

SKM1000GB17R8



IGBT R8 Modules

SKM1000GB17R8

Features*

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

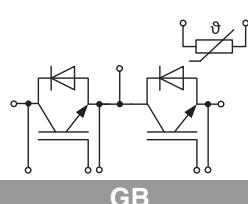
Typical Applications

- Motor Drives
- UPS Systems
- Solar Inverters

Remarks

Recommended T_{jop} = -40 ... +150°C

Absolute Maximum Ratings		Values	Unit		
Symbol	Conditions				
IGBT					
V_{CES}	$T_j = 25^\circ\text{C}$	1700	V		
I_C	$T_j = 175^\circ\text{C}$	1574	A		
	$T_c = 25^\circ\text{C}$	1027	A		
I_{Cnom}	$T_c = 100^\circ\text{C}$	1000	A		
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	2000	A		
V_{GES}		-20 ... 20	V		
t_{psc}	$V_{CC} = 1200\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1700\text{ V}$	10	μs		
T_j		-40 ... 175	°C		
Inverse diode					
V_{RRM}	$T_j = 25^\circ\text{C}$	1700	V		
I_F	$T_j = 175^\circ\text{C}$	1449	A		
	$T_c = 25^\circ\text{C}$	905	A		
I_{Fnom}	$T_c = 100^\circ\text{C}$	1000	A		
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	2000	A		
I_{FSM}	$t_p = 10\text{ ms, sin }180^\circ, T_j = 25^\circ\text{C}$	6240	A		
T_j		-40 ... 175	°C		
Module					
T_{stg}		-40 ... 150	°C		
V_{isol}	AC sinus 50 Hz, $t = 1\text{ min}$	4000	V		
Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 1000\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	1.66	1.99		V
	$T_j = 25^\circ\text{C}$	2.01	2.33		V
$T_j = 150^\circ\text{C}$					
V_{CE0}	chiplevel	1.06	1.12		V
	$T_j = 25^\circ\text{C}$	0.95	1.05		V
$T_j = 150^\circ\text{C}$					
r_{CE}	$V_{GE} = 15\text{ V}$ chiplevel	0.60	0.87		mΩ
	$T_j = 25^\circ\text{C}$	1.06	1.28		mΩ
$T_j = 150^\circ\text{C}$					
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 36\text{ mA}$	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}		90.0			nF
C_{oes}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	3.00			nF
C_{res}	$f = 1\text{ MHz}$	0.24			nF
Q_G	$V_{GE} = -15\text{ V} / +15\text{ V}$	5640			nC
R_{Gint}	$T_j = 25^\circ\text{C}$	1.8			Ω
$t_{d(on)}$	$V_{CC} = 900\text{ V}$	476			ns
t_r	$I_C = 1000\text{ A}$	105			ns
E_{on}	$V_{GE} = +15/-15\text{ V}$	465			mJ
$t_{d(off)}$	$R_{G\ on} = 0.7\ \Omega$	713			ns
t_f	$R_{G\ off} = 0.7\ \Omega$	158			ns
	$di/dt_{on} = 7.8\text{ kA/μs}$				
	$di/dt_{off} = 4.8\text{ kA/μs}$				
E_{off}	$dv/dt = 4600\text{ V/μs}$	332			mJ
	$L_s = 24\text{ nH}$				
$R_{th(j-c)}$	per IGBT		0.03		K/W
$R_{th(c-s)}$	per IGBT ($\lambda_{grease}=0.81\text{ W/(m*K)}$)		0.016		K/W





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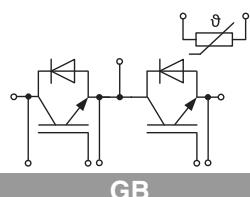
Typical Applications

