

SKM1400GAR17R8



SEMITRANS® 10

IGBT R8 Modules

SKM1400GAR17R8

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}	$T_j = 25^{\circ}\text{C}$	1700	V
I_C	$T_j = 175^{\circ}\text{C}$	$T_c = 25^{\circ}\text{C}$	2337
		$T_c = 100^{\circ}\text{C}$	1527
I_{Cnom}		1400	A
I_{CRM}		2800	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 1200\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1700\text{ V}$	$T_j = 150^{\circ}\text{C}$	10
T_j		-40 ... 175	$^{\circ}\text{C}$

Inverse diode

V_{RRM}	$T_j = 25^{\circ}\text{C}$	1700	V
I_F	$T_j = 175^{\circ}\text{C}$	$T_c = 25^{\circ}\text{C}$	1874
		$T_c = 100^{\circ}\text{C}$	1168
I_{FRM}		2800	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25^{\circ}\text{C}$	9024	A
T_j		-40 ... 175	$^{\circ}\text{C}$

Freewheeling diode

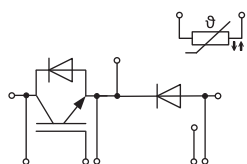
V_{RRM}	$T_j = 25^{\circ}\text{C}$	1700	V
I_F	$T_j = 175^{\circ}\text{C}$	$T_c = 25^{\circ}\text{C}$	1874
		$T_c = 100^{\circ}\text{C}$	1168
I_{FRM}		2800	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25^{\circ}\text{C}$	9024	A
T_j		-40 ... 175	$^{\circ}\text{C}$

Module

T_{stg}		-40 ... 150	$^{\circ}\text{C}$
V_{isol}	AC sinus 50 Hz, $t = 1\text{ min}$	4000	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 1400\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^{\circ}\text{C}$	1.63	1.95	V
		$T_j = 150^{\circ}\text{C}$	1.96	2.27	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	$T_j = 25^{\circ}\text{C}$	0.41	0.59	m Ω
		$T_j = 150^{\circ}\text{C}$	0.72	0.87	m Ω
$V_{GE(th)}$	$V_{CE} = 10\text{ V}, I_C = 52.8\text{ mA}$	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}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	139.2		nF
C_{oes}		$f = 1\text{ MHz}$	4.80		nF
C_{res}		$f = 1\text{ MHz}$	0.43		nF
Q_G	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		8640		nC
R_{Gint}	$T_j = 25^{\circ}\text{C}$		1.3		Ω



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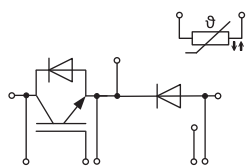
Typical Applications

- Brake chopper
- Windturbines

Remarks

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

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
t _{d(on)}	V _{CC} = 900 V	T _j = 150 °C		528		ns
t _r	I _C = 1400 A	T _j = 150 °C		127		ns
E _{on}	V _{GE} = +15/-15 V	T _j = 150 °C		632		mJ
t _{d(off)}	R _{G on} = 0.67 Ω	T _j = 150 °C		636		ns
t _f	R _{G off} = 0.5 Ω	T _j = 150 °C		161		ns
E _{off}	di/dt _{on} = 10.7 kA/ μs di/dt _{off} = 7.5 kA/μs dv/dt = 4300 V/μs L _s = 36 nH	T _j = 150 °C		496		mJ
R _{th(j-c)}	per IGBT				0.02	K/W
R _{th(c-s)}	per IGBT (λ _{grease} =0.81 W/(m*K))			0.01		K/W
Inverse diode						
V _F = V _{EC}	I _F = 1400 A	T _j = 25 °C		1.84	2.19	V
	V _{GE} = 0 V	T _j = 150 °C		1.89	2.25	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		0.37	0.45	mΩ
	chiplevel	T _j = 150 °C		0.58	0.74	mΩ
I _{RRM}	I _F = 1400 A	T _j = 150 °C		1015		A
Q _{rr}	V _{GE} = -15 V	T _j = 150 °C		516		μC
	di/dt _{off} = 10.1 kA/ μs					
E _{rr}	V _R = 900 V	T _j = 150 °C		269		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
Freewheeling diode						
V _F = V _{EC}	I _F = 1400 A	T _j = 25 °C		1.84	2.19	V
	V _{GE} = 0 V	T _j = 150 °C		1.89	2.25	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		0.37	0.45	mΩ
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Q _{rr}	di/dt _{off} = 10.1 kA/ μs	T _j = 150 °C		516		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		269		mJ
	V _R = 900 V					
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
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))			0.0028		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
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}	$T_c=100^{\circ}\text{C}$ ($R_{25}=5\text{ k}\Omega$)		$493 \pm 5\%$		Ω
$B_{100/125}$	$R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[\text{K}]$		$3550 \pm 2\%$		K

