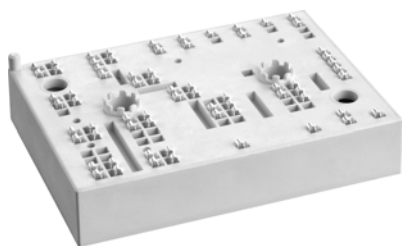


SKiiP 39AC12T4V1



MiniSKiiP® 3

Sixpack

SKiiP 39AC12T4V1

Features*

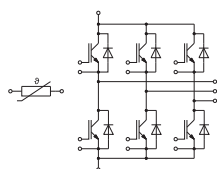
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Typical Applications

- Inverter up to 50 kVA
- Typical motor power 30 kW

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 $T_{J,op} = -40 \dots +150^\circ\text{C}$)
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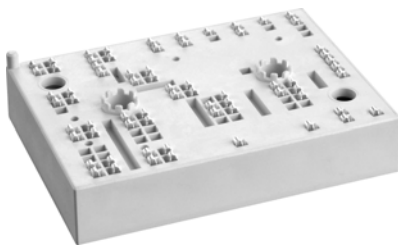
AC

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	165	A
	T _j = 175 °C	T _s = 70 °C	134	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	214	A
	T _j = 175 °C	T _s = 70 °C	174	A
I _{Cnom}			150	A
I _{CRM}			450	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
Inverse - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	136	A
	T _j = 175 °C	T _s = 70 °C	107	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	163	A
	T _j = 175 °C	T _s = 70 °C	130	A
I _{FRM}			450	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		900	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring		160	A
T _{stg}	module without TIM		-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, t = 1 min		2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 150 \text{ A}$ $V_{GE} = 15 \text{ V}$ chipelevel	$T_J = 25^\circ\text{C}$	1.85	2.10	V
		$T_J = 150^\circ\text{C}$	2.25	2.45	V
V_{CE0}	chipelevel	$T_J = 25^\circ\text{C}$	0.80	0.90	V
		$T_J = 150^\circ\text{C}$	0.70	0.80	V
r_{CE}	$V_{GE} = 15 \text{ V}$ chipelevel	$T_J = 25^\circ\text{C}$	7.0	8.0	m Ω
		$T_J = 150^\circ\text{C}$	10	11	m Ω
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 6 \text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0 \text{ V}, V_{CE} = 1200 \text{ V}, T_J = 25^\circ\text{C}$			1.5	mA
C_{ies}	$V_{CE} = 25 \text{ V}$	$f = 1 \text{ MHz}$	8.80		nF
C_{oes}	$V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	0.58		nF
C_{res}		$f = 1 \text{ MHz}$	0.47		nF
Q_G	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		850		nC
R_{Gint}	$T_J = 25^\circ\text{C}$		5.0		Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	$T_J = 150^\circ\text{C}$	165		ns
t_r	$I_C = 150 \text{ A}$ $R_{Gon} = 1 \Omega$	$T_J = 150^\circ\text{C}$	50		ns
		$T_J = 150^\circ\text{C}$	22.5		mJ
E_{on}	$R_{Goff} = 1 \Omega$	$T_J = 150^\circ\text{C}$			mJ
$t_{d(off)}$	$di/dt_{on} = 2840 \text{ A}/\mu\text{s}$	$T_J = 150^\circ\text{C}$	390		ns
t_f	$di/dt_{off} = 1880 \text{ A}/\mu\text{s}$	$T_J = 150^\circ\text{C}$	80		ns
E_{off}	$V_{GE} = +15/-15 \text{ V}$	$T_J = 150^\circ\text{C}$	14		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=0.8 \text{ W/(mK)}$		0.33		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5 \text{ W/(mK)}$		0.21		K/W



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SKiiP 39AC12T4V1

Features*

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- UL recognized: File no. E63532

Typical Applications

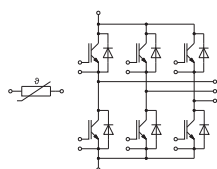
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Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 150\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	2.14	2.46	V
		$T_j = 150^\circ\text{C}$	2.07	2.38	V
V_{F0}	chiplevel	$T_j = 25^\circ\text{C}$	1.30	1.50	V
		$T_j = 150^\circ\text{C}$	0.90	1.10	V
r_F	chiplevel	$T_j = 25^\circ\text{C}$	5.6	6.4	mΩ
		$T_j = 150^\circ\text{C}$	7.8	8.5	mΩ
I_{RRM}	$I_F = 150\text{ A}$	$T_j = 150^\circ\text{C}$	188		A
Q_{rr}	$di/dt_{off} = 4020\text{ A}/\mu\text{s}$ $V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	27		μC
E_{rr}	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	11.4		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W}/(\text{mK})$		0.52		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5\text{ W}/(\text{mK})$		0.39		K/W
Module					
L_{CE}			-		nH
M_s	to heat sink	2		2.5	Nm
w			82		g
Temperature Sensor					
R_{100}	$T_r=100^\circ\text{C}$ ($R_{25}=1000\Omega$)		$1670 \pm 3\%$		Ω
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^\circ\text{C})+B(T-25^\circ\text{C})^2]$, $A = 7.635 \cdot 10^{-3}^\circ\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5}^\circ\text{C}^{-2}$				



