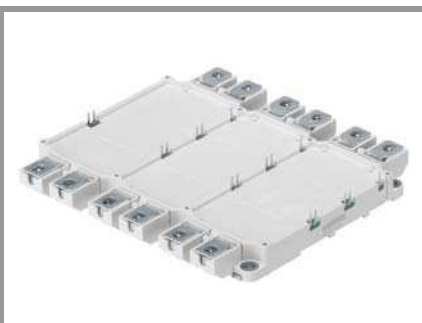


SEMiX223GD12E4c



SEMiX[®] 33c

Trench IGBT Modules

SEMiX223GD12E4c

Features

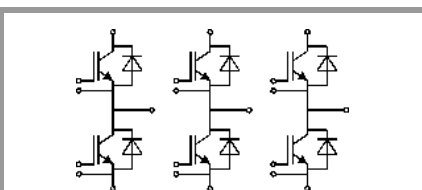
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognized, file no. E63532

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 $T_j=150^{\circ}\text{C}$

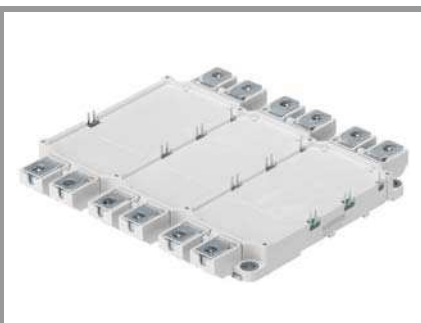


GD

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
IGBT			
V_{CES}	$T_j = 25^{\circ}\text{C}$	1200	V
I_C	$T_j = 175^{\circ}\text{C}$	$T_c = 25^{\circ}\text{C}$	333
		$T_c = 80^{\circ}\text{C}$	256
I_{Cnom}		225	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	675	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 800\text{ V}$	$T_j = 150^{\circ}\text{C}$	10
	$V_{GE} \leq 20\text{ V}$		
	$V_{CES} \leq 1200\text{ V}$		
T_j		-40 ... 175	$^{\circ}\text{C}$
Inverse diode			
I_F	$T_j = 175^{\circ}\text{C}$	$T_c = 25^{\circ}\text{C}$	270
		$T_c = 80^{\circ}\text{C}$	202
I_{Fnom}		225	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	675	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25^{\circ}\text{C}$	1161	A
T_j		-40 ... 175	$^{\circ}\text{C}$
Module			
$I_{t(RMS)}$	$T_{terminal} = 80^{\circ}\text{C}$	600	A
T_{stg}		-40 ... 125	$^{\circ}\text{C}$
V_{isol}	AC sinus 50Hz, t = 1 min	4000	V

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 225\text{ A}$ $V_{GE} = 15\text{ V}$ chipllevel	$T_j = 25^{\circ}\text{C}$	1.85	2.10	V
		$T_j = 150^{\circ}\text{C}$	2.3	2.45	V
V_{CE0}	chipllevel	$T_j = 25^{\circ}\text{C}$	0.8	0.9	V
		$T_j = 150^{\circ}\text{C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipllevel	$T_j = 25^{\circ}\text{C}$	4.7	5.3	m Ω
		$T_j = 150^{\circ}\text{C}$	6.9	7.3	m Ω
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 9\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^{\circ}\text{C}$		3.0	mA
		$T_j = 150^{\circ}\text{C}$			mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	13.2		nF
C_{oes}		$f = 1\text{ MHz}$	0.87		nF
C_{res}		$f = 1\text{ MHz}$	0.71		nF
Q_G	$V_{GE} = -8\text{ V...} + 15\text{ V}$		1275		nC
R_{Gint}	$T_j = 25^{\circ}\text{C}$		3.33		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 225\text{ A}$	$T_j = 150^{\circ}\text{C}$	213		ns
t_r	$V_{GE} = \pm 15\text{ V}$	$T_j = 150^{\circ}\text{C}$	60		ns
E_{on}	$R_{Gon} = 1.5\ \Omega$	$T_j = 150^{\circ}\text{C}$	22		mJ
$t_{d(off)}$	$R_{Goff} = 1.5\ \Omega$	$T_j = 150^{\circ}\text{C}$	535		ns
t_f	$di/dt_{on} = 3630\text{ A}/\mu\text{s}$ $di/dt_{off} = 2235\text{ A}/\mu\text{s}$	$T_j = 150^{\circ}\text{C}$	113		ns
E_{off}		$T_j = 150^{\circ}\text{C}$	31.4		mJ
$R_{th(j-c)}$	per IGBT			0.135	K/W

