

MiniSKiiP® 2

Sixpack

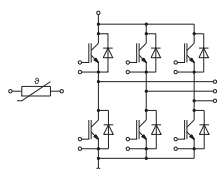
SKiiP 25AC12T7V1

Features*

- 1200V Generation 7 IGBTs (T7)
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Remarks

- Max. case temperature limited to $T_C = T_S = 125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$; $T_{j,op} > 150^\circ\text{C}$ during overload (Details see AN19-002)
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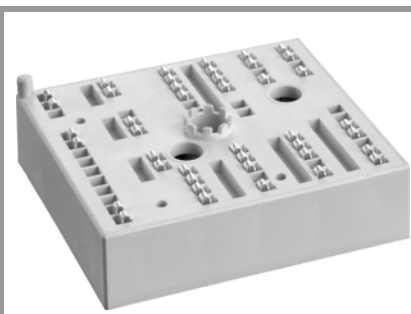
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 70 °C	56	A
	T _j = 175 °C	T _s = 100 °C	46	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	64	A
	T _j = 175 °C	T _s = 100 °C	52	A
I _{Cnom}			50	A
I _{CRM}			100	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 175 °C	7	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 = 70 °C	45	A
	T _j = 175 °C	T _s = 100 °C	36	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	51	A
	T _j = 175 °C	T _s = 100 °C	41	A
I _{FRM}			100	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		270	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring		100	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					
$V_{CE(sat)}$	$I_C = 50\text{ A}$	$T_j = 25^\circ\text{C}$	1.55	1.70	V
	$V_{GE} = 15\text{ V}$	$T_j = 150^\circ\text{C}$	1.73	1.88	V
	chiplevel	$T_j = 175^\circ\text{C}$	1.77	1.92	V
V_{CE0}		$T_j = 25^\circ\text{C}$	1.00	1.05	V
	chiplevel	$T_j = 150^\circ\text{C}$	0.80	0.85	V
		$T_j = 175^\circ\text{C}$	0.75	0.80	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	11	13	$\text{m}\Omega$
	chiplevel	$T_j = 150^\circ\text{C}$	19	21	$\text{m}\Omega$
		$T_j = 175^\circ\text{C}$	20	22	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1.27\text{ mA}$	5.15	5.8	6.45	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}, T_j = 25^\circ\text{C}$			1	mA
C_{ies}	$V_{CE} = 25\text{ V}$	$f = 1\text{ MHz}$	10.00		nF
C_{oes}	$V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	0.13		nF
C_{res}		$f = 1\text{ MHz}$	0.04		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		700		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		0		Ω

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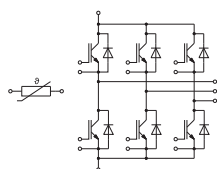
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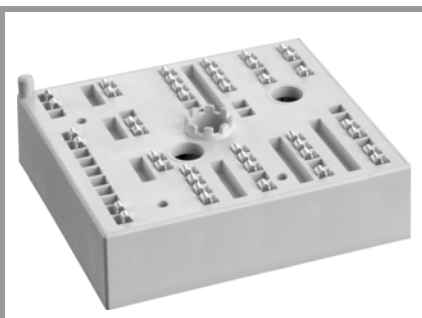


