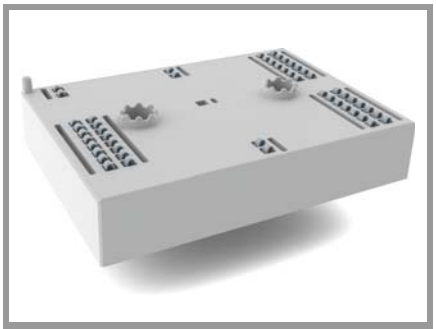
SKiiP39GB12VV1



MiniSKiiP® 3 Dual

Half-Bridge

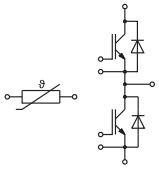
SKiiP39GB12VV1

Features*

- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

Remarks

- V_{CEsat} , V_F= chip level value
- Case temp. limited to T_C= 125°C max. (for baseplateless modules $T_C = T_S$)
- Product reliability results valid for T_j≤150°C (recomm. Top = -40 ... +150°C)



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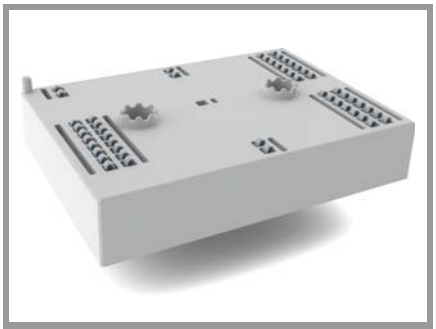
Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Inverter - IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	378	A
	T_j = 175 °C	T_s = 70 °C	302	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	574	A
	T_j = 175 °C	T_s = 70 °C	464	A
I_{Cnom}			400	A
I_{CRM}			1200	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 720 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 125 °C	10	µs
T_j			-40 ... 175	°C
Inverse - Diode				
I_F	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	363	A
	T_j = 175 °C	T_s = 70 °C	287	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	422	A
	T_j = 175 °C	T_s = 70 °C	335	A
I_{FRM}			800	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		1980	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C, 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

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverter - IGBT						
$V_{CE(sat)}$	I_C = 400 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.75	2.20	V
		T_j = 150 °C		2.20	2.50	V
V_{CE0}	chiplevel	T_j = 25 °C		0.94	1.04	V
		T_j = 150 °C		0.88	0.98	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		2.0	2.9	mΩ
		T_j = 150 °C		3.3	3.8	mΩ
$V_{GE(th)}$	V_{CE}, I_C = 16 mA		5.5	6	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				0.3	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		24.04		nF
C_{oes}		f = 1 MHz		2.36		nF
C_{res}		f = 1 MHz		2.36		nF
Q_G	V_{GE} = - 8 V...+ 15 V			4400		nC
R_{Gint}	T_j = 25 °C			1.9		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 400 A $R_{G\ on}$ = 1.8 Ω $R_{G\ off}$ = 1.8 Ω di/dt_{on} = 7451 A/µs di/dt_{off} = 3870 A/µs			410		ns
t_r				68		ns
E_{on}				17.8		mJ
$t_{d(off)}$				667		ns
t_f				107		ns
E_{off}	V_{GE} = +15/-15 V			47.5		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.16		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.08		K/W



MiniSKiiP® 3 Dual

Half-Bridge

SKiiP39GB12VV1

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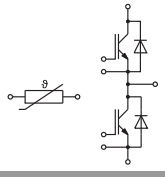
- Product reliability results valid for T_j≤150°C (recomm. Top = -40 ... +150°C)