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Features*

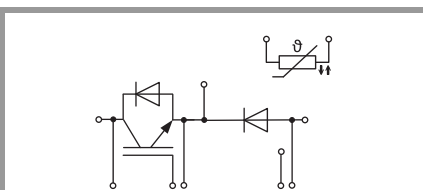
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Typical Applications

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Remarks

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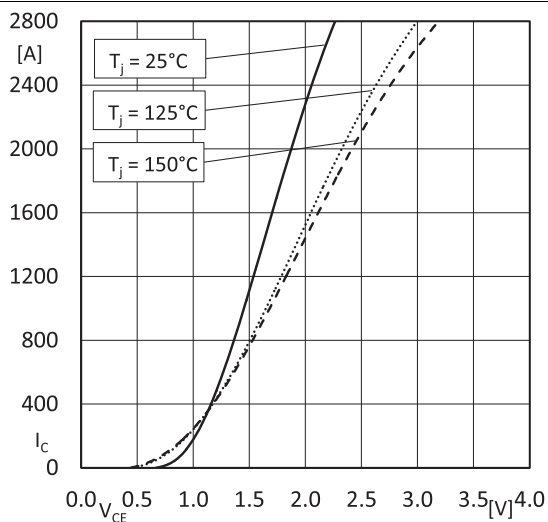


Fig. 1: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $V_{GE} = 15V$; (chiplevel)

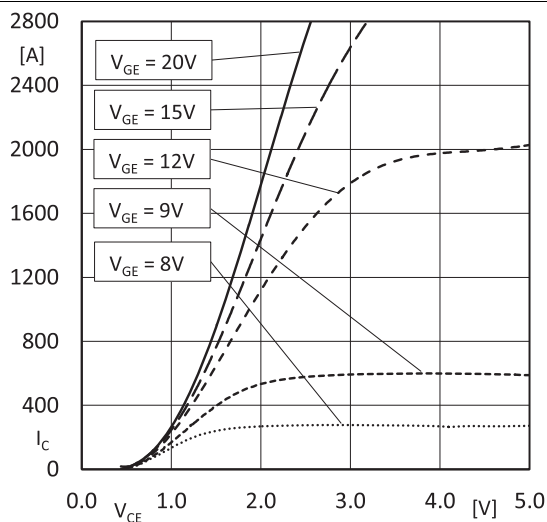


Fig. 2: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $T_j = 150^\circ C$; (chiplevel)