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Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 50\text{ A}$ $R_{G\ on} = 6.4\ \Omega$ $R_{G\ off} = 6.4\ \Omega$ $V_{GE} = +15/-15\text{ V}$	$T_j = 25^\circ\text{C}$	32		ns
		$T_j = 150^\circ\text{C}$	36		ns
		$T_j = 175^\circ\text{C}$	36		ns
t_r		$T_j = 25^\circ\text{C}$	37		ns
		$T_j = 150^\circ\text{C}$	42		ns
		$T_j = 175^\circ\text{C}$	45		ns
E_{on}	$R_{G\ on} = 6.4\ \Omega$ $R_{G\ off} = 6.4\ \Omega$ $V_{GE} = +15/-15\text{ V}$	$T_j = 25^\circ\text{C}$	4.4		mJ
		$T_j = 150^\circ\text{C}$	6.2		mJ
		$T_j = 175^\circ\text{C}$	6.6		mJ
$t_{d(off)}$		$T_j = 25^\circ\text{C}$	250		ns
		$T_j = 150^\circ\text{C}$	340		ns
		$T_j = 175^\circ\text{C}$	365		ns
t_f	$@ T_j = 150^\circ\text{C}$: $di/dt_{on} = 1270\text{ A}/\mu\text{s}$ $di/dt_{off} = 530\text{ A}/\mu\text{s}$ $dv/dt = 3620\text{ V}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	51		ns
		$T_j = 150^\circ\text{C}$	79		ns
		$T_j = 175^\circ\text{C}$	94		ns
E_{off}		$T_j = 25^\circ\text{C}$	3		mJ
		$T_j = 150^\circ\text{C}$	5.5		mJ
		$T_j = 175^\circ\text{C}$	6		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		0.91		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 2.5\text{ W}/(\text{mK})$		0.74		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 50\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	2.22	2.54	V
		$T_j = 150^\circ\text{C}$	2.18	2.50	V
		$T_j = 175^\circ\text{C}$	2.03	2.34	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
		$T_j = 175^\circ\text{C}$	0.82	0.98	V
r_F	chiplevel	$T_j = 25^\circ\text{C}$	18	21	m Ω
		$T_j = 150^\circ\text{C}$	26	28	m Ω
		$T_j = 175^\circ\text{C}$	24	27	m Ω
I_{RRM}	$I_F = 50\text{ A}$ $V_{GE} = +15/-15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	32		A
		$T_j = 150^\circ\text{C}$	42		A
		$T_j = 175^\circ\text{C}$	50		A
Q_{rr}		$T_j = 25^\circ\text{C}$	2.8		μC
		$T_j = 150^\circ\text{C}$	7.6		μC
		$T_j = 175^\circ\text{C}$	8.2		μC
E_{rr}	$@ T_j = 150^\circ\text{C}$: $di/dt_{off} = 1270\text{ A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	0.86		mJ
		$T_j = 150^\circ\text{C}$	2.9		mJ
		$T_j = 175^\circ\text{C}$	3.8		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		1.06		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 2.5\text{ W}/(\text{mK})$		0.88		K/W
Module					
L_{CE}			-		nH
M_s	to heat sink	2		2.5	Nm
w			55		g

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Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	$T_r=100^{\circ}\text{C}$ ($R_{25}=1000\Omega$)		$1670 \pm 3\%$		Ω
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^{\circ}\text{C})+B(T-25^{\circ}\text{C})^2]$, $A = 7.635 \cdot 10^{-3}^{\circ}\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5}^{\circ}\text{C}^{-2}$				

