



SEMITRANS® 10

IGBT R8 Modules

SKM1000GAR17R8

Features*

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

Typical Applications

- Brake chopper
- Wind turbines

Remarks

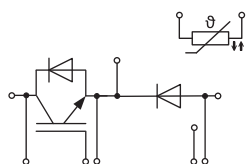
Recommended $T_{jop} = -40 \dots +150^\circ\text{C}$

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	1574	A
		T _c = 100 °C	1027	A
I _{Cnom}			1000	A
I _{CRM}			2000	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 1200 V V _{GE} ≤ 15 V V _{CES} ≤ 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	1449	A
		T _c = 100 °C	905	A
I _{FRM}			2000	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		6240	A
T _j			-40 ... 175	°C
Freewheeling diode				
V _{RRM}	T _j = 25 °C		1700	V
I _F	T _j = 175 °C	T _c = 25 °C	1449	A
		T _c = 100 °C	905	A
I _{FRM}			2000	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		6240	A
T _j			-40 ... 175	°C
Module				
T _{stg}			-40 ... 150	°C
V _{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 1000\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.66	1.99	V
		$T_j = 150^\circ\text{C}$	2.01	2.33	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	1.06	1.12	V
		$T_j = 150^\circ\text{C}$	0.95	1.05	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	0.60	0.87	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	1.06	1.28	$\text{m}\Omega$
$V_{GE(th)}$	$V_{CE} = 10\text{ V}, I_C = 36\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 1700\text{ V}, T_j = 25^\circ\text{C}$			6.0	mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	90.0		nF
C_{oes}		$f = 1\text{ MHz}$	3.00		nF
C_{res}		$f = 1\text{ MHz}$	0.24		nF
Q_G	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		5640		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		1.7		Ω



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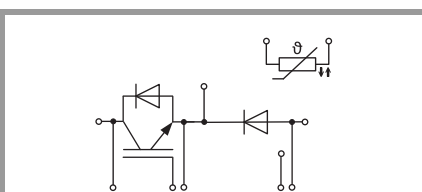
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
t _{d(on)}	V _{CC} = 900 V	T _j = 150 °C		450		ns
t _r	I _C = 1000 A	T _j = 150 °C		95		ns
E _{on}	V _{GE} = +15/-15 V	T _j = 150 °C		415		mJ
t _{d(off)}	R _{G on} = 0.7 Ω	T _j = 150 °C		620		ns
t _f	R _{G off} = 0.7 Ω	T _j = 150 °C		155		ns
E _{off}	di/dt _{on} = 9.7 kA/μs	T _j = 150 °C				
	di/dt _{off} = 5.5 kA/μs					
	dv/dt = 4300 V/μs	T _j = 150 °C		345		mJ
	L _s = 36 nH					
R _{th(j-c)}	per IGBT				0.03	K/W
R _{th(c-s)}	per IGBT (λ _{grease} =0.81 W/(m*K))			0.016		K/W
Inverse diode						
V _F = V _{EC}	I _F = 1000 A	T _j = 25 °C		1.78	2.12	V
	V _{GE} = 0 V	T _j = 150 °C		1.81	2.14	V
	chiplevel					
V _{F0}		T _j = 25 °C		1.32	1.56	V
	chiplevel	T _j = 150 °C		1.08	1.22	V
r _F		T _j = 25 °C		0.46	0.56	mΩ
	chiplevel	T _j = 150 °C		0.73	0.92	mΩ
I _{RRM}	I _F = 1000 A	T _j = 150 °C		885		A
Q _{rr}	V _{GE} = -15 V	T _j = 150 °C		355		μC
E _{rr}	di/dt _{off} = 9.2 kA/μs					
	V _R = 900 V	T _j = 150 °C		185		mJ
R _{th(j-c)}	per diode				0.042	K/W
R _{th(c-s)}	per diode (λ _{grease} =0.81 W/(m*K))			0.017		K/W
Freewheeling diode						
V _F = V _{EC}	I _F = 1000 A	T _j = 25 °C		1.78	2.12	V
	V _{GE} = 0 V	T _j = 150 °C		1.81	2.14	V
	level = chiplevel					
V _{F0}		T _j = 25 °C		1.32	1.56	V
	chiplevel	T _j = 150 °C		1.08	1.22	V
r _F		T _j = 25 °C		0.46	0.56	mΩ
	chiplevel	T _j = 150 °C		0.73	0.92	mΩ
I _{RRM}	I _F = 1000 A	T _j = 150 °C		885		A
Q _{rr}	di/dt _{off} = 9.2 kA/μs	T _j = 150 °C		355		μC
E _{rr}	V _{GE} = -15 V					
	V _R = 900 V	T _j = 150 °C		185		mJ
R _{th(j-c)}	per diode				0.042	K/W
R _{th(c-s)}	per diode (λ _{grease} =0.81 W/(m*K))			0.017		K/W
Module						
L _{CE}				10		nH
R _{CC'+EE'}	measured per switch, T _C = 25 °C			0.2		mΩ
R _{th(c-s)1}	calculated without thermal coupling (λ _{grease} =0.81 W/(m*K))			0.0041		K/W
R _{th(c-s)2}	including thermal coupling, T _s underneath module (λ _{grease} =0.81 W/(m*K))			0.007		K/W
M _s	to heat sink M5		4		6	Nm
M _t		to terminals M8	8		10	Nm
		to terminals M4	1.8		2.1	Nm
w					1250	g