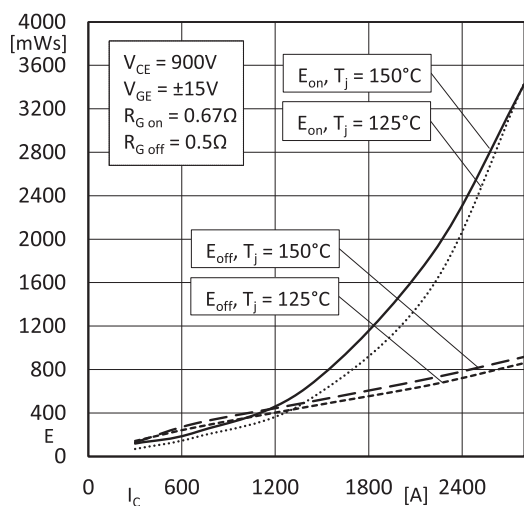


Fig. 3: Switching losses IGBT (typical); $E = f(I_C)$

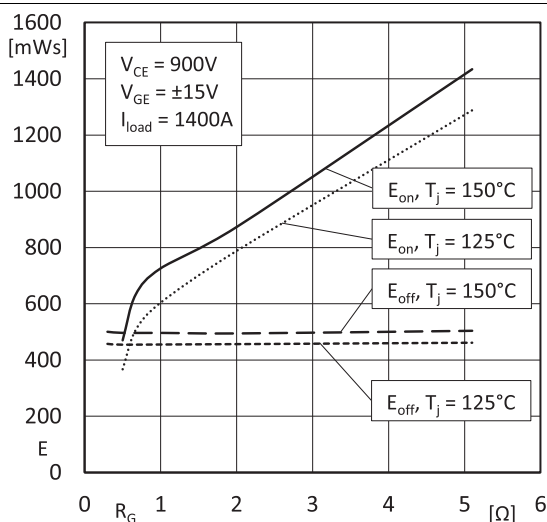


Fig. 4: Switching losses IGBT (typical); $E = f(R_G)$

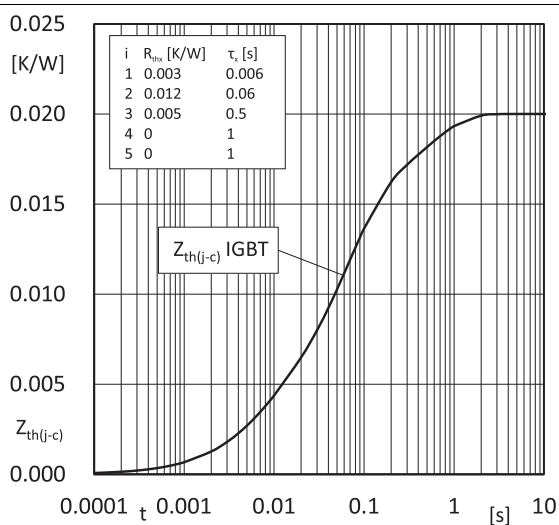


Fig. 5: Transient thermal impedance IGBT

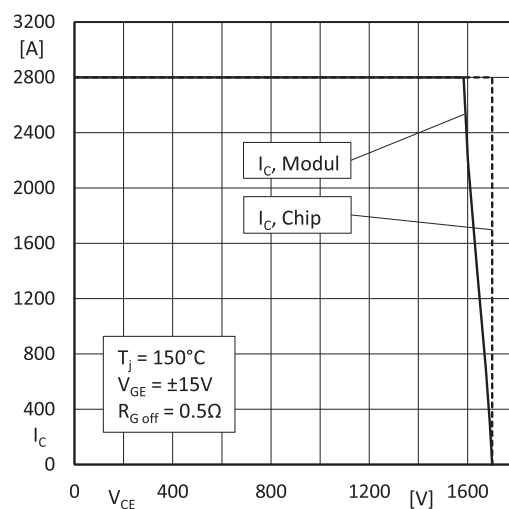


Fig. 6: RBSOA IGBT

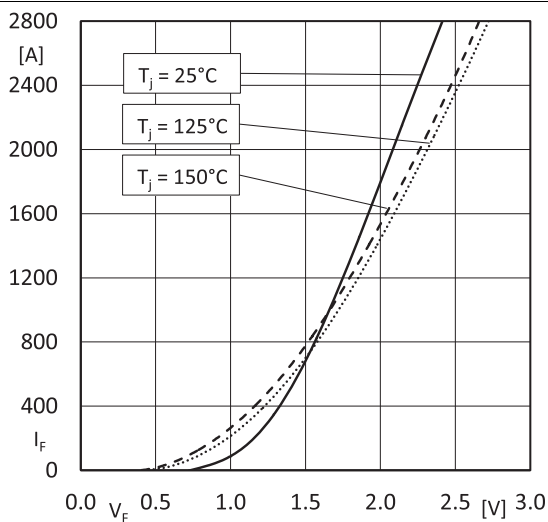


Fig. 7: Forward charact. Diode (typical); $I_F = f(V_F)$; (chipllevel)

