SKM1400GB12P4

SEMITRANS® 10

IGBT4 Modules

SKM1400GB12P4

Features*

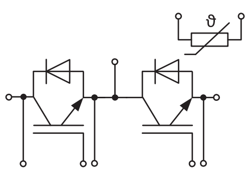
- Symmetrical current sharing
- Low-inductive module design
- High mechanical robustness
- UL recognized, file no. E63532

Typical Applications

- Motor Drives
- UPS Systems
- Solar Inverters

Remarks

Recommended T_{jop} = -40 ... +150°C



GB

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_c = 25 °C	2165	A
		T_c = 100 °C	1453	A
I_{Cnom}			1400	A
I_{CRM}			2800	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_c = 25 °C	1768	A
		T_c = 100 °C	1135	A
I_{FRM}			2800	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		7296	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 = 1400 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.75	2.07	V
		T_j = 150 °C		2.18	2.44	V
V_{CE0}	chiplevel	T_j = 25 °C		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		0.68	0.83	mΩ
		T_j = 150 °C		1.06	1.17	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 49.2 mA		5.1	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				6	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		81.6		nF
C_{oes}		f = 1 MHz		5.28		nF
C_{res}		f = 1 MHz		4.50		nF
Q_G	V_{GE} = - 8 V...+ 15 V			7500		nC
R_{Gint}	T_j = 25 °C			0.8		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 1400 A V_{GE} = +15/-15 V $R_{G\,on}$ = 1 Ω $R_{G\,off}$ = 1 Ω di/dt$_{on}$ = 11 kA/µs di/dt$_{off}$ = 6.9 kA/µs dv/dt = 3300 V/µs L_s = 36 nH	T_j = 150 °C		353		ns
t_r		T_j = 150 °C		119		ns
E_{on}		T_j = 150 °C		150		mJ
$t_{d(off)}$		T_j = 150 °C		803		ns
t_f		T_j = 150 °C		171		ns
E_{off}		T_j = 150 °C		277		mJ
$R_{th(j-c)}$	per IGBT				0.02	K/W
$R_{th(c-s)}$	per IGBT (λ_{grease}=0.81 W/(m*K))			0.008		K/W

SEMITRANS® 10

IGBT4 Modules

SKM1400GB12P4

Features*

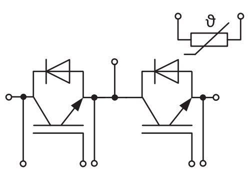
- Symmetrical current sharing
- Low-inductive module design
- High mechanical robustness
- UL recognized, file no. E63532

Typical Applications

- Motor Drives
- UPS Systems
- Solar Inverters

Remarks

Recommended T_{jop} = -40 ... +150°C



GB

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		2.06	2.37	V
		T_j = 150 °C		2.03	2.35	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		0.54	0.62	mΩ
		T_j = 150 °C		0.81	0.89	mΩ
I_{RRM}	I_F = 1400 A di/dt_{off} = 11 kA/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		1014		A
Q_{rr}		T_j = 150 °C		214		µC
E_{rr}		T_j = 150 °C		85		mJ
$R_{th(j-c)}$	per diode				0.033	K/W
$R_{th(c-s)}$	per diode (λ_{grease}=0.81 W/(m*K))			0.01		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))			0.0022		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module (λ_{grease}=0.81 W/(m*K))			0.004		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°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

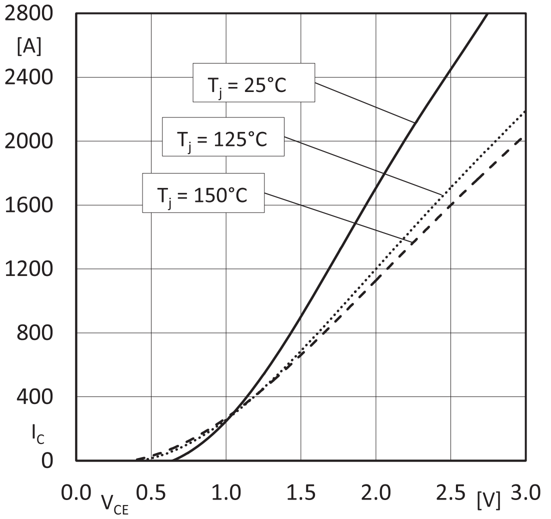


Fig. 1: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $V_{GE} = 15V$; (chiplevel)

