

SEMiX151GB17E4s



SEMiX[®] 1s

SEMiX151GB17E4s

Features

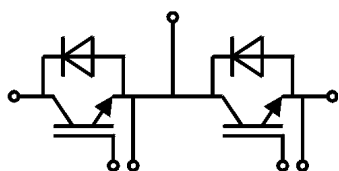
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125\text{ °C}$ max.
- Product reliability results are valid for $T_j=150\text{ °C}$



GB

Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
IGBT				
V_{CES}	$T_j = 25\text{ °C}$	1700	V	
I_C	$T_j = 175\text{ °C}$	$T_c = 25\text{ °C}$	260	A
		$T_c = 80\text{ °C}$	198	A
I_{Cnom}		150	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	450	A	
V_{GES}		-20 ... 20	V	
t_{psc}	$V_{CC} = 1000\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1700\text{ V}$	$T_j = 150\text{ °C}$	10	μs
T_j		-40 ... 175	$^{\circ}\text{C}$	
Inverse diode				
V_{RRM}	$T_j = 25\text{ °C}$	1700	V	
I_F	$T_j = 175\text{ °C}$	$T_c = 25\text{ °C}$	169	A
		$T_c = 80\text{ °C}$	125	A
I_{Fnom}		150	A	
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	300	A	
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^{\circ}$, $T_j = 25\text{ °C}$	950	A	
T_j		-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					
$V_{CE(sat)}$	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	1.90	2.20	V
		$T_j = 150\text{ °C}$	2.25	2.45	V
V_{CE0}	chipelevel	$T_j = 25\text{ °C}$	1.1	1.2	V
		$T_j = 150\text{ °C}$	1	1.1	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	5.3	6.7	$\text{m}\Omega$
		$T_j = 150\text{ °C}$	8.3	9	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C = 6\text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1700\text{ V}$	$T_j = 25\text{ °C}$		2	mA
					mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	12		nF
C_{oes}		$f = 1\text{ MHz}$	0.50		nF
C_{res}		$f = 1\text{ MHz}$	0.38		nF
Q_G	$V_{GE} = -8\text{ V...} + 15\text{ V}$		1200		nC
R_{Gint}	$T_j = 25\text{ °C}$		5.00		Ω
$t_{d(on)}$	$V_{CC} = 1200\text{ V}$	$T_j = 150\text{ °C}$	210		ns
t_r	$I_C = 150\text{ A}$ $V_{GE} = +15/-15\text{ V}$	$T_j = 150\text{ °C}$	28		ns
E_{on}	$R_{G on} = 1\text{ }\Omega$	$T_j = 150\text{ °C}$	52		mJ
$t_{d(off)}$	$R_{G off} = 1\text{ }\Omega$	$T_j = 150\text{ °C}$	670		ns
t_f	$di/dt_{on} = 6400\text{ A}/\mu\text{s}$ $di/dt_{off} = 840\text{ A}/\mu\text{s}$ $du/dt = 5000\text{ V}/\mu\text{s}$ $L_s = 30\text{ nH}$	$T_j = 150\text{ °C}$	150		ns
E_{off}		$T_j = 150\text{ °C}$	60		mJ

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Typical Applications*

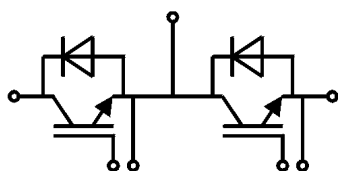
- AC inverter drives
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Remarks