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Remarks

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Characteristics		Conditions	min.	typ.	max.	Unit
Symbol						
Inverse diode						
$V_F = V_{EC}$	$I_F = 1000 \text{ A}$	$T_j = 25 \text{ °C}$		1.78	2.12	V
	$V_{GE} = 0 \text{ V}$ chiplevel	$T_j = 150 \text{ °C}$		1.81	2.14	V
V_{FO}	chiplevel	$T_j = 25 \text{ °C}$		1.32	1.56	V
		$T_j = 150 \text{ °C}$		1.08	1.22	V
r_F	chiplevel	$T_j = 25 \text{ °C}$		0.46	0.56	$\text{m}\Omega$
		$T_j = 150 \text{ °C}$		0.73	0.92	$\text{m}\Omega$
I_{RRM}	$I_F = 1000 \text{ A}$	$T_j = 150 \text{ °C}$		711		A
Q_{rr}	$di/dt_{off} = 8.1 \text{ kA}/\mu\text{s}$	$T_j = 150 \text{ °C}$		325		μC
E_{rr}	$V_{GE} = -15 \text{ V}$	$T_j = 150 \text{ °C}$		159		mJ
$R_{th(j-c)}$	per diode			0.042		K/W
$R_{th(c-s)}$	per diode ($\lambda_{\text{grease}}=0.81 \text{ W}/(\text{m}^*\text{K})$)			0.017		K/W
Module						
L_{CE}				10		nH
$R_{CC+EE'}$	measured per switch, $T_C = 25 \text{ °C}$			0.2		$\text{m}\Omega$
$R_{th(c-s)1}$	calculated without thermal coupling ($\lambda_{\text{grease}}=0.81 \text{ W}/(\text{m}^*\text{K})$)			0.0041		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module ($\lambda_{\text{grease}}=0.81 \text{ W}/(\text{m}^*\text{K})$)			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
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



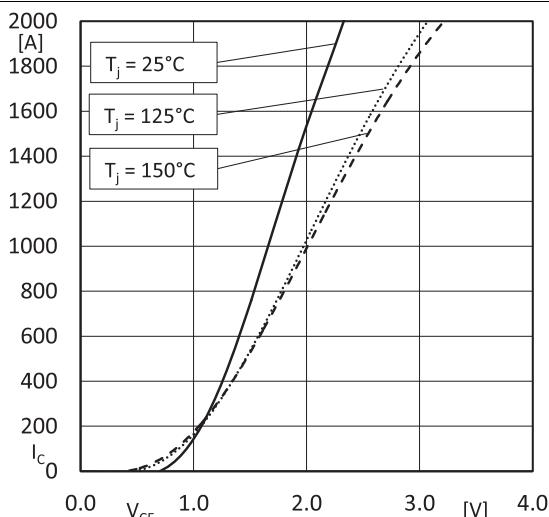


Fig. 1: Output characteristics IGBT (typical); $I_C = f (V_{CE})$; $V_{GE} = 15V$; (chiplevel)

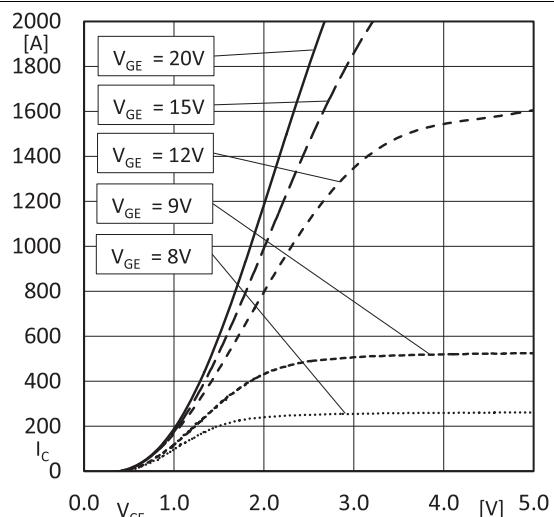


Fig. 2: Output characteristics IGBT (typical); $I_C = f (V_{CE})$; $T_j = 150 ^\circ C$; (chiplevel)

