

# SKM 150GB123D



**SEMITRANS™ 3**

## IGBT Modules

SKM 150GB123D

SKM 150GAL123D

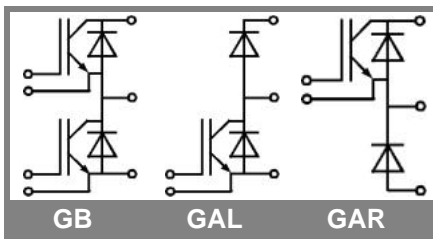
SKM 150GAR123D

### Features

- MOS input (voltage controlled)
- N channel, Homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to  $6 \times I_{Cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding
- Large clearance (12 mm) and creepage distances (20 mm)

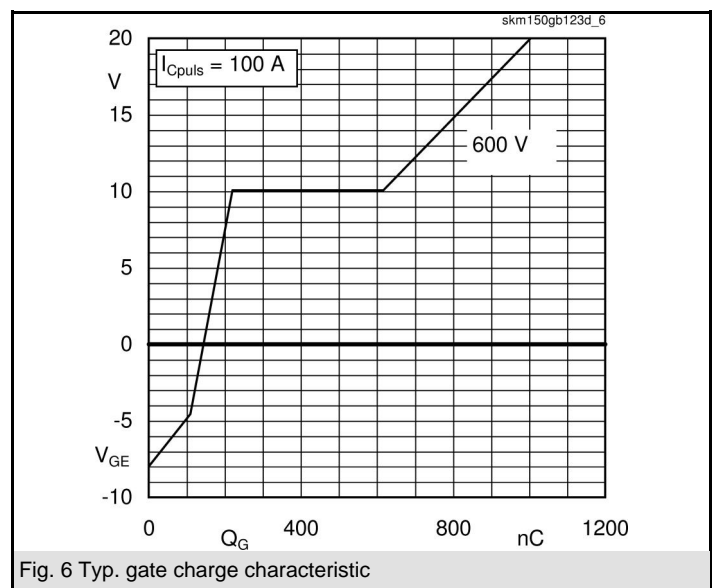
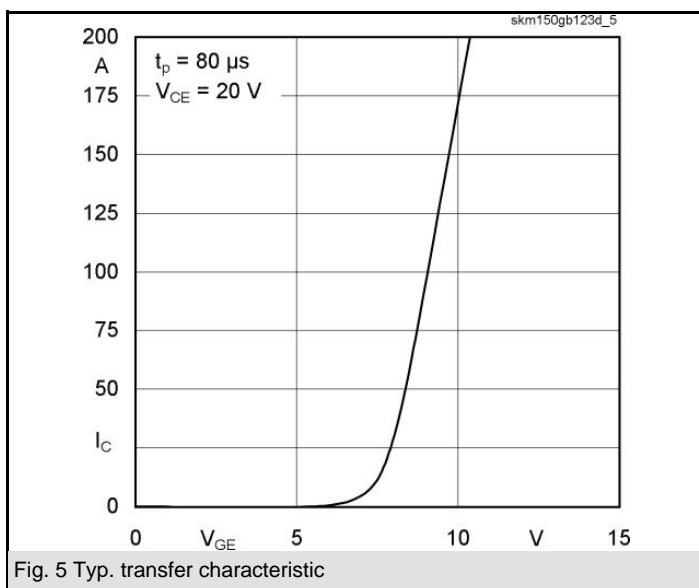
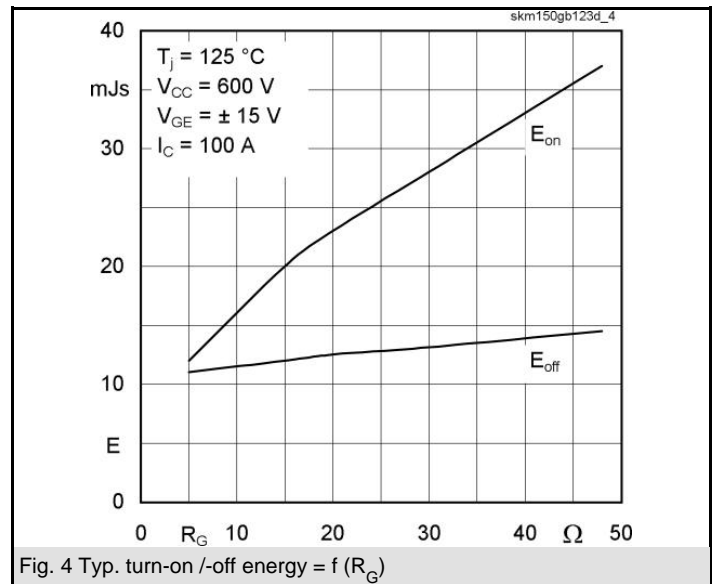
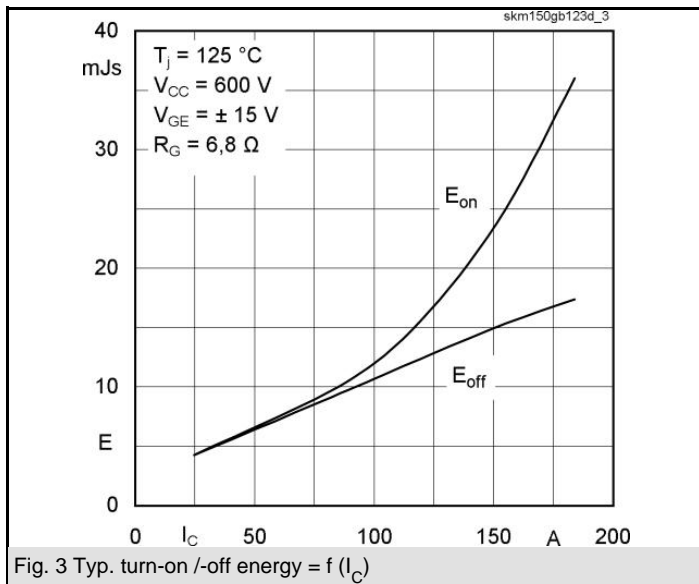
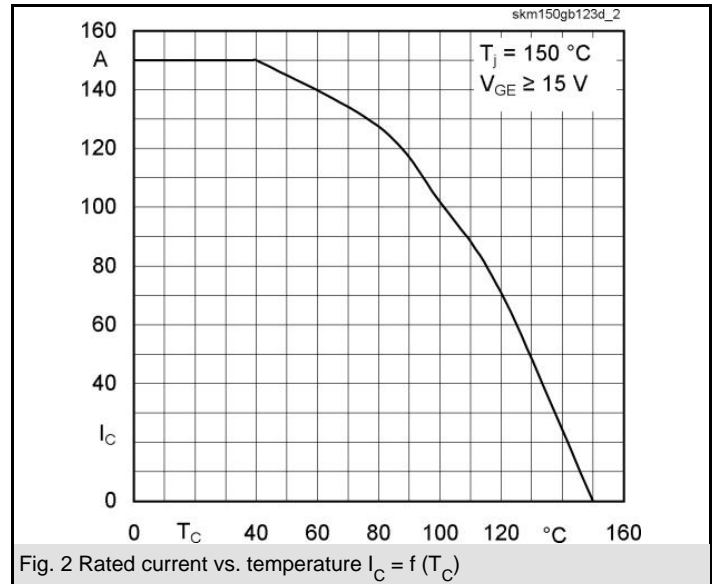
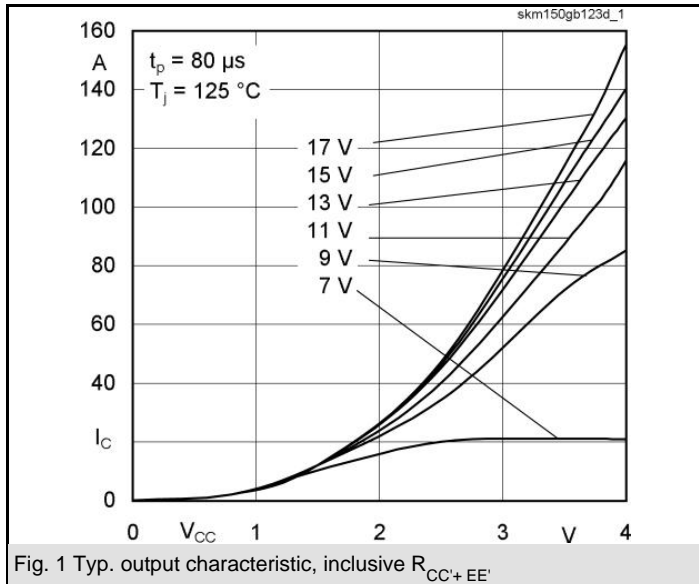
### Typical Applications

- Switching (not for linear use)