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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
$t_{d(on)}$	$V_{CC} = 900\text{ V}$	$T_j = 150\text{ °C}$		210		ns
t_r	$I_C = 150\text{ A}$	$T_j = 150\text{ °C}$		47		ns
E_{on}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150\text{ °C}$		28		mJ
$t_{d(off)}$	$R_{G\ on} = 1\ \Omega$	$T_j = 150\text{ °C}$		620		ns
t_f	$R_{G\ off} = 1\ \Omega$	$T_j = 150\text{ °C}$		160		ns
E_{off}	$di/dt_{on} = 3500\text{ A}/\mu\text{s}$	$T_j = 150\text{ °C}$				
	$di/dt_{off} = 800\text{ A}/\mu\text{s}$					
	$du/dt = 4400\text{ V}/\mu\text{s}$			49		mJ
	$L_s = 80\text{ nH}$					
$R_{th(j-c)}$	per IGBT				0.162	K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 150\text{ A}$	$T_j = 25\text{ °C}$		1.98	2.37	V
	$V_{GE} = 0\text{ V}$	$T_j = 150\text{ °C}$		2.11	2.52	V
	chipllevel					
V_{F0}		$T_j = 25\text{ °C}$	1.16	1.32	1.56	V
	chipllevel	$T_j = 150\text{ °C}$		1.08	1.22	V
r_F		$T_j = 25\text{ °C}$	3.5	4.4	5.4	m Ω
	chipllevel	$T_j = 150\text{ °C}$		6.9	8.7	m Ω
I_{RRM}	$I_F = 150\text{ A}$	$T_j = 150\text{ °C}$		200		A
Q_{rr}	$di/dt_{off} = 5500\text{ A}/\mu\text{s}$	$T_j = 150\text{ °C}$		56		μC
E_{rr}	$V_{GE} = -15\text{ V}$	$T_j = 150\text{ °C}$		41		mJ
	$V_R = 1200\text{ V}$					
I_{RRM}	$I_F = 150\text{ A}$	$T_j = 150\text{ °C}$		190		A
Q_{rr}	$di/dt_{off} = 3200\text{ A}/\mu\text{s}$	$T_j = 150\text{ °C}$		54		μC
E_{rr}	$V_{GE} = -15\text{ V}$	$T_j = 150\text{ °C}$		34		mJ
	$V_R = 900\text{ V}$					
$R_{th(j-c)}$	per diode				0.345	K/W
Module						
L_{CE}				16		nH
$R_{CC'+EE'}$	res. terminal-chip	$T_C = 25\text{ °C}$		0.7		m Ω
		$T_C = 125\text{ °C}$		1		m Ω
$R_{th(c-s)}$	per module			0.075		K/W
M_s	to heat sink (M5)		3		5	Nm
M_t		to terminals (M6)	2.5		5	Nm
						Nm
w					145	g
Temperature Sensor						
R_{100}	$T_C=100\text{ °C}$ ($R_{25}=5\text{ k}\Omega$)			$493 \pm 5\%$		Ω
$B_{100/125}$	$R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[K]$;			$3550 \pm 2\%$		K



