SKM1400GB17R8H1

SEMITRANS® 10

IGBT R8 Modules

SKM1400GB17R8H1

Features*

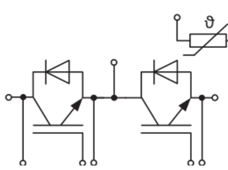
- Symmetrical current sharing
- Low-inductive module design
- High mechanical robustness
- UL recognized, file no. E63532

Typical Applications

- Motor Drives
- UPS Systems
- Solar Inverters

Remarks

- Max. case temperature limited to $T_c = T_s = 125$ °C
- Recommended $T_{j,op}$ = -40...+150 °C
- $I_{DC} \leq 1000$ A for $T_{Terminal}$ = 100 °C



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Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}	T_j = 25 °C		1700	V
I_C	T_j = 175 °C	T_c = 25 °C	2337	A
		T_c = 100 °C	1527	A
I_{Cnom}			1400	A
I_{CRM}			2800	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 1200 V $V_{GE} \leq 15$ V $V_{CES} \leq 1700$ V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
V_{RRM}	T_j = 25 °C		1700	V
I_F	T_j = 175 °C	T_c = 25 °C	1874	A
		T_c = 100 °C	1168	A
I_{FRM}			2800	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		9024	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			1000	A
T_{stg}			-40 ... 150	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
IGBT						
$V_{CE(sat)}$	I_C = 1400 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.63	1.95	V
		T_j = 150 °C		1.96	2.27	V
V_{CE0}	chiplevel	T_j = 25 °C		1.06	1.12	V
		T_j = 150 °C		0.95	1.05	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		0.41	0.59	mΩ
		T_j = 150 °C		0.72	0.87	mΩ
$V_{GE(th)}$	V_{CE} = 10 V, I_C = 52.8 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1700 V, T_j = 25 °C				6.0	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		139.2		nF
C_{oes}		f = 1 MHz		4.80		nF
C_{res}		f = 1 MHz		0.43		nF
Q_G	V_{GE} = - 15 V / + 15 V			8640		nC
R_{Gint}	T_j = 25 °C			1.7		Ω
$t_{d(on)}$	V_{CC}= 900 V I_C= 1400 A V_{GE} = +15 V/-15 V R_{Gon}= 2 Ω R_{Goff}= 2 Ω di/dt_{on}= 6.3 kA/µs di/dt_{off}= 6.3 kA/µs dv/dt = 4500 V/µs L_S= 25 nH	T_j = 150 °C		775		ns
t_r		T_j = 150 °C		205		ns
E_{on}		T_j = 150 °C		830		mJ
$t_{d(off)}$		T_j = 150 °C		865		ns
t_f		T_j = 150 °C		180		ns
E_{off}		T_j = 150 °C		520		mJ
$R_{th(j-c)}$	per IGBT				0.02	K/W
$R_{th(c-s)}$	per IGBT, (λ_{grease} = 0.81 W/(m*K))			0.010		K/W
$R_{th(c-s)}$	per IGBT, pre-applied phase change material			0.009		K/W

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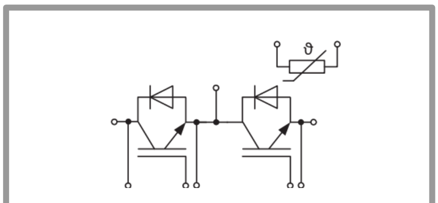

