SK45MH120TSCp

SEMITOP® 2 Press-Fit

SiC MOSFET Module

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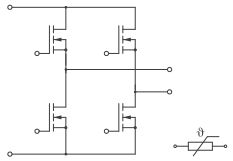
Features*

- Low inductance design
- One screw mounting module
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performance by aluminum oxide substrate
- 1200V Planar Gen2 SiC MOS
- Integrated NTC temperature sensor
- UL recognized, file no. E63532

Typical Applications

- Switched Mode Power Supplies
- Energy Storage Systems
- Electric Vehicle charging



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
MOSFET 1				
V_{DSS}			1200	V
I_D	T_j = 175 °C	T_s = 25 °C	40	A
		T_s = 70 °C	33	A
I_{DM}	PW≤10µs, duty cycle≤1%		160	A
$I_{DM,repetitive}$			90	A
V_{GS}			-6 ... 22	V
T_j			-40 ... 175	°C
Integrated body diode				
I_{FM}	PW ≤ 10µs, Duty cycle ≤ 1%		160	A
$I_{FM,repetitive}$			90	A

Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	35	A
T_{stg}		-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
MOSFET 1						
$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA, T_j = 25 °C		1200			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 8.9 mA, T_j = 25 °C		1.6	2.8	4	V
I_{DSS}	V_{GS} = 0 V, V_{DS} = 1200 V, T_j = 25 °C				1	mA
I_{GSS}	V_{DS} = 0 V, V_{GS} = 22 V, T_j = 25 °C				100	nA
$R_{DS(on)}$	V_{GS} = 18 V, I_D = 22 A, chiplevel	T_j = 25 °C		45	56	mΩ
		T_j = 150 °C		76		mΩ
C_{iss}	V_{GS} = 0 V, V_{DS} = 800 V, f = 1 MHz			4310		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 800 V, f = 1 MHz			137		pF
C_{rss}	V_{GS} = 0 V, V_{DS} = 800 V, f = 1 MHz			19		pF
R_{Gint}	T_j = 25 °C			4.7		Ω
Q_G	V_{DD}=600V, V_{GS}=-5V...+18V, I_D = 45 A			206		nC
$t_{d(on)}$	V_{DD} = 600 V	T_j = 150 °C		20		ns
$t_{d(off)}$	V_{GS} = 20/-5 V	T_j = 150 °C		65		ns
t_r	I_D = 45 A	T_j = 150 °C		49		ns
t_f	$R_{G\ on/off}$ = 0.5 Ω	T_j = 150 °C		13		ns
E_{on}	di/dt_{off} = 2.0 kA/µs, di/dt_{on} = 2.6 kA/µs	T_j = 150 °C		0.95		mJ
E_{off}	dv/dt = 36.3 kV/µs	T_j = 150 °C		0.3		mJ
$R_{th(j-s)}$	per MOSFET, λ_{paste}=0.8 W/(mK)			1		K/W
Integrated body diode						
$V_F = V_{SD}$	$-I_D$ = 22 A, V_{GS} = 0 V, chiplevel	T_j = 25 °C		4.10		V
		T_j = 150 °C		3.90		V
$V_{F0} = V_{SD0}$	chiplevel	T_j = 25 °C		2.60		V
		T_j = 150 °C		2.10		V
$r_F = r_{SD}$	chiplevel	T_j = 25 °C		68		mΩ
		T_j = 150 °C		82		mΩ
t_{rr}	V_{DD} = 600 V	T_j = 150 °C		73		ns
Q_{rr}	$-I_D$ = 45 A	T_j = 150 °C		1.4		µC
I_{rr}	di/dt_{off} = 2.6 kA/µs	T_j = 150 °C		40		A
E_{rr}	V_{GS} = -5 V	T_j = 150 °C		0.45		mJ

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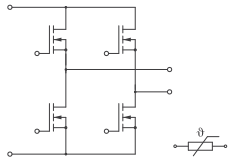

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Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
L_{CE}			18		nH
M_s	to heatsink	1.8		2	Nm
w	weight		19		g

