Typ. switching times = f (I_C)

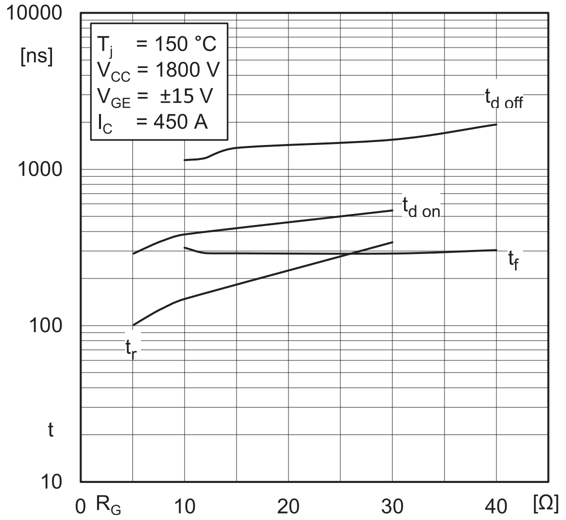


Fig. 8: Typ. switching times = f (R_G)

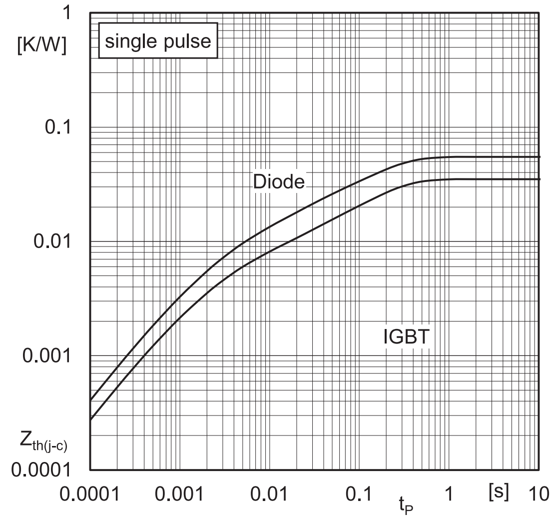


Fig. 9: Transient thermal impedance

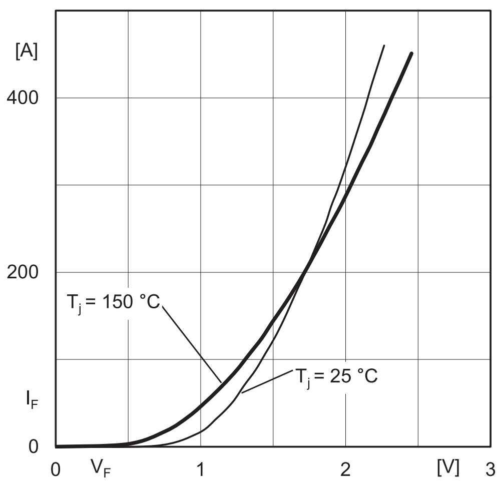


Fig. 10: Typ. diode forward charact., incl. $R_{CC'+EE'}$

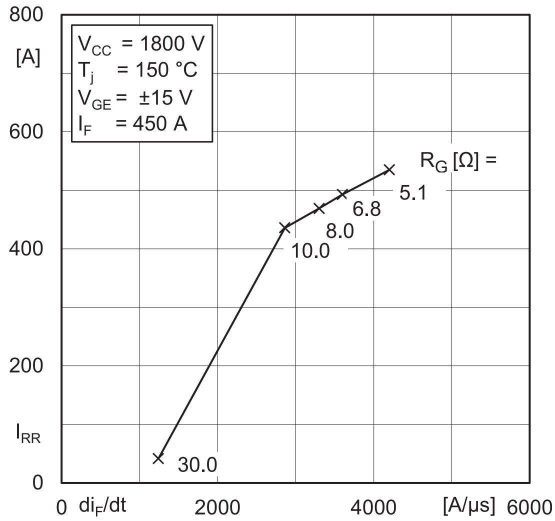


