

SEMiX302GB17E4s



SEMiX® 2s

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Features

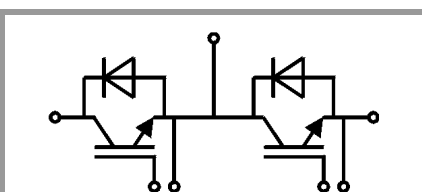
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^{\circ}\text{C}$ max.
- Product reliability results are valid for $T_J=150^{\circ}\text{C}$
- Dynamic values apply to the following combination of resistors:
 $R_{Gon,main} = 1,95 \Omega$
 $R_{Goff,main} = 1,95 \Omega$
 $R_{G,X} = 2,2 \Omega$
 $R_{E,X} = 0,5 \Omega$



GB

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	516	A
		T _c = 80 °C	392	A
I _{Cnom}			300	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		900	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 1000 V V _{GE} ≤ 15 V V _{CES} ≤ 1700 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C

Inverse diode

V_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$		1700	V
I_F	$T_J = 175\text{ }^{\circ}\text{C}$	$T_c = 25\text{ }^{\circ}\text{C}$	324	A
		$T_c = 80\text{ }^{\circ}\text{C}$	238	A
I_{Fnom}			300	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$		600	A
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^{\circ}$, $T_J = 25\text{ }^{\circ}\text{C}$		1710	A
T_i			-40 ... 175	$^{\circ}\text{C}$

Module

$I_{t(RMS)}$		600	A
T_{stg}		-40 ... 125	$^{\circ}\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1 \text{ min}$	4000	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 300 \text{ A}$ $V_{GE} = 15 \text{ V}$ chiplevel	$T_J = 25^{\circ}\text{C}$	1.90	2.20	V
		$T_J = 150^{\circ}\text{C}$	2.26	2.45	V
V_{CE0}	chiplevel	$T_J = 25^{\circ}\text{C}$	1.1	1.2	V
		$T_J = 150^{\circ}\text{C}$	1	1.1	V
r_{CE}	$V_{GE} = 15 \text{ V}$ chiplevel	$T_J = 25^{\circ}\text{C}$	2.7	3.3	$\text{m}\Omega$
		$T_J = 150^{\circ}\text{C}$	4.2	4.5	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 12 \text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0 \text{ V}$ $V_{CE} = 1700 \text{ V}$	$T_J = 25^{\circ}\text{C}$		4	mA
					mA
C_{ies}	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	24		nF
C_{oes}		$f = 1 \text{ MHz}$	1.00		nF
C_{res}		$f = 1 \text{ MHz}$	0.76		nF
Q_G	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		2400		nC
R_{Gint}	$T_J = 25^{\circ}\text{C}$		2.50		Ω
$t_{d(on)}$	$V_{CC} = 1200 \text{ V}$ $I_C = 300 \text{ A}$	$T_J = 150^{\circ}\text{C}$	380		ns
t_r	$V_{GE} = +15/-15 \text{ V}$	$T_J = 150^{\circ}\text{C}$	50		ns
E_{on}	$R_{Gon} = 3.3 \Omega$	$T_J = 150^{\circ}\text{C}$	140		mJ
$t_{d(off)}$	$R_{Goff} = 3.3 \Omega$	$T_J = 150^{\circ}\text{C}$	840		ns
t_f	$di/dt_{on} = 6600 \text{ A}/\mu\text{s}$ $di/dt_{off} = 1600 \text{ A}/\mu\text{s}$	$T_J = 150^{\circ}\text{C}$	160		ns
E_{off}	$du/dt = 4400 \text{ V}/\mu\text{s}$ $L_s = 30 \text{ nH}$	$T_J = 150^{\circ}\text{C}$	122		mJ