Absolute Maximum Ratings		$T_c = 25\text{ °C}$ , unless otherwise specified	
Symbol	Conditions	Values	Units
<b>IGBT</b>			
$V_{CES}$		1200	V
$I_C$	$T_c = 25\text{ (80) °C}$	150 (110)	A
$I_{CRM}$	$t_p = 1\text{ ms}$	200	A
$V_{GES}$		$\pm 20$	V
$T_{vj}$ ( $T_{stg}$ )	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	°C
$V_{isol}$	AC, 1 min.	2500	V
<b>Inverse diode</b>			
$I_F$	$T_c = 25\text{ (80) °C}$	150 (100)	A
$I_{FRM}$	$t_p = 1\text{ ms}$	200	A
$I_{FSM}$	$t_p = 10\text{ ms}$ ; sin.; $T_j = 150\text{ °C}$	1100	A
<b>Freewheeling diode</b>			
$I_F$	$T_c = 25\text{ (80) °C}$	200 (135)	A
$I_{FRM}$	$t_p = 1\text{ ms}$	300	A
$I_{FSM}$	$t_p = 10\text{ ms}$ ; sin.; $T_j = 150\text{ °C}$	1450	A

Characteristics		$T_c = 25\text{ °C}$ , unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{GE(th)}$	$V_{GE} = V_{CE}$ , $I_C = 4\text{ mA}$	4,5	5,5	6,5	V
$I_{CES}$	$V_{GE} = 0$ , $V_{CE} = V_{CES}$ , $T_j = 25\text{ (125) °C}$		0,1	0,3	mA
$V_{CE(TO)}$	$T_j = 25\text{ (125) °C}$		1,4 (1,6)	1,6 (1,8)	V
$r_{CE}$	$V_{GE} = 15\text{ V}$ , $T_j = 25\text{ (125) °C}$		11 (15)	14 (19)	mΩ
$V_{CE(sat)}$	$I_{Cnom} = 100\text{ A}$ , $V_{GE} = 15\text{ V}$ , chip level		2,5 (3,1)	3 (3,7)	V
$C_{res}$	under following conditions		6,5	8,5	nF
$C_{oes}$	$V_{GE} = 0$ , $V_{CE} = 25\text{ V}$ , $f = 1\text{ MHz}$		1	1,5	nF
$C_{res}$			0,5	0,6	nF
$L_{CE}$				20	nH
$R_{CC'+EE'}$	res., terminal-chip $T_c = 25\text{ (125) °C}$		0,35 (0,5)		mΩ
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ , $I_{Cnom} = 100\text{ A}$		160	320	ns
$t_r$	$R_{Gon} = R_{Goff} = 6,8\text{ Ω}$ , $T_j = 125\text{ °C}$		80	160	ns
$t_{d(off)}$	$V_{GE} = \pm 15\text{ V}$		400	520	ns
$t_f$			70	100	ns
$E_{on}$ ( $E_{off}$ )			13 (11)		mJ
<b>Inverse diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 100\text{ A}$ ; $V_{GE} = 0\text{ V}$ ; $T_j = 25\text{ (125) °C}$		2 (1,8)	2,5	V
$V_{(TO)}$	$T_j = 125\text{ ( ) °C}$			1,2	V
$r_T$	$T_j = 125\text{ ( ) °C}$		8	11	mΩ
$I_{RRM}$	$I_{Fnom} = 100\text{ A}$ ; $T_j = 25\text{ (125) °C}$		35 (50)		A
$Q_{rr}$	$di/dt = 1000\text{ A/μs}$		5 (14)		μC
$E_{rr}$	$V_{GE} = V$				mJ
<b>FWD</b>					
$V_F = V_{EC}$	$I_F = 150\text{ A}$ ; $V_{GE} = 0\text{ V}$ , $T_j = 25\text{ (125) °C}$		2 (1,8)	2,5	V
$V_{(TO)}$	$T_j = 125\text{ ( ) °C}$			1,2	V
$r_T$	$T_j = 125\text{ ( ) °C}$		5	8,7	mΩ
$I_{RRM}$	$I_F = 100\text{ A}$ ; $T_j = 25\text{ (125) °C}$		40 (65)		A
$Q_{rr}$	$di/dt = A/μs$		5 (15)		μC
$E_{rr}$	$V_{GE} = V$				mJ
<b>Thermal characteristics</b>					
$R_{th(j-c)}$	per IGBT			0,15	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,3	K/W
$R_{th(j-c)FD}$	per FWD			0,25	K/W
$R_{th(c-s)}$	per module			0,038	K/W
<b>Mechanical data</b>					
$M_s$	to heatsink M6	3		5	Nm
$M_t$	to terminals M6	2,5		5	Nm
w				325	g