SEMiX223GD12E4c



SEMiX® 33c

Trench IGBT Modules

SEMiX223GD12E4c

Features

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- High short circuit capability
- UL recognized, file no. E63532

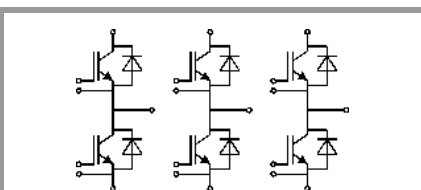
Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

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

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 225\text{ A}$ $V_{GE} = 0\text{ V}$ chipllevel	$T_j = 25^\circ\text{C}$		2.2	2.49	V
		$T_j = 150^\circ\text{C}$		2.1	2.4	V
V_{F0}	chipllevel	$T_j = 25^\circ\text{C}$	1.1	1.3	1.5	V
		$T_j = 150^\circ\text{C}$	0.7	0.9	1.1	V
r_F	chipllevel	$T_j = 25^\circ\text{C}$	3.6	3.9	4.4	m Ω
		$T_j = 150^\circ\text{C}$	4.7	5.4	5.9	m Ω
I_{RRM}	$I_F = 225\text{ A}$	$T_j = 150^\circ\text{C}$		210		A
Q_{rr}	$di/dt_{off} = 3900\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		37		μC
E_{rr}	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		17.2		mJ
$R_{th(j-c)}$	per diode				0.22	K/W
Module						
L_{CE}				20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_C = 25^\circ\text{C}$		0.7		m Ω
		$T_C = 125^\circ\text{C}$		1		m Ω
$R_{th(c-s)}$	per module			0.014		K/W
M_s	to heat sink (M5)		3		5	Nm
M_t		to terminals (M6)	2.5		5	Nm
						Nm
w					900	g
Temperature Sensor						
R_{100}	$T_C=100^\circ\text{C}$ ($R_{25}=5\text{ k}\Omega$)			$493 \pm 5\%$		Ω
$B_{100/125}$	$R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[K]$;			$3550 \pm 2\%$		K