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Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
$t_{d(on)}$	$V_{CC} = 900 \text{ V}$	$T_J = 150^\circ\text{C}$		410	ns
t_r	$I_C = 300 \text{ A}$	$T_J = 150^\circ\text{C}$		90	ns
E_{on}	$V_{GE} = +15/-15 \text{ V}$	$T_J = 150^\circ\text{C}$		73	mJ
$t_{d(off)}$	$R_{G on} = 3.3 \Omega$	$T_J = 150^\circ\text{C}$		780	ns
t_f	$R_{G off} = 3.3 \Omega$	$T_J = 150^\circ\text{C}$		170	ns
E_{off}	$di/dt_{on} = 3400 \text{ A}/\mu\text{s}$ $di/dt_{off} = 1400 \text{ A}/\mu\text{s}$ $du/dt = 4400 \text{ V}/\mu\text{s}$ $L_s = 80 \text{ nH}$	$T_J = 150^\circ\text{C}$		100	mJ
$R_{th(j-c)}$	per IGBT			0.083	K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 300 A	T _j = 25 °C		1.98	2.37	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		2.11	2.52	V
V _{F0}	chiplevel	T _j = 25 °C	1.16	1.32	1.56	V
		T _j = 150 °C		1.08	1.22	V
r _F	chiplevel	T _j = 25 °C	1.7	2.2	2.7	mΩ
		T _j = 150 °C		3.4	4.3	mΩ
I _{RRM}	I _F = 300 A	T _j = 150 °C		310		A
Q _{rr}	di/dt _{off} = 5600 A/μs	T _j = 150 °C		103		μC
E _{rr}	V _{GE} = -15 V V _R = 1200 V	T _j = 150 °C		70		mJ
I _{RRM}	I _F = 300 A	T _j = 150 °C		300		A
Q _{rr}	di/dt _{off} = 3400 A/μs	T _j = 150 °C		100		μC
E _{rr}	V _{GE} = -15 V V _R = 900 V	T _j = 150 °C		61		mJ
R _{th(j-c)}	per diode				0.184	K/W
Module						
L _{CE}				18		nH
R _{CC'+EE'}	res. terminal-chip	T _C = 25 °C		0.7		mΩ
		T _C = 125 °C		1		mΩ
R _{th(c-s)}	per module			0.045		K/W
M _s	to heat sink (M5)		3		5	Nm
M _t		to terminals (M6)	2.5		5	Nm
						Nm
w					250	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



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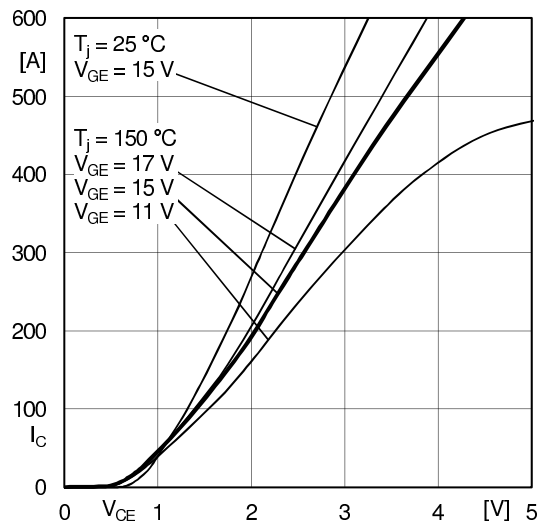