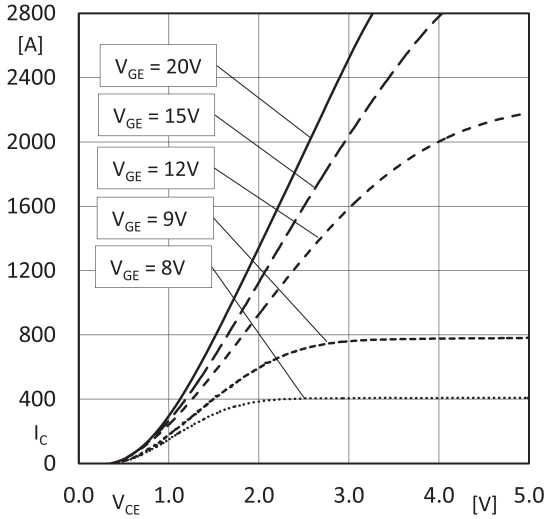


Fig. 2: Output characteristics IGBT (typical); $I_C = f(V_{CE})$; $T_j = 150\ °C$; (chiplevel)

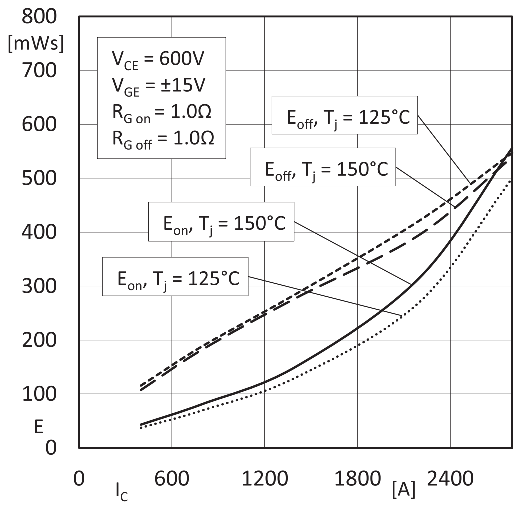


Fig. 3: Switching losses IGBT (typical); $E=f(I_C)$

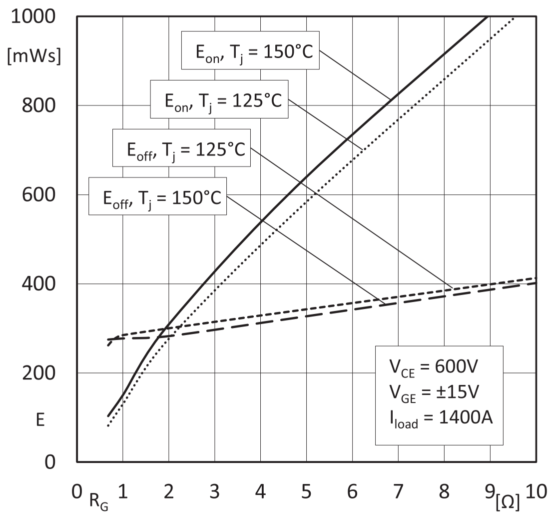


Fig. 4: Switching losses IGBT (typical); $E=f(R_G)$