AC

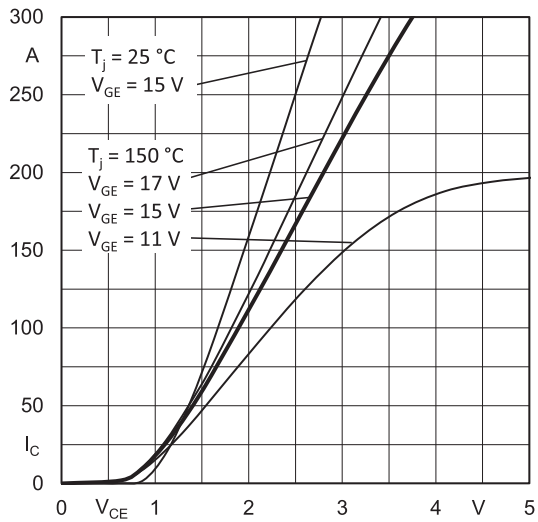


Fig. 1: Typ. output characteristic

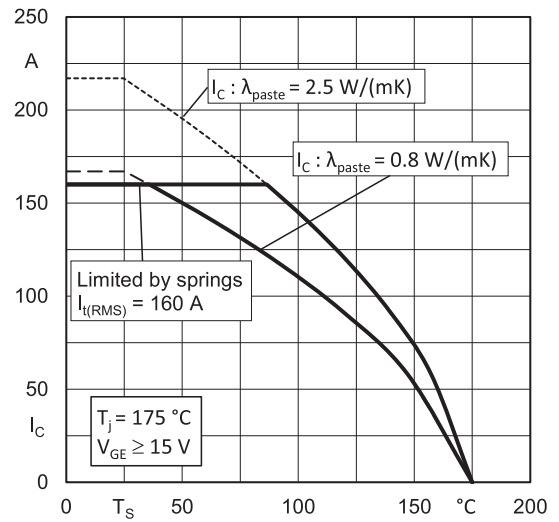


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

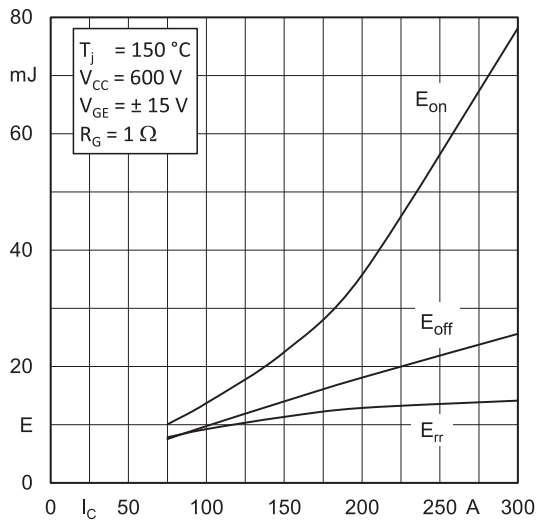


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

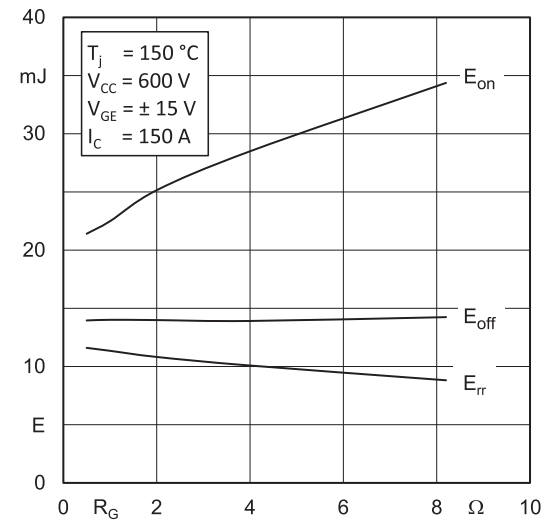


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

