

SEMiX453GD17E4c



SEMiX® 33c

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Features

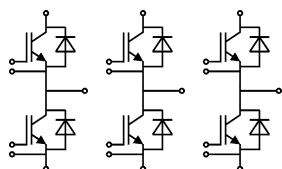
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

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



GD

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	762	A
		T _c = 80 °C	579	A
I _{Cnom}			450	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		1350	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	$T_J = 175\text{ }^{\circ}\text{C}$	$T_c = 25\text{ }^{\circ}\text{C}$	482	A
		$T_c = 80\text{ }^{\circ}\text{C}$	354	A
I_{Fnom}			450	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$		900	A
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^{\circ}$, $T_J = 25\text{ }^{\circ}\text{C}$		2565	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					
$V_{CE(sat)}$	$I_C = 450\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_J = 25\text{ °C}$	1.90	2.20	V
		$T_J = 150\text{ °C}$	2.26	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	$T_J = 25\text{ °C}$	1.8	2.2	$\text{m}\Omega$
		$T_J = 150\text{ °C}$	2.8	3	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C = 18\text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1700\text{ V}$	$T_J = 25\text{ °C}$		5	mA
					mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	36		nF
C_{oes}		$f = 1\text{ MHz}$	1.50		nF
C_{res}		$f = 1\text{ MHz}$	1.14		nF
Q_G	$V_{GE} = -8\text{ V...} + 15\text{ V}$		3600		nC
R_{Gint}	$T_J = 25\text{ °C}$		1.67		Ω
$t_{d(on)}$	$V_{CC} = 1200\text{ V}$ $I_C = 450\text{ A}$	$T_J = 150\text{ °C}$	270		ns
t_r	$V_{GE} = +15/-15\text{ V}$	$T_J = 150\text{ °C}$	61		ns
E_{on}	$R_{G on} = 2\text{ }\Omega$	$T_J = 150\text{ °C}$	186		mJ
$t_{d(off)}$	$R_{G off} = 2\text{ }\Omega$	$T_J = 150\text{ °C}$	810		ns
t_f	$di/dt_{on} = 7560\text{ A}/\mu\text{s}$ $di/dt_{off} = 2400\text{ A}/\mu\text{s}$	$T_J = 150\text{ °C}$	170		ns
E_{off}	$du/dt = 5320\text{ V}/\mu\text{s}$ $L_s = 30\text{ nH}$	$T_J = 150\text{ °C}$	183		mJ



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Typical Applications*

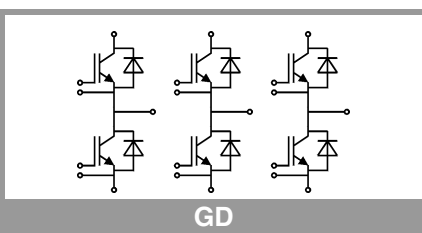
- AC inverter drives
- UPS
- Electronic Welding

Remarks

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

Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
$t_{d(on)}$	$V_{CC} = 1200\text{ V}$	$T_J = 150\text{ °C}$		310	ns
t_r	$I_C = 450\text{ A}$	$T_J = 150\text{ °C}$		110	ns
E_{on}	$V_{GE} = +15/-15\text{ V}$	$T_J = 150\text{ °C}$		84	mJ
$t_{d(off)}$	$R_{G\ on} = 2\ \Omega$	$T_J = 150\text{ °C}$		760	ns
t_f	$R_{G\ off} = 2\ \Omega$	$T_J = 150\text{ °C}$		200	ns
E_{off}	$di/dt_{on} = 4250\text{ A}/\mu\text{s}$ $di/dt_{off} = 1950\text{ A}/\mu\text{s}$ $du/dt = 4800\text{ V}/\mu\text{s}$ $L_s = 80\text{ nH}$	$T_J = 150\text{ °C}$		150	mJ
$R_{th(j-c)}$	per IGBT			0.056	K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 450 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	1.2	1.5	1.8	mΩ
		T _j = 150 °C		2.3	2.9	mΩ
I _{RRM}	I _F = 450 A	T _j = 150 °C		540		A
Q _{rr}	di/dt _{off} = 7400 A/μs	T _j = 150 °C		160		μC
E _{rr}	V _{GE} = -15 V V _R = 1200 V	T _j = 150 °C		122		mJ
I _{RRM}	I _F = 450 A	T _j = 150 °C		470		A
Q _{rr}	di/dt _{off} = 4300 A/μs	T _j = 150 °C		155		μC
E _{rr}	V _{GE} = -15 V V _R = 900 V	T _j = 150 °C		107		mJ
R _{th(j-c)}	per diode				0.125	K/W
Module						
L _{CE}				20		nH
R _{CC'+EE'}	res. terminal-chip	T _C = 25 °C		0.85		mΩ
		T _C = 125 °C		1.2		mΩ
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°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