GD

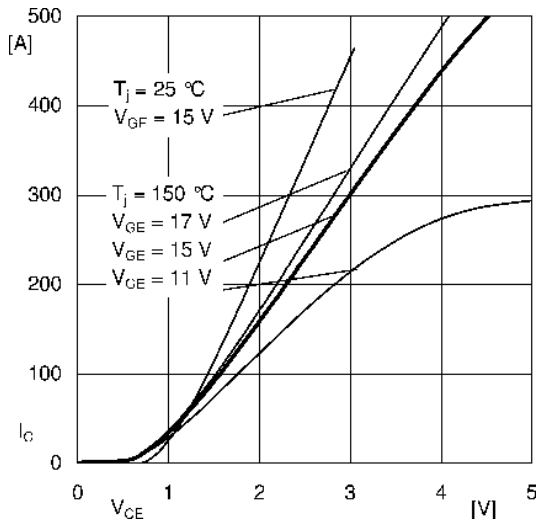


Fig. 1: Typ. output characteristic, inclusive R_{CC+EE}

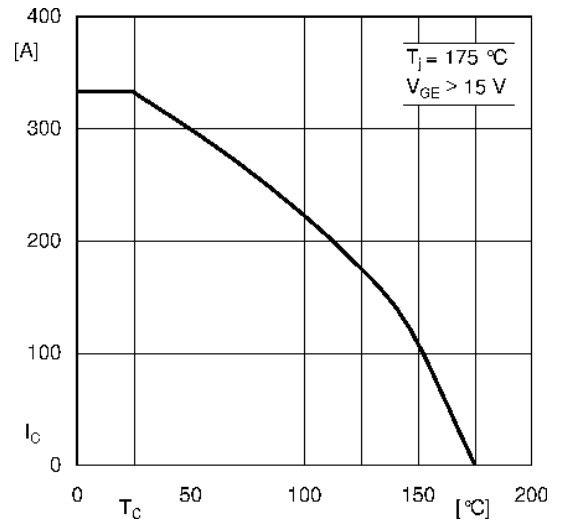


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

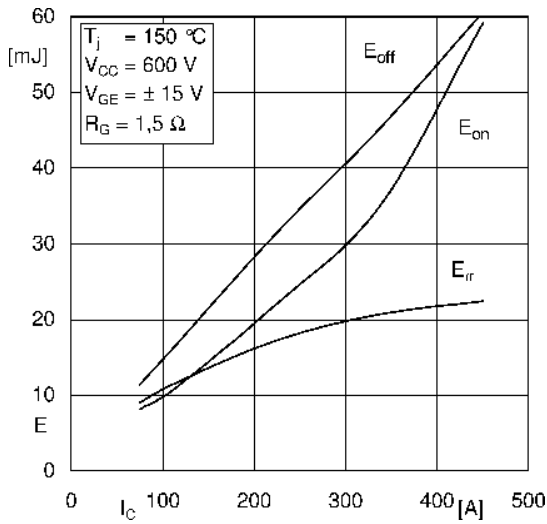


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

