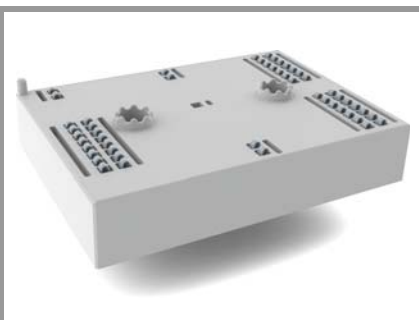


SKiiP38GAL12E4V1



MiniSKiiP® 3

Boost Chopper

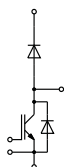
SKiiP38GAL12E4V1

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.
- For storage and case temperature with TIM see document: "Technical Explanations Thermal Interface Materials"
- Diode 1 = D1
- Diode 2 = D2
- IGBT 1 = T2



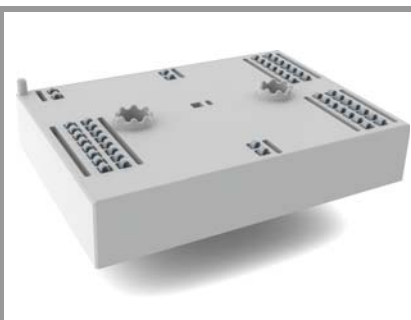
GAL

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 _j = 175 °C	T _s = 25 °C	17	A
		T _s = 70 °C	13	A
I _F	λ _{paste} =2.5 W/(mK) T _j = 175 °C	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



MiniSKiiP® 3

Boost Chopper

SKiiP38GAL12E4V1

Features*

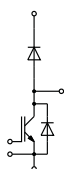
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532
- NTC T-Sensor

Remarks

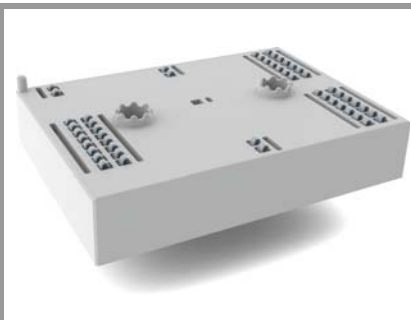
- Max. case temperature limited to $T_C=125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{j,op} = -40 \dots +150^\circ\text{C}$)
- MiniSKiiP "Technical Explanations" and "Mounting Instructions" are part of the data sheet. Please refer to both documents for further information.
- For storage and case temperature with TIM see document: "Technical Explanations Thermal Interface Materials"
- Diode 1 = D1
- Diode 2 = D2
- IGBT 1 = T2

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 chiplevel	T _j = 150 °C		2.25	2.45	V
V _{CE0}	chiplevel	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
	chiplevel	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 chiplevel	T _j = 150 °C		2.15	2.47	V
V _{F0}	chiplevel	T _j = 25 °C		1.30	1.50	V
		T _j = 150 °C		0.90	1.10	V
r _F	chiplevel	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



GAL



MiniSKiiP® 3

Boost Chopper

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

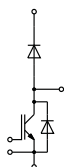
Remarks

- 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.
- For storage and case temperature with TIM see document: "Technical Explanations Thermal Interface Materials"
- 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