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
$V_F = V_{EC}$	I_F = 1400 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.84	2.19	V
		T_j = 150 °C		1.89	2.25	V
V_{F0}	chiplevel	T_j = 25 °C		1.32	1.56	V
		T_j = 150 °C		1.08	1.22	V
r_F	chiplevel	T_j = 25 °C		0.37	0.45	mΩ
		T_j = 150 °C		0.58	0.74	mΩ
I_{RRM}	I_F = 1400 A di/dt_{off} = 6.4 kA/μs V_{GE} = -15 V V_{CC} = 900 V	T_j = 150 °C		925		A
Q_{rr}		T_j = 150 °C		420		μC
E_{rr}		T_j = 150 °C		208		mJ
$R_{th(j-c)}$	per diode				0.032	K/W
$R_{th(c-s)}$	per diode, (λ_{grease} = 0.81 W/(m*K))			0.013		K/W
$R_{th(c-s)}$	per diode, pre-applied phase change material			0.011		K/W
Module						
L_{CE}				10		nH
$R_{CC'+EE'}$	measured per switch, T_C = 25 °C			0.20		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling (λ_{grease}=0.81 W/(m*K))			0.0028		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module (λ_{grease}=0.81 W/(m*K))			0.005		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, pre-applied phase change material			0.004		K/W
M_s	to heat sink M5		4		6	Nm
M_t		to terminal M8	8		10	Nm
		to terminal M4	1.8		2.1	Nm
w					1250	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

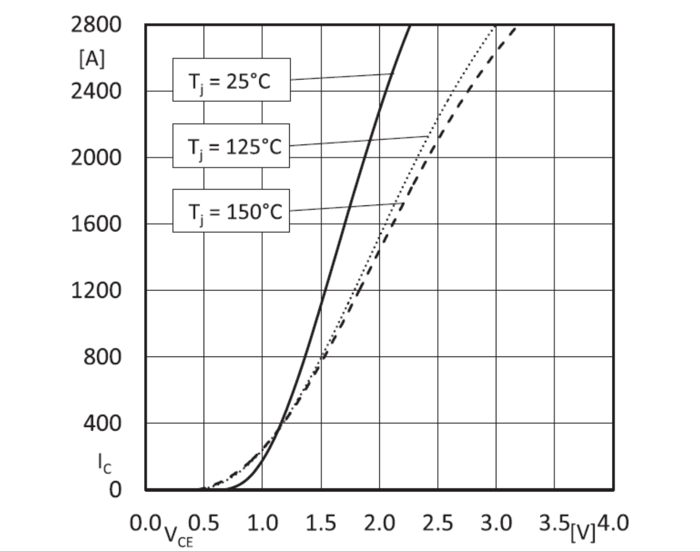


Fig.1: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $V_{GE} = 15V$; (chiplevel)

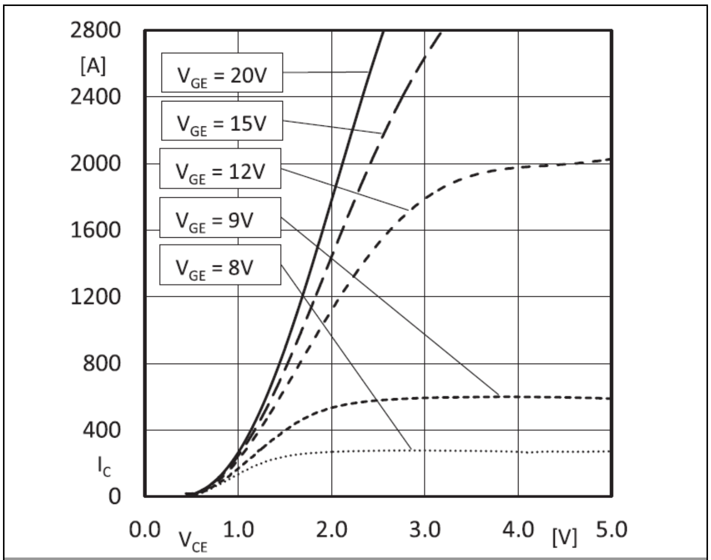


Fig. 2: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $T_j = 150°C$; (chiplevel)