GB

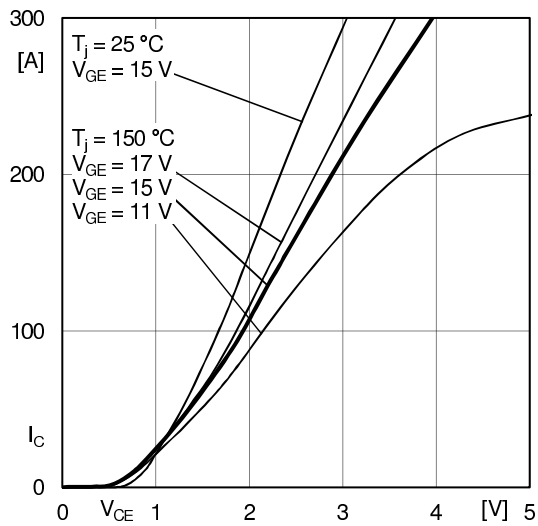


Fig. 1: Typ. output characteristic, inclusive R_{CC+EE}

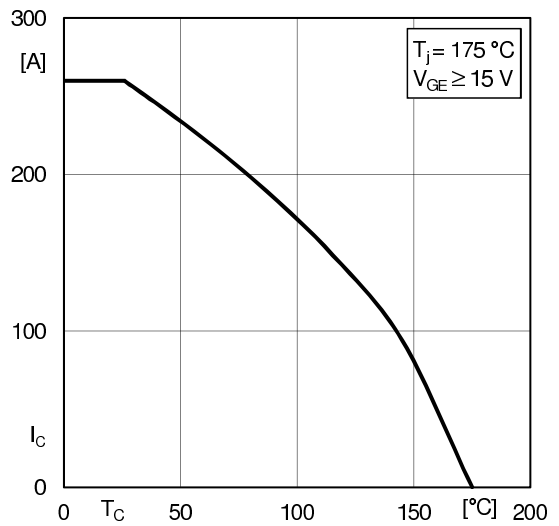


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

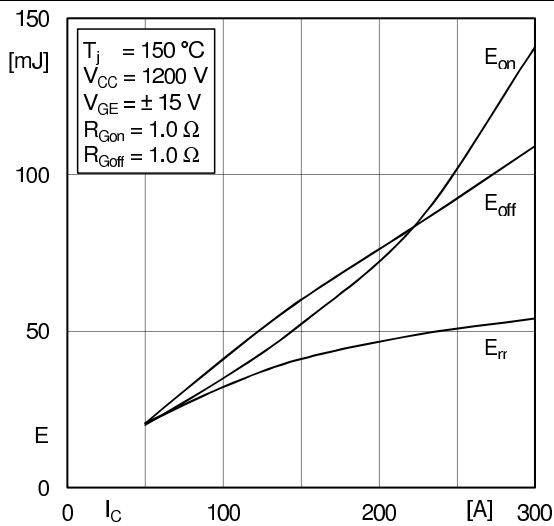