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
$V_F = V_{EC}$	I_F = 400 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.20	2.52	V
		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		2.3	2.6	mΩ
		T_j = 150 °C		3.1	3.4	mΩ
I_{RRM}	I_F = 400 A di/dt_{off} = 7310 A/µs V_{GE} = -15 V V_{CC} = 600 V			427		A
Q_{rr}				62.5		µC
E_{rr}				31.5		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.19		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			0.15		K/W
Module						
L_{CE}				15		nH
M_s	to heat sink		2		2.5	Nm
w				76		g
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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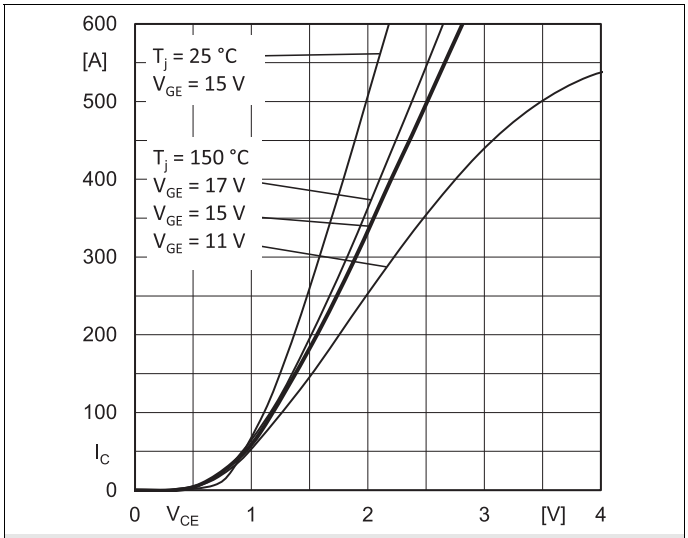


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

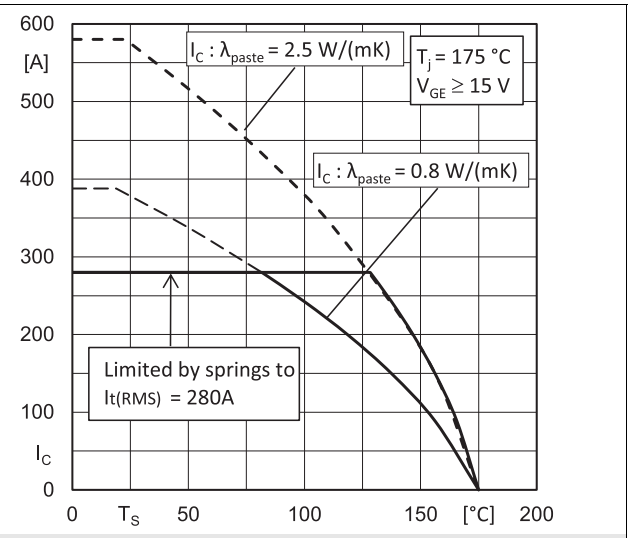


Fig. 2: Rated current vs. temperature Ic = f (Ts)

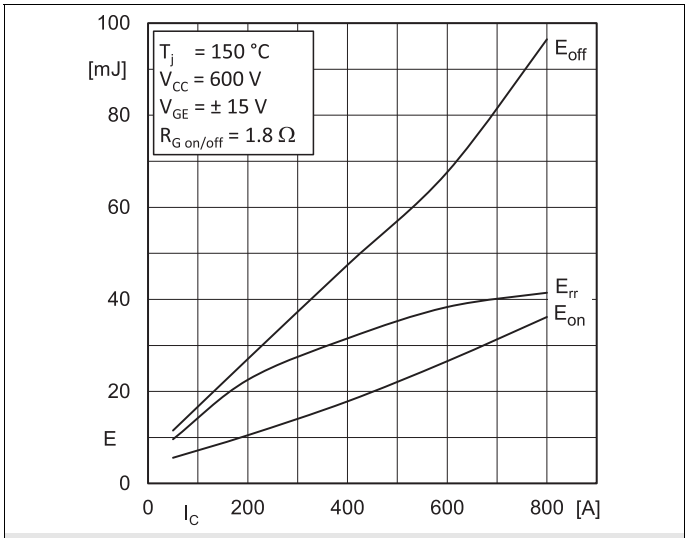


Fig. 3: Typ. turn-on /-off energy = f (I_C)

