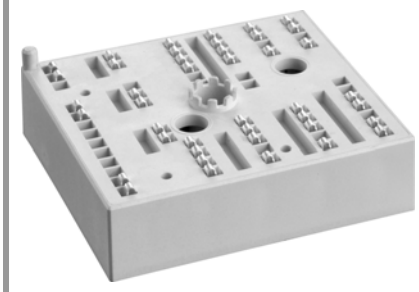
SKiiP 23AC12T7V1



MiniSKiiP® 2

Sixpack

SKiiP 23AC12T7V1

Features*

- 1200V Generation 7 IGBTs (T7)
- Robust and soft switching freewheeling diodes in CAL technology
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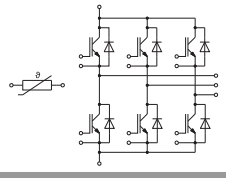


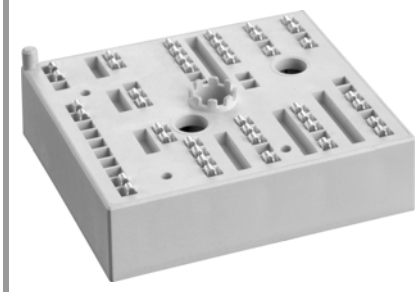
AC

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 = 70 °C	33	A
	T_j = 175 °C	T_s = 100 °C	27	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 70 °C	37	A
	T_j = 175 °C	T_s = 100 °C	30	A
I_{Cnom}			25	A
I_{CRM}			50	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 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	24	A
	T_j = 175 °C	T_s = 100 °C	20	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 70 °C	27	A
	T_j = 175 °C	T_s = 100 °C	22	A
I_{FRM}			50	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 150 °C		100	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 = 25 A	T_j = 25 °C		1.60	1.75	V
	V_{GE} = 15 V chiplevel	T_j = 150 °C		1.78	1.93	V
		T_j = 175 °C		1.82	1.97	V
V_{CE0}	chiplevel	T_j = 25 °C		1.00	1.05	V
		T_j = 150 °C		0.80	0.85	V
		T_j = 175 °C		0.75	0.80	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		24	28	mΩ
		T_j = 150 °C		39	43	mΩ
		T_j = 175 °C		43	47	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 0.53 mA		5.15	5.8	6.45	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				1	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		4.80		nF
C_{oes}		f = 1 MHz		0.06		nF
C_{res}		f = 1 MHz		0.02		nF
Q_G	V_{GE} = - 8V ... + 15 V			350		nC
R_{Gint}	T_j = 25 °C			0		Ω



MiniSKiiP® 2

Sixpack

SKiiP 23AC12T7V1

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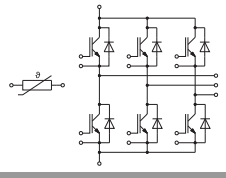


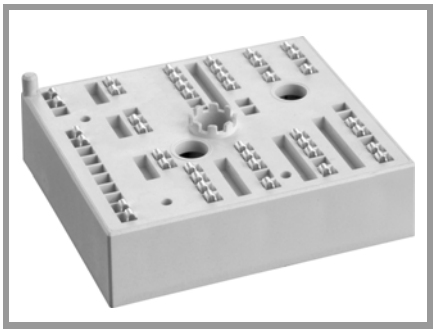
AC

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
$t_{d(on)}$	V_{CC} = 600 V I_C = 25 A $R_{G\ on}$ = 12.8 Ω $R_{G\ off}$ = 12.8 Ω V_{GE} = +15/-15 V @ T_j = 150 °C: di/dt_{on} = 590 A/µs di/dt_{off} = 280 A/µs dv/dt = 3600 V/µs	T_j = 25 °C		40		ns
		T_j = 150 °C		42		ns
		T_j = 175 °C		43		ns
t_r		T_j = 25 °C		38		ns
		T_j = 150 °C		44		ns
		T_j = 175 °C		47		ns
E_{on}		T_j = 25 °C		2.2		mJ
		T_j = 150 °C		3.1		mJ
		T_j = 175 °C		3.3		mJ
$t_{d(off)}$		T_j = 25 °C		218		ns
		T_j = 150 °C		308		ns
		T_j = 175 °C		333		ns
t_f		T_j = 25 °C		46		ns
		T_j = 150 °C		71		ns
		T_j = 175 °C		87		ns
E_{off}		T_j = 25 °C		1.6		mJ
		T_j = 150 °C		2.8		mJ
		T_j = 175 °C		3		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			1.32		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			1.11		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
$V_F = V_{EC}$	I_F = 25 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.41	2.74	V
		T_j = 150 °C		2.45	2.79	V
		T_j = 175 °C		2.30	2.62	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
		T_j = 175 °C		0.82	0.98	V
r_F	chiplevel	T_j = 25 °C		44	50	mΩ
		T_j = 150 °C		62	68	mΩ
		T_j = 175 °C		59	66	mΩ
I_{RRM}	I_F = 25 A V_{GE} = +15/-15 V V_{CC} = 600 V @ T_j = 150 °C: di/dt_{off} = 610 A/µs	T_j = 25 °C		15		A
		T_j = 150 °C		20		A
		T_j = 175 °C		23		A
Q_{rr}		T_j = 25 °C		1.5		µC
		T_j = 150 °C		3.7		µC
		T_j = 175 °C		4.1		µC
E_{rr}		T_j = 25 °C		0.45		mJ
		T_j = 150 °C		1.4		mJ
		T_j = 175 °C		1.8		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.68		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			1.44		K/W
Module						
L_{CE}				-		nH
M_s	to heat sink		2		2.5	Nm
w				55		g