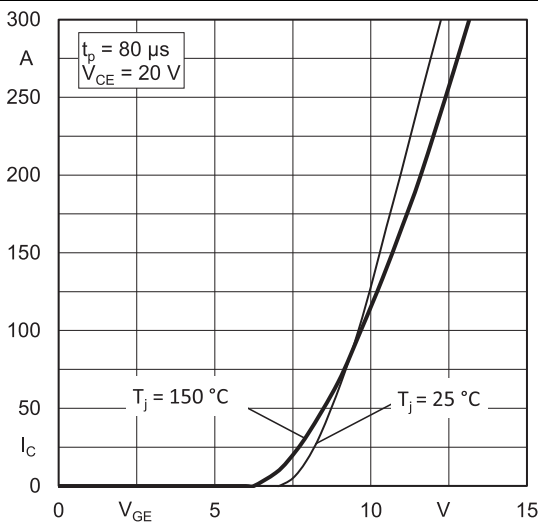


Fig. 5: Typ. transfer characteristic

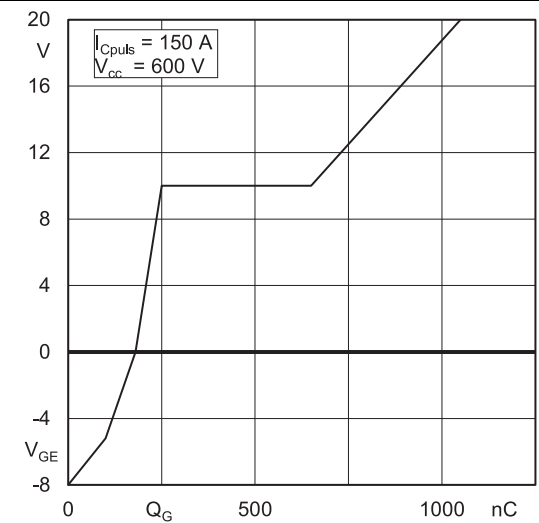


Fig. 6: Typ. gate charge characteristic

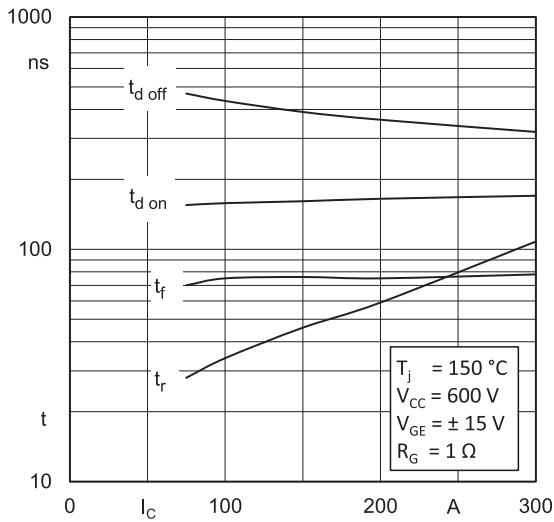


Fig. 7: Typ. switching times vs. I_C

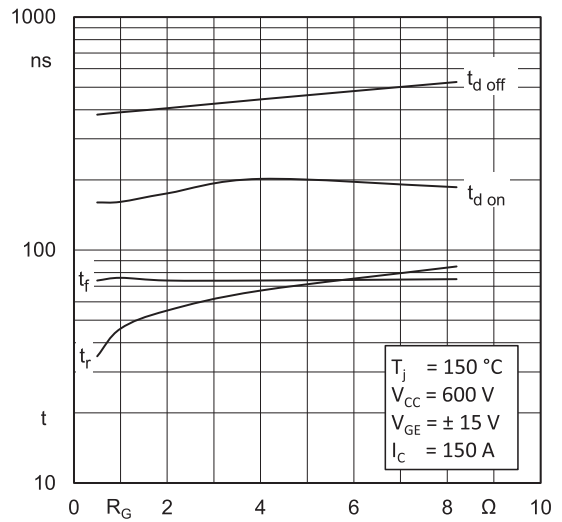


Fig. 8: Typ. switching times vs. gate resistor R_G