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

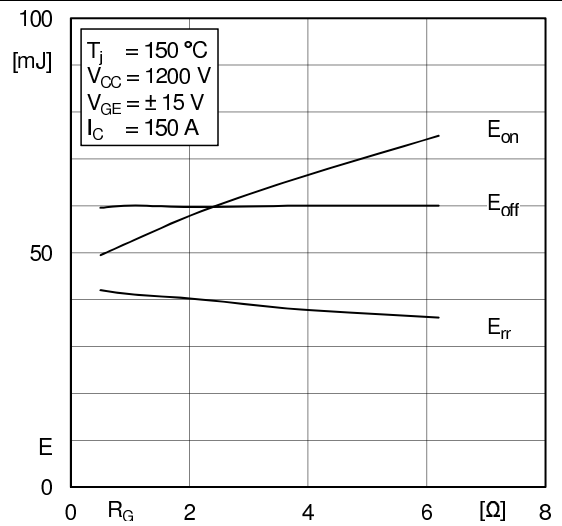


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

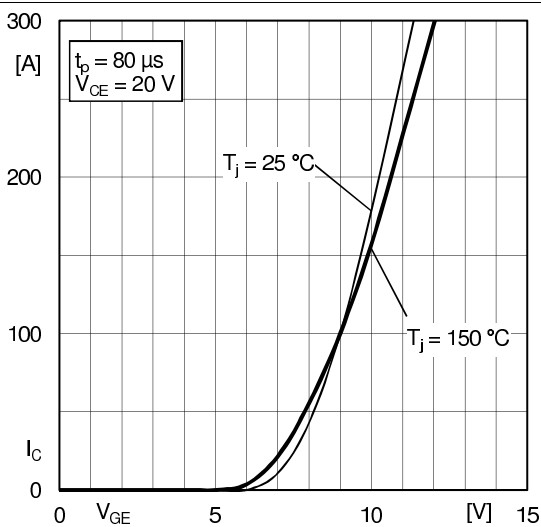


Fig. 5: Typ. transfer characteristic

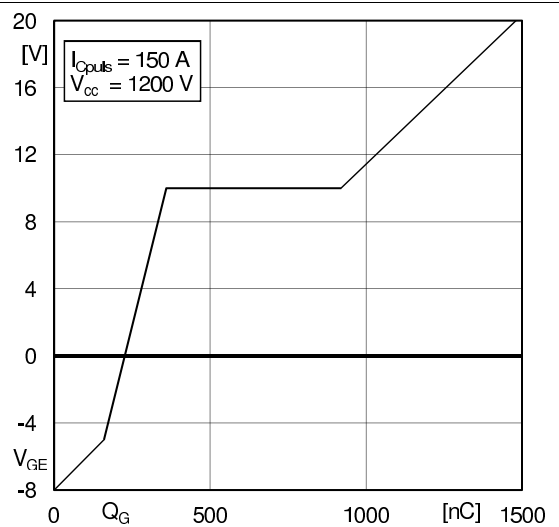
