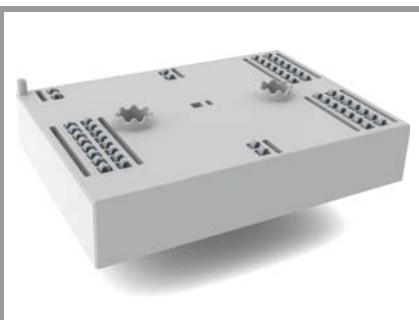


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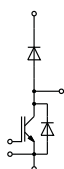
SKiiP38GAL12E4V1

Features*

- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532
- NTC T-Sensor

Remarks

- Max. case temperature limited to $T_C=125^{\circ}\text{C}$
- Product reliability results valid for $T_j \leq 150^{\circ}\text{C}$ (recommended $T_{j,op} = -40 \dots +150^{\circ}\text{C}$)
- MiniSKiiP "Technical Explanations" and "Mounting Instructions" are part of the data sheet. Please refer to both documents for further information.
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- IGBT 1 = T2



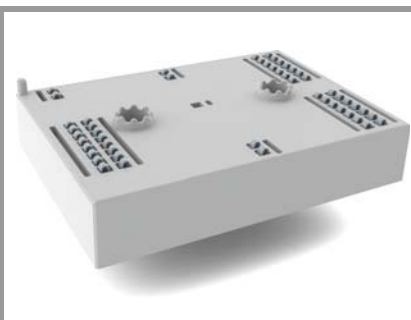
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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT 1				
V _{CES}	T _J = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK) T _J = 175 °C	T _s = 25 °C	299	A
		T _s = 70 °C	241	A
I _C	λ _{paste} =2.5 W/(mK) T _J = 175 °C	T _s = 25 °C	368	A
		T _s = 70 °C	299	A
I _{Cnom}			300	A
I _{CRM}			900	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _J = 150 °C	10	μs
T _J			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 1				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	274	A
		T _j = 175 °C	217	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	327	A
		T _j = 175 °C	260	A
I _{FRM}			600	A
I _{FSM}	10 ms	T _j = 25 °C	1485	A
	sin 180°	T _j = 150 °C	1485	A
T _j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 2				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	17	A
		T _s = 70 °C	13	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	17	A
		T _s = 70 °C	14	A
I _{FRM}			16	A
I _{FSM}	10 ms	T _j = 25 °C	36	A
	sin 180°	T _j = 150 °C	36	A
T _j			-40 ... 175	°C

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
Module			
I _{t(RMS)}	20 A per spring	280	A
T _{stg}	module without TIM	-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, t = 1 min	2500	V



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Features*

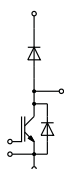
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- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532
- NTC T-Sensor

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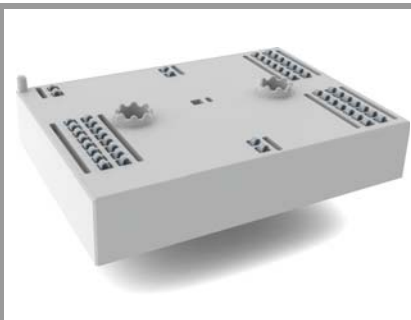
Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
V _{CE(sat)}	I _C = 300 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.25	2.45	V
V _{CE0}	chipelevel	T _j = 25 °C		0.80	0.90	V
		T _j = 150 °C		0.70	0.80	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		3.5	4.0	mΩ
	chipelevel	T _j = 150 °C		5.2	5.5	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 12 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V, V _{CE} = 1200 V, T _j = 25 °C				3.0	mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		17.60		nF
C _{oes}		f = 1 MHz		1.16		nF
C _{res}		f = 1 MHz		0.94		nF
Q _G	V _{GE} = - 8 V...+ 15 V			1700		nC
R _{Gint}	T _j = 25 °C			2.5		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		180		ns
t _r	I _C = 300 A	T _j = 150 °C		51		ns
E _{on}	V _{GE} = +15/-15 V	T _j = 150 °C		19		mJ
t _{d(off)}	R _{G on} = 2 Ω	T _j = 150 °C		455		ns
t _f	R _{G off} = 2 Ω	T _j = 150 °C		96		ns
E _{off}	di/dt _{on} = 6995 A/μs di/dt _{off} = 3030 A/μs dv/dt = 5280 V/μs L _s = 25 nH	T _j = 150 °C		34.6		mJ
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			0.2		K/W
R _{th(j-s)}	per IGBT, λ _{paste} =2.5 W/(mK)			0.14		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V _F	I _F = 300 A	T _j = 25 °C		2.20	2.52	V
	V _{GE} = 0 V chipelevel	T _j = 150 °C		2.15	2.47	V
V _{F0}	chipelevel	T _j = 25 °C		1.30	1.50	V
		T _j = 150 °C		0.90	1.10	V
r _F	chipelevel	T _j = 25 °C		3.0	3.4	mΩ
		T _j = 150 °C		4.2	4.6	mΩ
I _{RRM}	I _F = 300 A	T _j = 150 °C		353		A
Q _{rr}	di/dt _{off} = 7005 A/μs	T _j = 150 °C		49		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _j = 150 °C		21.5		mJ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			0.25		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			0.19		K/W