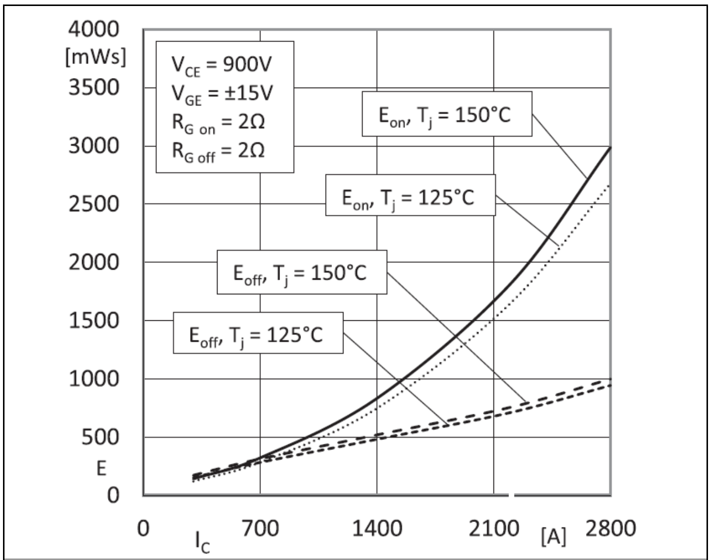


Fig. 3: Switching losses IGBT (typical); E = f(I_C)

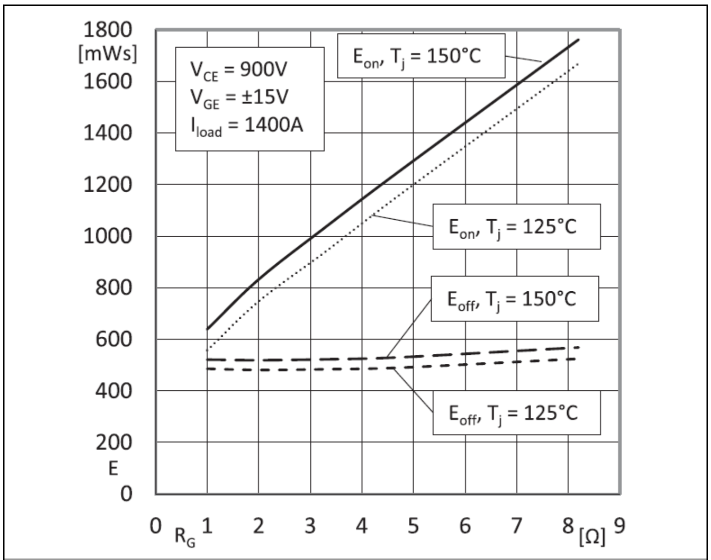


Fig. 4: Switching losses IGBT (typical); E = f(R_G)