MiniSKiiP® 2

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SKiiP 23AC12T7V1

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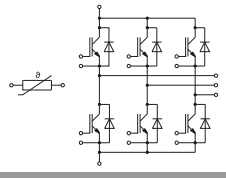
Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Temperature Sensor					
R_{100}	T_r=100°C (R_{25}=1000Ω)		1670 ± 3%		Ω
$R_{(T)}$	$R_{(T)}$=1000Ω[1+A(T-25°C)+B(T-25°C)^2] , A = 7.635*10^{-3}°C^{-1}, B = 1.731*10^{-5}°C^{-2}				



AC

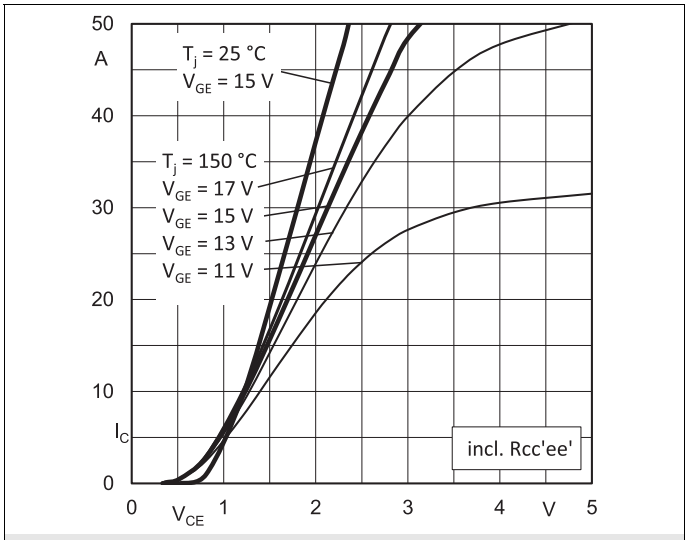


Fig. 1: Typ. output characteristic

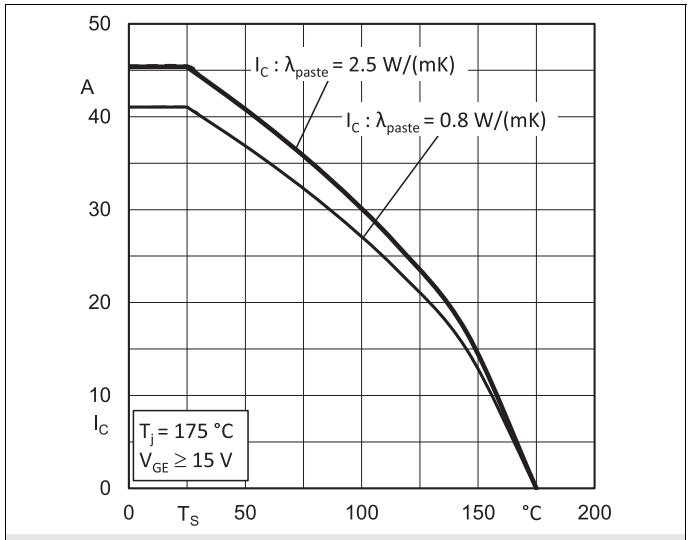


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

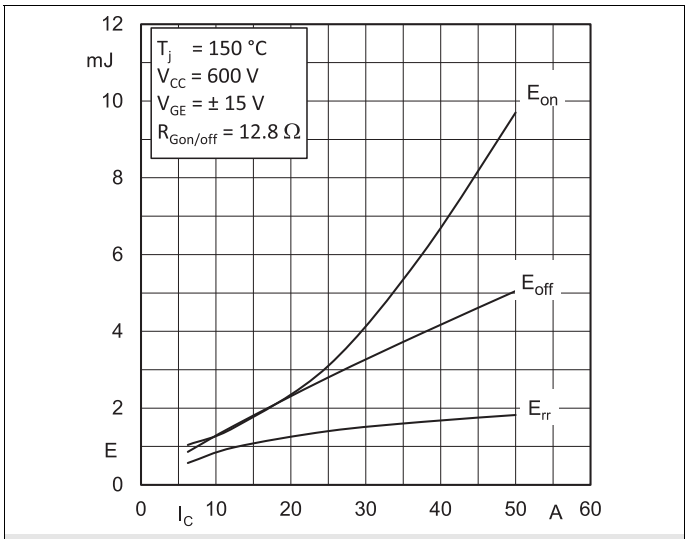


Fig. 3: Typ. turn-on /-off energy = f (I_C)

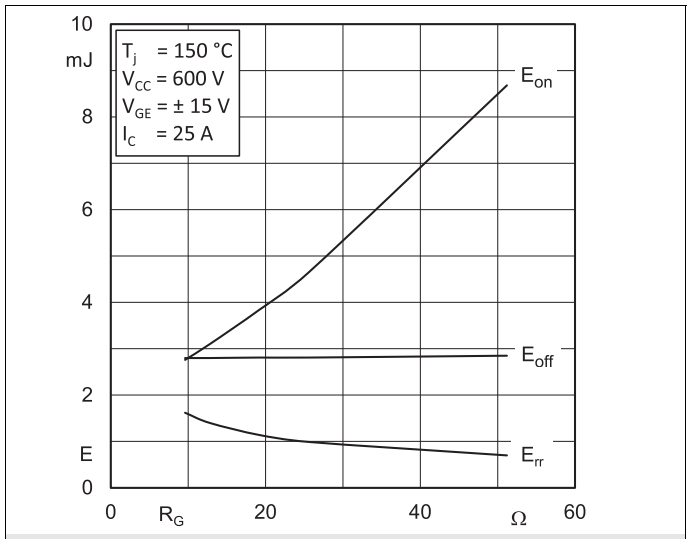


Fig. 4: Typ. turn-on /-off energy = f (R_G)

