SK96GAB06UF

SEMITOP® 3

Single phase ultrafast bridge rectifier with single IGBT

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Features*

- 1200V trench4 IGBT
- CAL4F antiparallel diode
- Hyperfast rectifier diodes
- Compact design
- One screw mounting
- Heat transfer and insulation through direct copper bonded aluminum oxide ceramic (DBC)

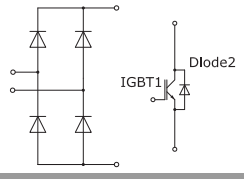
Typical Applications

- Switching (not for linear use)
- Resonant applications
- Switch mode power supply
- UPS

Remarks

Hyperfast diode = Rectifier
CAL4F diode = Diode2

Dynamic measurements set-up:
- IGBT switching on external 50A 1200V CAL4F diode
- Diode2 switching on external 15A 1200V Trench4 IGBT



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Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT 1				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_s = 25 °C	56	A
		T_s = 70 °C	43	A
I_C	T_j = 175 °C	T_s = 25 °C	62	A
		T_s = 70 °C	51	A
I_{Cnom}			50	A
I_{CRM}			150	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Rectifier				
V_{RSM}	T_j = 25 °C		600	V
V_{RRM}	T_j = 25 °C		600	V
I_D	rec 120°	T_s = 25 °C	126	A
	T_j = 150 °C	T_s = 70 °C	95	A
I_{FSM}	sin 180°	T_j = 25 °C	630	A
	10 ms	T_j = 150 °C	549	A
i^2t	sin 180°	T_j = 25 °C	1984	A^2s
	10 ms	T_j = 150 °C	1507	A^2s
T_j			-40 ... 150	°C

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
Diode 2				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 150 °C	T_s = 25 °C	18	A
		T_s = 70 °C	14	A
I_F	T_j = 175 °C	T_s = 25 °C	21	A
		T_s = 70 °C	17	A
I_{Fnom}			15	A
I_{FRM}			30	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		65	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings			
Symbol	**Conditions**	**Values**	**Unit**
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	60	A
T_{stg}	module without TIM	-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V

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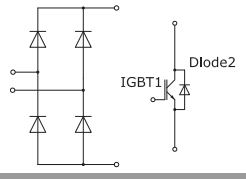
- IGBT switching on external 50A 1200V CAL4F diode
- Diode2 switching on external 15A 1200V Trench4 IGBT

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
$V_{CE(sat)}$	I_C = 50 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.10	V
		T_j = 150 °C		2.20	2.40	V
V_{CE0}	chiplevel	T_j = 25 °C		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		21	24	mΩ
		T_j = 150 °C		30	32	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 1.7 mA		5	5.8	6.5	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		2.77		nF
C_{oes}		f = 1 MHz		0.21		nF
C_{res}		f = 1 MHz		0.16		nF
Q_G	V_{GE} = -7V..+15V			375		nC
R_{Gint}	T_j = 25 °C			4.0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 50 A $V_{GE\ neg}$ = -7 V $V_{GE\ pos}$ = 15 V $R_{G\ on}$ = 32 Ω $R_{G\ off}$ = 32 Ω di/dt_{on} = 920 A/µs di/dt_{off} = 2750 A/µs	T_j = 150 °C		63		ns
t_r		T_j = 150 °C		65		ns
E_{on}		T_j = 150 °C		8.3		mJ
$t_{d(off)}$		T_j = 150 °C		521		ns
t_f		T_j = 150 °C		80		ns
E_{off}		T_j = 150 °C		5		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.83		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Rectifier						
V_F	I_F = 75 A	T_j = 25 °C		1.80	2.20	V
	chiplevel	T_j = 125 °C		1.60	2.00	V
V_{F0}	chiplevel	T_j = 25 °C		1.15	1.35	V
		T_j = 125 °C		0.85	1.05	V
r_F	chiplevel	T_j = 25 °C		8.7	11	mΩ
		T_j = 125 °C		10	13	mΩ
I_R	T_j = 25 °C, V_{RRM}				0.1	mA
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.16		K/W



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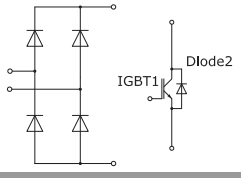

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 2						
V_F	I_F = 15 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.38	2.71	V
		T_j = 150 °C		2.44	2.77	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		72	81	mΩ
		T_j = 150 °C		103	111	mΩ
I_{RRM}	I_F = 15 A di/dt_{off} = 2750 A/µs V_{GE} = 15 V V_{CC} = 600 V	T_j = 150 °C		28		A
Q_{rr}		T_j = 150 °C		0.3		µC
E_{rr}		T_j = 150 °C		0.8		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			2.3		K/W