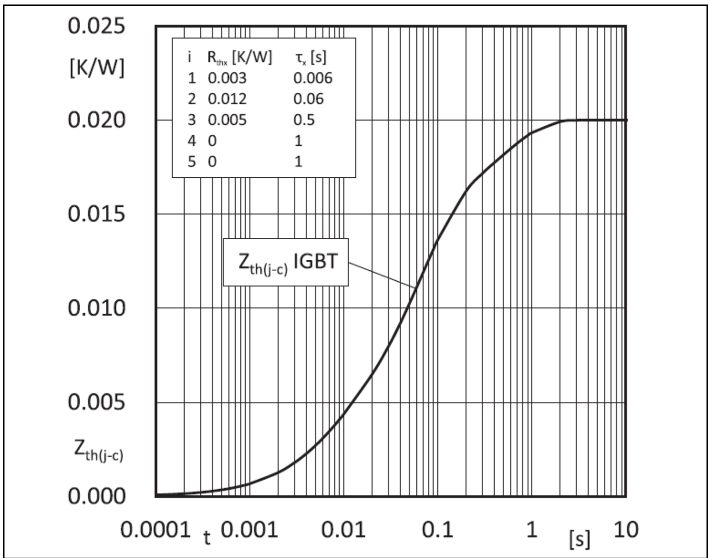


Fig. 5: Transient thermal impedance IGBT

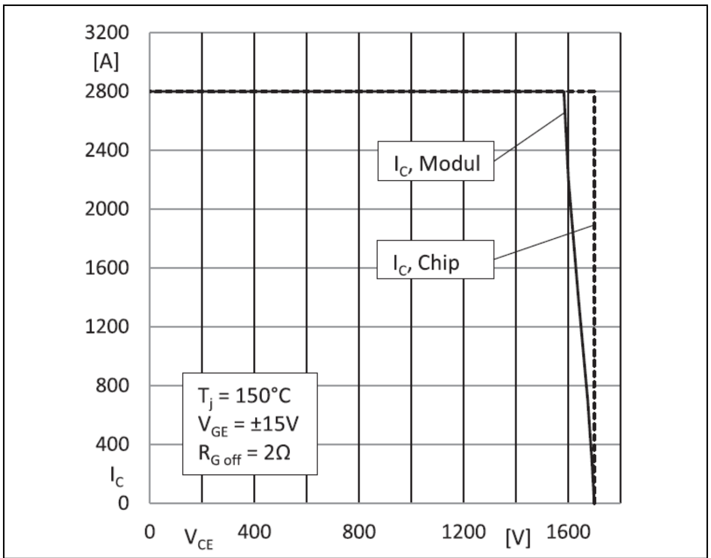


Fig. 6: RBSOA IGBT

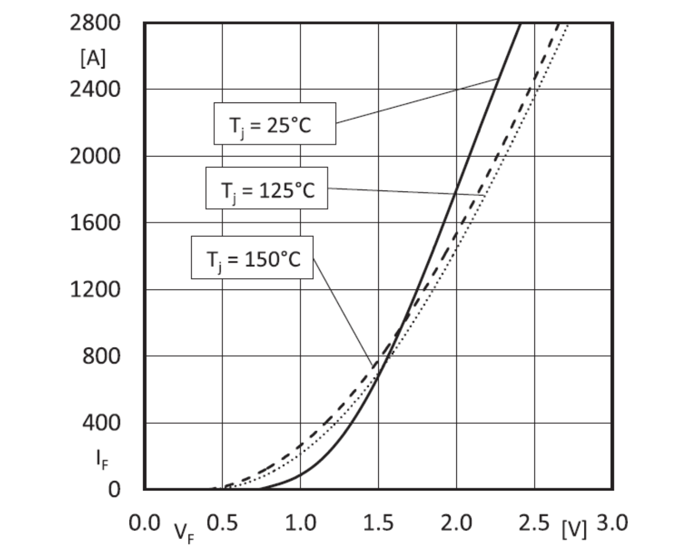


Fig. 7: Forward characteristics Diode (typical), $I_F = f(V_F)$; (chiplevel)

