

SEMiX453GD17E4c



SEMiX® 33c

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Features

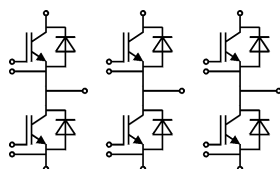
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognized, file no. E63532

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}	$T_J = 25\text{ °C}$	1700	V
I_C	$T_J = 175\text{ °C}$	$T_C = 25\text{ °C}$	762
		$T_C = 80\text{ °C}$	579
I_{Cnom}		450	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	1350	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
T_J		-40 ... 175	°C
Inverse diode			
V_{RRM}	$T_J = 25\text{ °C}$	1700	V
I_F	$T_J = 175\text{ °C}$	$T_C = 25\text{ °C}$	482
		$T_C = 80\text{ °C}$	354
I_{Fnom}		450	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	900	A
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^\circ$, $T_J = 25\text{ °C}$	2565	A
T_J		-40 ... 175	°C
Module			
$I_{t(RMS)}$		600	A
T_{stg}		-40 ... 125	°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	mΩ
		$T_J = 150\text{ °C}$	2.8	3	mΩ
$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C = 18\text{ mA}$	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}	$R_{G on} = 2\text{ Ω}$	$T_J = 150\text{ °C}$	186		mJ
$t_{d(off)}$	$R_{G off} = 2\text{ Ω}$	$T_J = 150\text{ °C}$	810		ns
t_f	$di/dt_{on} = 7560\text{ A/μs}$ $di/dt_{off} = 2400\text{ A/μs}$	$T_J = 150\text{ °C}$	170		ns
E_{off}	$du/dt = 5320\text{ V/μs}$ $L_s = 30\text{ nH}$	$T_J = 150\text{ °C}$	183		mJ



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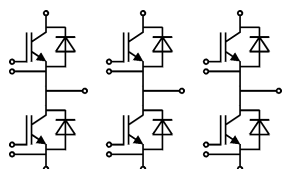
- Case temperature limited to $T_C=125\text{ °C}$ max.
- Product reliability results are valid for $T_J=150\text{ °C}$

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}	$V_{GE} = +15/-15\text{ V}$ $R_{G on} = 2\text{ }\Omega$ $T_J = 150\text{ °C}$		84		mJ
$t_{d(off)}$	$R_{G off} = 2\text{ }\Omega$ $T_J = 150\text{ °C}$		760		ns
t_f	$di/dt_{on} = 4250\text{ A}/\mu\text{s}$ $di/dt_{off} = 1950\text{ A}/\mu\text{s}$ $T_J = 150\text{ °C}$		200		ns
E_{off}	$du/dt = 4800\text{ V}/\mu\text{s}$ $L_s = 80\text{ nH}$ $T_J = 150\text{ °C}$		150		mJ
$R_{th(j-c)}$	per IGBT			0.056	K/W

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverse diode					
$V_F = V_{EC}$	$I_F = 450\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel $T_J = 25\text{ °C}$		1.98	2.37	V
	$T_J = 150\text{ °C}$		2.11	2.52	V
V_{F0}	chiplevel $T_J = 25\text{ °C}$	1.16	1.32	1.56	V
	$T_J = 150\text{ °C}$		1.08	1.22	V
r_F	chiplevel $T_J = 25\text{ °C}$	1.2	1.5	1.8	m Ω
	$T_J = 150\text{ °C}$		2.3	2.9	m Ω
I_{RRM}	$I_F = 450\text{ A}$ $di/dt_{off} = 7400\text{ A}/\mu\text{s}$ $T_J = 150\text{ °C}$		540		A
Q_{rr}	$V_{GE} = -15\text{ V}$ $T_J = 150\text{ °C}$		160		μC
E_{rr}	$V_R = 1200\text{ V}$ $T_J = 150\text{ °C}$		122		mJ
I_{RRM}	$I_F = 450\text{ A}$ $di/dt_{off} = 4300\text{ A}/\mu\text{s}$ $T_J = 150\text{ °C}$		470		A
Q_{rr}	$V_{GE} = -15\text{ V}$ $T_J = 150\text{ °C}$		155		μC
E_{rr}	$V_R = 900\text{ V}$ $T_J = 150\text{ °C}$		107		mJ
$R_{th(j-c)}$	per diode			0.125	K/W
Module					
L_{CE}			20		nH
$R_{CC'+EE'}$	res. terminal-chip $T_C = 25\text{ °C}$		0.85		m Ω
	$T_C = 125\text{ °C}$		1.2		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}	$T_C=100\text{ °C}$ ($R_{25}=5\text{ k}\Omega$)		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