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

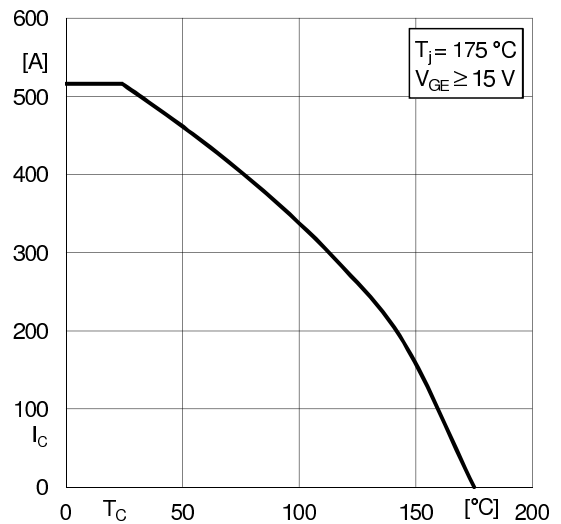


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

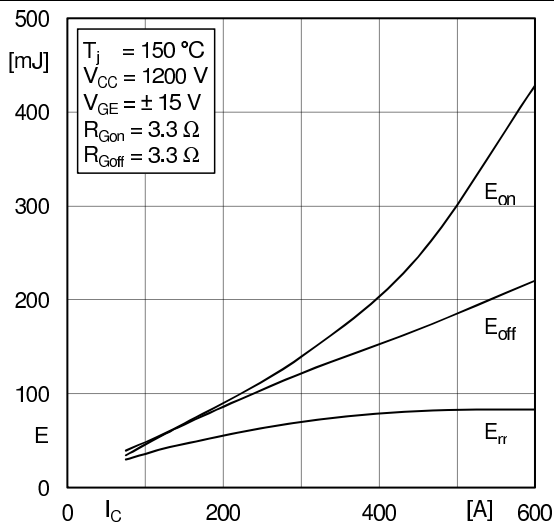


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

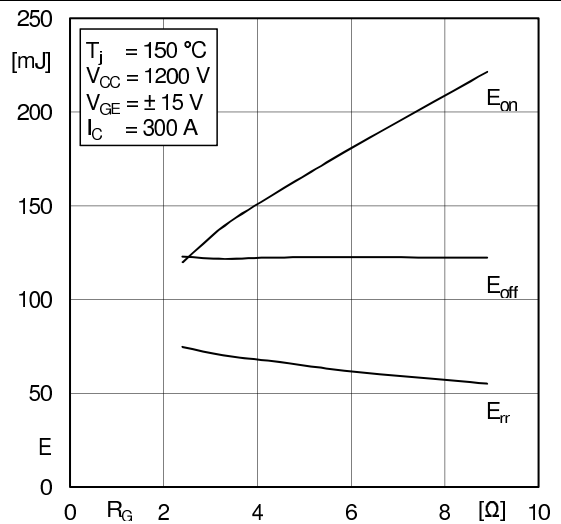