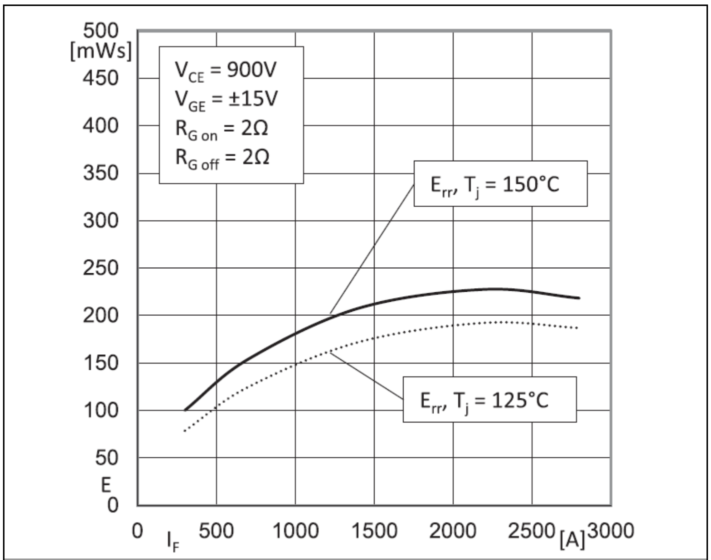


Fig. 8: Switching losses Diode (typical); $E = f(I_F)$

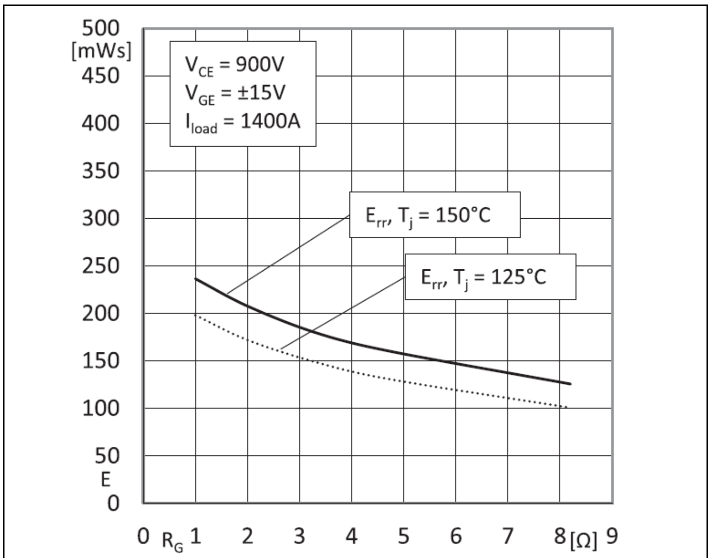


Fig. 9: Switching losses Diode (typical); $E = f(R_G)$