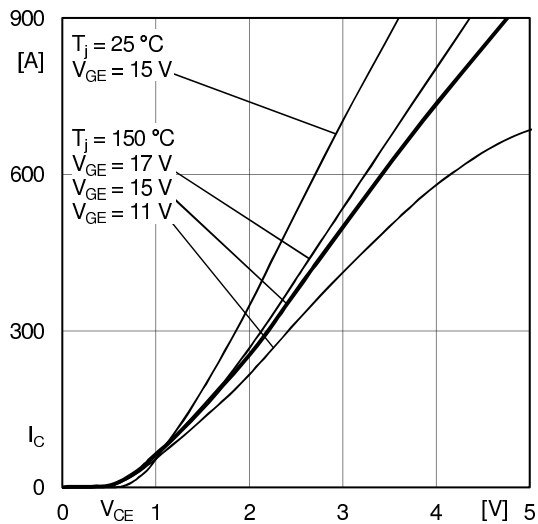


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + EE'$

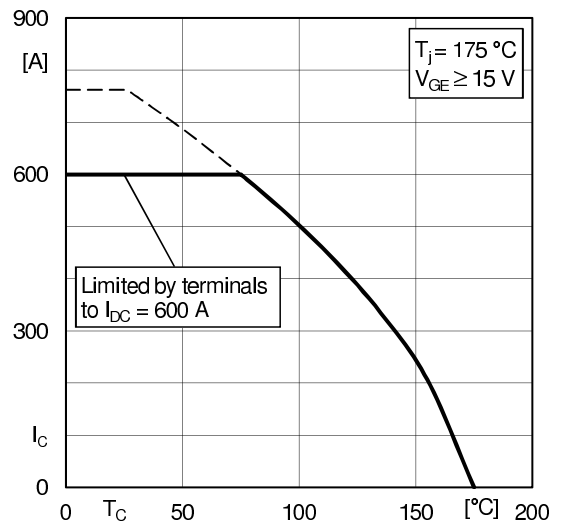


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

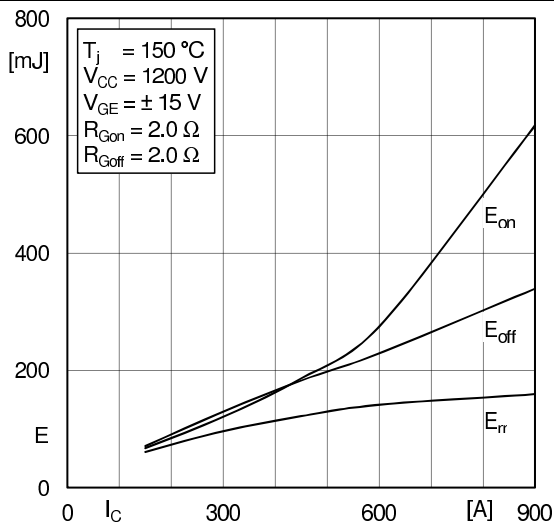