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Temperature Sensor					
R_{100}	T_r = 100 °C		493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];		3550 ±2%		K

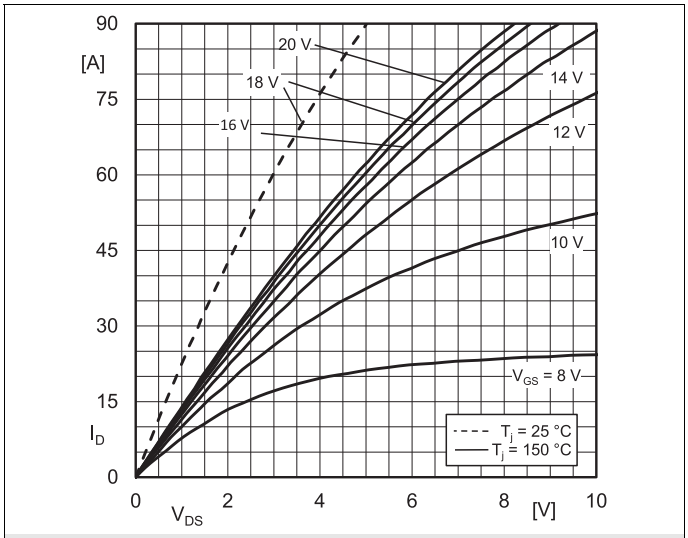


Fig.1: Typ. MOSFET forward output characteristic, incl. $R_{DD'+SS'}$

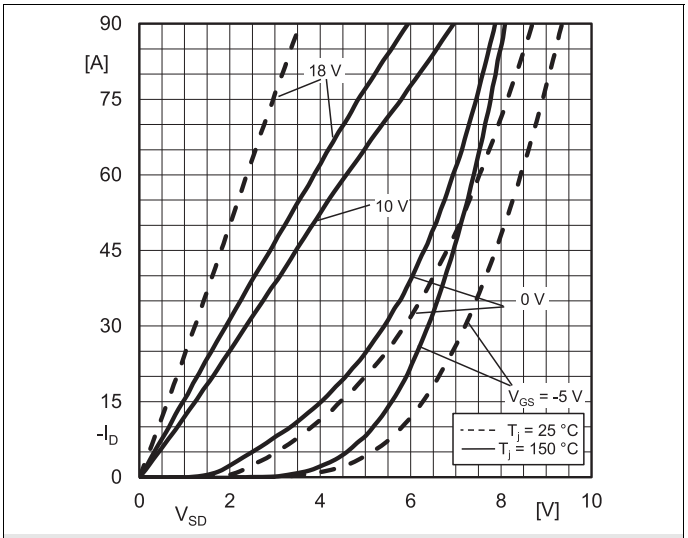


Fig. 2: Typ. reverse output characteristic, incl. $R_{DD'+SS'}$