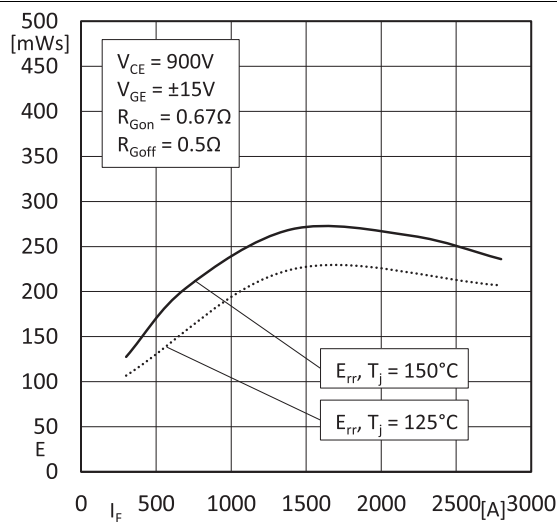


Fig. 8: Switching losses Diode (typical); $E = f(I_F)$

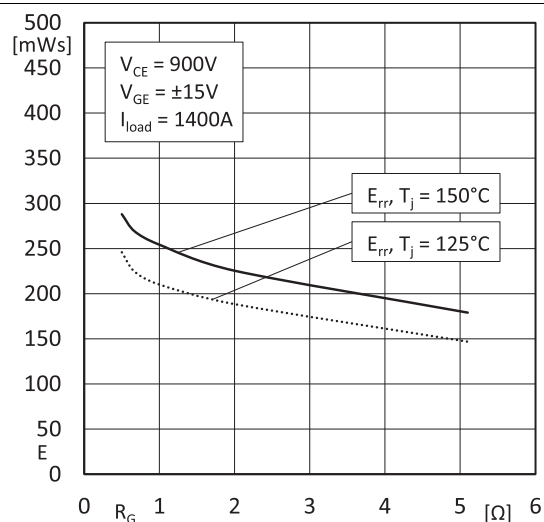


Fig. 9: Switching losses Diode (typical); $E = f(R_G)$

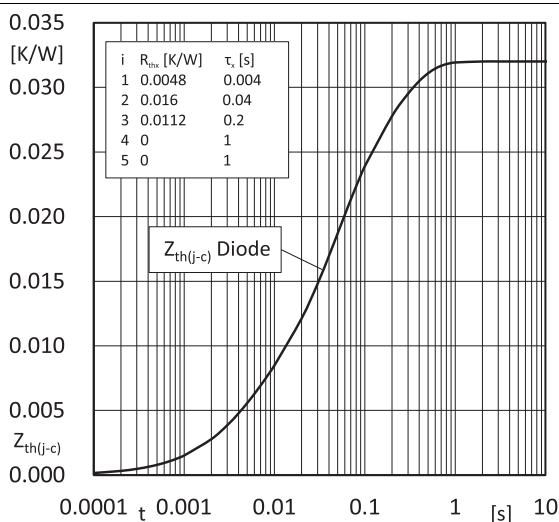


Fig. 10: Transient thermal impedance Diode

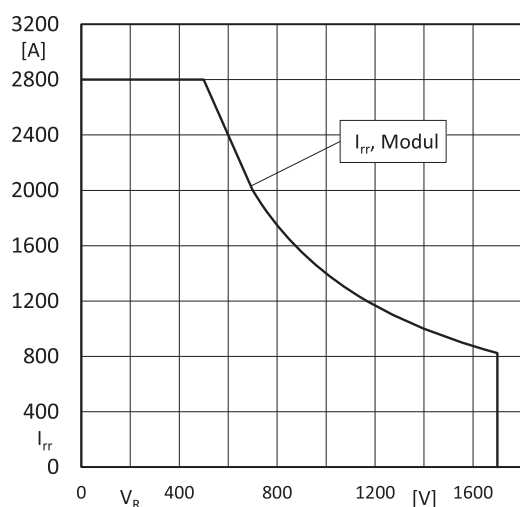


Fig. 11: RBSOA Diode

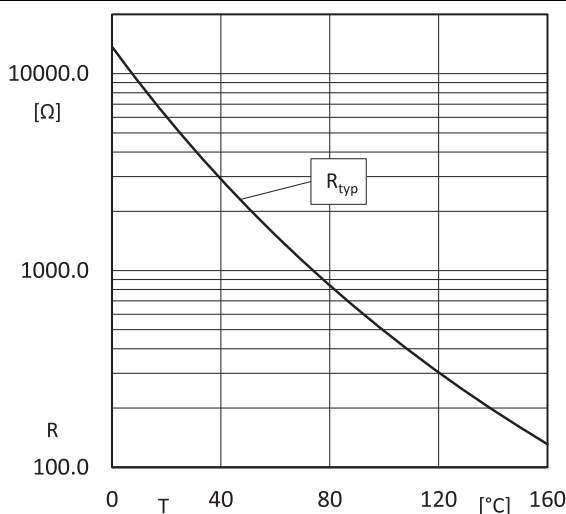


Fig. 12: NTC characteristics (typical)