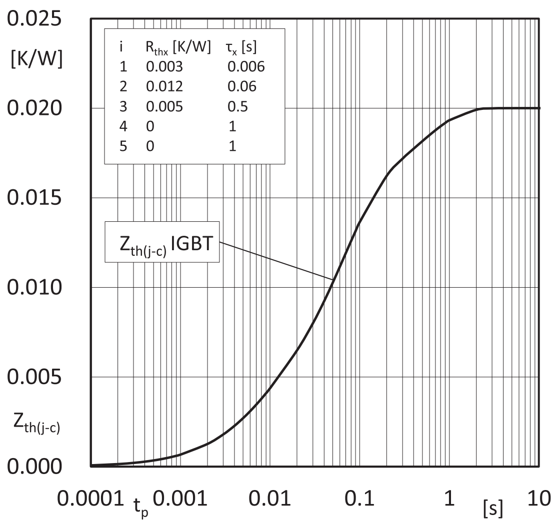


Fig. 5: Transient thermal impedance IGBT

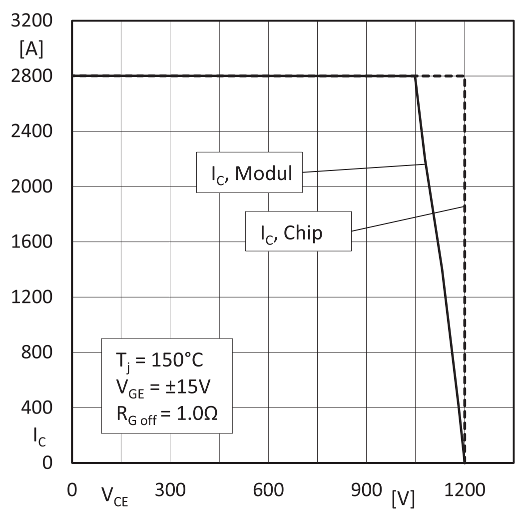


Fig. 6: RBSOA IGBT

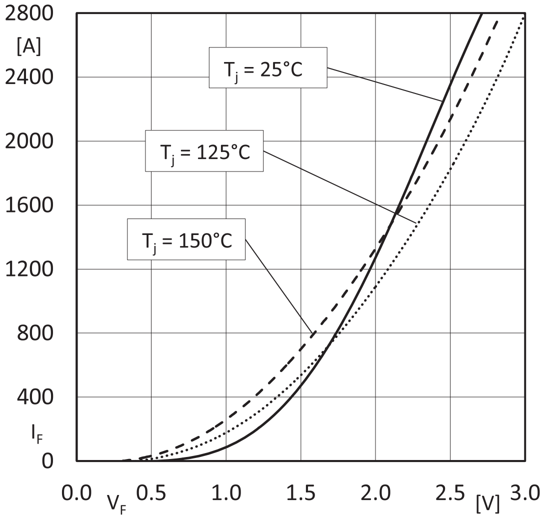


Fig. 7: Forward charact. Diode (typical); I_F=f(V_F); (chiplevel)

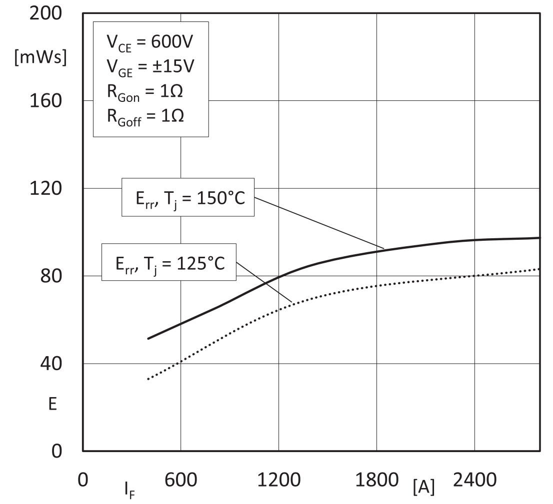


Fig. 8: Switching losses Diode (typical); E=f(I_F)