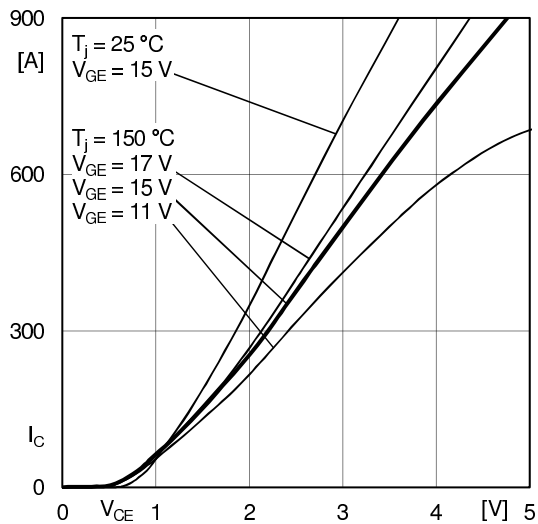


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

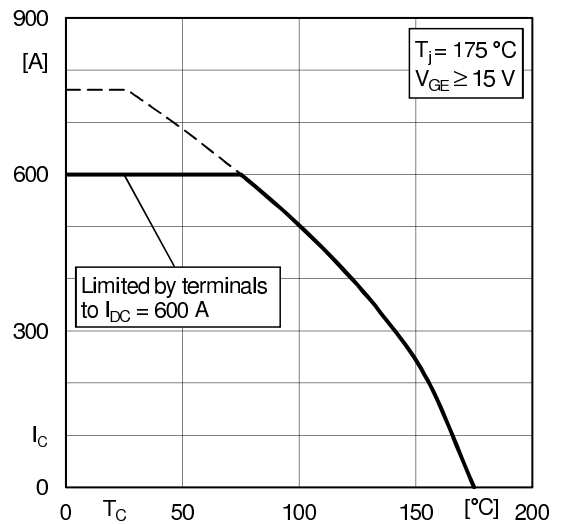


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

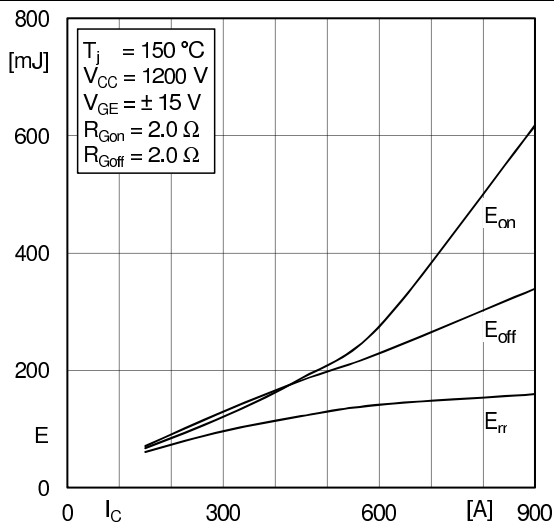