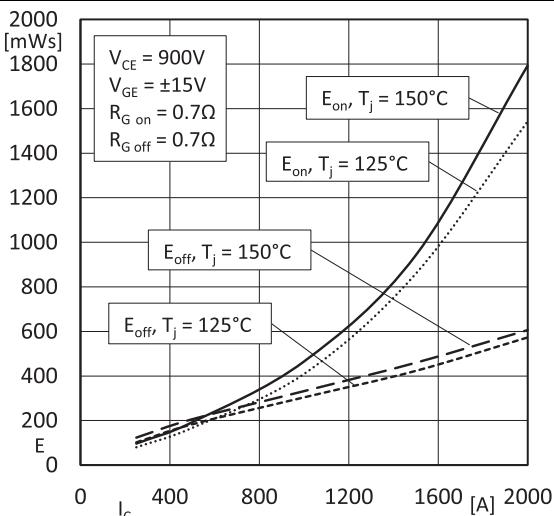


Fig. 3: Switching losses IGBT (typical); $E = f(I_C)$

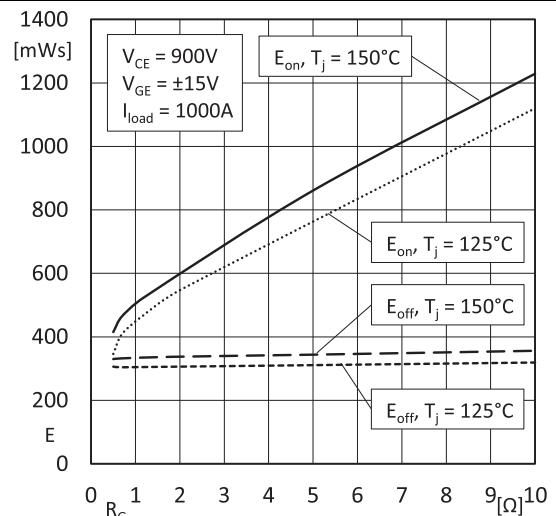


Fig. 4: Switching losses IGBT (typical); $E = f(R_G)$

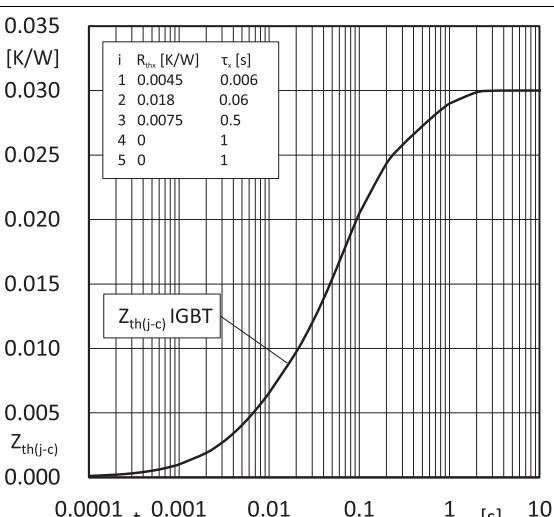


Fig. 5: Transient thermal impedance IGBT

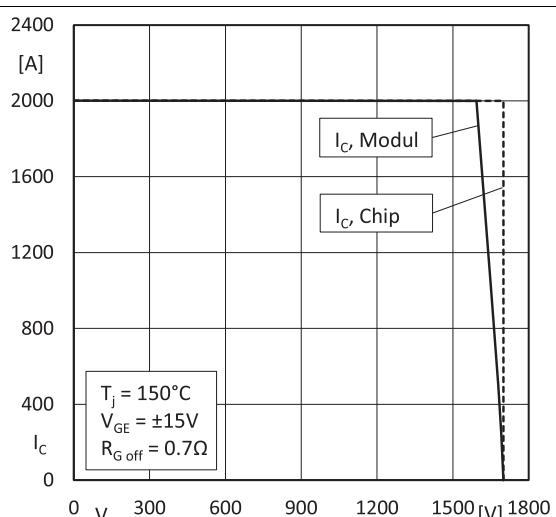


Fig. 6: RBSOA IGBT

SKM1000GB17R8

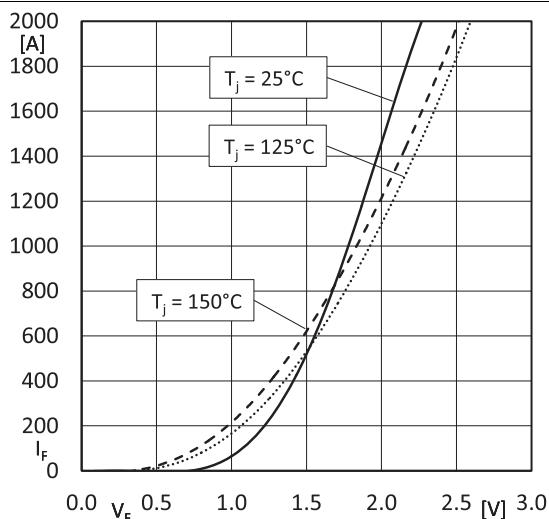


Fig. 7: Forward charact. Diode (typical); $I_F=f(V_F)$; (chiplevel)