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
M_s	to heatsink	2.25		2.5	Nm
w	weight		29		g

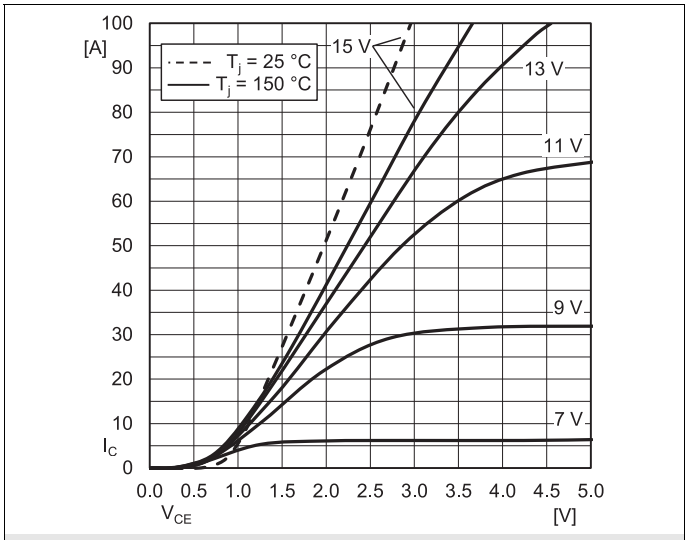


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

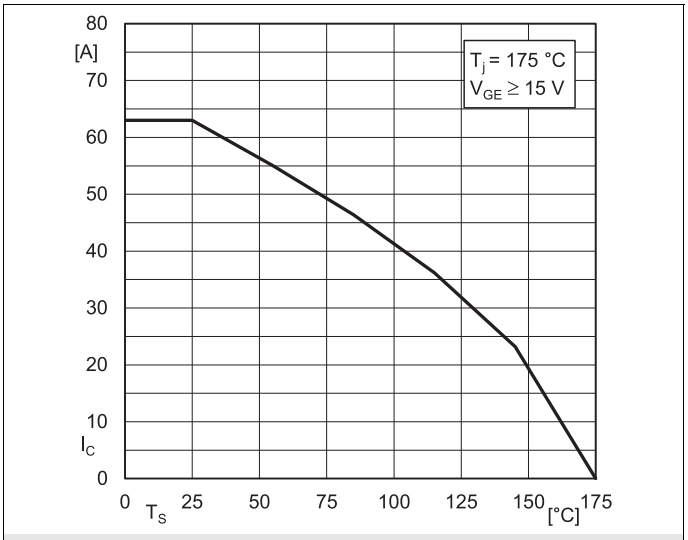


Fig. 2: IGBT rated current vs. Temperature $I_c=f(T_s)$

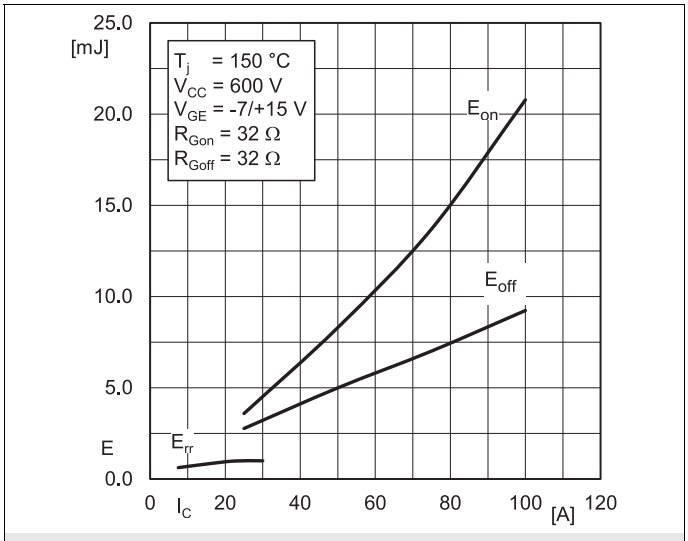


Fig. 3: Typ. turn-on /-off energy = f (I_C)