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

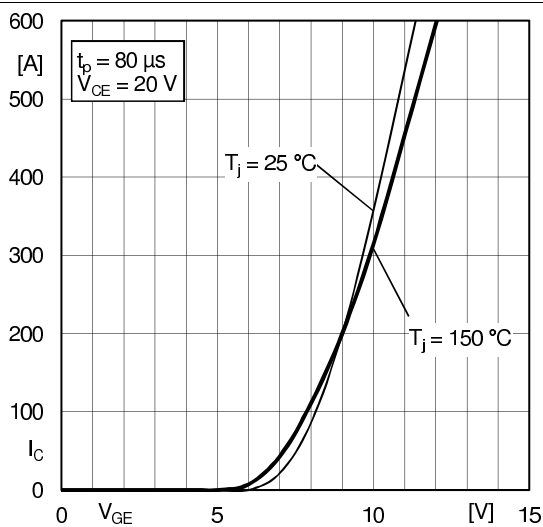


Fig. 5: Typ. transfer characteristic

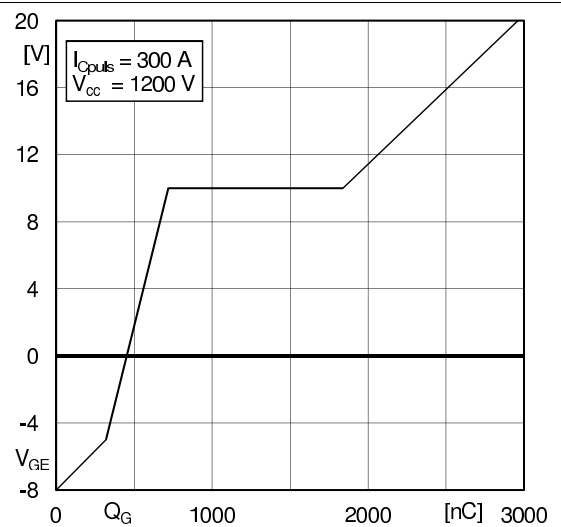
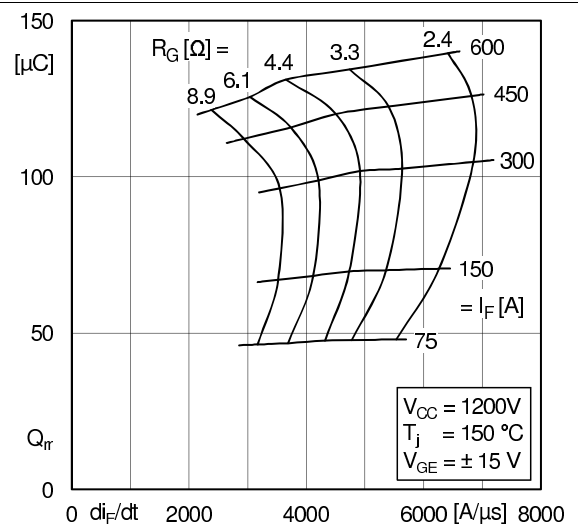
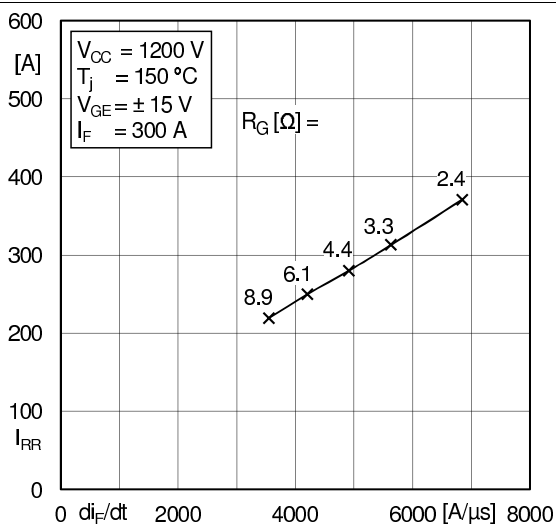
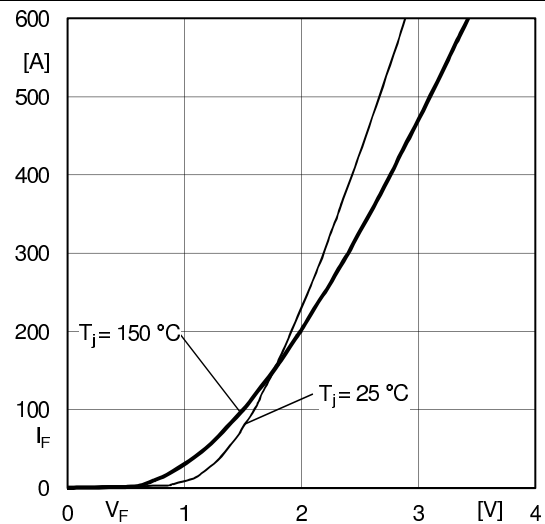
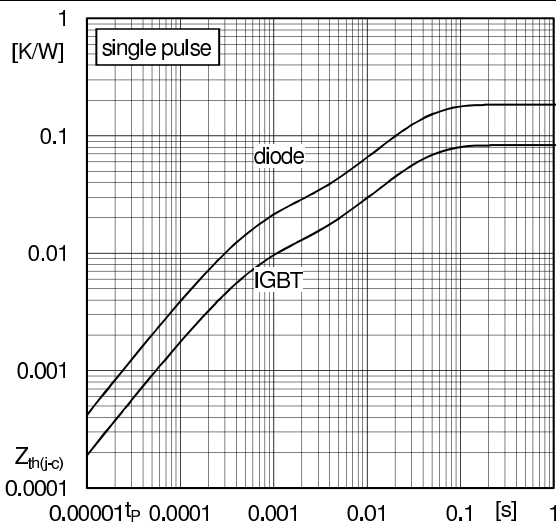