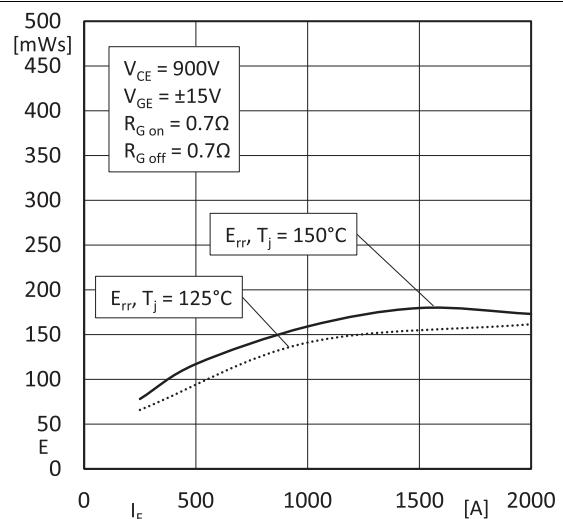


Fig. 8: Switching losses Diode (typical); $E=f(I_F)$

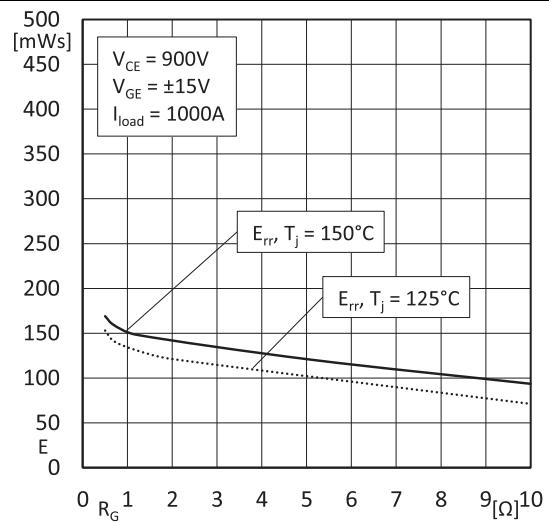


Fig. 9: Switching losses Diode (typical); $E=f(R_G)$

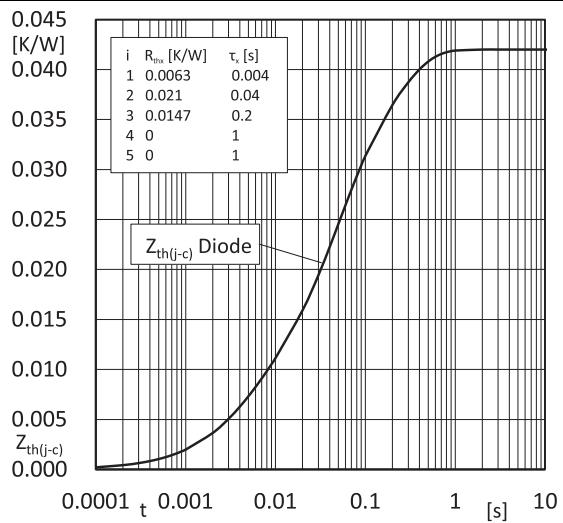


Fig. 10: Transient thermal impedance Diode

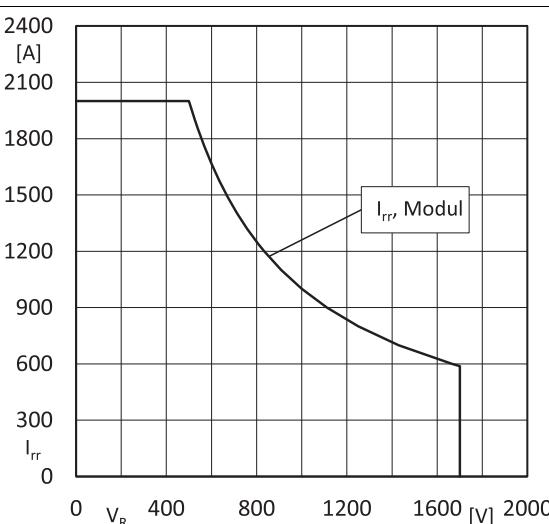


Fig. 11: RBSOA Diode

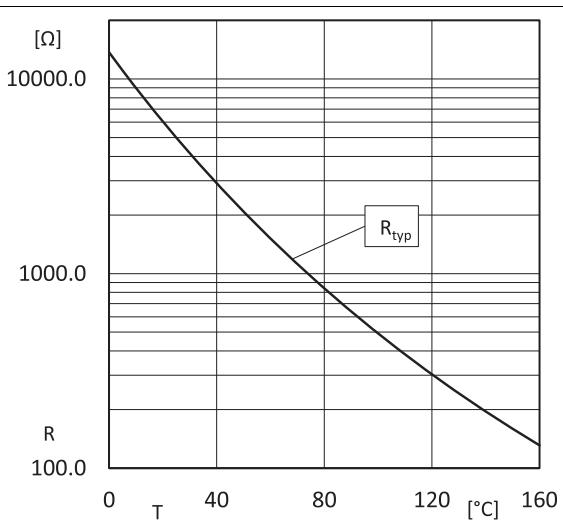


Fig. 12: NTC characteristics (typical)