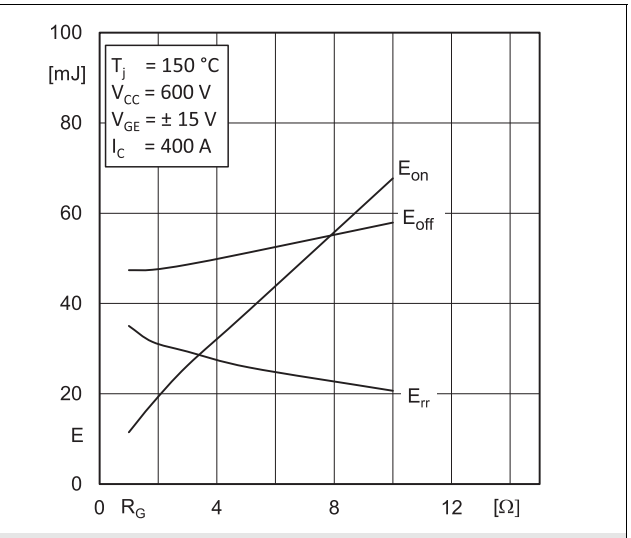


Fig. 4: Typ. turn-on /-off energy = f (R_G)

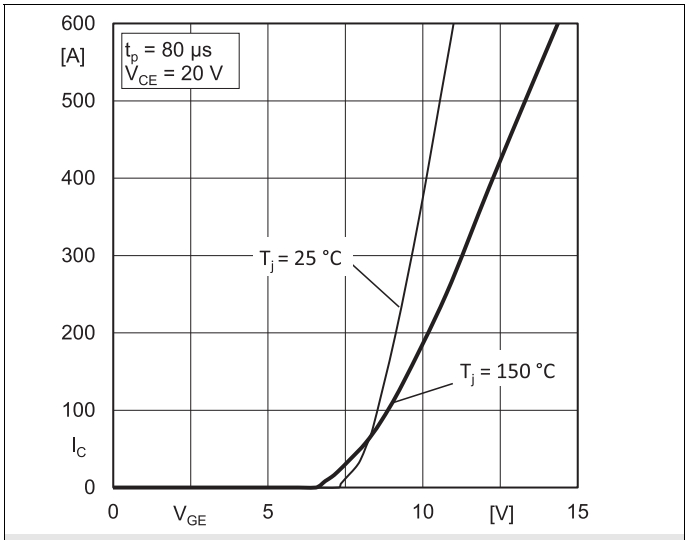


Fig. 5: Typ. transfer characteristic

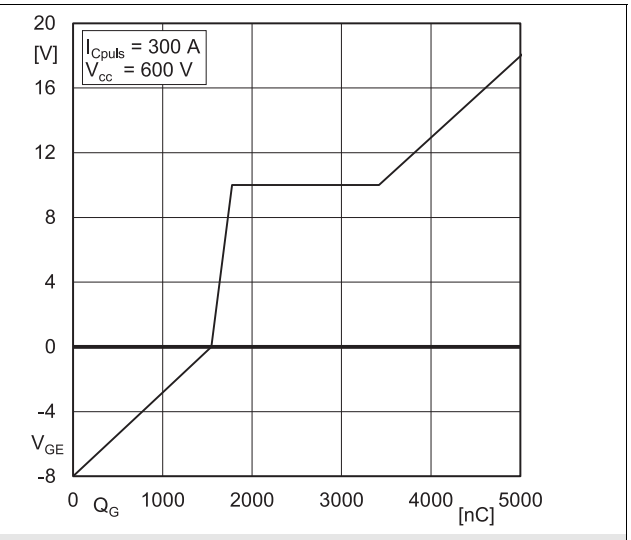


Fig. 6: Typ. gate charge characteristic

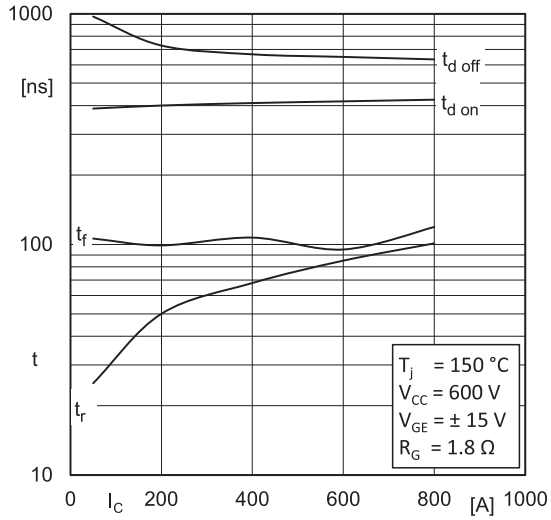


Fig. 7: Typ. switching times vs. I_C

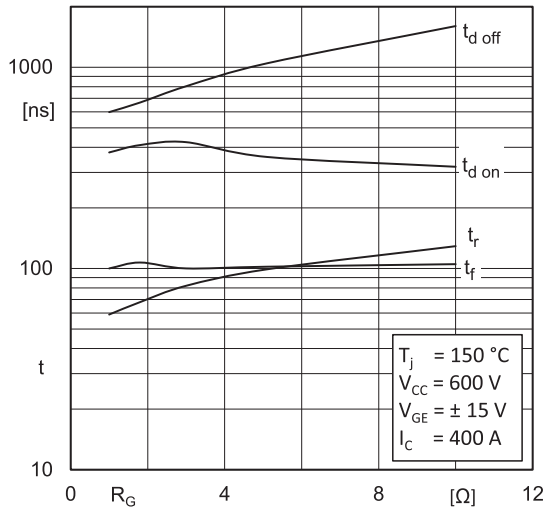