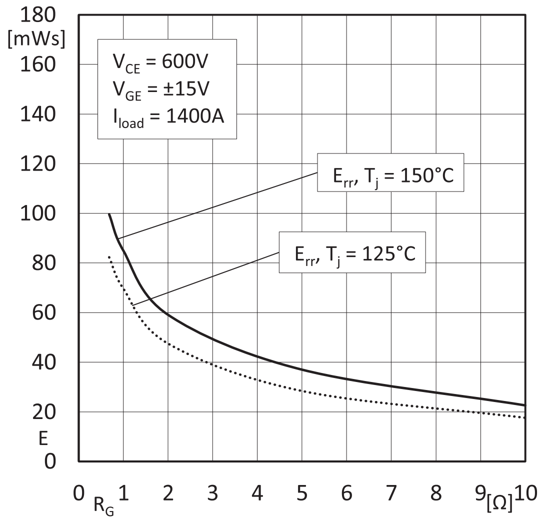


Fig. 9: Switching losses Diode (typical); E=f(R_G)

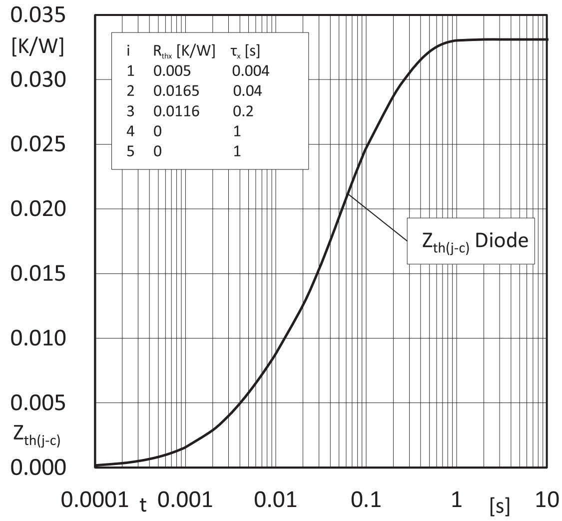


Fig. 10: Transient thermal impedance Diode

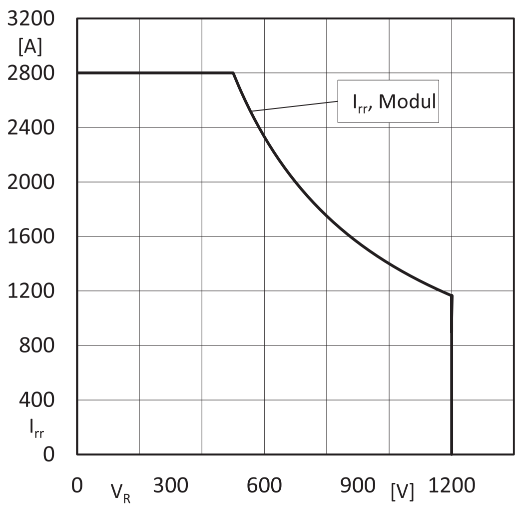


Fig. 11: RBSOA Diode

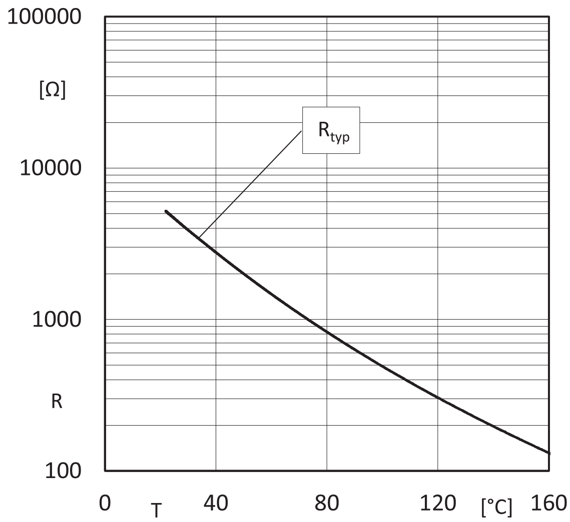


Fig. 12: NTC characteristics (typical)