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

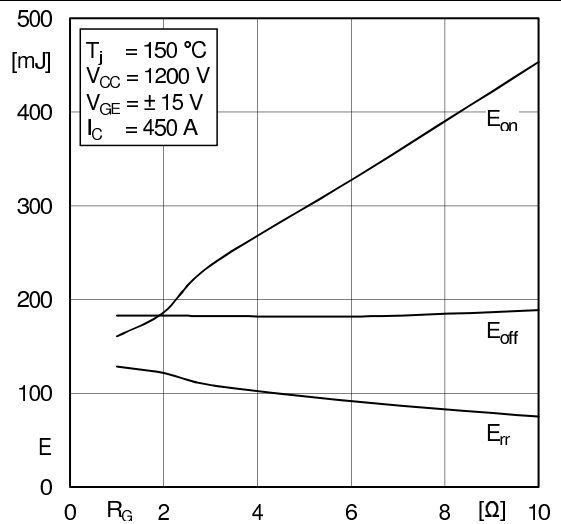


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

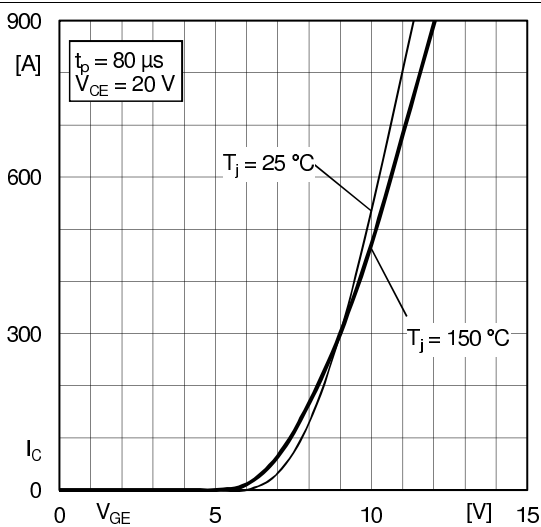


Fig. 5: Typ. transfer characteristic