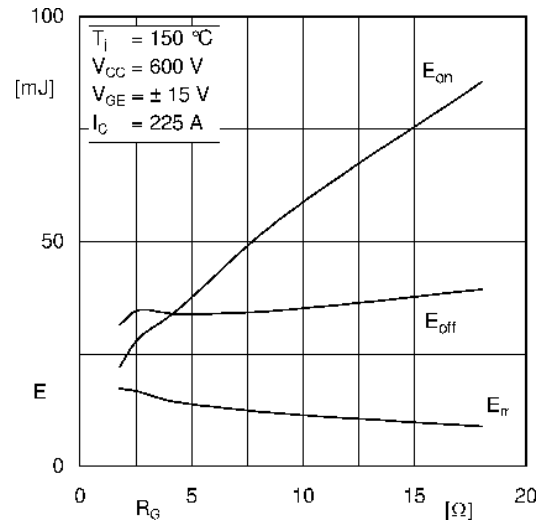


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

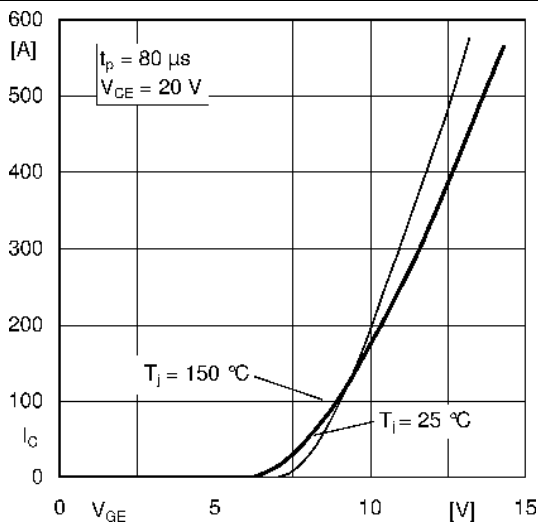


Fig. 5: Typ. transfer characteristic

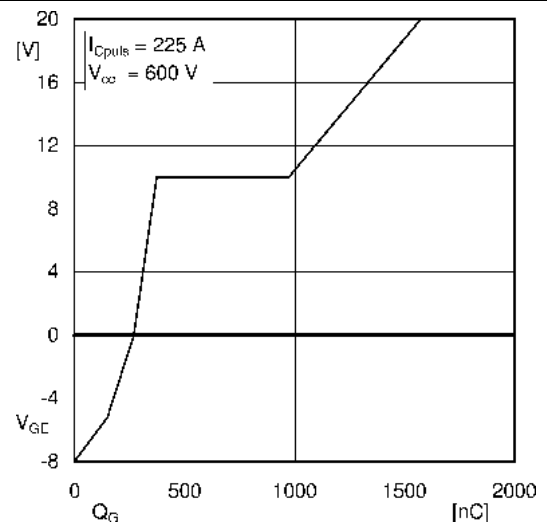
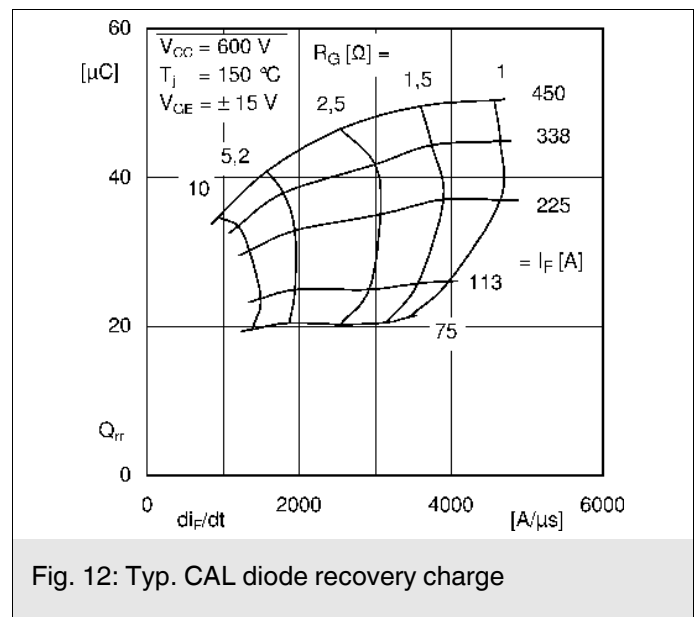