Fig. 8: Typ. switching times vs. gate resistor R_G

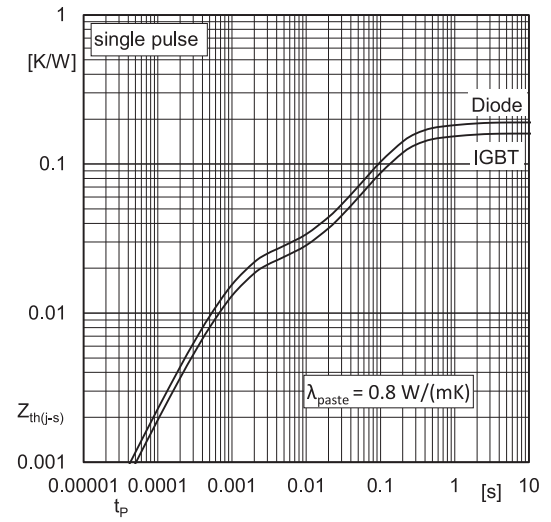


Fig. 9: Transient thermal impedance of IGBT and Diode

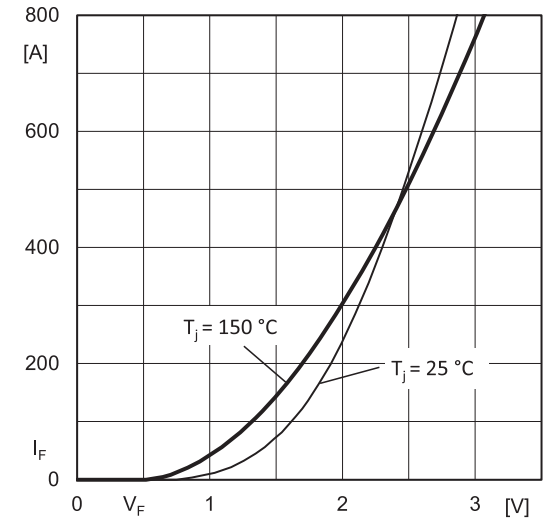


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

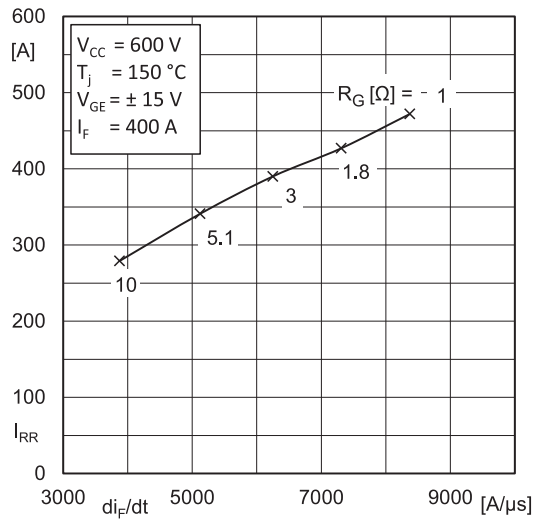


Fig. 11: Typ. CAL diode peak reverse recovery current