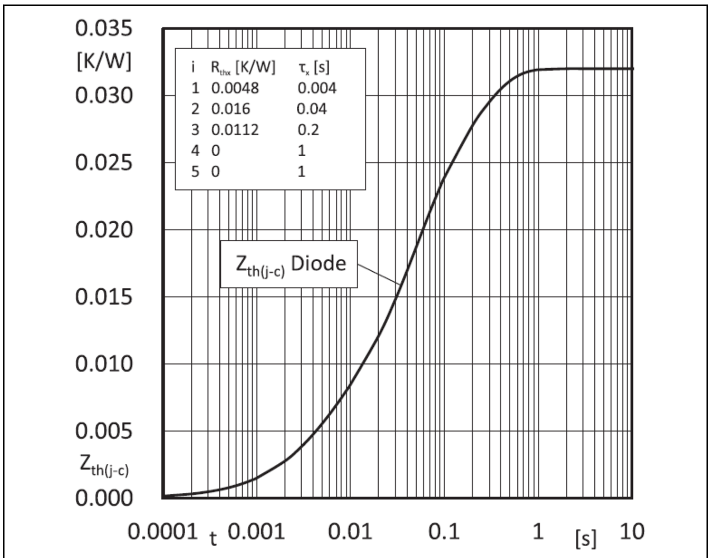


Fig. 10: Transient thermal impedance Diode

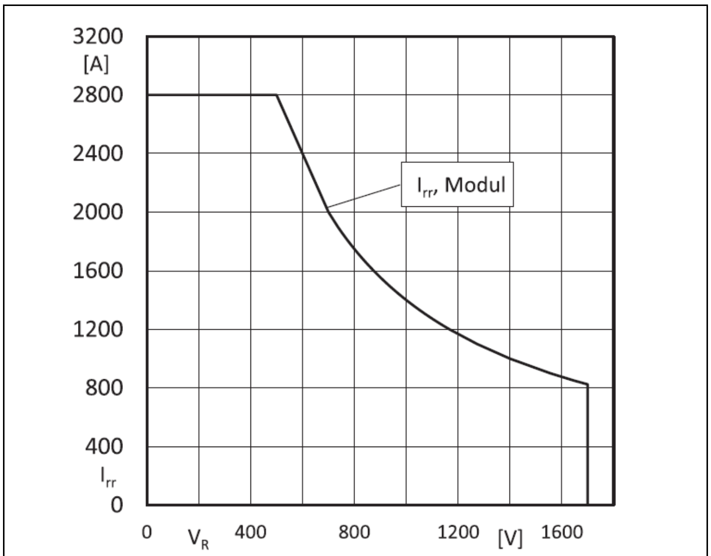


Fig. 11: RBSOA Diode

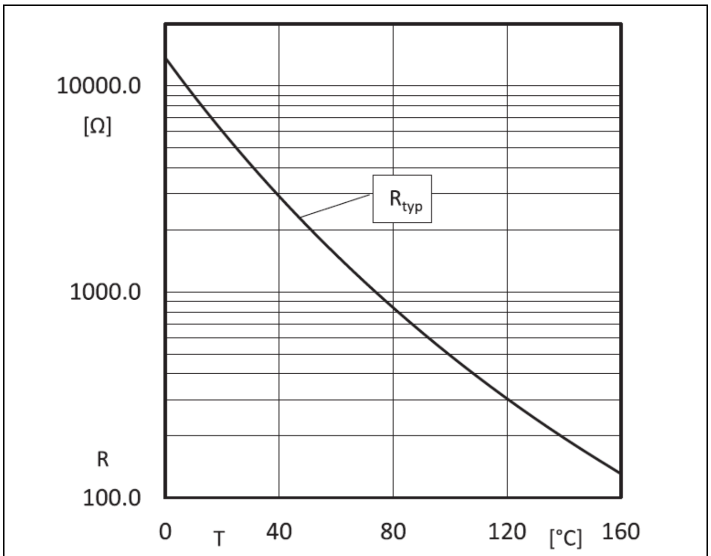


Fig. 12: NTC characteristics (typical)