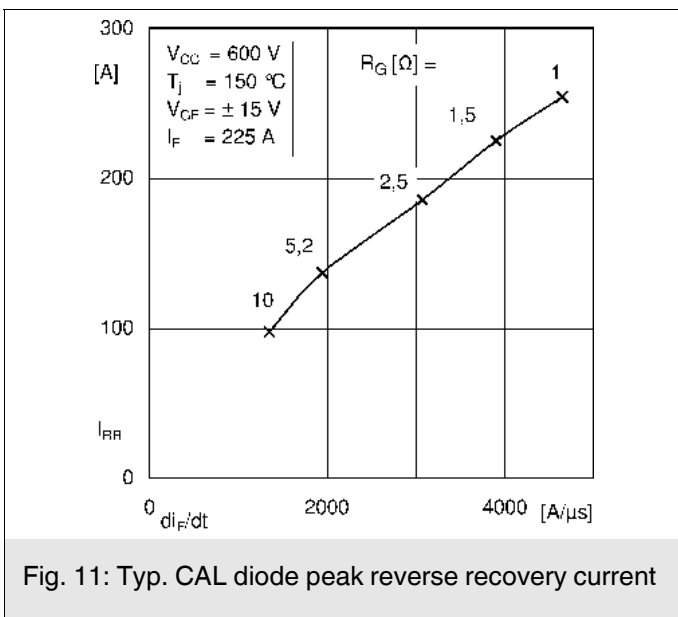
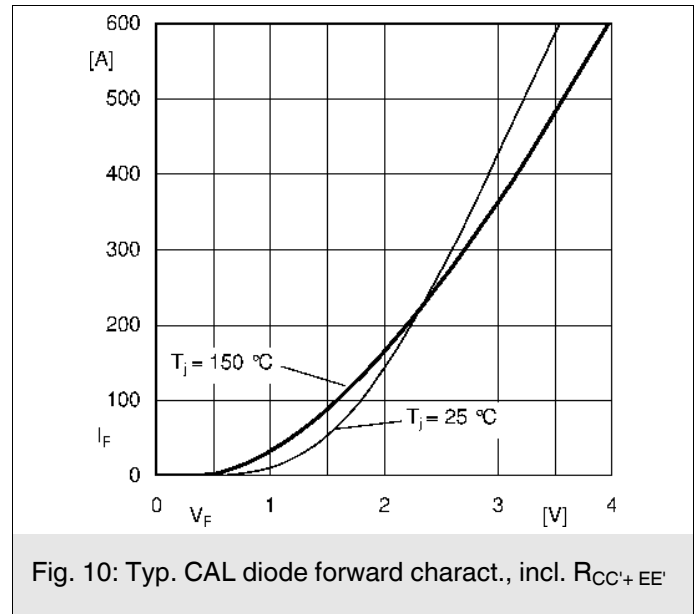
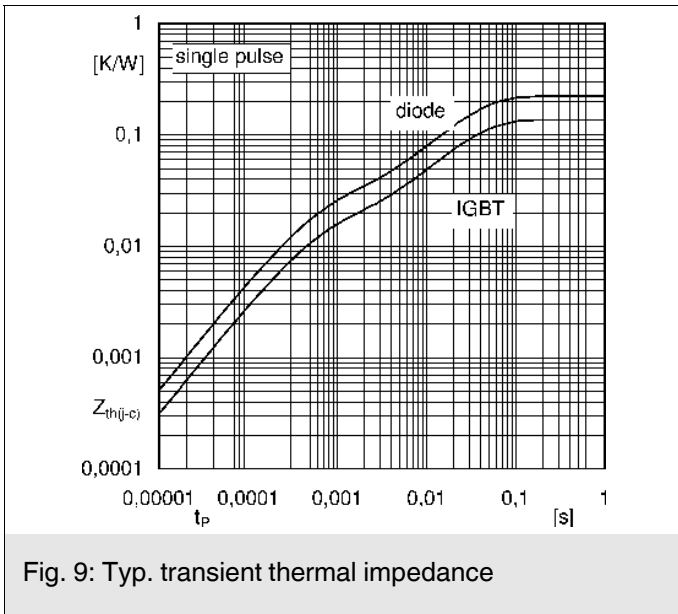
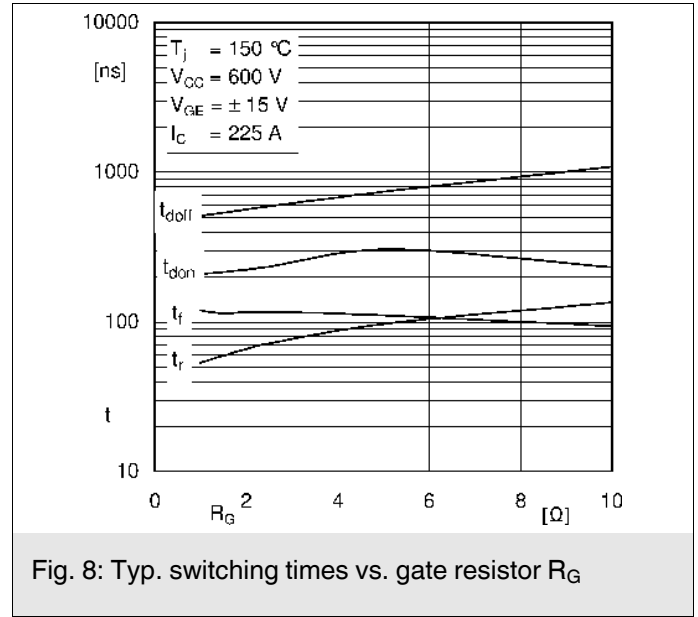
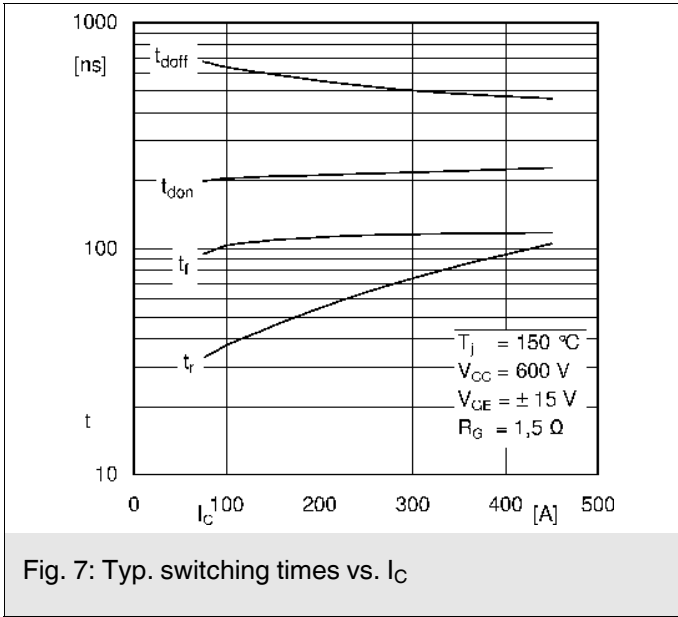
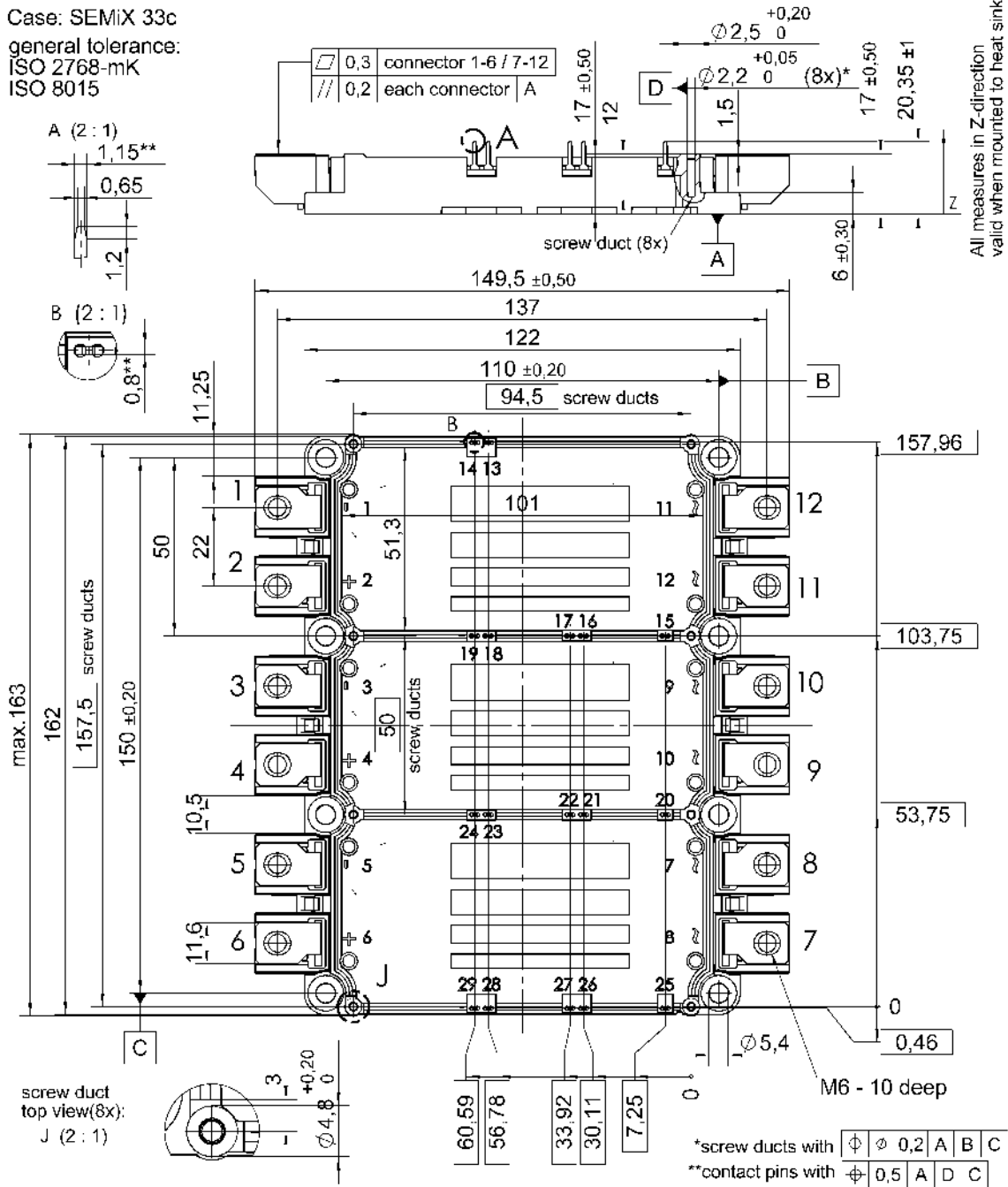


Fig. 6: Typ. gate charge characteristic



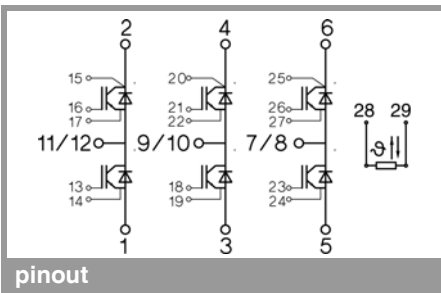
SEMiX223GD12E4c

Case: SEMiX 33c
 general tolerance:
 ISO 2768-mK
 ISO 8015



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

SEMIX 33c



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.