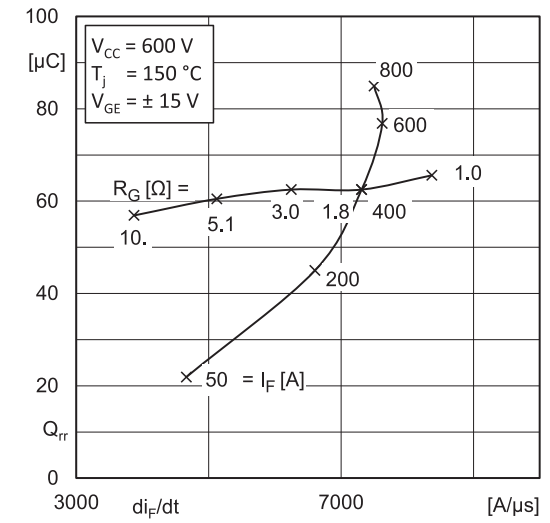
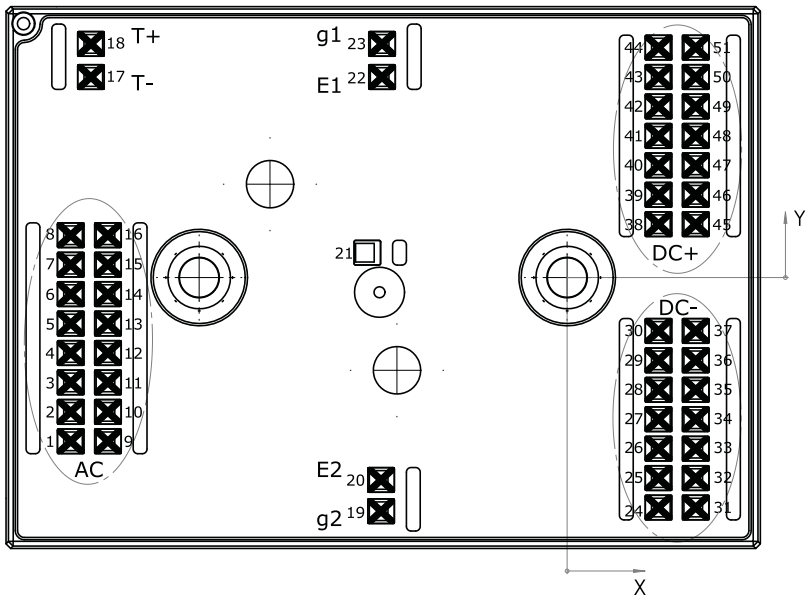


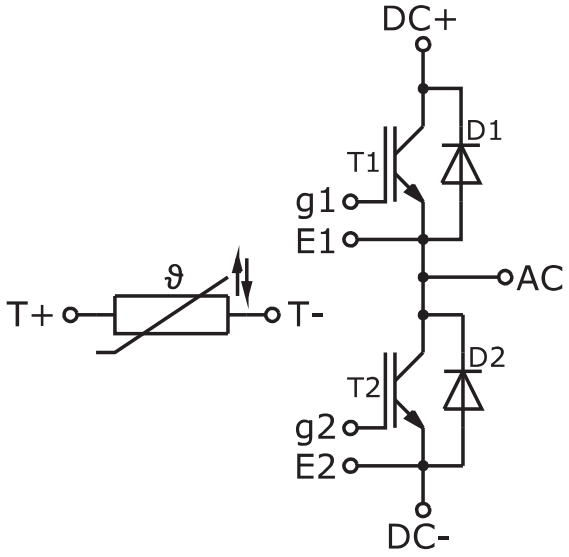
Fig. 12: Typ. CAL diode recovery charge

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	E1	39	9,93	9,00	DC+
6	-53,98	-1,80	AC	23	-20,13	25,40	g1	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.

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