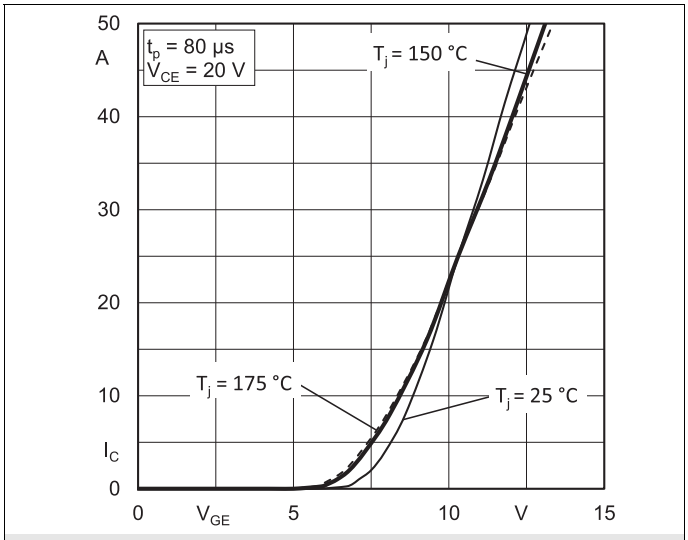


Fig. 5: Typ. transfer characteristic

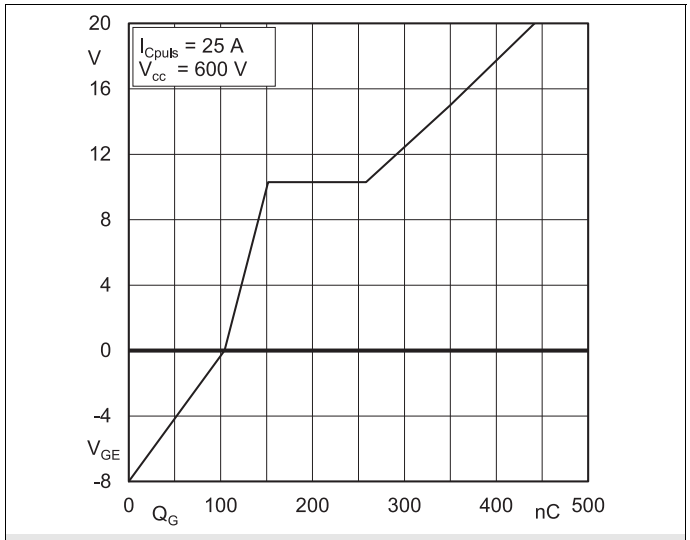


Fig. 6: Typ. gate charge characteristic

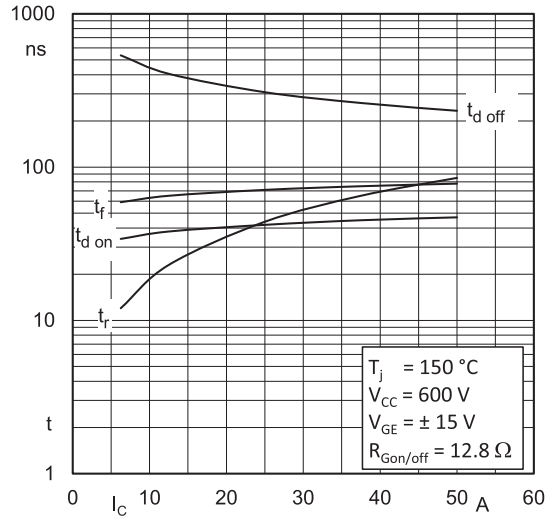


Fig. 7: Typ. switching times vs. I_C

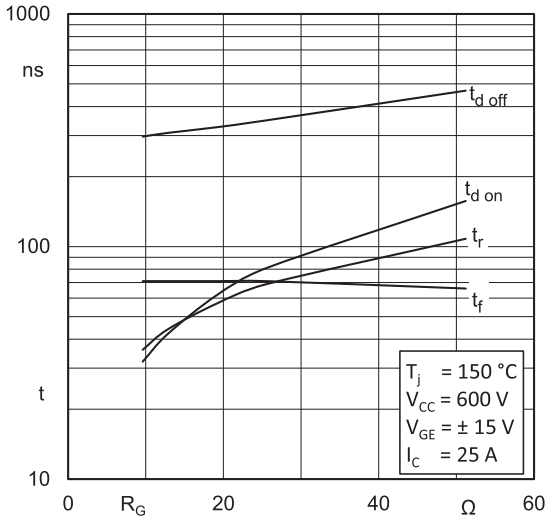