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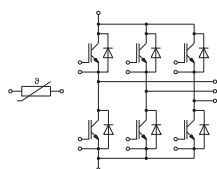
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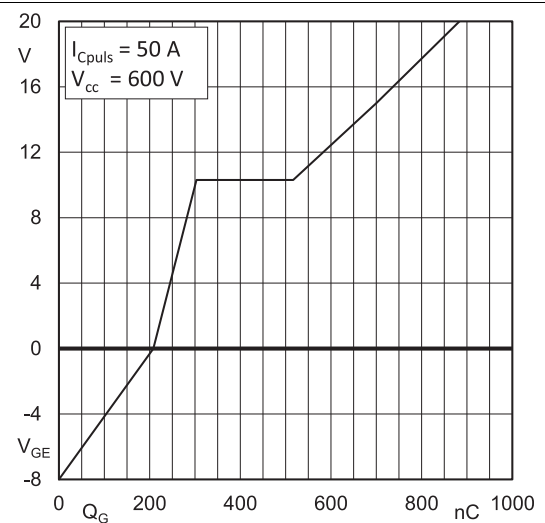
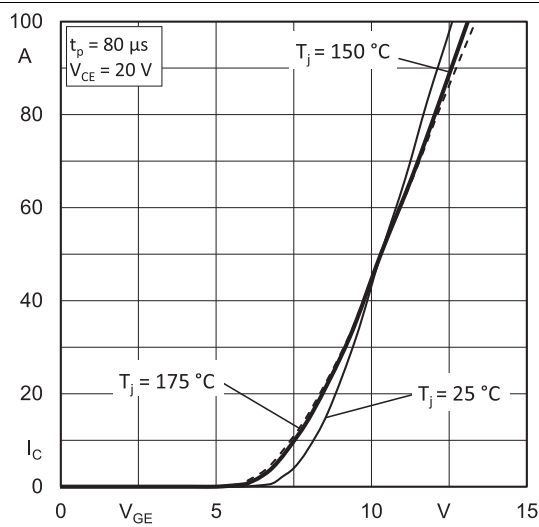
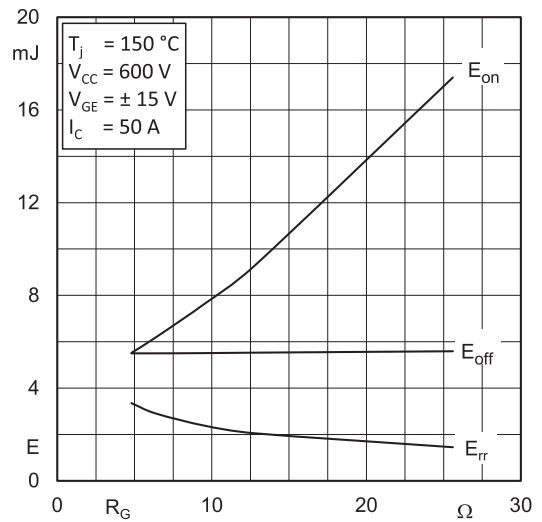
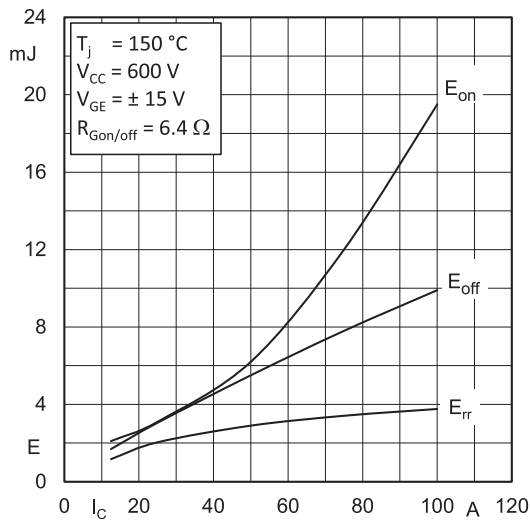
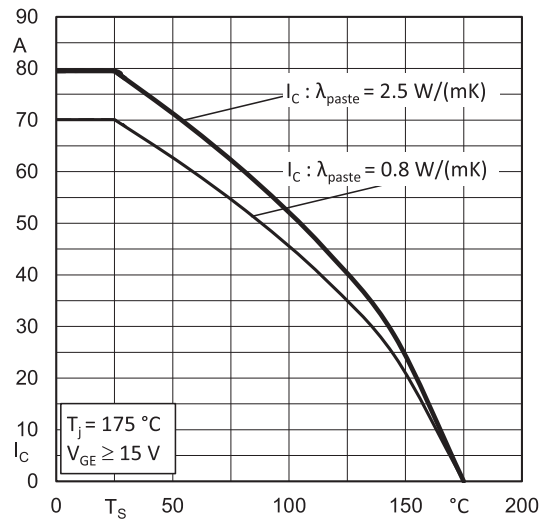
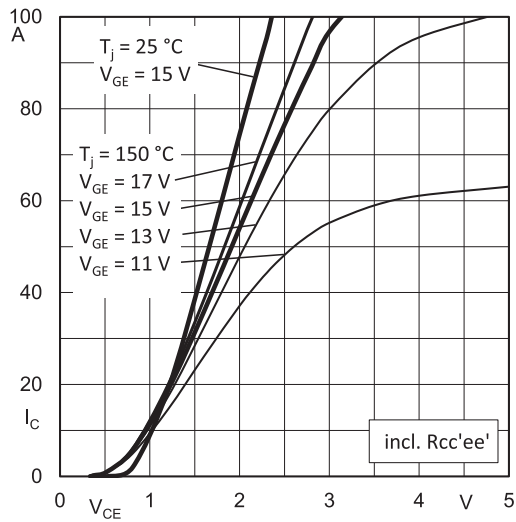
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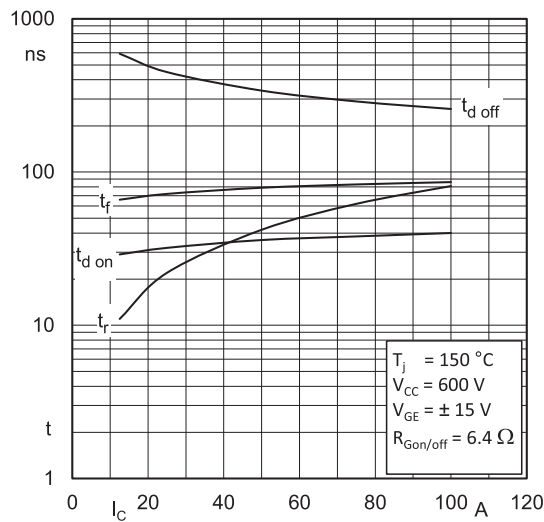