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Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
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

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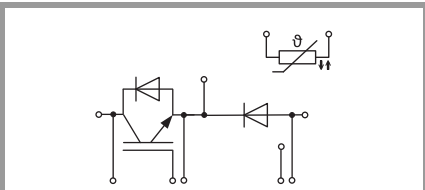
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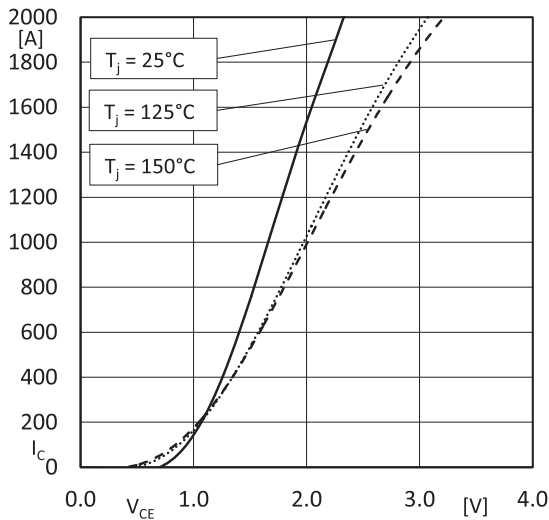


Fig. 1: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $V_{GE} = 15V$; (chiplevel)

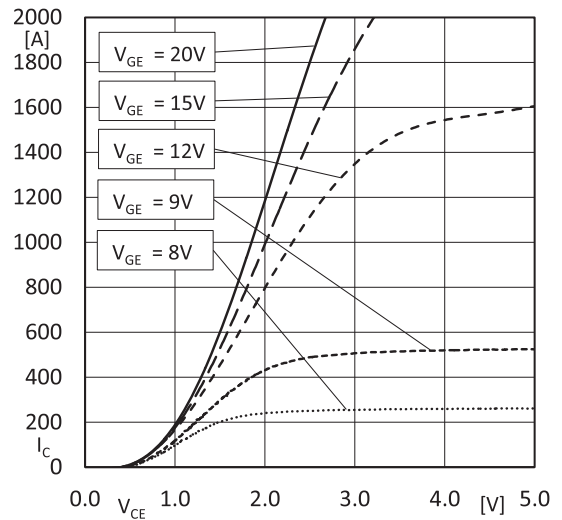


Fig. 2: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $T_j = 150^\circ C$; (chiplevel)