GAL

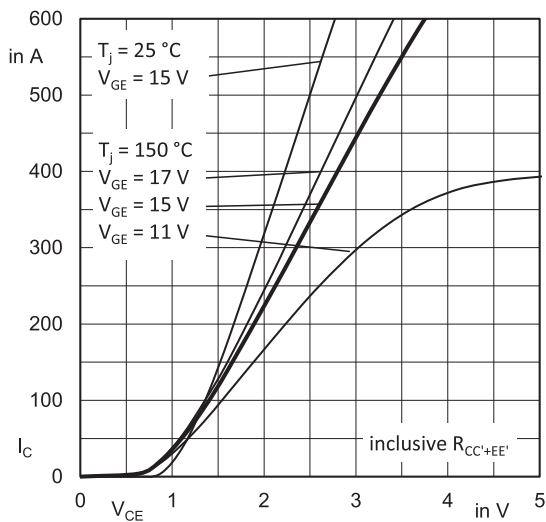


Fig. 1: Typ. output characteristic

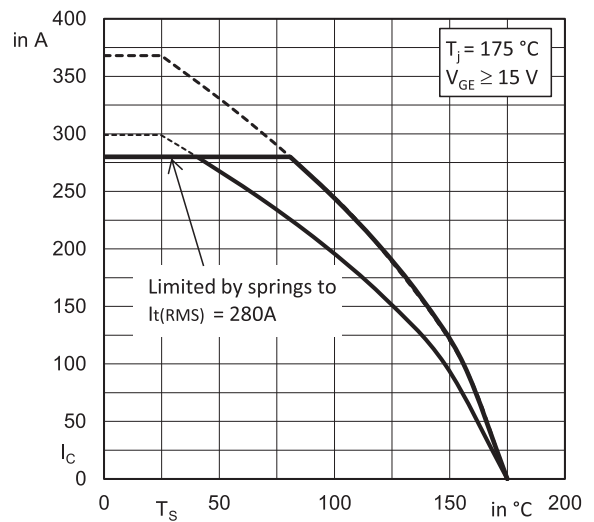


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

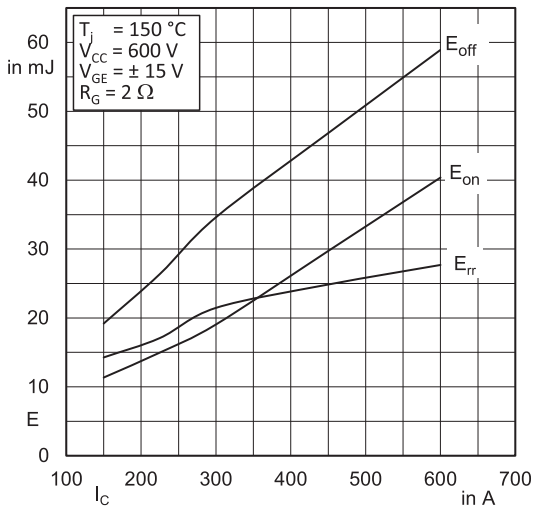


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

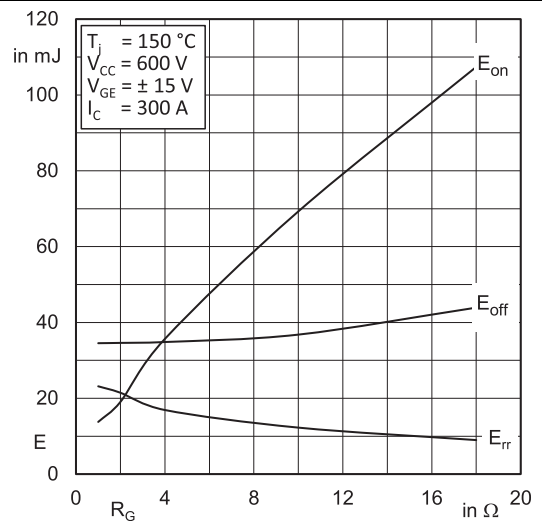


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

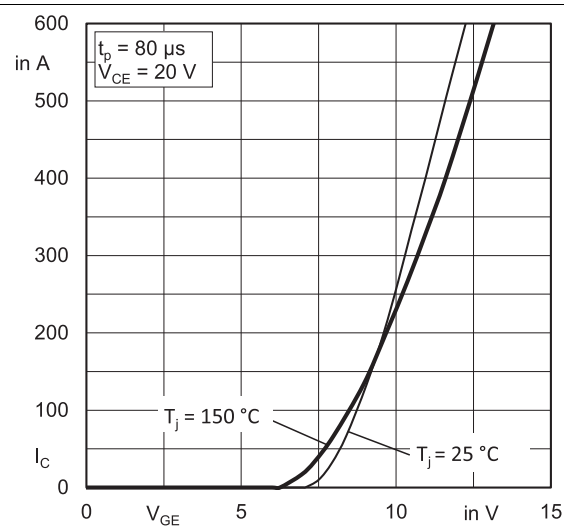


Fig. 5: Typ. transfer characteristic

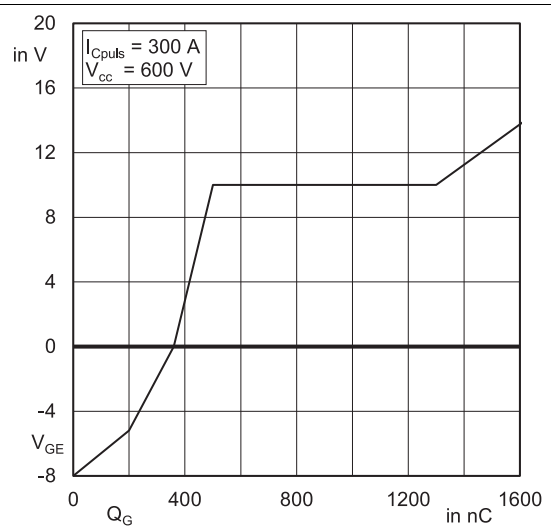


Fig. 6: Typ. gate charge characteristic

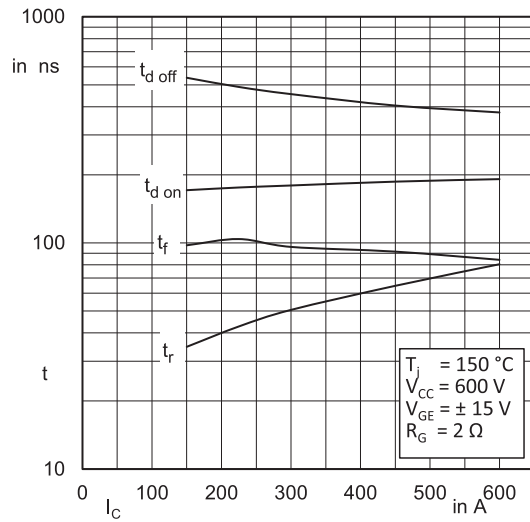


Fig. 7: Typ. switching times vs. I_C

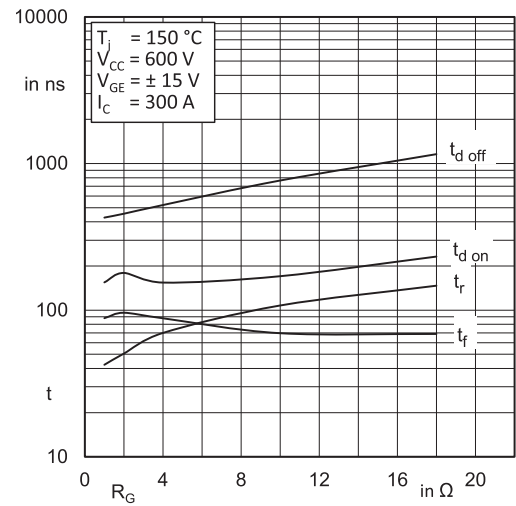


Fig. 8: Typ. switching times vs. gate resistor R_G

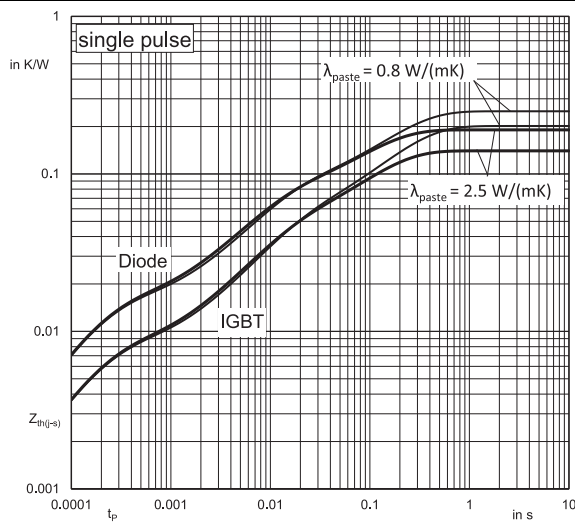


Fig. 9: Typ. transient thermal impedance

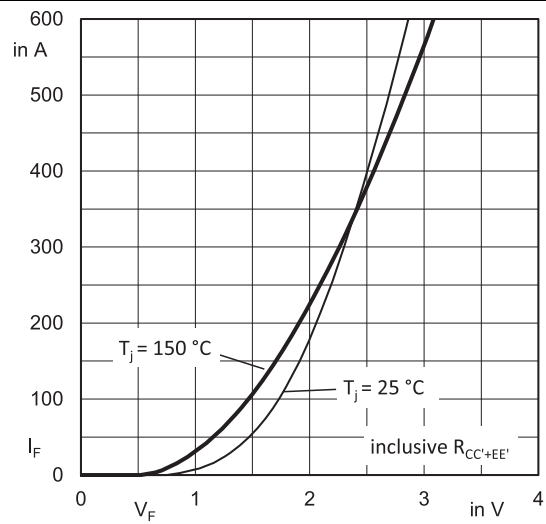


Fig. 10: Typ. CAL diode forward characteristic

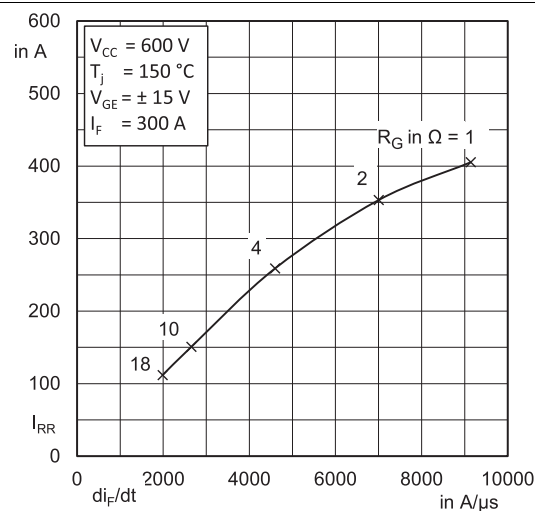


Fig. 11: Typ. CAL diode peak reverse recovery current

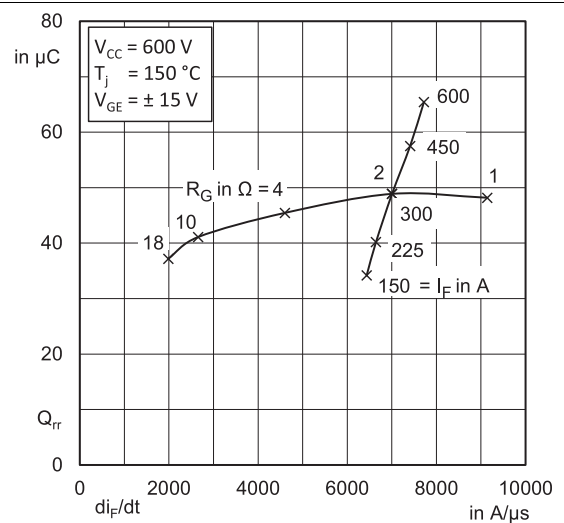
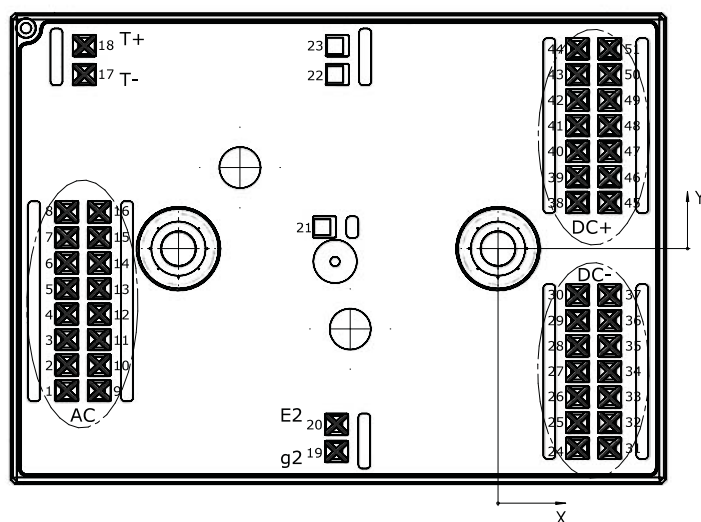