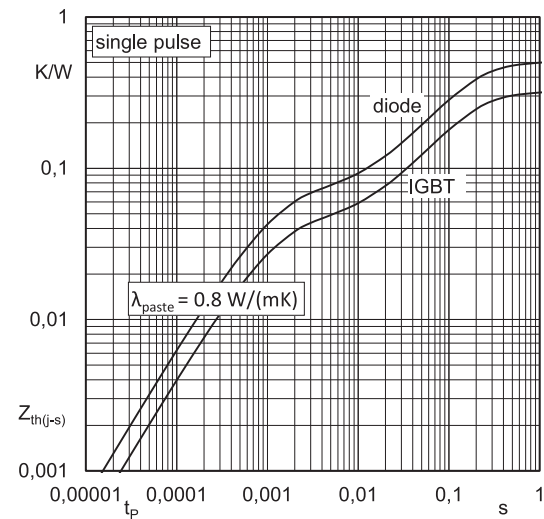


Fig. 9: Typ. transient thermal impedance

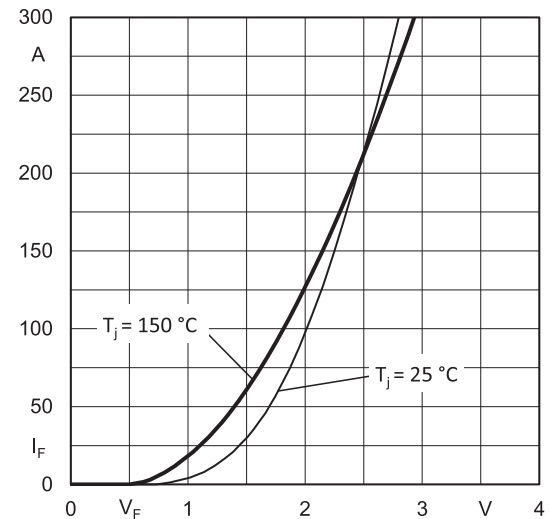


Fig. 10: Typ. CAL diode forward characteristic

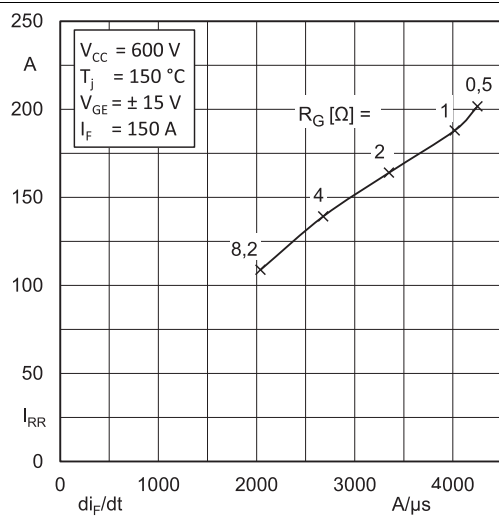


Fig. 11: Typ. CAL diode peak reverse recovery current

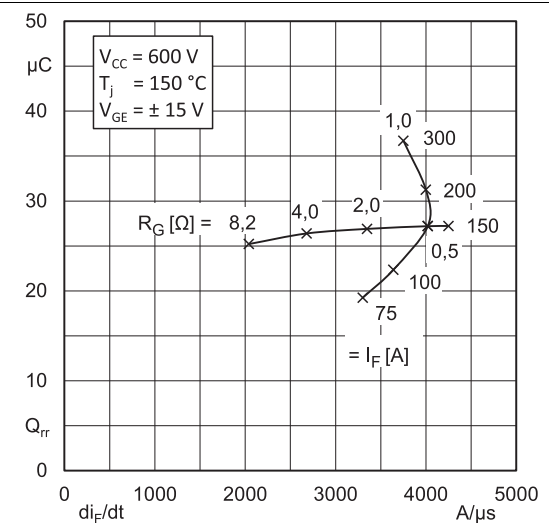
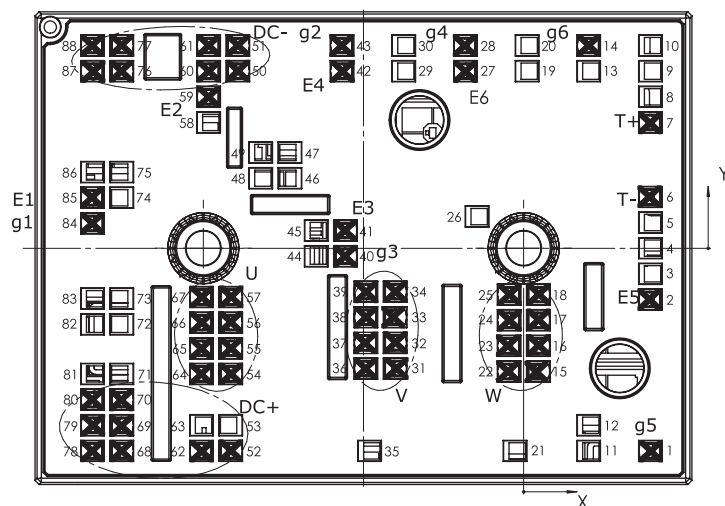