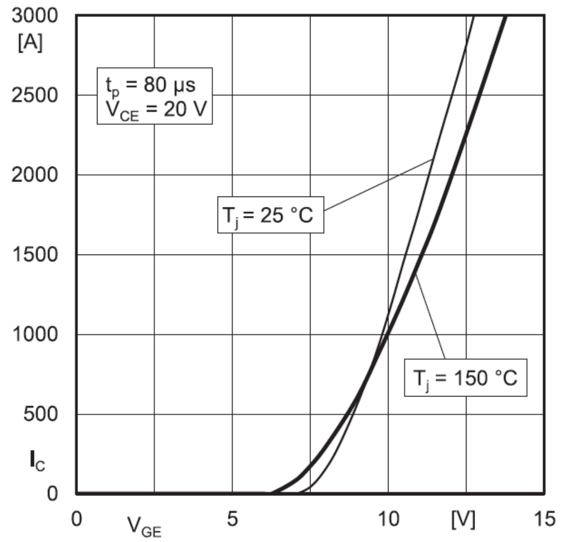


Fig. 13: Typical transfer characteristic

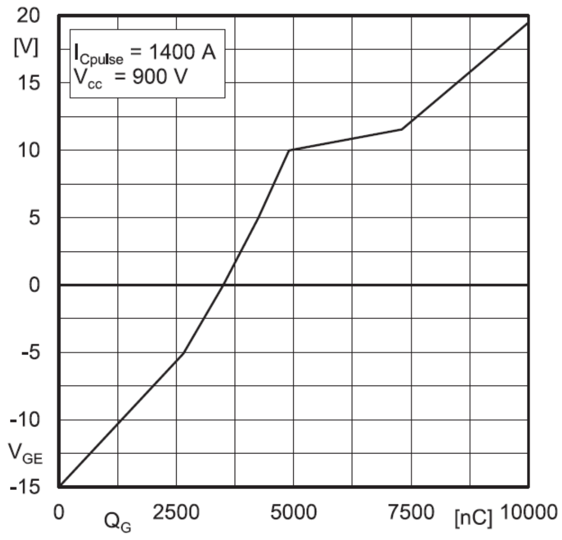
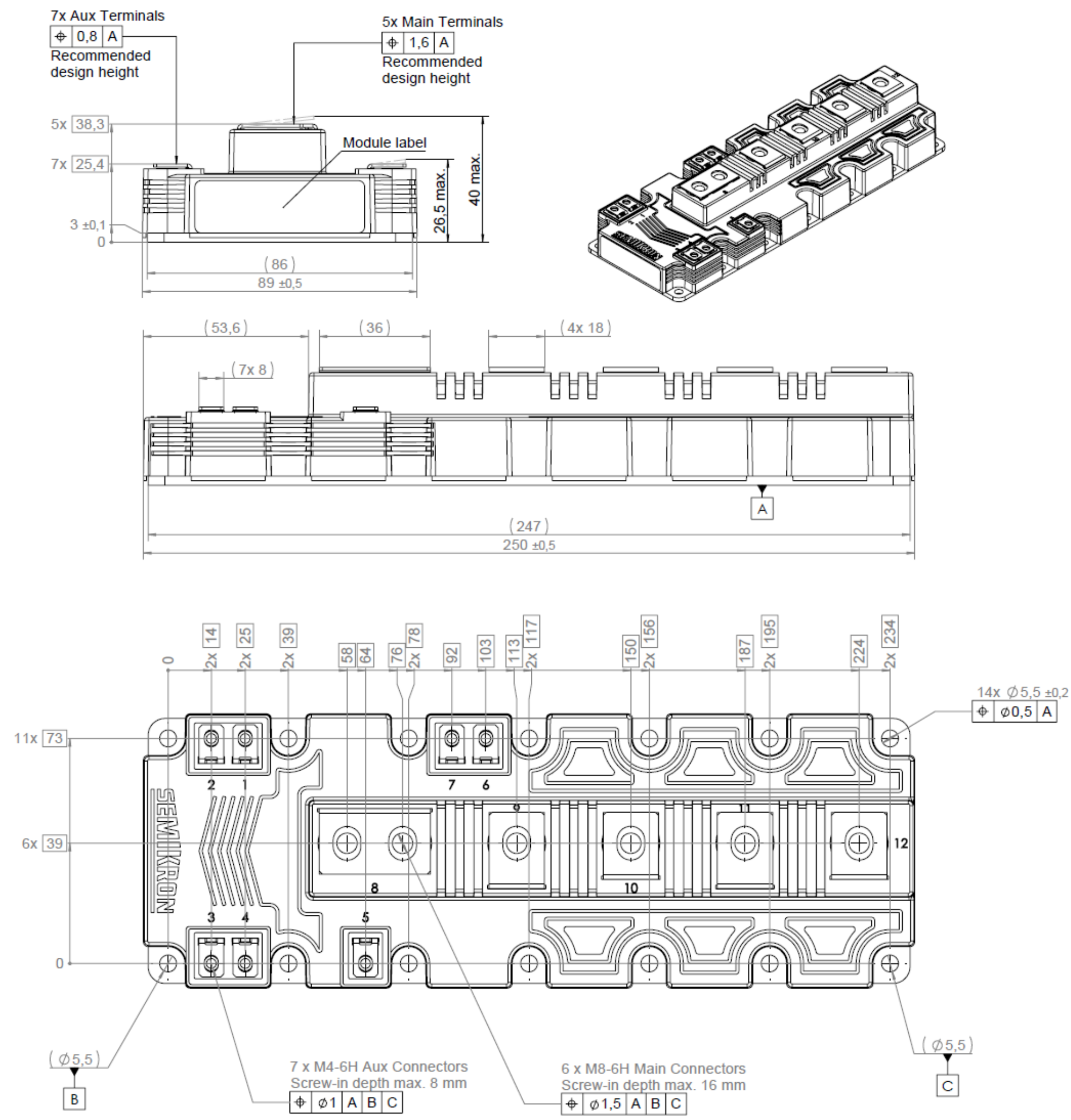


Fig. 14: Typical gate charge characteristic



• Dimensions in mm
• General tolerances ±0,5mm

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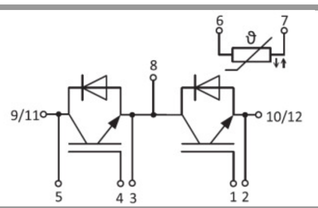

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This is an electrostatic discharge sensitive device (ESDS) according to international standard IEC 61340.

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