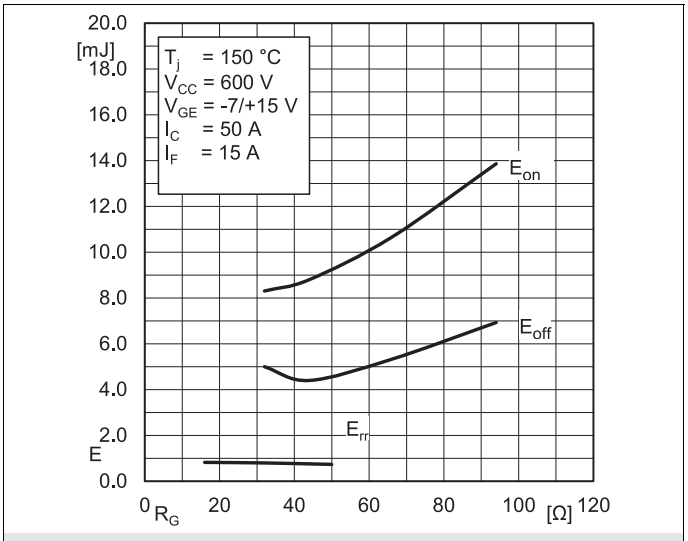


Fig. 4: Typ. turn-on /-off energy = f (R_G)