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

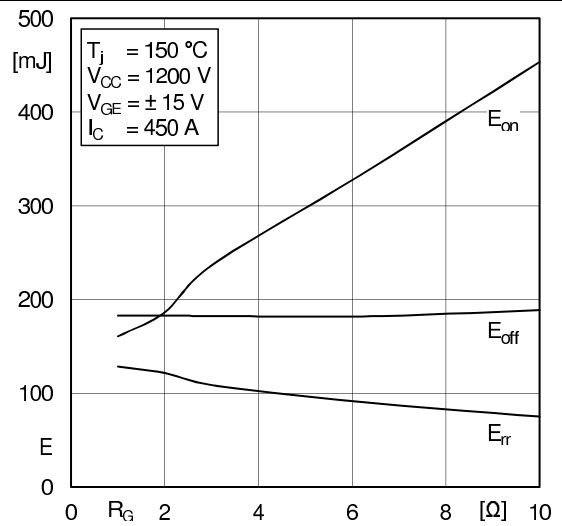


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

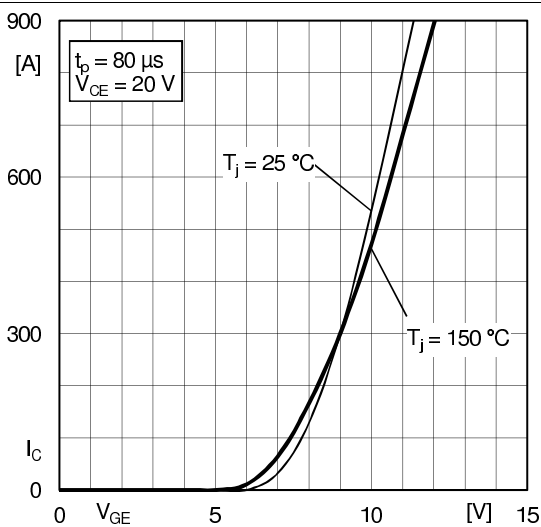


Fig. 5: Typ. transfer characteristic

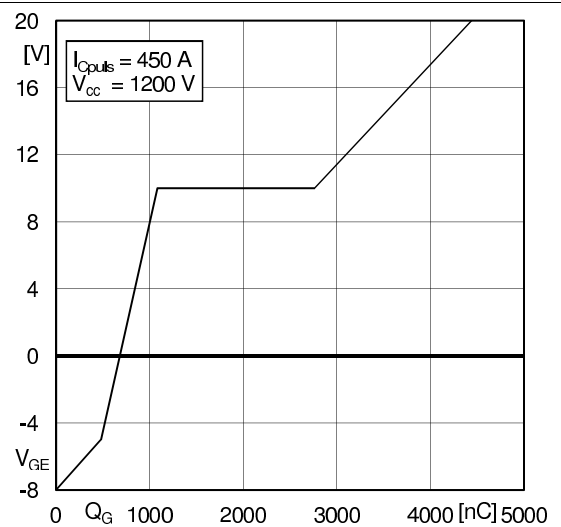