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MiniSKiiP® 3

Boost Chopper

SKiiP38GAL12E4V1

Features*

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- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532
- NTC T-Sensor

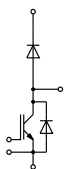
Remarks

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- Diode 1 = D1
- Diode 2 = D2
- IGBT 1 = T2

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 2						
V _F	I _F = 8 A	T _j = 25 °C		2.33	2.65	V
	V _{GE} = 0 V	T _j = 150 °C		2.35	2.68	V
	chiplevel					
V _{F0}		T _j = 25 °C		1.30	1.50	V
	chiplevel	T _j = 150 °C		0.90	1.10	V
r _F		T _j = 25 °C		129	144	mΩ
	chiplevel	T _j = 150 °C		181	198	mΩ
I _{RRM}	I _F = 8 A	T _j = 150 °C		t.b.d.		A
Q _{rr}		T _j = 150 °C		t.b.d.		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		t.b.d.		mJ
	V _{CC} = 600 V					
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			2.2		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			2		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Module					
M _s	to heat sink	2		2.5	Nm
w	weight		82		g

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R ₁₀₀	T _c =100°C (R ₂₅ =5 kΩ)		493 ± 5%		Ω
B _{25/85}	R _(T) =R ₂₅ *exp[B _{25/85} *(1/T-1/298)], T[K]		3420		K



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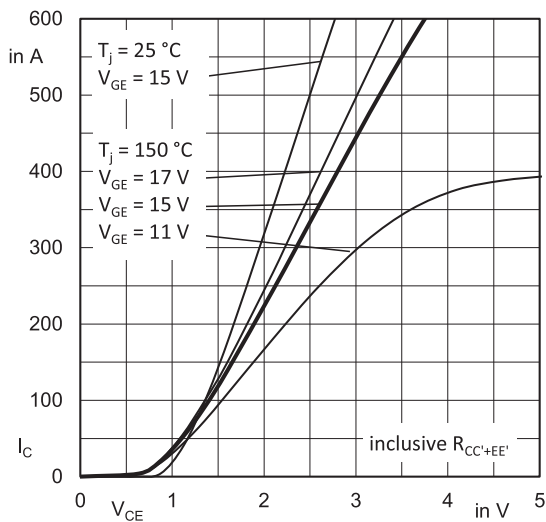