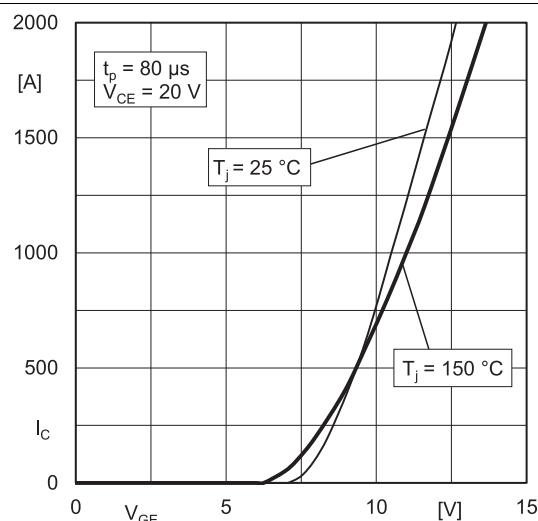


Fig. 13: Typ. transfer characteristic

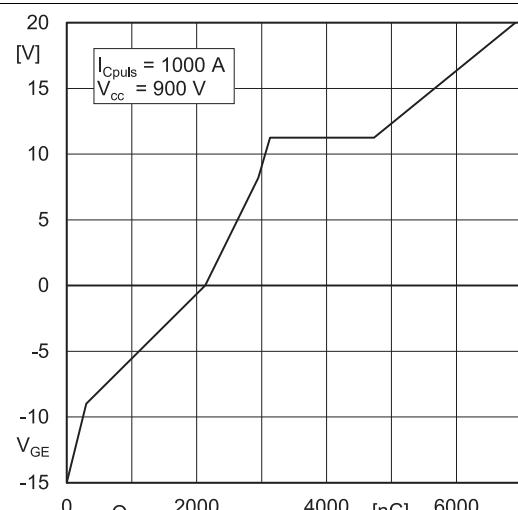
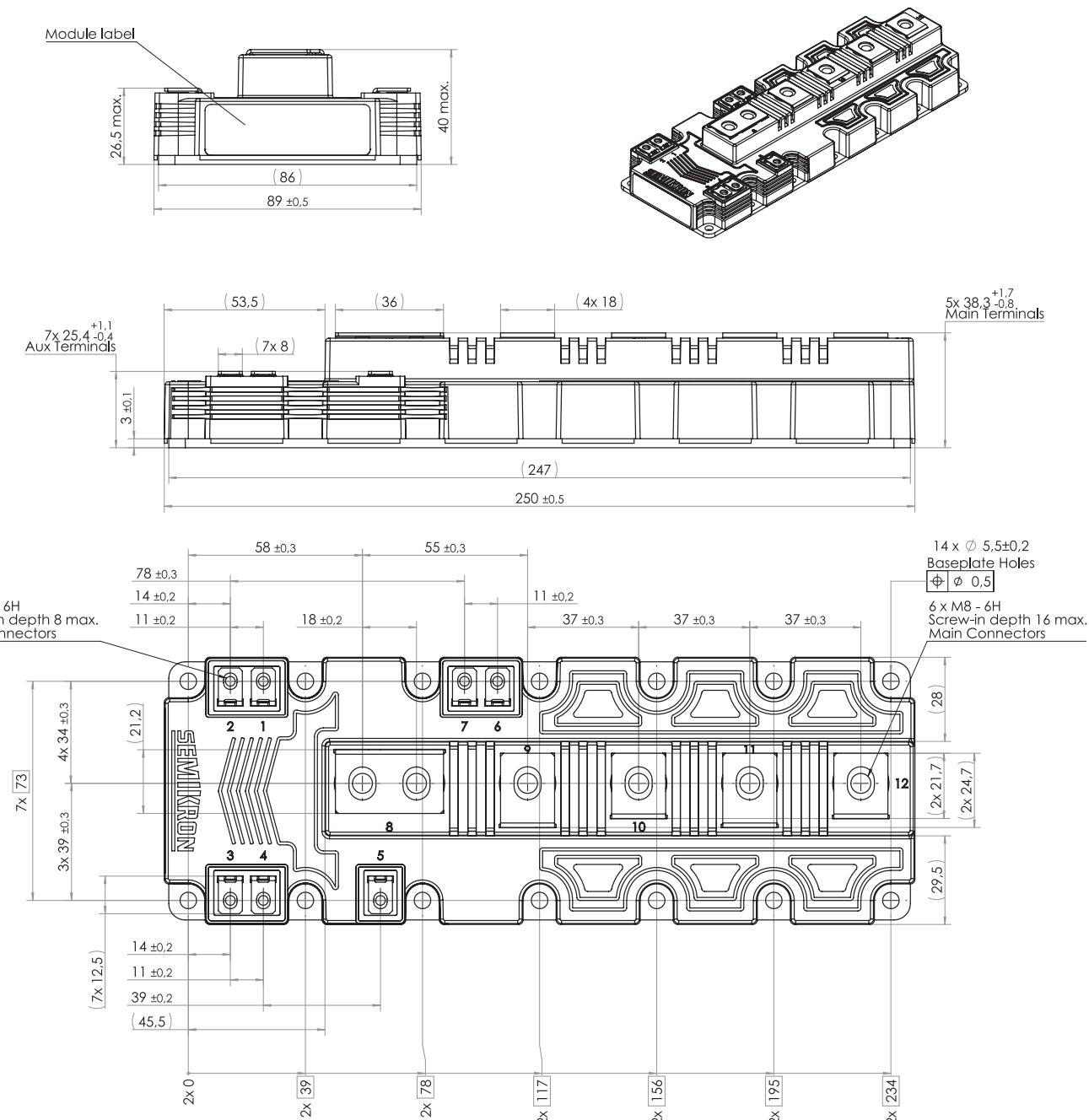
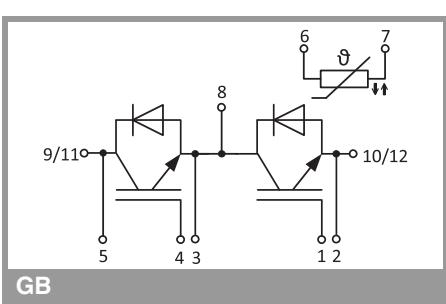


Fig. 14: Typ. gate charge characteristic

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SEMITRANS 10



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

*IMPORTANT INFORMATION AND WARNINGS

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