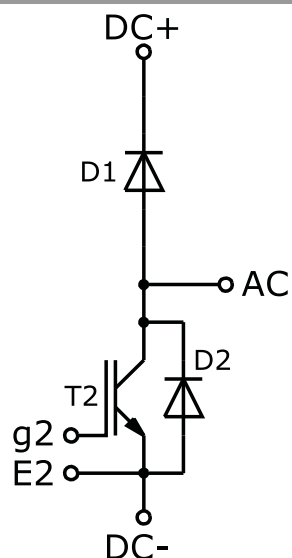
Fig. 12: Typ. CAL diode recovery charge

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**

The specifications of SEMIKRON products may not be considered as guarantee or assurance of product characteristics ("Beschaffenheitsgarantie"). The specifications of SEMIKRON products describe only the usual characteristics of products to be expected in typical applications, which may still vary depending on the specific application. Therefore, products must be tested for the respective application in advance. Application adjustments may be necessary. The user of SEMIKRON products is responsible for the safety of their applications embedding SEMIKRON products and must take adequate safety measures to prevent the applications from causing a physical injury, fire or other problem if any of SEMIKRON products become faulty. The user is responsible to make sure that the application design is compliant with all applicable laws, regulations, norms and standards. Except as otherwise explicitly approved by SEMIKRON in a written document signed by authorized representatives of SEMIKRON, SEMIKRON products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. No representation or warranty is given and no liability is assumed with respect to the accuracy, completeness and/or use of any information herein, including without limitation, warranties of non-infringement of intellectual property rights of any third party. SEMIKRON does not assume any liability arising out of the applications or use of any product; neither does it convey any license under its patent rights, copyrights, trade secrets or other intellectual property rights, nor the rights of others. SEMIKRON makes no representation or warranty of non-infringement or alleged non-infringement of intellectual property rights of any third party which may arise from applications. Due to technical requirements our products may contain dangerous substances. For information on the types in question please contact the nearest SEMIKRON sales office. This document supersedes and replaces all information previously supplied and may be superseded by updates. SEMIKRON reserves the right to make changes.