Fig. 1: Typ. output characteristic

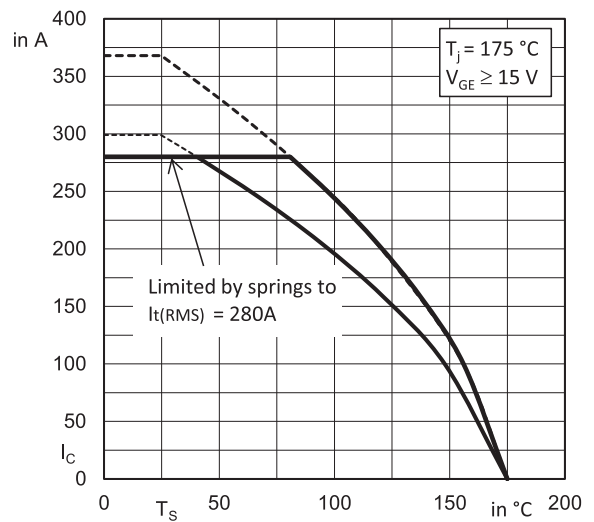


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

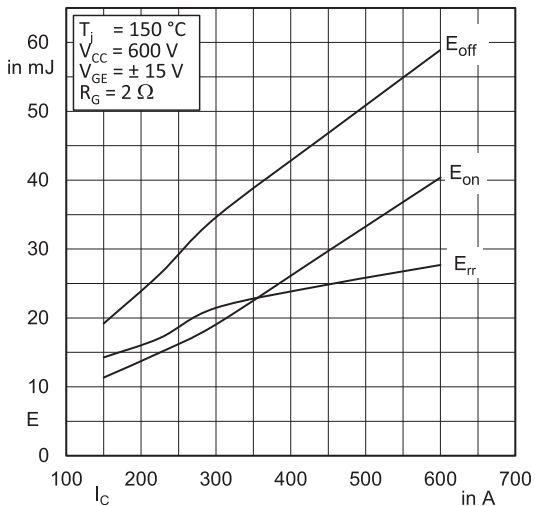


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

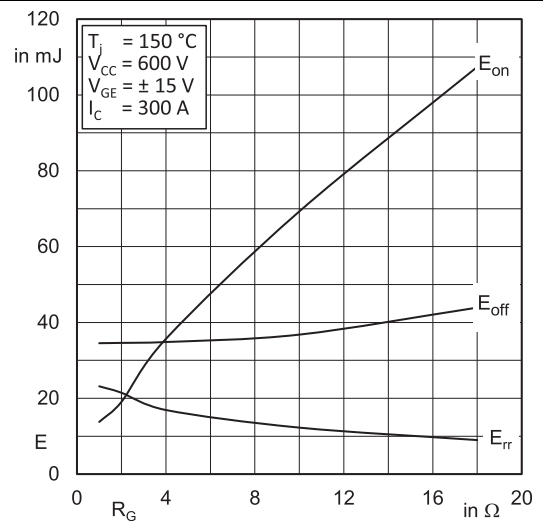


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

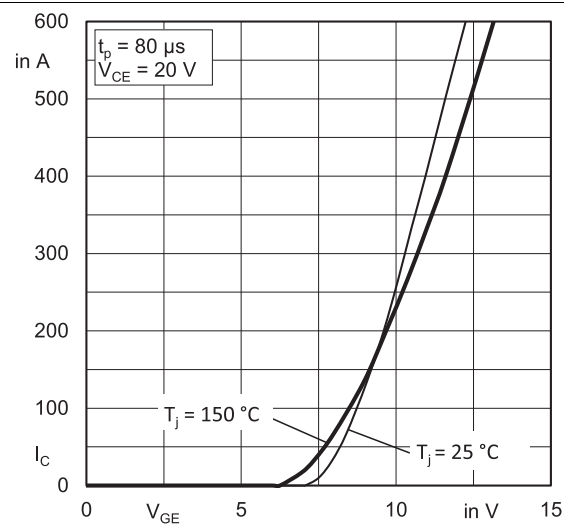


Fig. 5: Typ. transfer characteristic

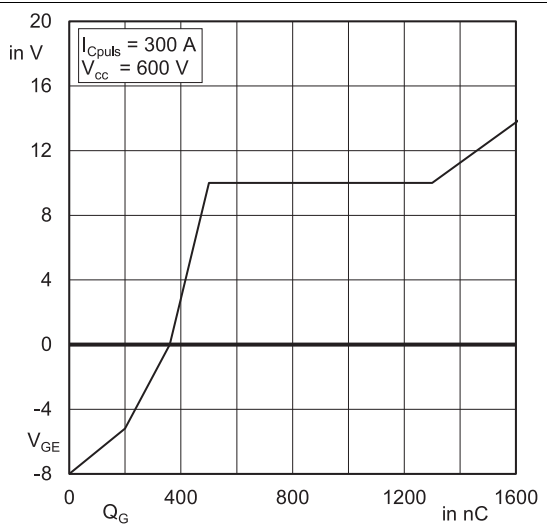


Fig. 6: Typ. gate charge characteristic

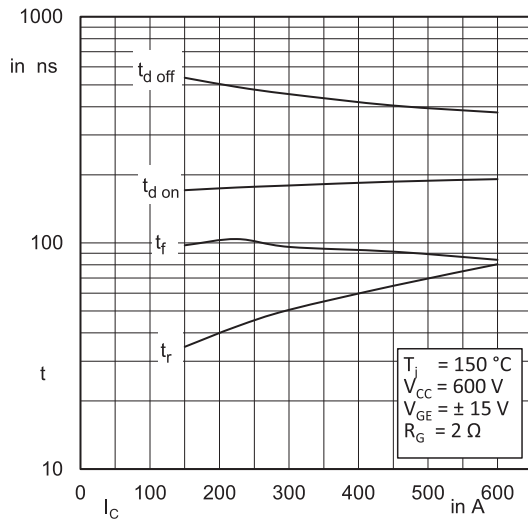


Fig. 7: Typ. switching times vs. I_C

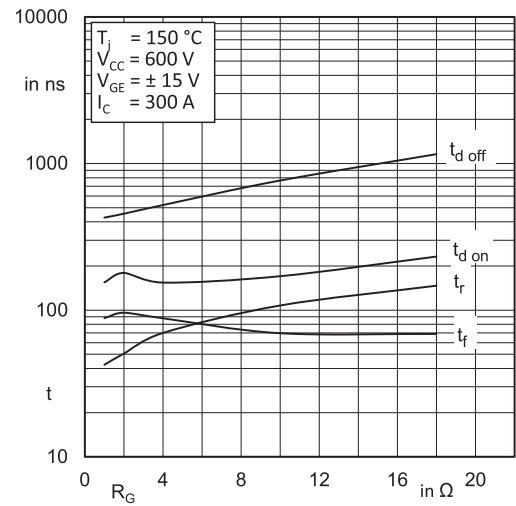


Fig. 8: Typ. switching times vs. gate resistor R_G

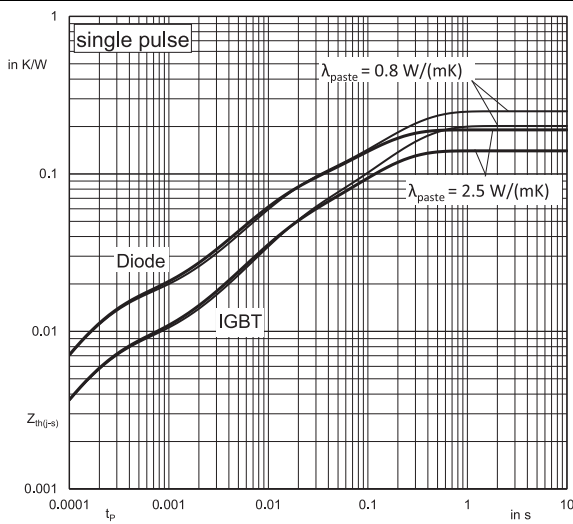


Fig. 9: Typ. transient thermal impedance