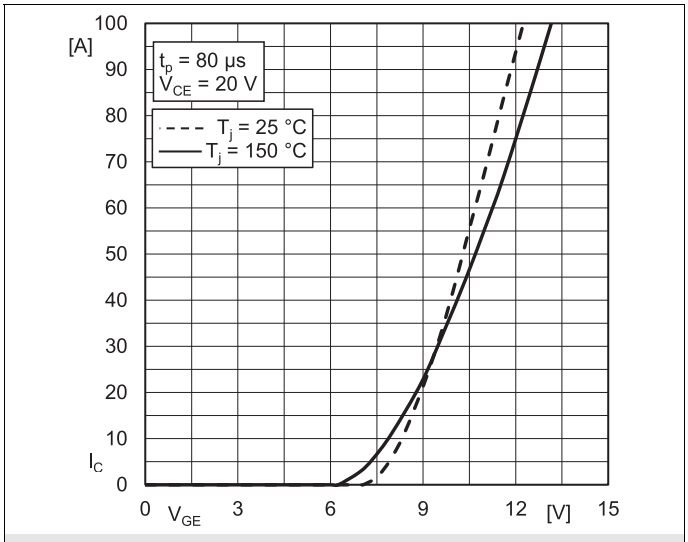


Fig. 5: Typ. transfer characteristic

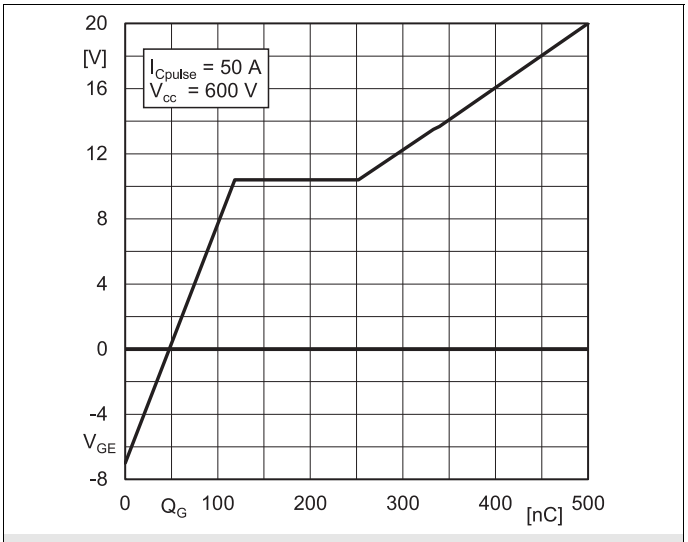


Fig. 6: Typ. gate charge characteristic

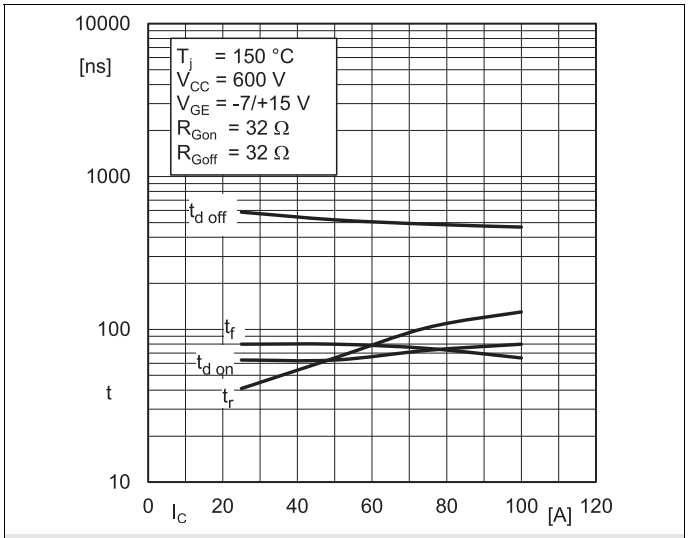


Fig. 7: Typ. switching times vs. I_C

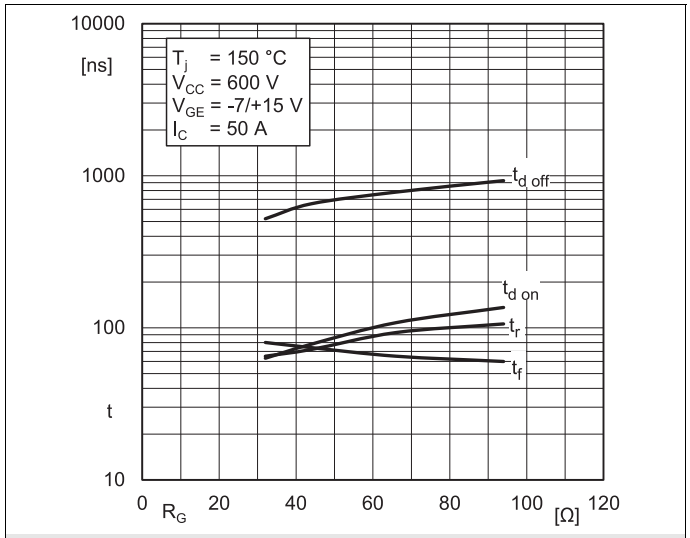


Fig. 8: Typ. switching times vs. gate resistor R_G

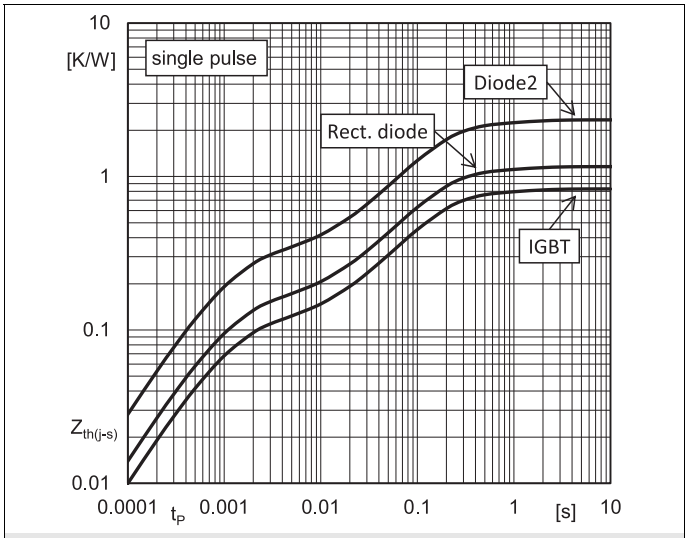


Fig. 9: Typ. transient thermal impedance

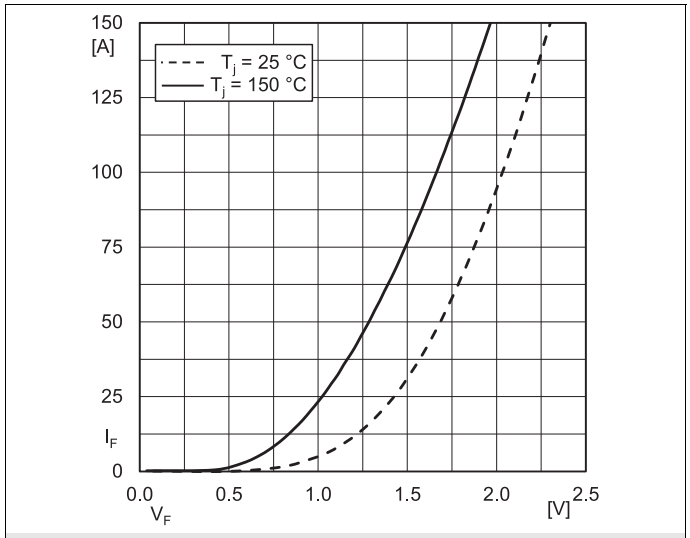
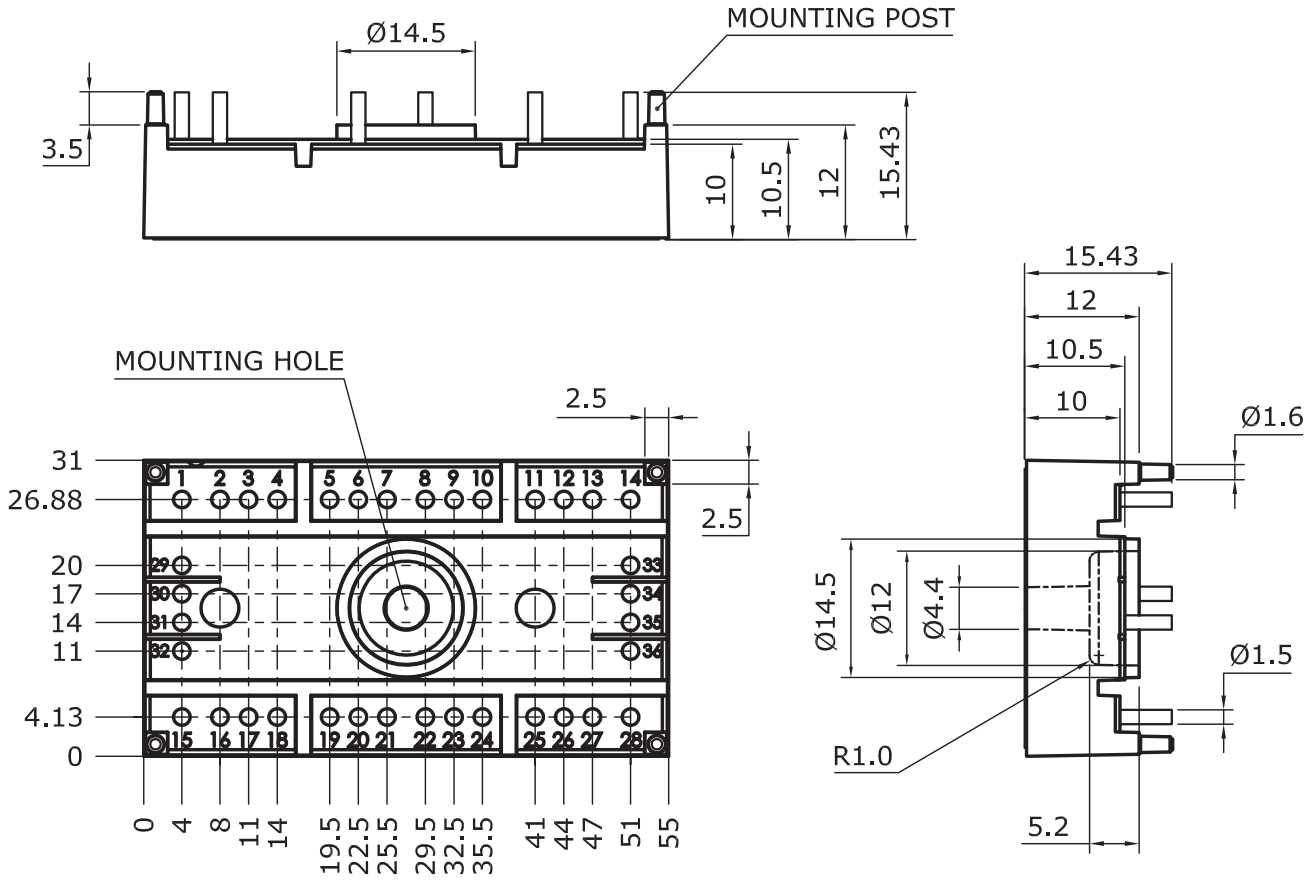


Fig. 10: Typ. Rectifier diode forward charact., incl. $R_{CC'+EE'}$

Dimensions: mm
Tolerance system: ISO 2768-m



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

- refer Mounting Instruction SEMITOP® Classic

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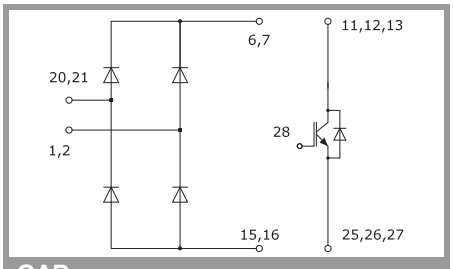

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This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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