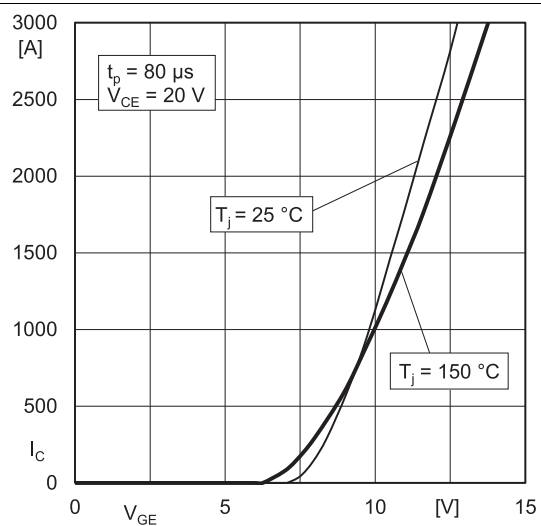


Fig. 13: Typ. transfer characteristic

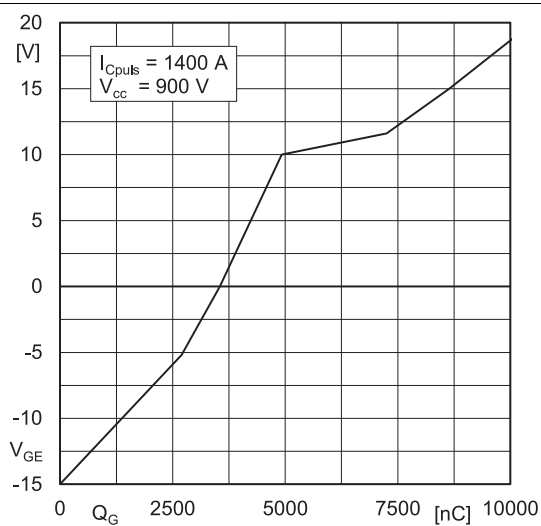
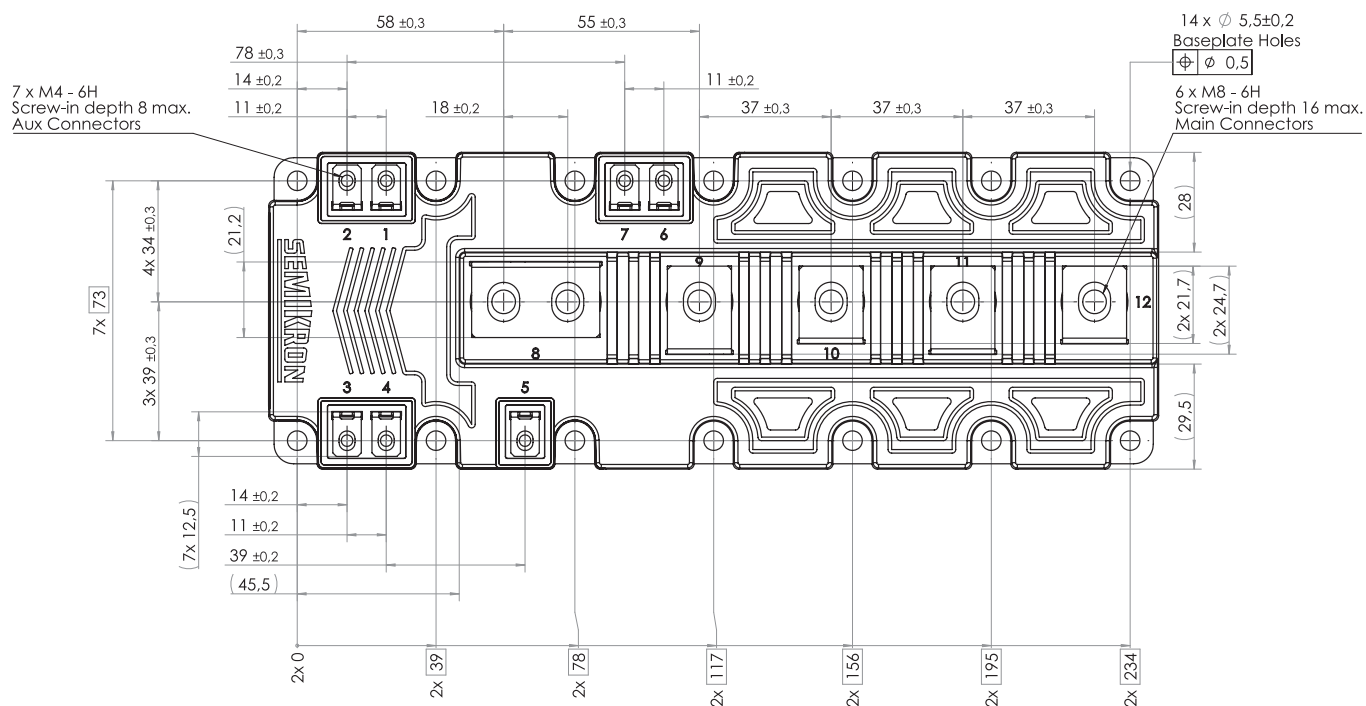
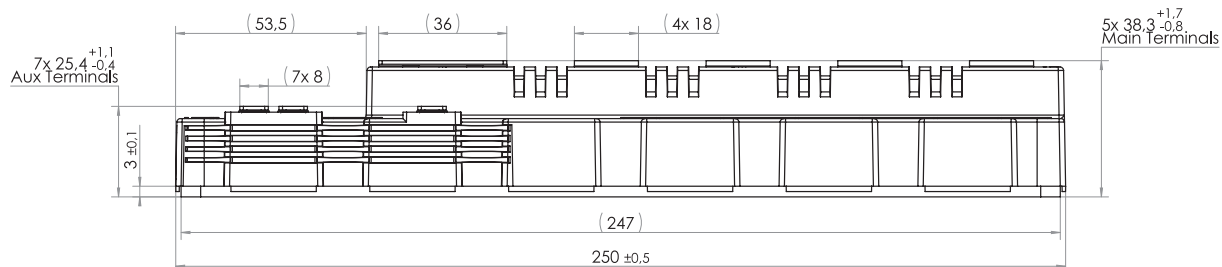
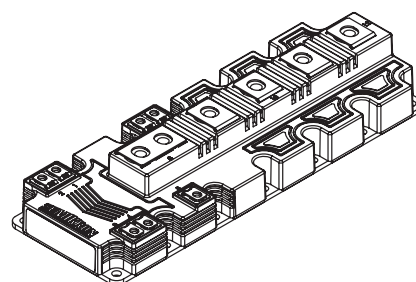
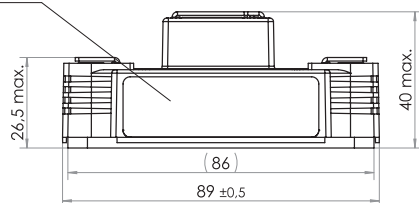


Fig. 14: Typ. gate charge characteristic

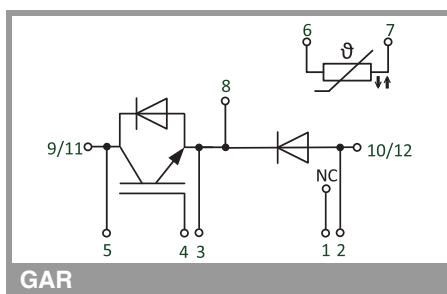
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Module label



- 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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