Fig. 8: Typ. switching times vs. gate resistor R_G

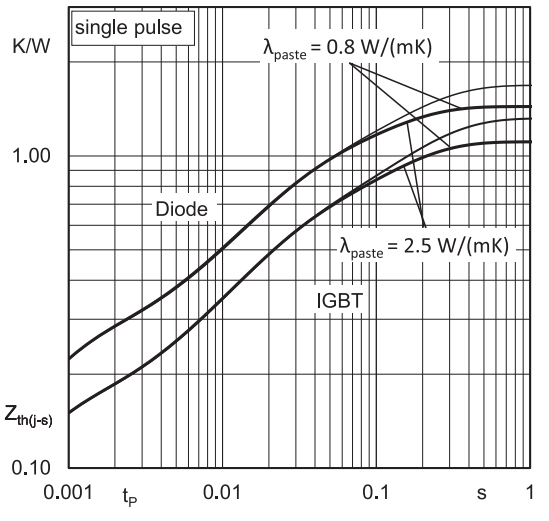


Fig. 9: Typ. transient thermal impedance

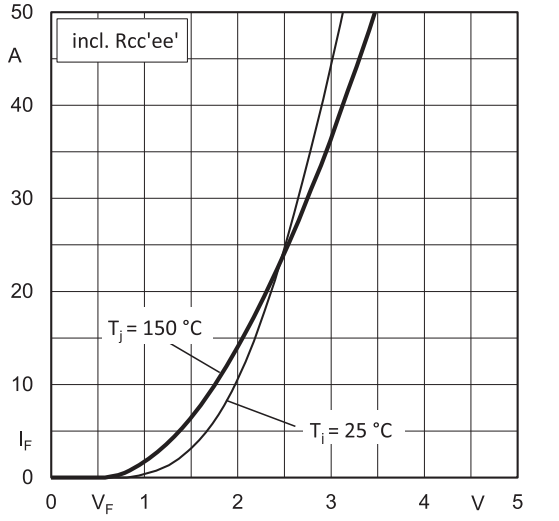


Fig. 10: Typ. CAL diode forward characteristic

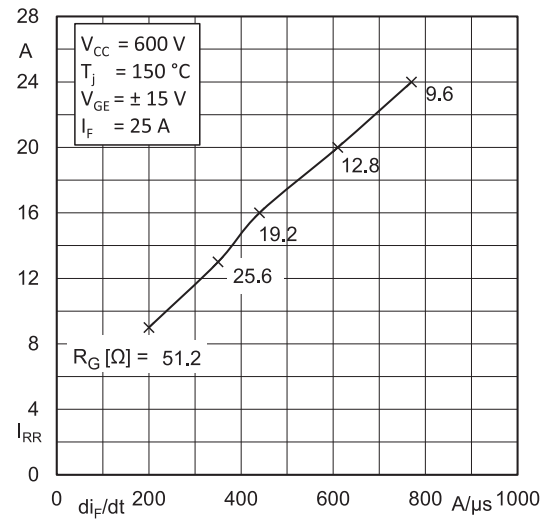


Fig. 11: Typ. CAL diode peak reverse recovery current