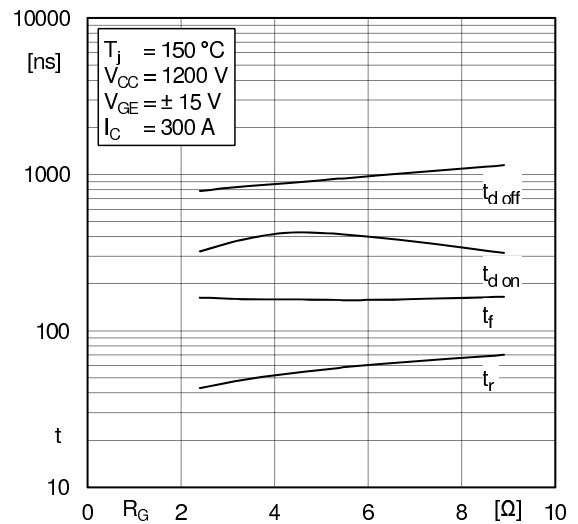
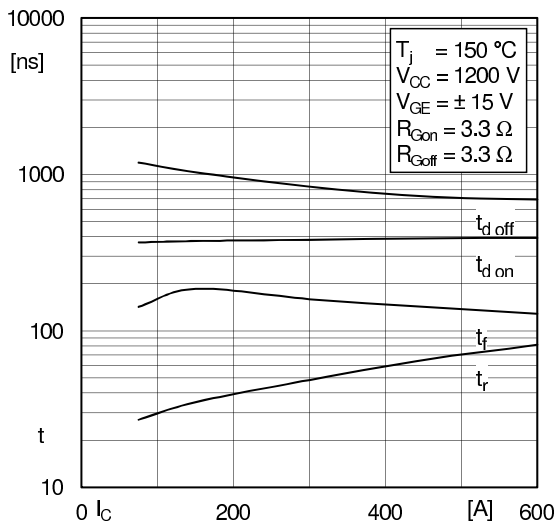
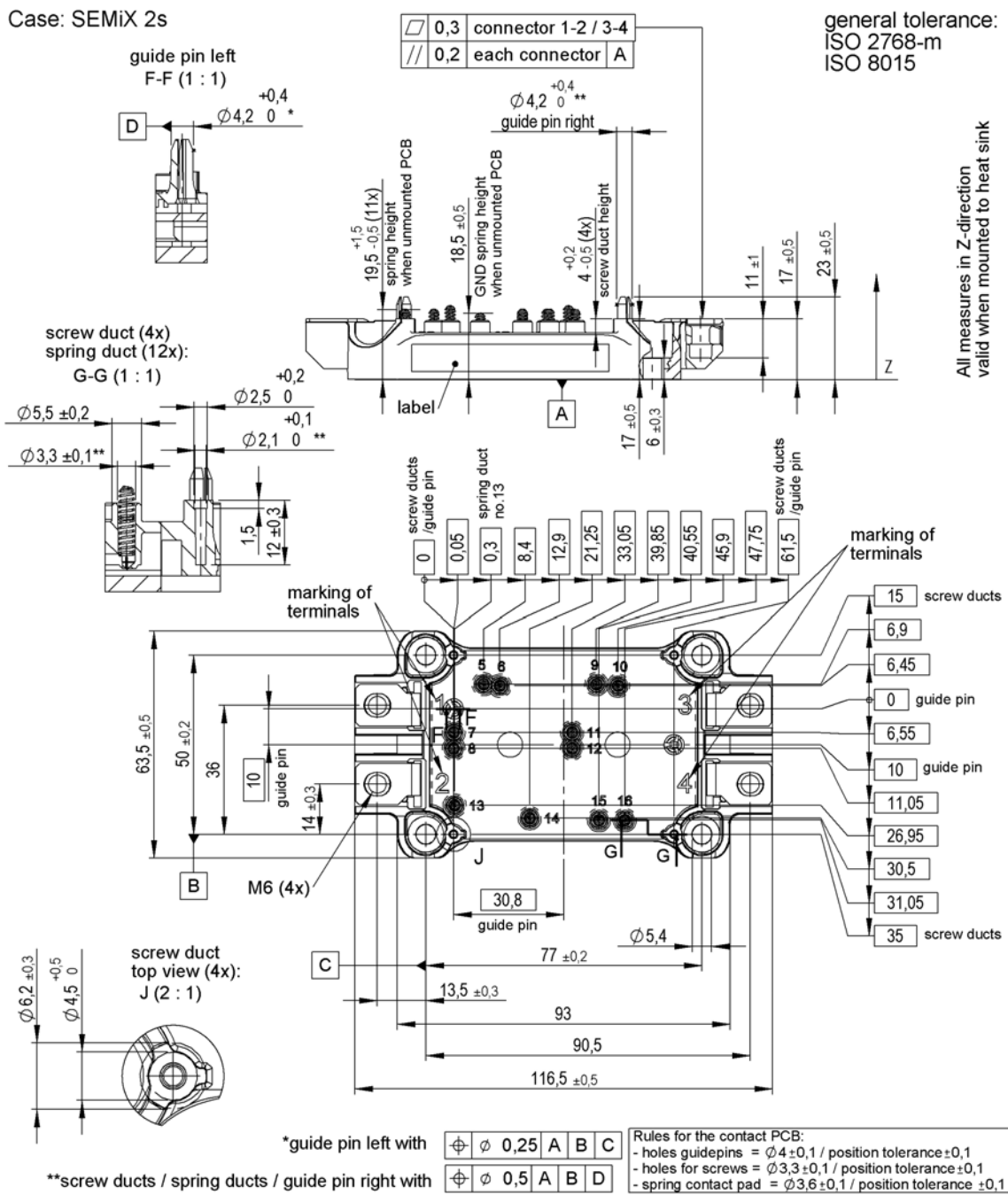


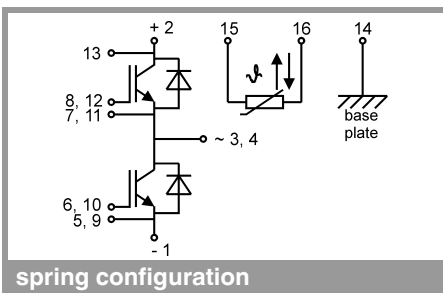
Fig. 6: Typ. gate charge characteristic



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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.