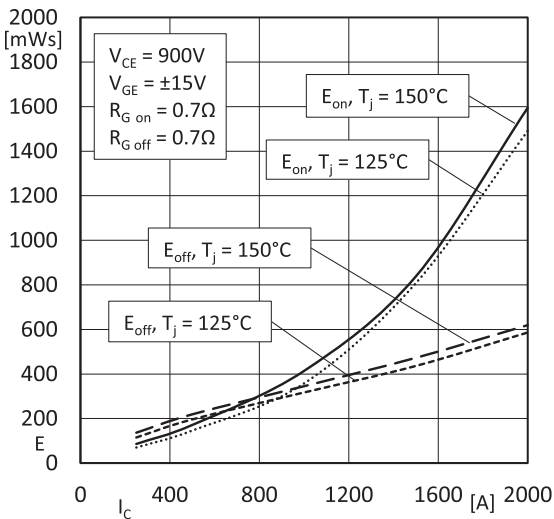


Fig. 3: Switching losses IGBT (typical); $E=f(I_C)$

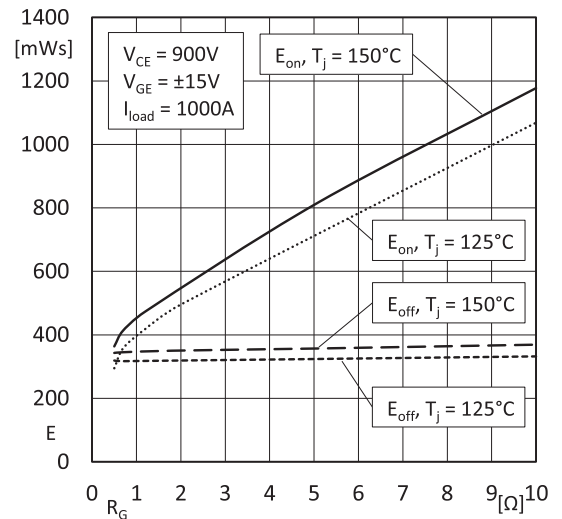


Fig. 4: Switching losses IGBT (typical); $E=f(R_G)$

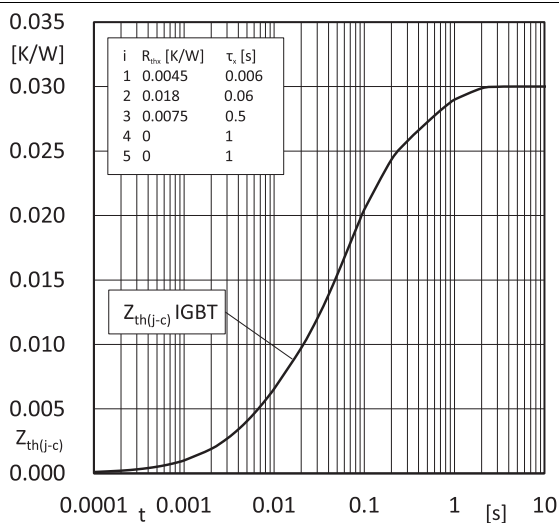


Fig. 5: Transient thermal impedance IGBT

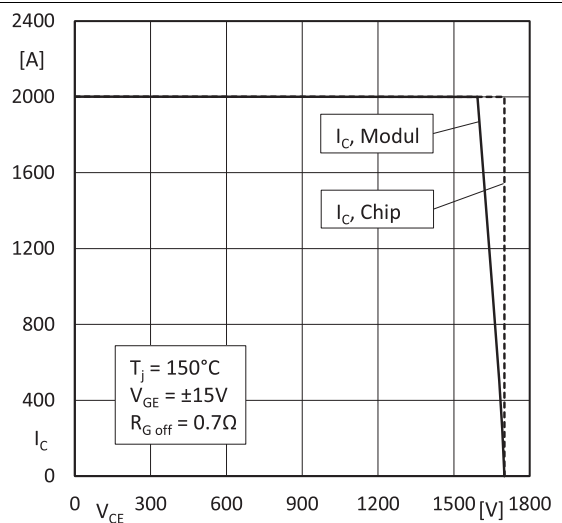


Fig. 6: RBSOA IGBT

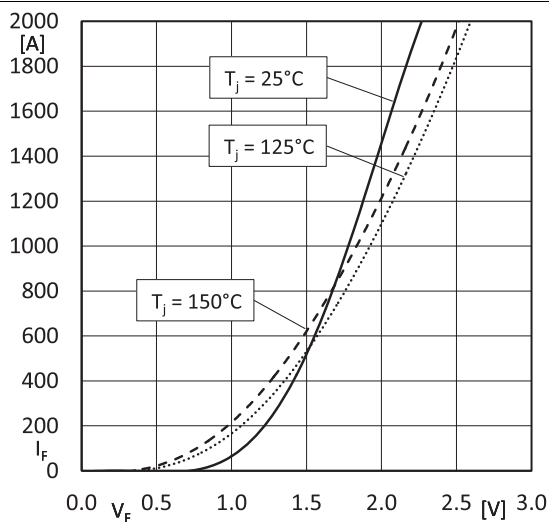


Fig. 7: Forward charact. Diode (typical); $I_F=f(V_F)$; (chipllevel)