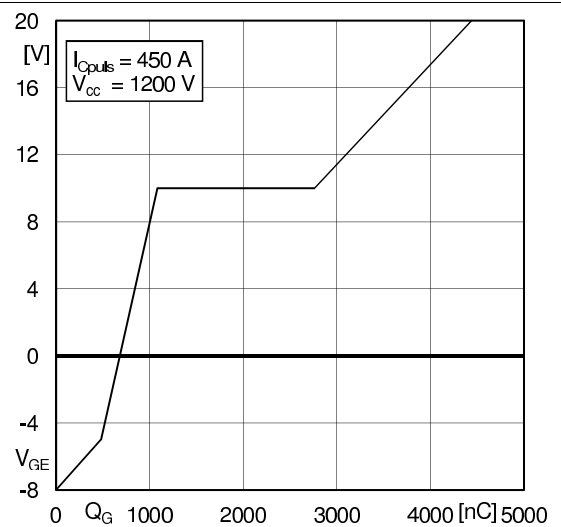
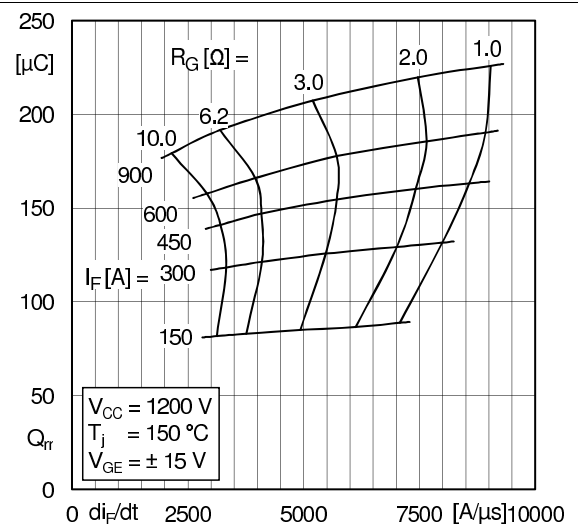
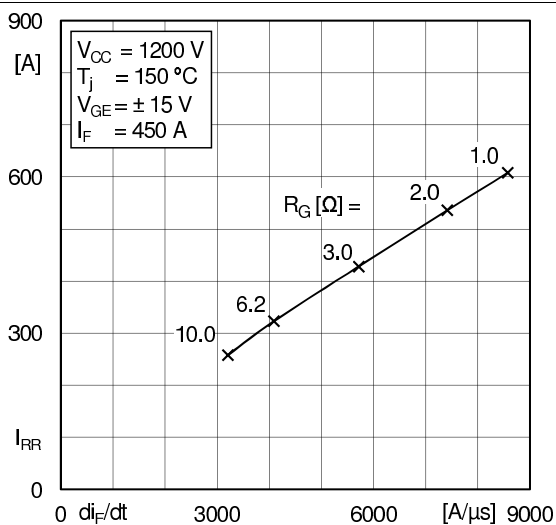
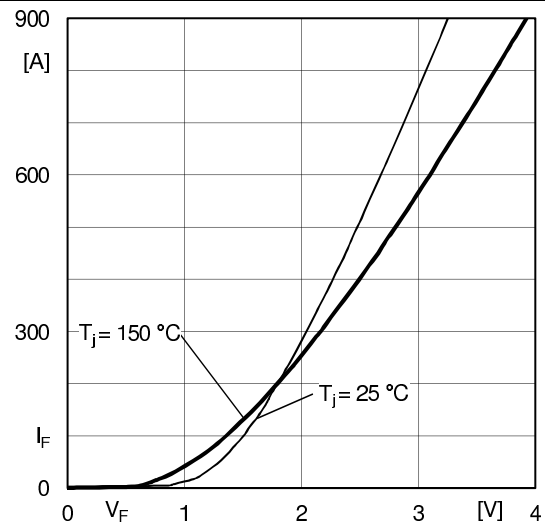
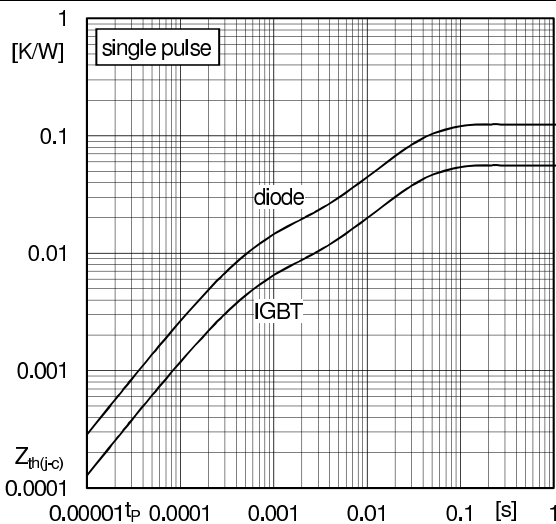
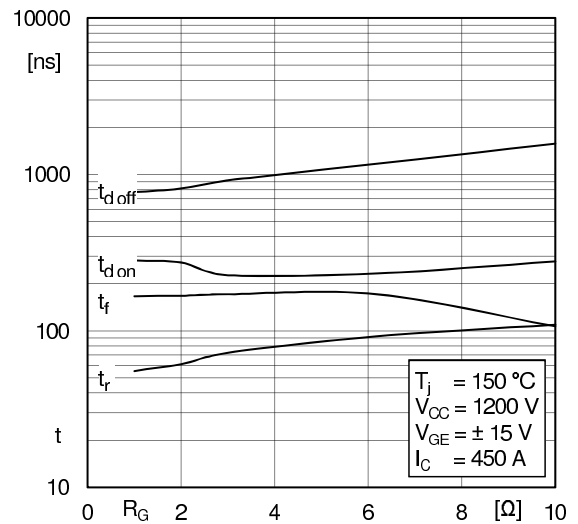