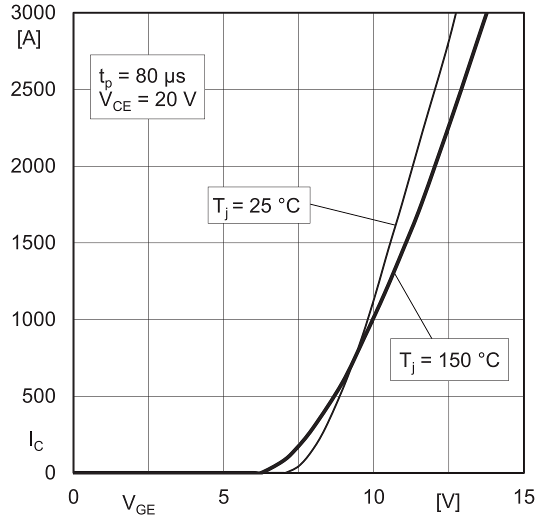


Fig. 13: Typ. transfer characteristic

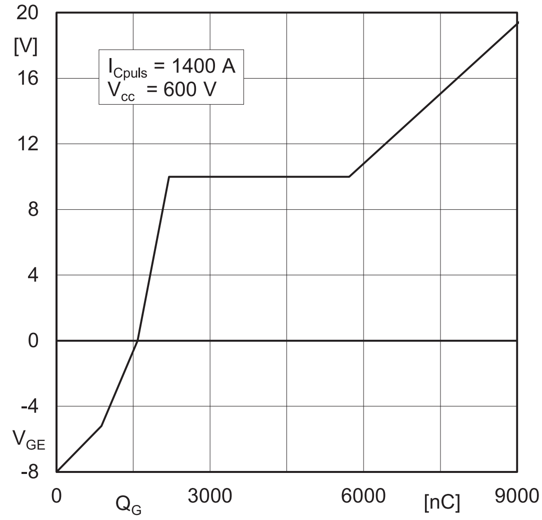
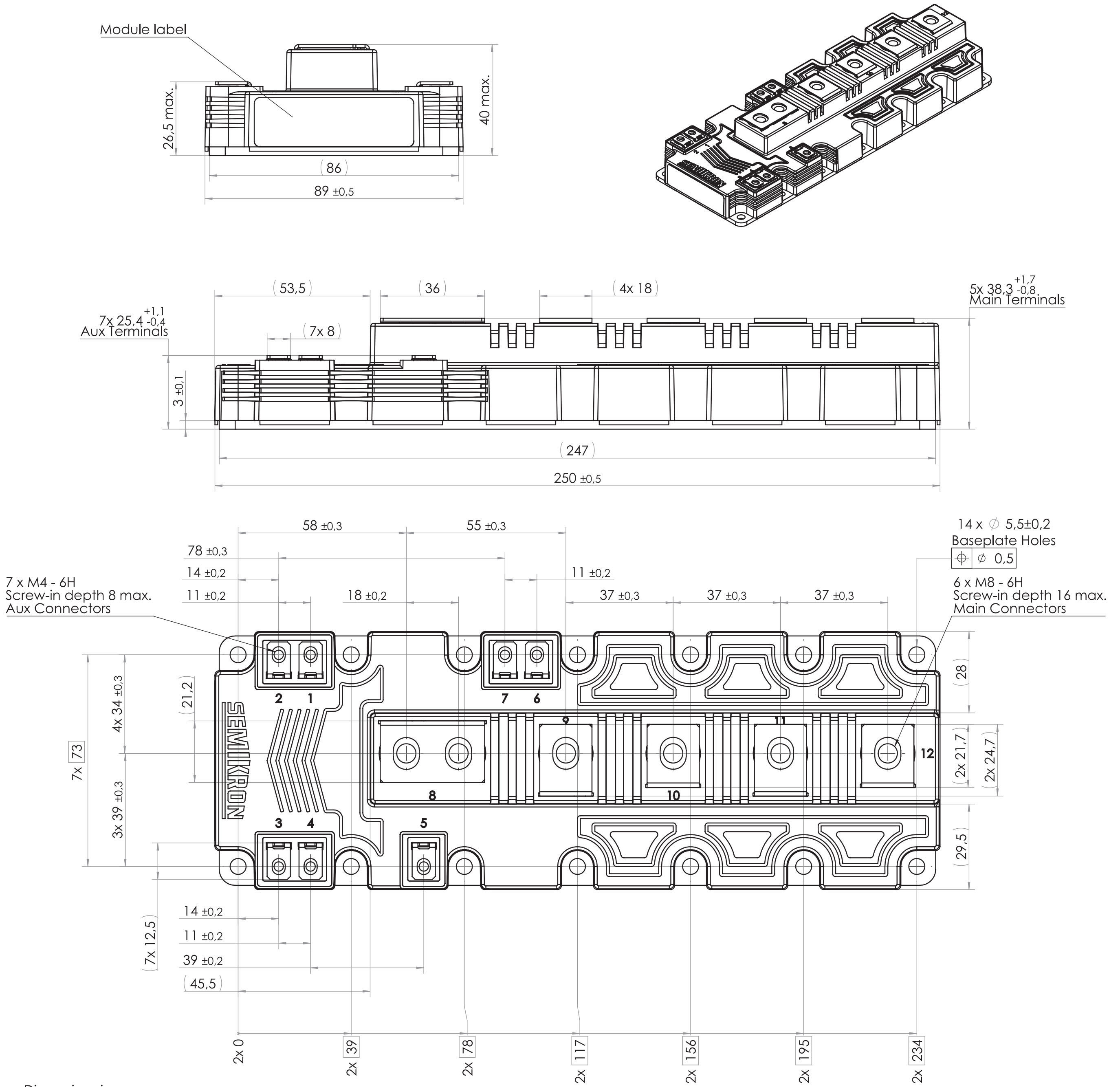
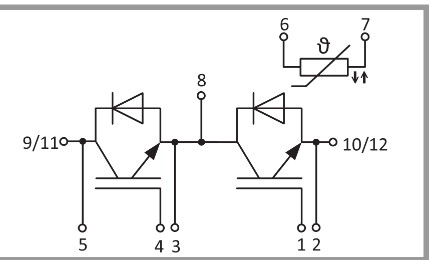