Fig. 11: Typ. diode peak reverse recovery current

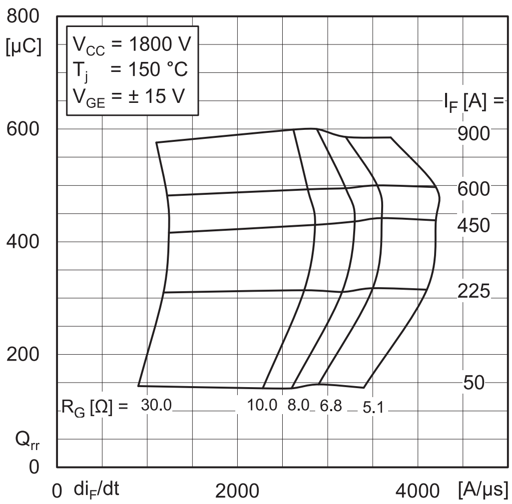
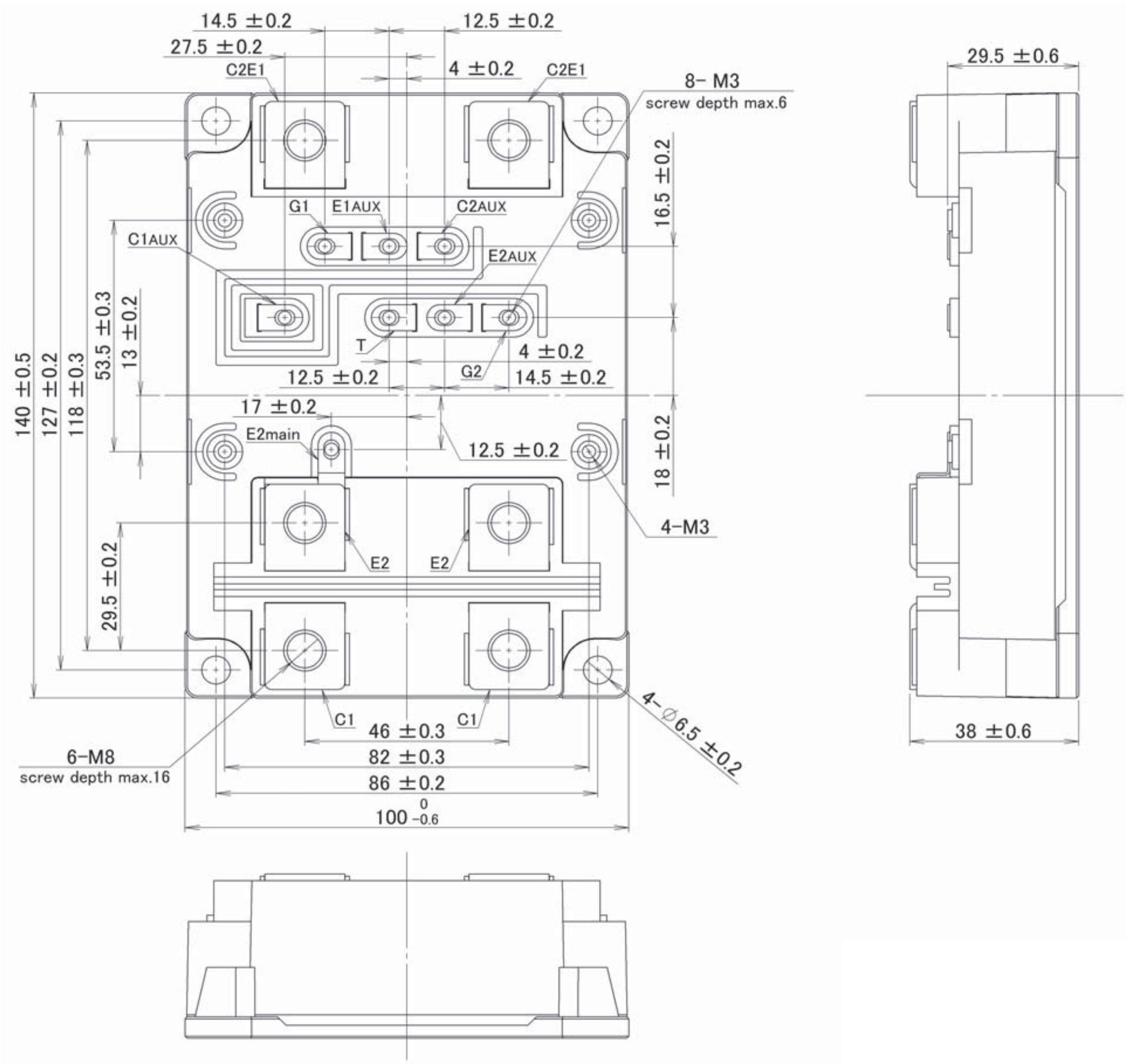


Fig. 12: Typ. diode peak reverse recovery charge



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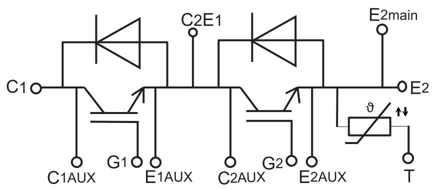

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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