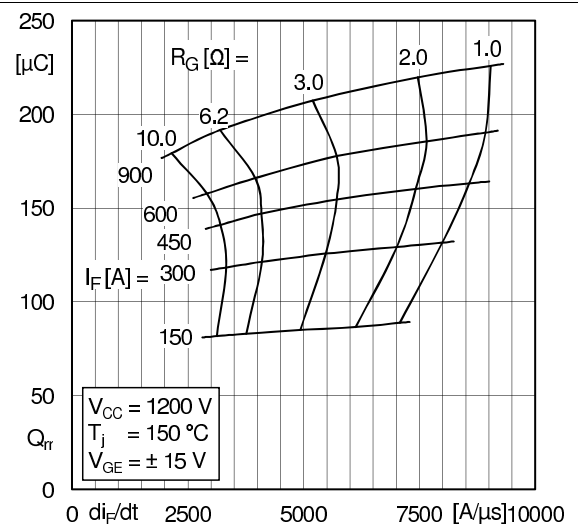
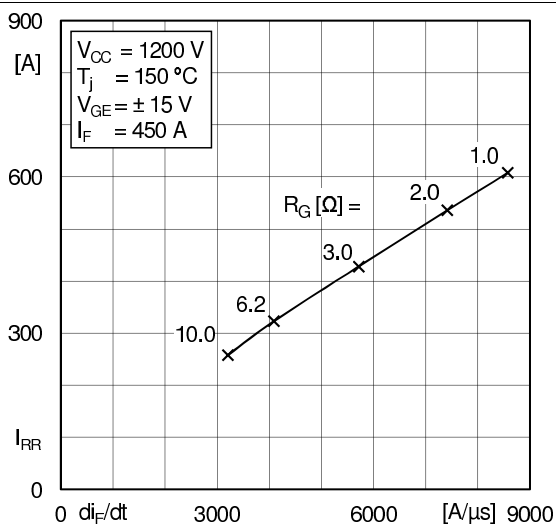
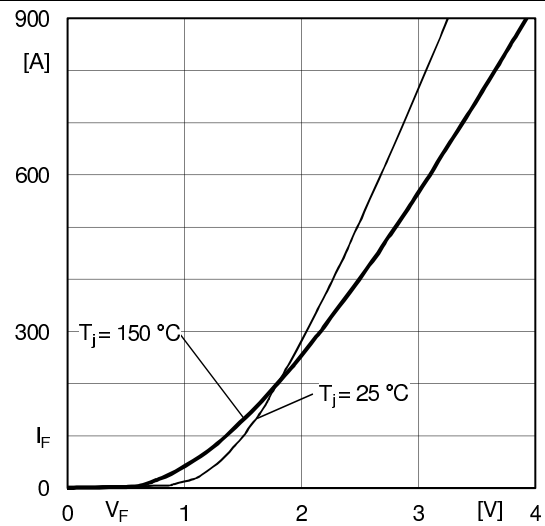
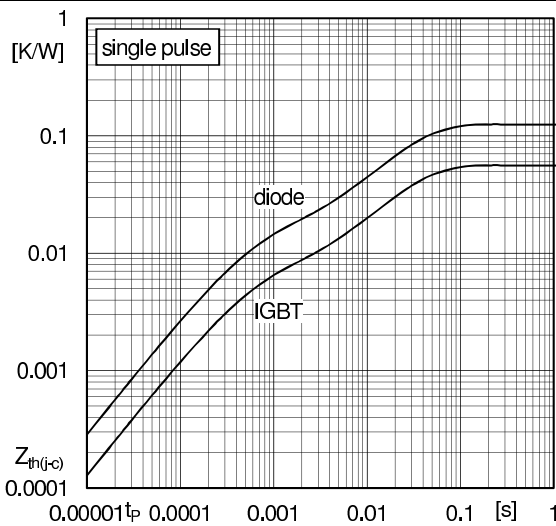
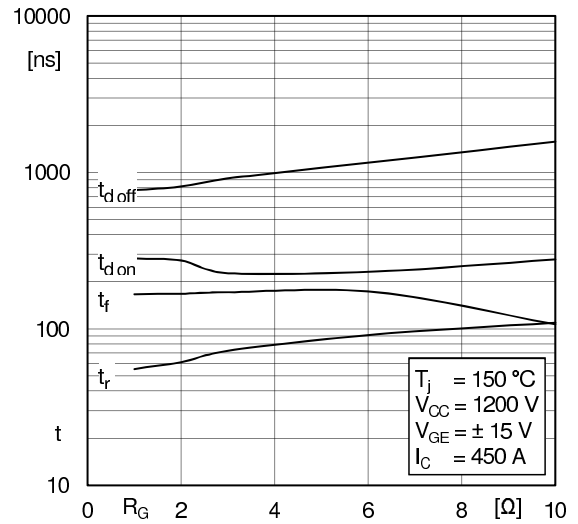
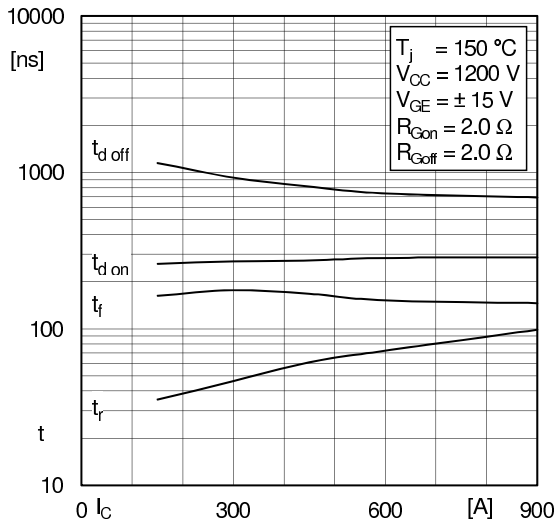
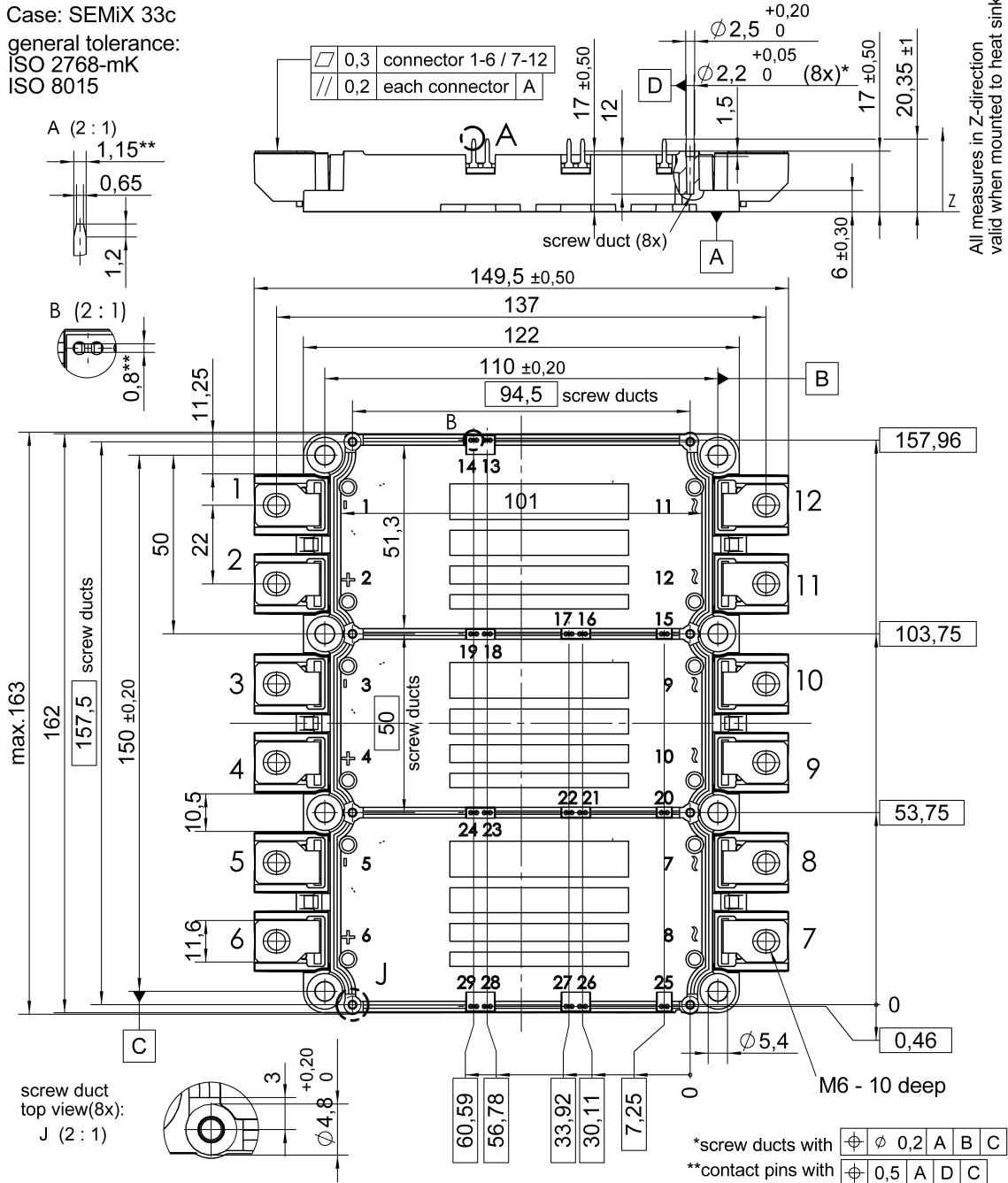


Fig. 6: Typ. gate charge characteristic

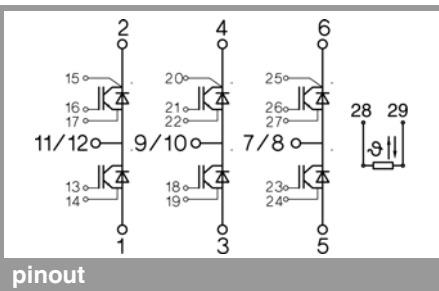


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Case: SEMiX 33c
general tolerance:
ISO 2768-mK
ISO 8015



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.