Fig. 7: Typ. switching times vs. I_C

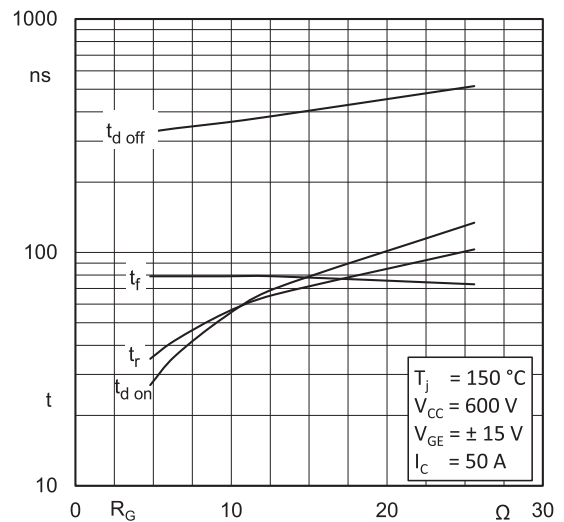


Fig. 8: Typ. switching times vs. gate resistor R_G

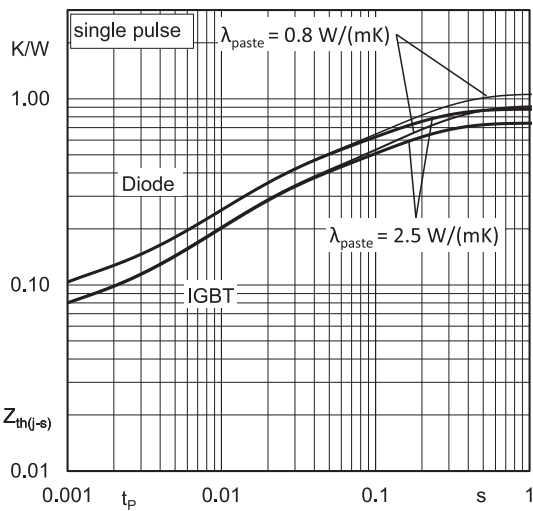


Fig. 9: Typ. transient thermal impedance

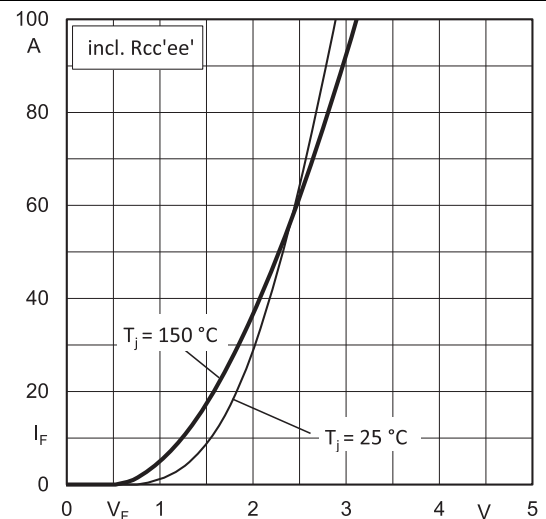


Fig. 10: Typ. CAL diode forward characteristic

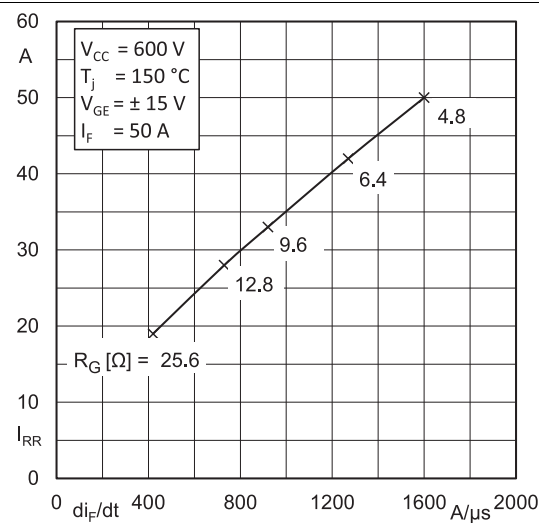


Fig. 11: Typ. CAL diode peak reverse recovery current

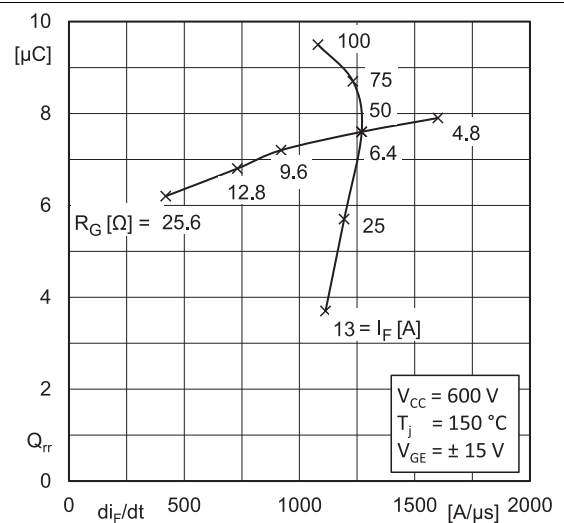
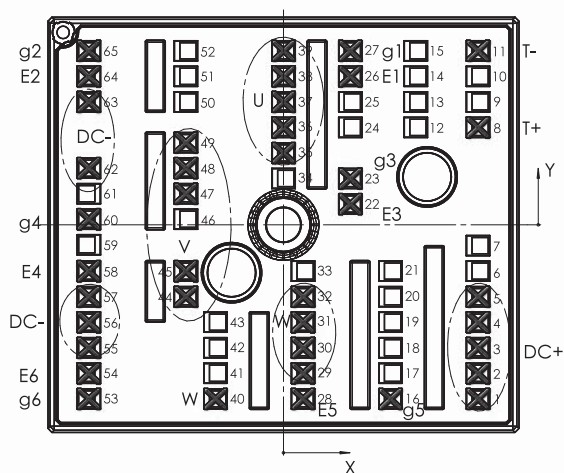


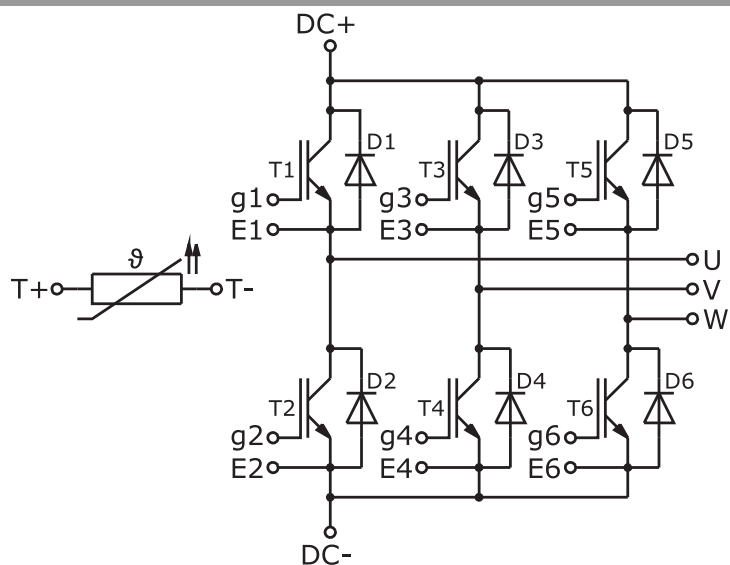
Fig. 12: Typ. CAL diode recovery charge

Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	24,38	-21,8	DC+	23	8,38	5,8	g3	45	-12,23	-5,8	V
2	24,38	-18,6	DC+	24				46			
3	24,38	-15,4	DC+	25				47	-12,23	3,9	V
4	24,38	-12,2	DC+	26	8,38	18,6	E1	48	-12,23	7,1	V
5	24,38	-9	DC+	27	8,38	21,8	g1	49	-12,23	10,3	V
6				28	2,46	-21,8	E5	50			
7				29	2,46	-18,6	W	51			
8	24,38	12,2	T+	30	2,46	-15,4	W	52			
9				31	2,46	-12,2	W	53	-24,38	-21,8	g6
10				32	2,46	-9	W	54	-24,38	-18,6	E6
11	24,38	21,8	T-	33				55	-24,38	-15,4	DC-
12				34				56	-24,38	-12,2	DC-
13				35	0,03	9	U	57	-24,38	-9	DC-
14				36	0,03	12,2	U	58	-24,38	-5,8	E4
15				37	0,03	15,4	U	59			
16	13,42	-21,8	g5	38	0,03	18,6	U	60	-24,38	0,7	g4
17				39	0,03	21,8	U	61			
18				40	-8,51	-21,8	W	62	-24,38	7,1	DC-
19				41				63	-24,38	15,4	DC-
20				42				64	-24,38	18,6	E2
21				43				65	-24,38	21,8	g2
22	8,38	2,6	E3	44	-12,23	-9	V				

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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