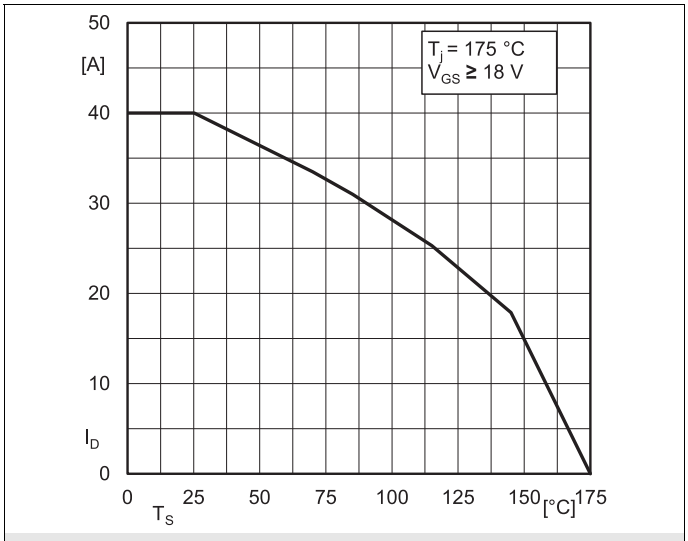


Fig. 3: Rated current vs. temperature $I_D = f(T_S)$

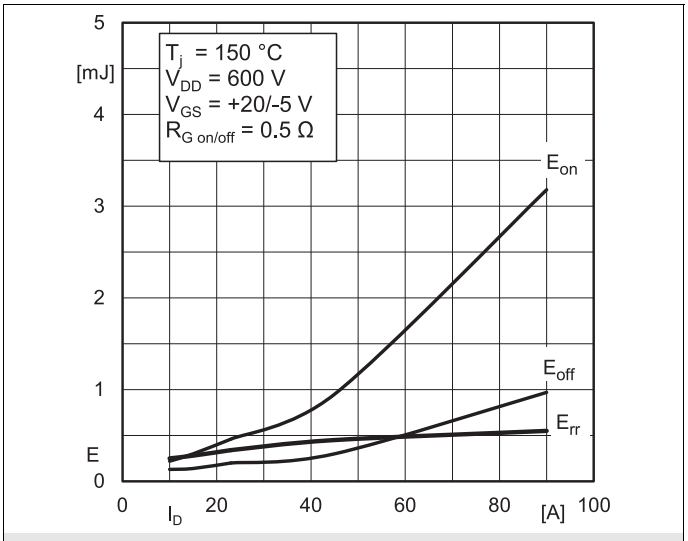


Fig. 4: Typ. turn-on/-off energy $E = f(I_D)$

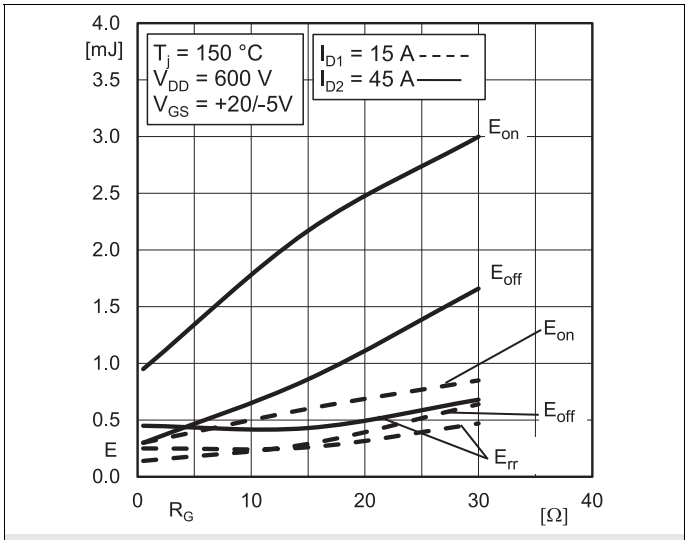


Fig. 5: Typ. turn-on /-off energy $E = f(R_G)$

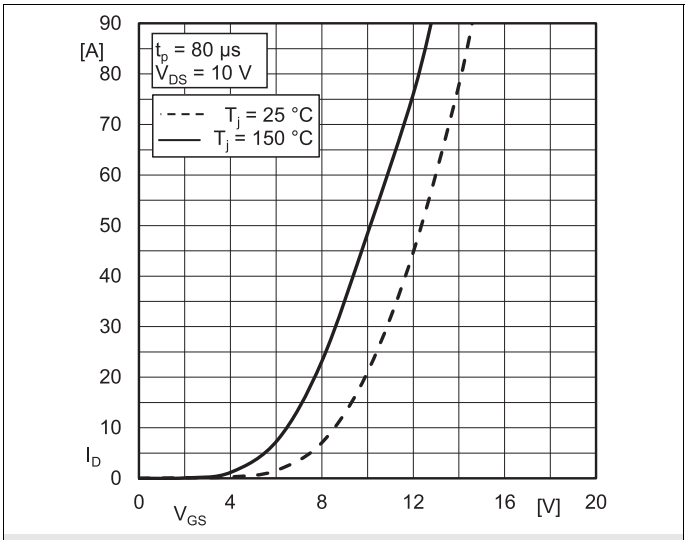
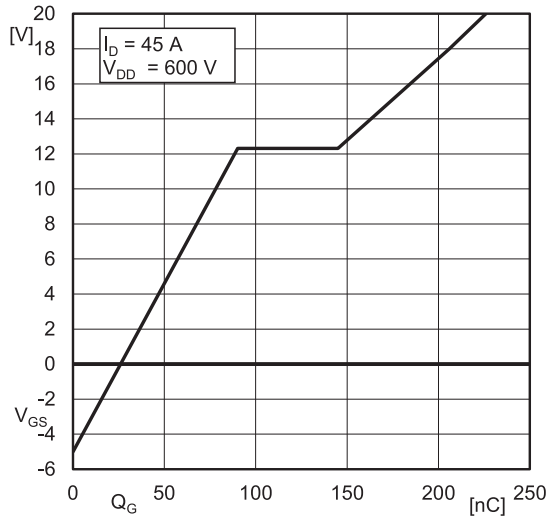