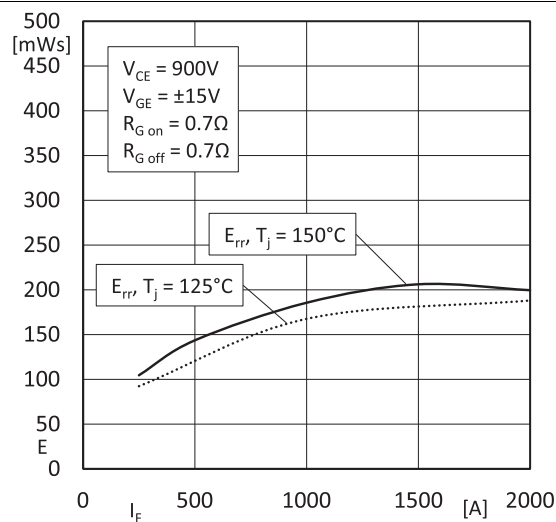


Fig. 8: Switching losses Diode (typical); $E=f(I_F)$

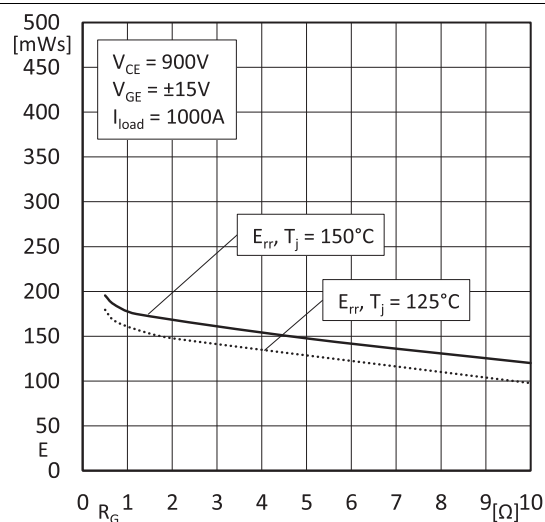


Fig. 9: Switching losses Diode (typical); $E=f(R_G)$

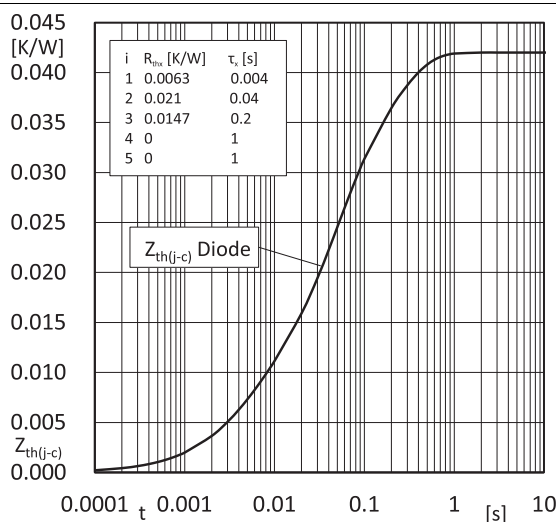


Fig. 10: Transient thermal impedance Diode

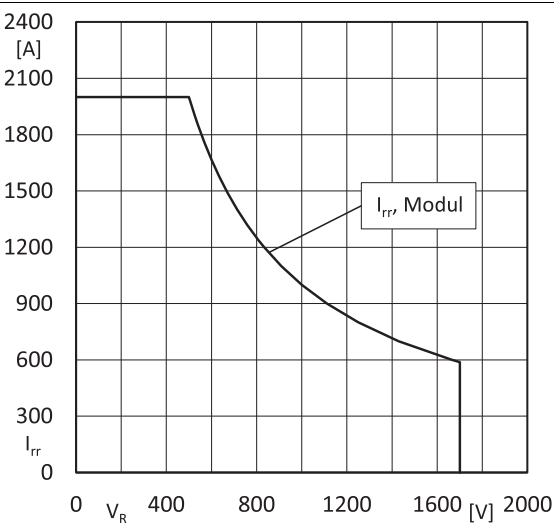


Fig. 11: RBSOA Diode

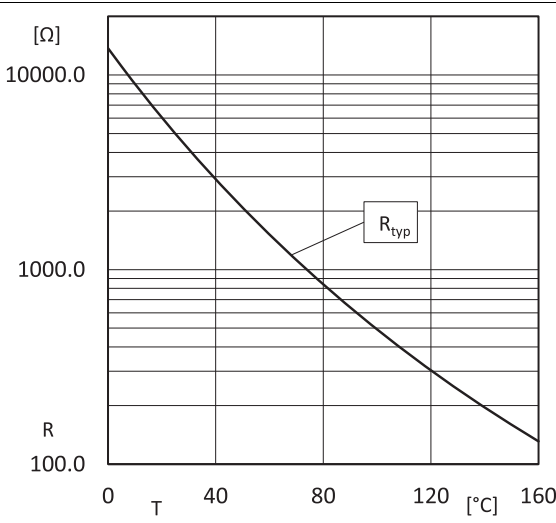


Fig. 12: NTC characteristics (typical)