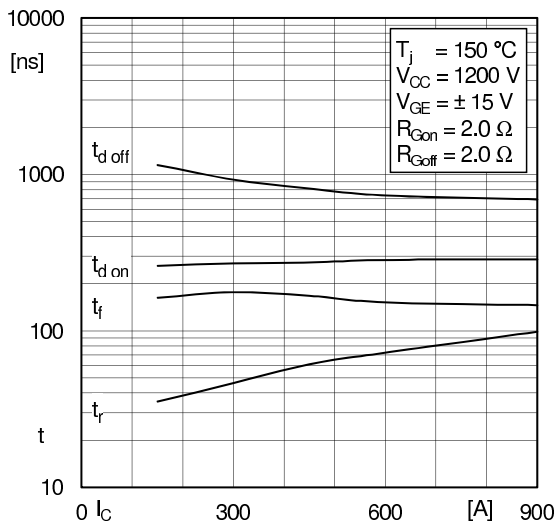
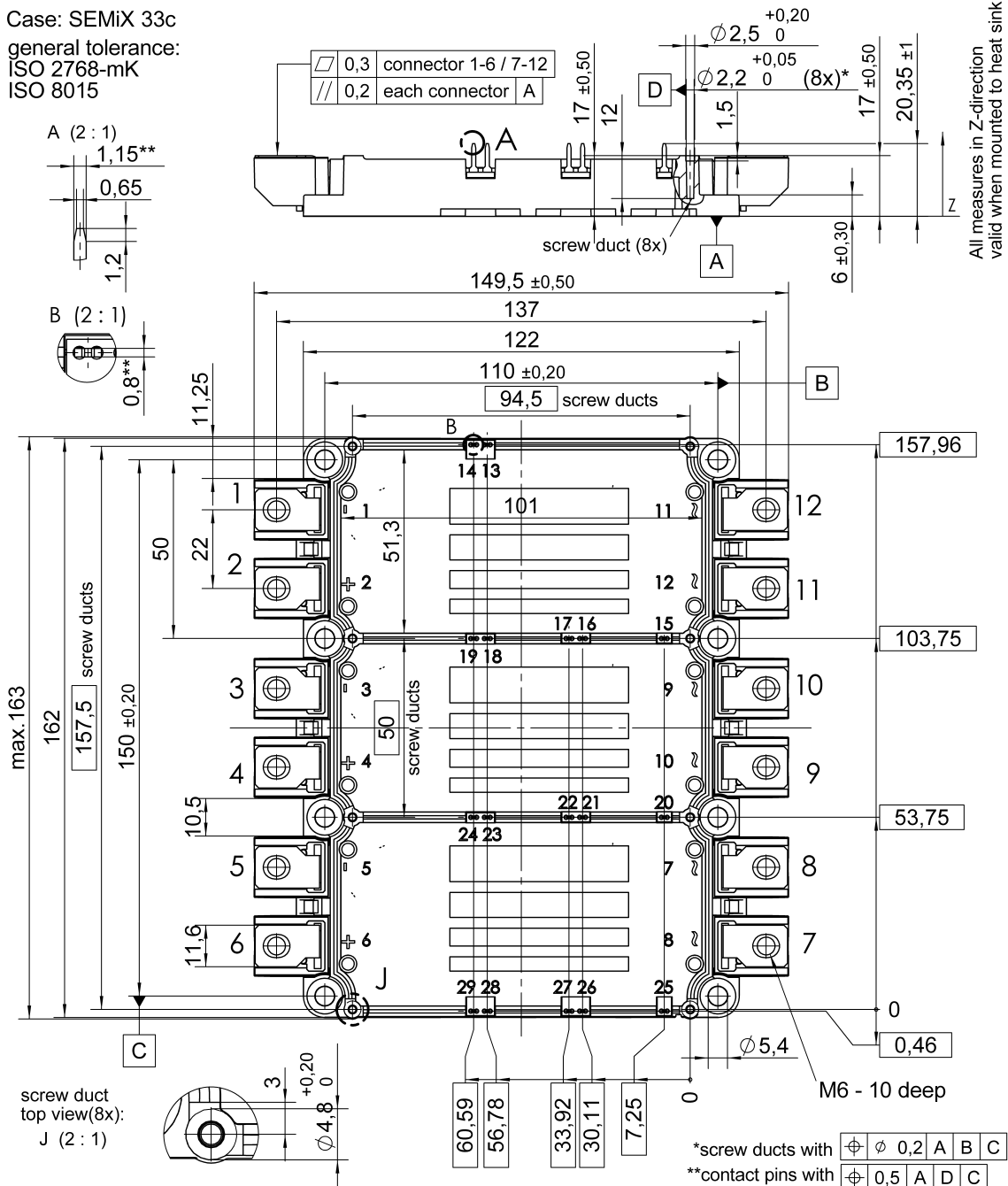


Fig. 6: Typ. gate charge characteristic

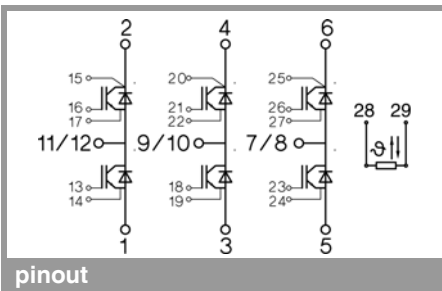


SEMiX453GD17E4c

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.