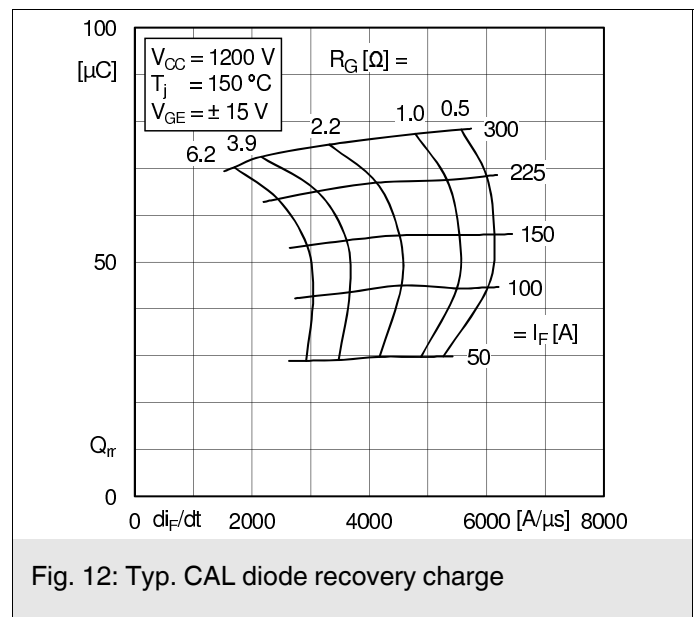
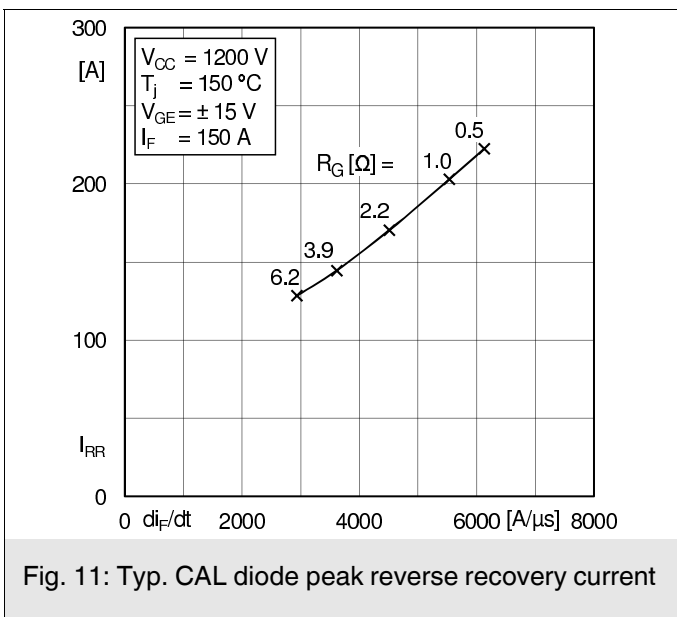
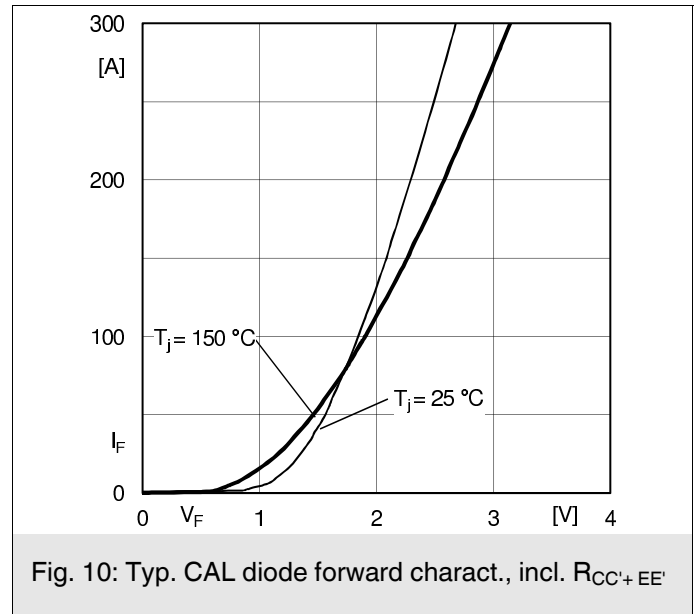
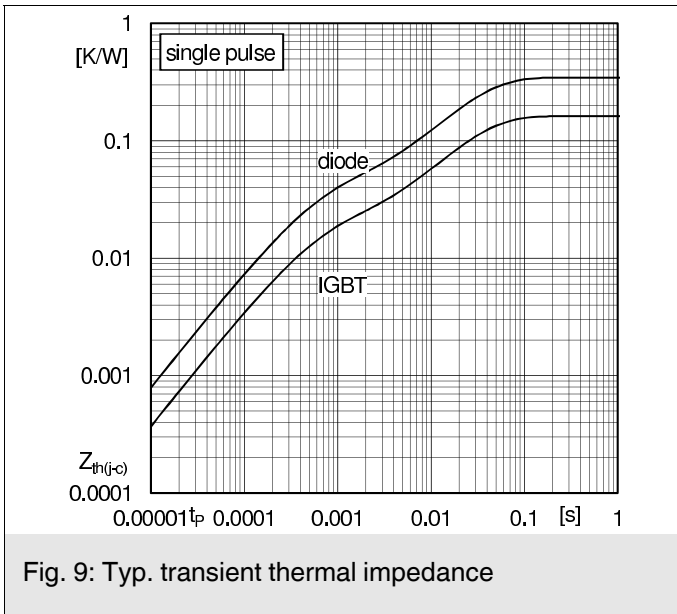
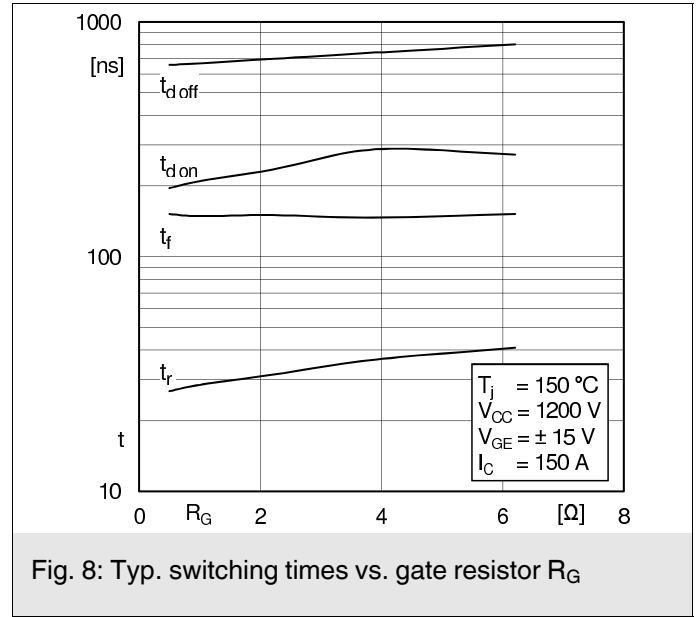
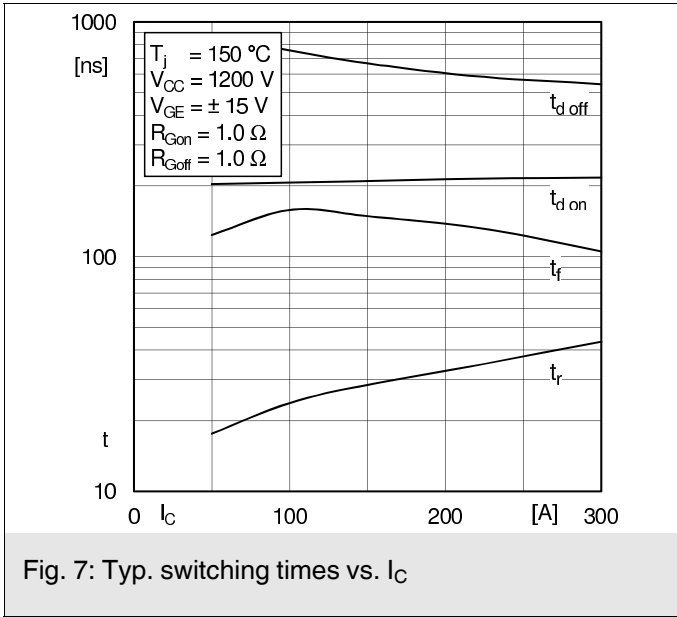