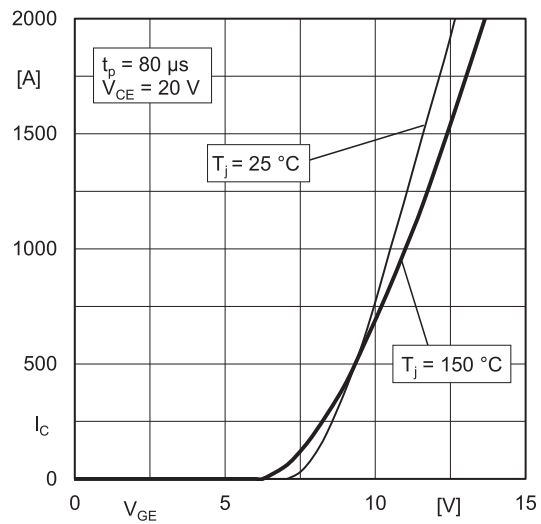


Fig. 13: Typ. transfer characteristic

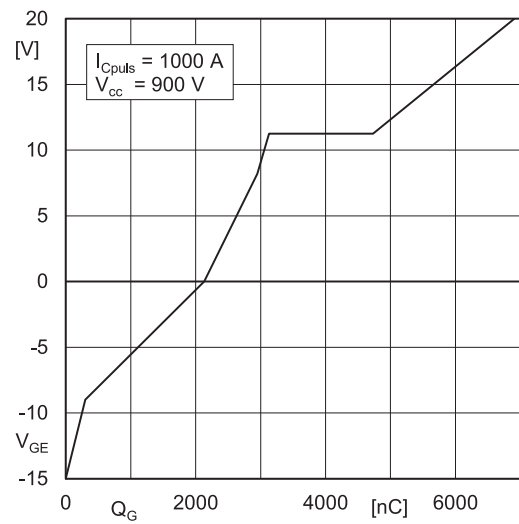
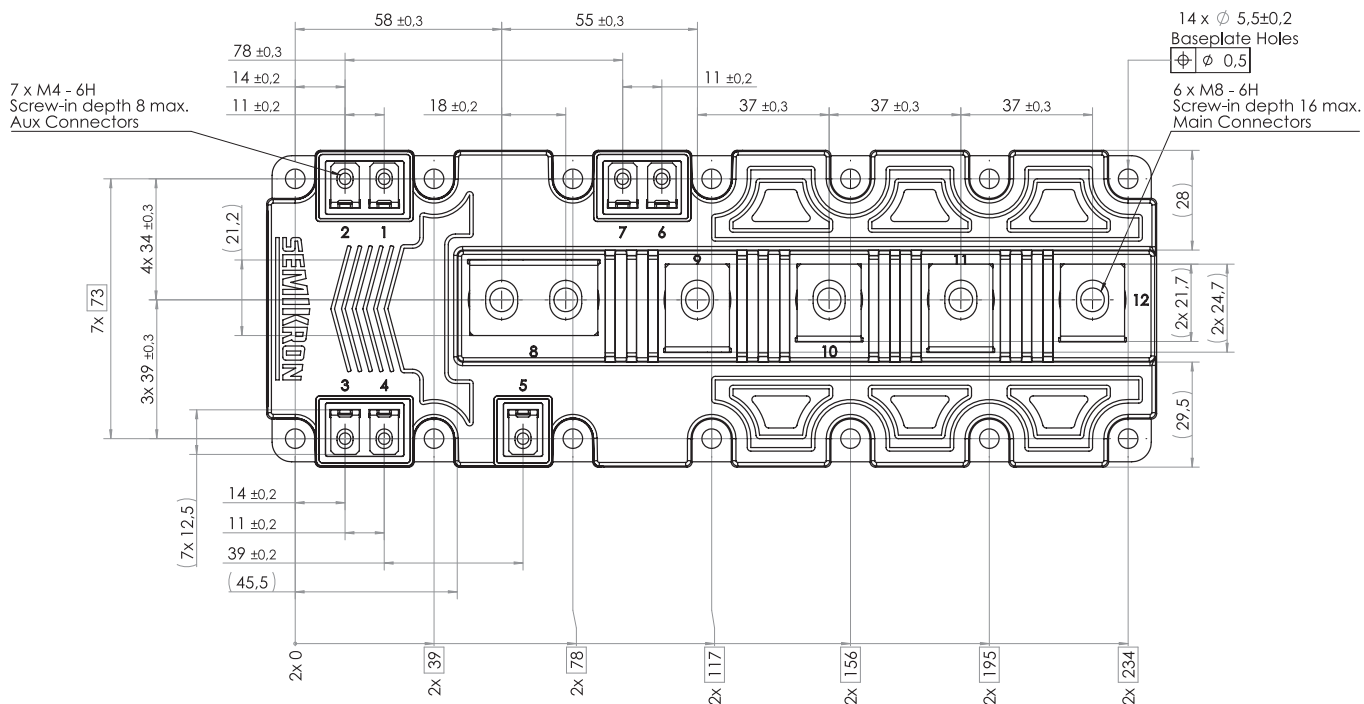
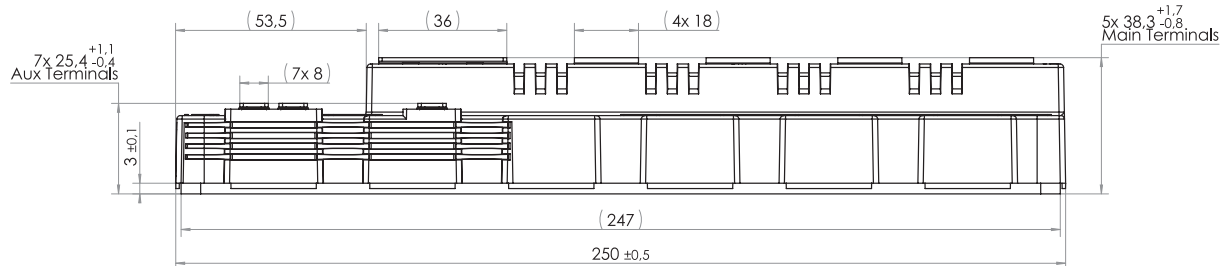
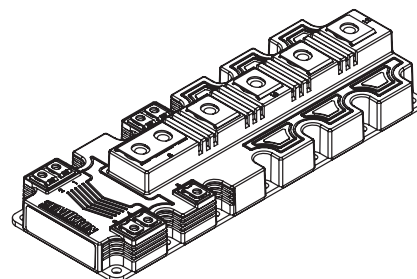
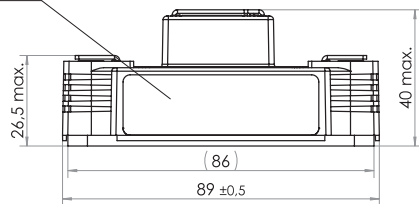


Fig. 14: Typ. gate charge characteristic

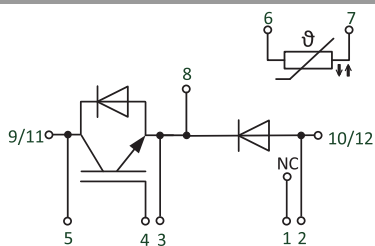
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Module label



- Dimensions in mm
- General tolerances ± 0.5 mm

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

***IMPORTANT INFORMATION AND WARNINGS**

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