Fig. 6: Typ. MOSFET transfer characteristic



Flg. 7: Typ. MOSFET gate charge characteristic

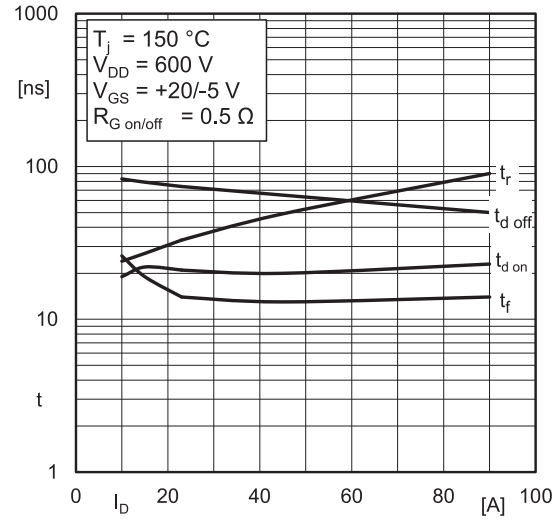


Fig. 8: Typ. switching times vs. I_D

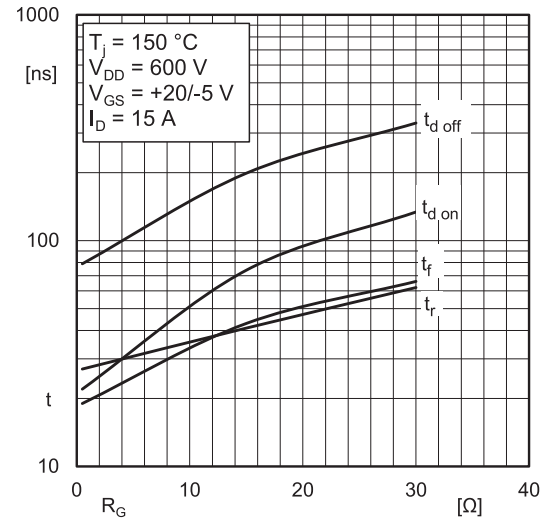


Fig. 9: Typ. switching times vs. gate resistor R_G at I_{D1}

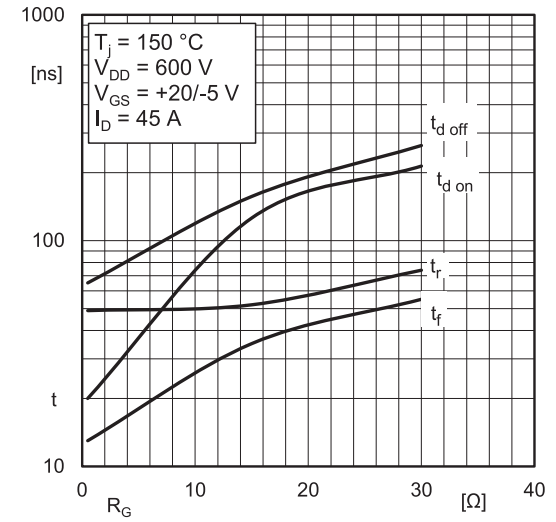


Fig. 10: Typ. switching times vs. gate resistor R_G at I_{D2}

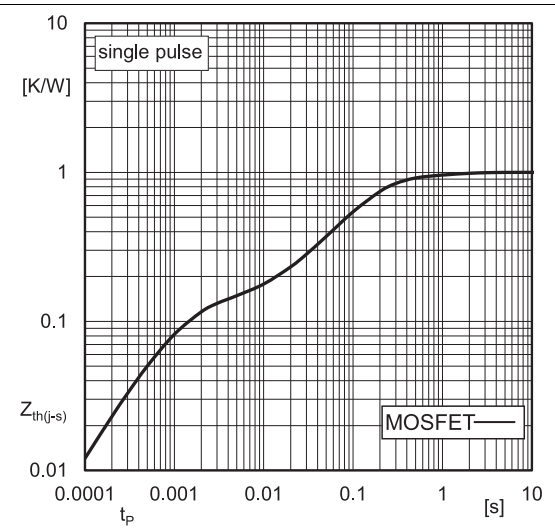


Fig. 11: Typ. transient thermal impedances

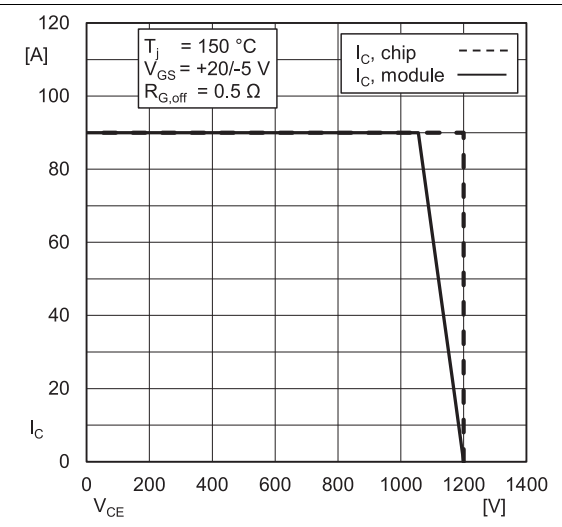


Fig. 12: SiC MOSFET Reverse Bias Safe Operating Area (RBSOA)