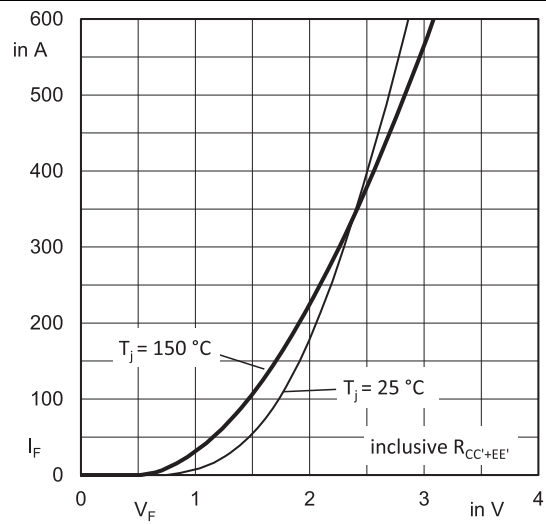


Fig. 10: Typ. CAL diode forward characteristic

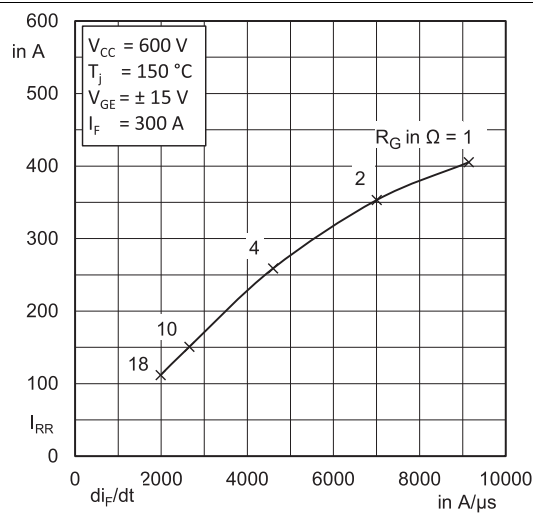


Fig. 11: Typ. CAL diode peak reverse recovery current

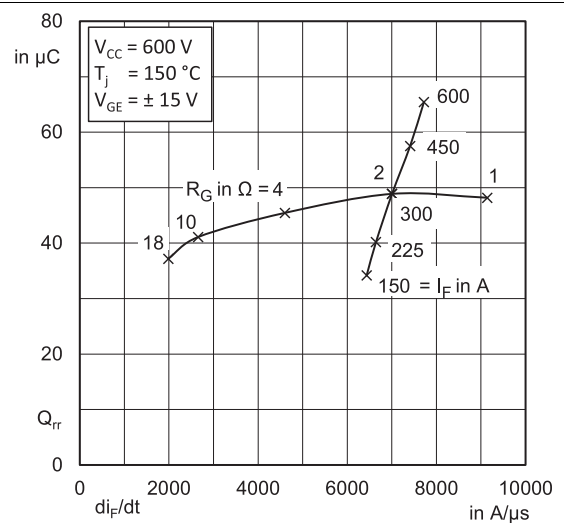
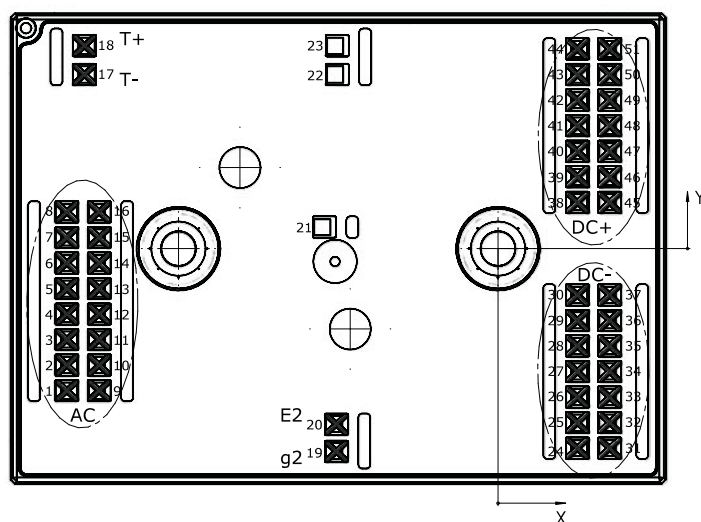


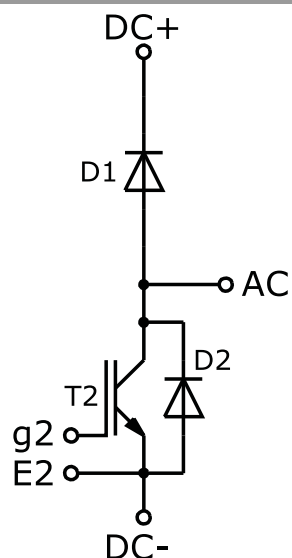
Fig. 12: Typ. CAL diode recovery charge

Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	-53,98	-17,80	AC	18	-51,78	25,40	T+	35	13,98	-12,20	DC-
2	-53,98	-14,60	AC	19	-20,23	-25,40	g2	36	13,98	-9,00	DC-
3	-53,98	-11,40	AC	20	-20,23	-22,00	E2	37	13,98	-5,80	DC-
4	-53,98	-8,20	AC	21	-21,73	2,70		38	9,93	5,80	DC+
5	-53,98	-5,00	AC	22	-20,13	21,80		39	9,93	9,00	DC+
6	-53,98	-1,80	AC	23	-20,13	25,40		40	9,93	12,20	DC+
7	-53,98	1,40	AC	24	9,93	-25,00	DC-	41	9,93	15,40	DC+
8	-53,98	4,60	AC	25	9,93	-21,80	DC-	42	9,93	18,60	DC+
9	-49,93	-17,80	AC	26	9,93	-18,60	DC-	43	9,93	21,80	DC+
10	-49,93	-14,60	AC	27	9,93	-15,40	DC-	44	9,93	25,00	DC+
11	-49,93	-11,40	AC	28	9,93	-12,20	DC-	45	13,98	5,80	DC+
12	-49,93	-8,20	AC	29	9,93	-9,00	DC-	46	13,98	9,00	DC+
13	-49,93	-5,00	AC	30	9,93	-5,80	DC-	47	13,98	12,20	DC+
14	-49,93	-1,80	AC	31	13,98	-25,00	DC-	48	13,98	15,40	DC+
15	-49,93	1,40	AC	32	13,98	-21,80	DC-	49	13,98	18,60	DC+
16	-49,93	4,60	AC	33	13,98	-18,60	DC-	50	13,98	21,80	DC+
17	-51,78	21,80	T-	34	13,98	-15,40	DC-	51	13,98	25,00	DC+

all values in [mm]



Pinout and Dimensions



Pinout

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

***IMPORTANT INFORMATION AND WARNINGS**

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