Fig. 14: Typ. gate charge characteristic



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

SEMITRANS 10



GB

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

***IMPORTANT INFORMATION AND WARNINGS**

The specifications of SEMIKRON products may not be considered as guarantee or assurance of product characteristics ("Beschaffenheitsgarantie"). The specifications of SEMIKRON products describe only the usual characteristics of products to be expected in typical applications, which may still vary depending on the specific application. Therefore, products must be tested for the respective application in advance. Application adjustments may be necessary. The user of SEMIKRON products is responsible for the safety of their applications embedding SEMIKRON products and must take adequate safety measures to prevent the applications from causing a physical injury, fire or other problem if any of SEMIKRON products become faulty. The user is responsible to make sure that the application design is compliant with all applicable laws, regulations, norms and standards. Except as otherwise explicitly approved by SEMIKRON in a written document signed by authorized representatives of SEMIKRON, SEMIKRON products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. No representation or warranty is given and no liability is assumed with respect to the accuracy, completeness and/or use of any information herein, including without limitation, warranties of non-infringement of intellectual property rights of any third party. SEMIKRON does not assume any liability arising out of the applications or use of any product; neither does it convey any license under its patent rights, copyrights, trade secrets or other intellectual property rights, nor the rights of others. SEMIKRON makes no representation or warranty of non-infringement or alleged non-infringement of intellectual property rights of any third party which may arise from applications. Due to technical requirements our products may contain dangerous substances. For information on the types in question please contact the nearest SEMIKRON sales office. This document supersedes and replaces all information previously supplied and may be superseded by updates. SEMIKRON reserves the right to make changes.