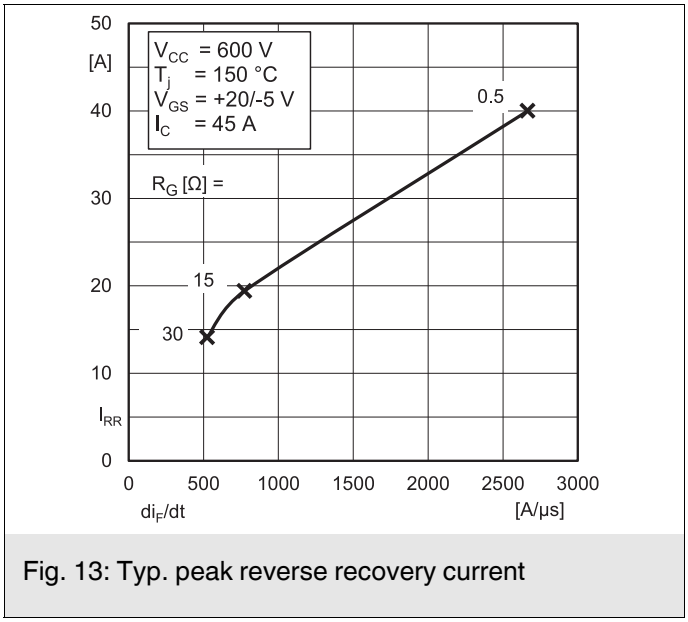


Fig. 13: Typ. peak reverse recovery current

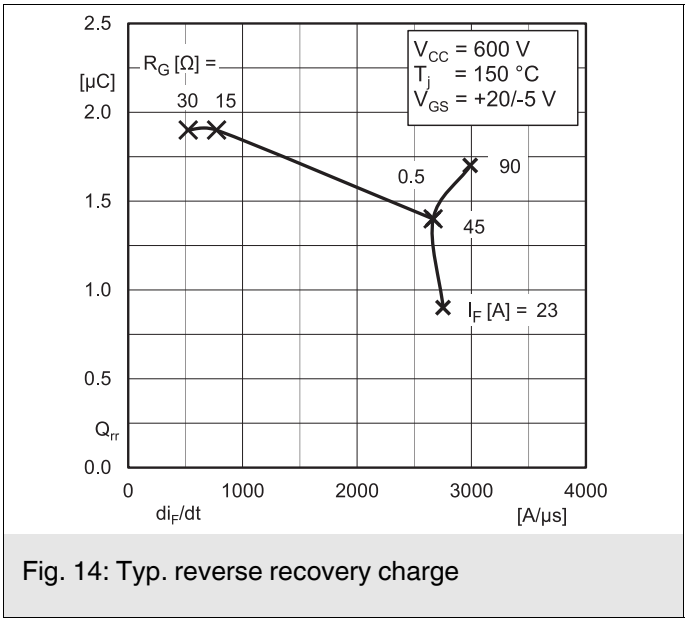
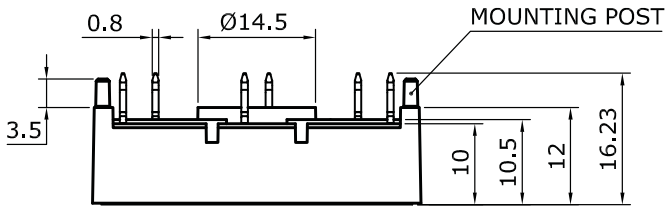
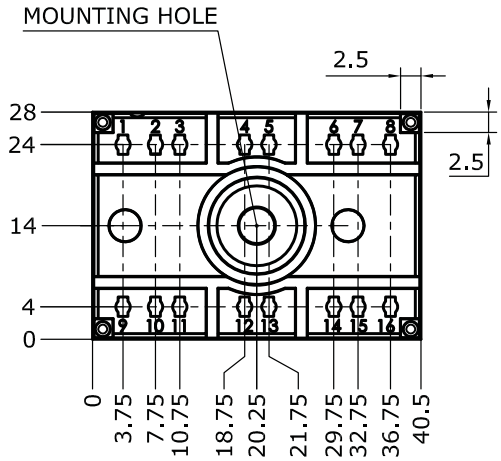
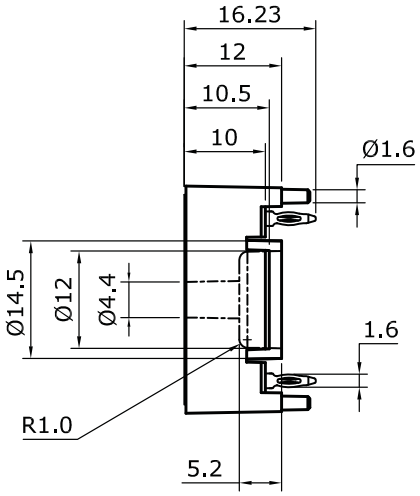


Fig. 14: Typ. reverse recovery charge

Dimensions: mm
Tolerance system: ISO 2768-m







Suggested drilled hole diameter for terminal pins in the circuit board:

- minimum: 1.575 mm
- typical: 1.6 mm
- maximum: 1.625 mm

Suggested hole diameter for the mounting post in the circuit board:

- 2 mm

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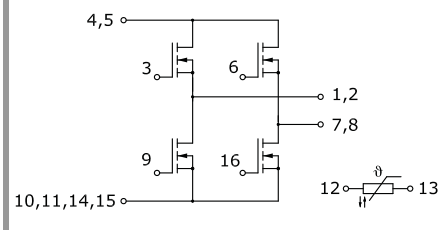

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This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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