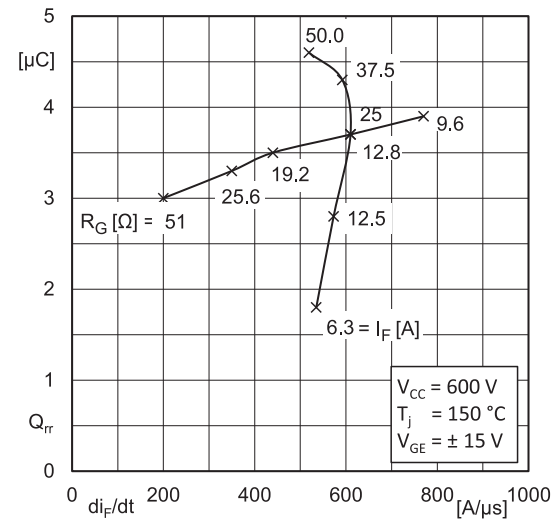
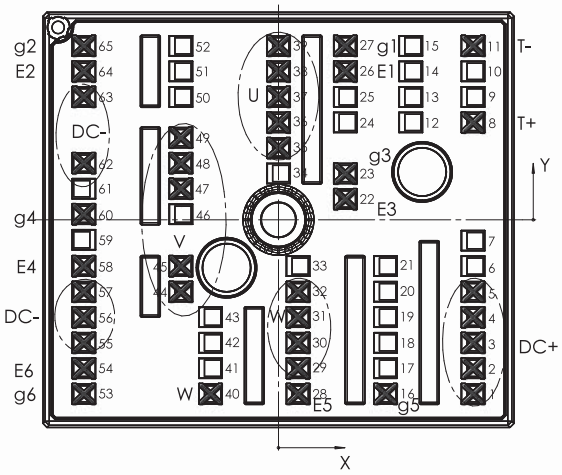


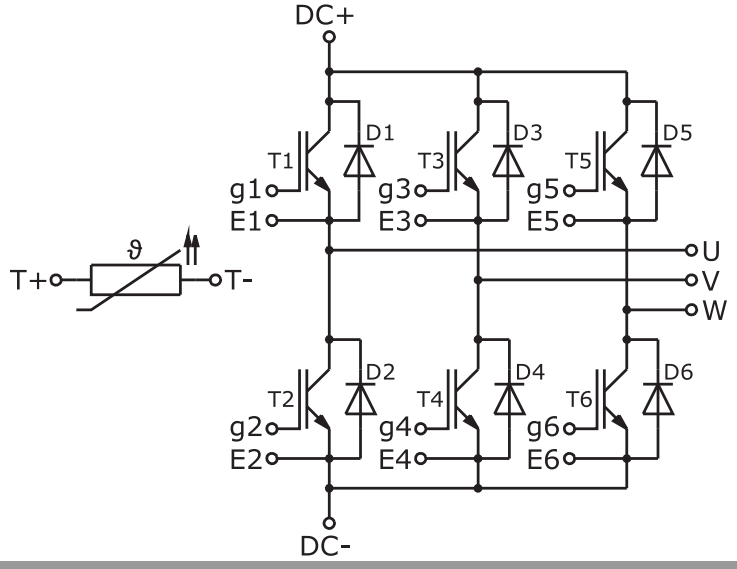
Fig. 12: Typ. CAL diode recovery charge

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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