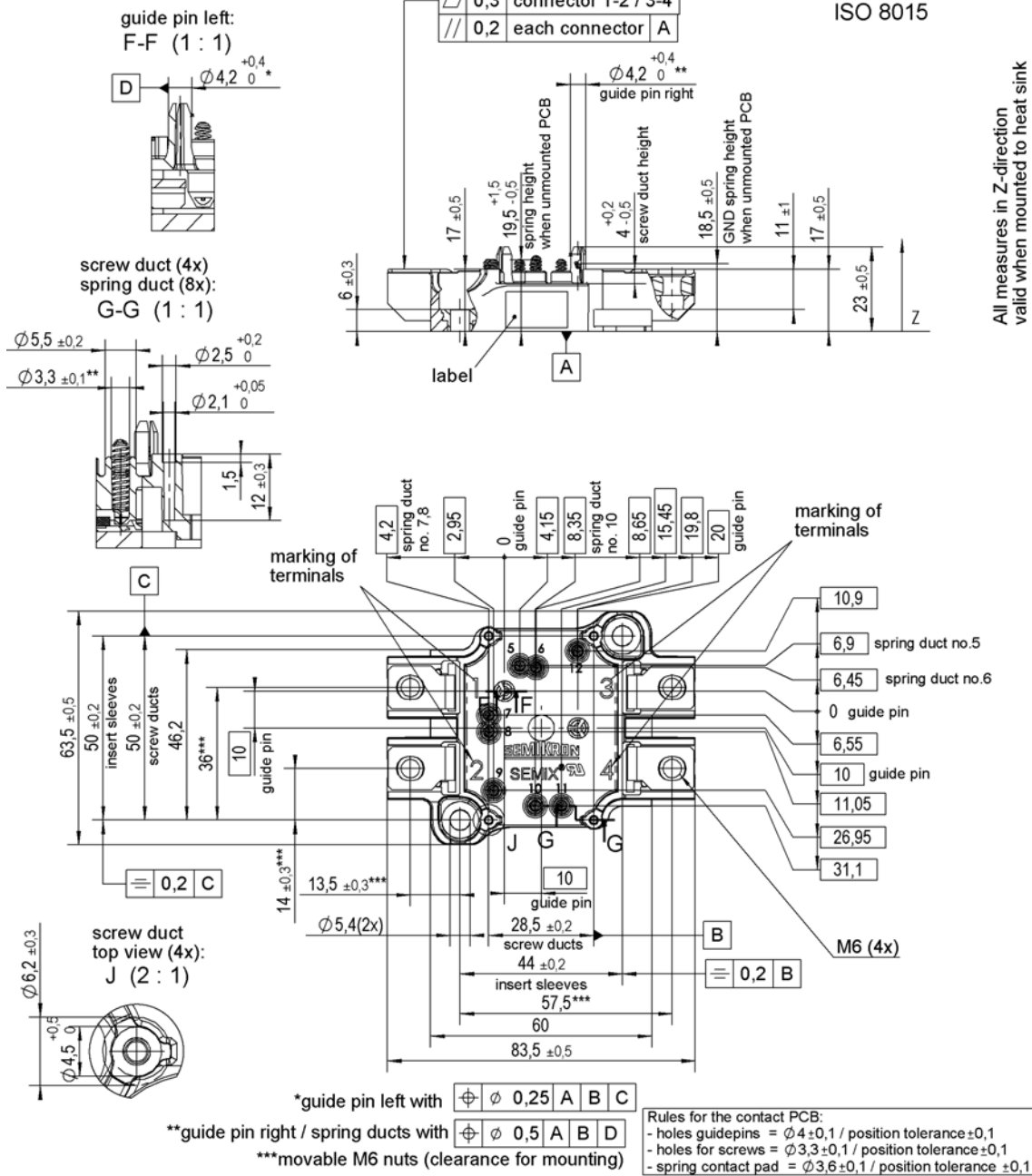
Fig. 6: Typ. gate charge characteristic



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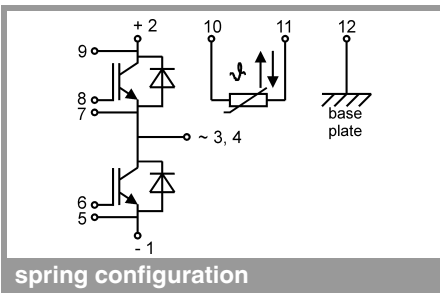
Case: SEMiX 1s

general tolerance:
ISO 2768-m
ISO 8015



All measures in Z-direction
valid when mounted to heat sink

SEMIX 1s



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.