Fig. 12: Typ. CAL diode recovery charge

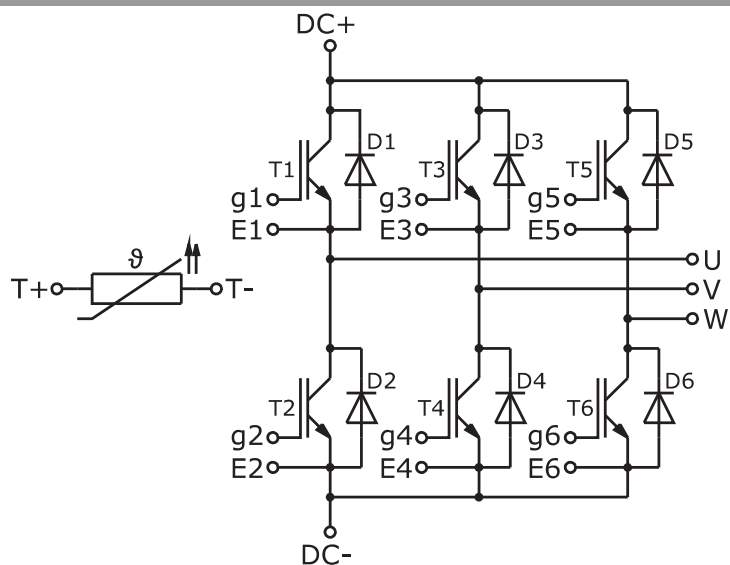
SKiiP 39AC12T4V1

Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	15,83	-25,30	g5	31	-16,05	-15,02	V	61	-39,33	25,30	DC-
2	15,83	-6,40	E5	32	-16,05	-11,82	V	62	-40,23	-25,30	DC+
3	15,83	-3,20		33	-16,05	-8,62	V	63	-40,23	-22,10	
4	15,83	0		34	-16,05	-5,42	V	64	-40,23	-15,70	U
5	15,83	3,20		35	-19,23	-25,30		65	-40,23	-12,50	U
6	15,83	6,40	T-	36	-19,70	-15,02	V	66	-40,23	-9,30	U
7	15,83	15,70	T+	37	-19,70	-11,82	V	67	-40,23	-6,10	U
8	15,83	18,90		38	-19,70	-8,62	V	68	-50,18	-25,30	DC+
9	15,83	22,10		39	-19,70	-5,42	V	69	-50,18	-22,10	DC+
10	15,83	25,30		40	-22,26	-1,00	g3	70	-50,18	-18,90	DC+
11	8,13	-25,30		41	-22,26	2,20	E3	71	-50,18	-15,70	
12	8,13	-22,10		42	-22,68	22,10	E4	72	-50,18	-9,50	
13	8,13	22,10		43	-22,68	25,30	g2	73	-50,18	-6,30	
14	8,13	25,30	g6	44	-25,91	-1,00		74	-50,18	6,30	
15	1,83	-15,39	W	45	-25,91	2,20		75	-50,18	9,50	
16	1,83	-12,19	W	46	-29,18	8,74		76	-50,18	22,10	DC-
17	1,83	-8,99	W	47	-29,18	11,94		77	-50,18	25,30	DC-
18	1,83	-5,79	W	48	-32,83	8,74		78	-53,83	-25,30	DC+
19	0,43	22,10		49	-32,83	11,94		79	-53,83	-22,10	DC+
20	0,43	25,30		50	-35,68	22,10	DC-	80	-53,83	-18,90	DC+
21	-1,08	-25,30		51	-35,68	25,30	DC-	81	-53,83	-15,70	
22	-1,83	-15,39	W	52	-36,58	-25,30	DC+	82	-53,83	-9,50	
23	-1,83	-12,19	W	53	-36,58	-22,10		83	-53,83	-6,30	
24	-1,83	-8,99	W	54	-36,58	-15,70	U	84	-53,83	3,10	g1
25	-1,83	-5,79	W	55	-36,58	-12,50	U	85	-53,83	6,30	E1
26	-5,83	3,95		56	-36,58	-9,30	U	86	-53,83	9,50	
27	-7,28	22,10	E6	57	-36,58	-6,10	U	87	-53,83	22,10	DC-
28	-7,28	25,30	g4	58	-39,33	15,70		88	-53,83	25,30	DC-
29	-14,98	22,10		59	-39,33	18,90	E2				
30	-14,98	25,30		60	-39,33	22,10	DC-				

all values in mm



Pinout and Dimensions



Pinout

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

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