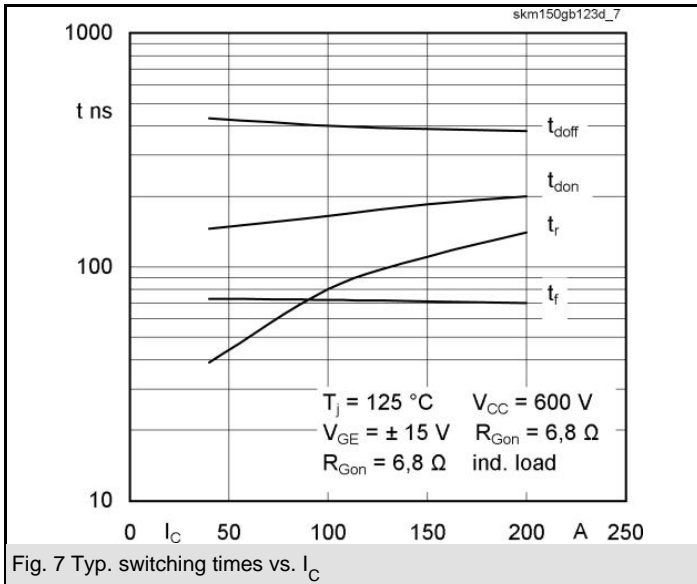


Fig. 7 Typ. switching times vs.  $I_C$

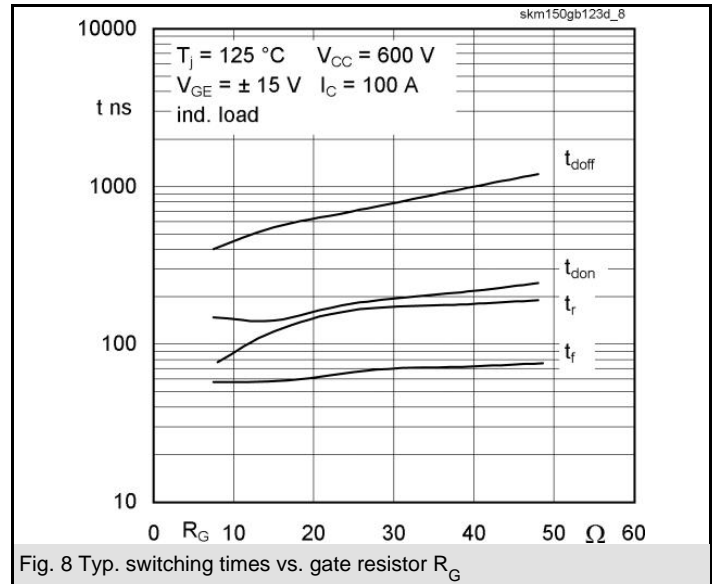


Fig. 8 Typ. switching times vs. gate resistor  $R_G$

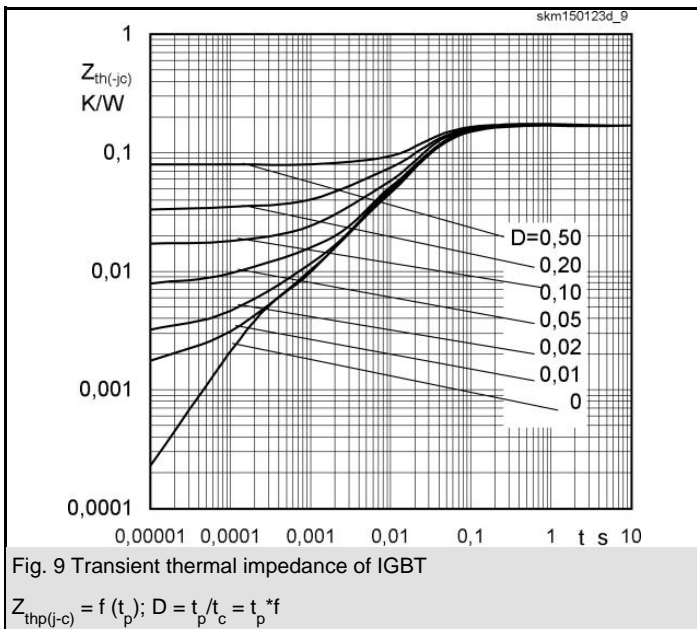


Fig. 9 Transient thermal impedance of IGBT

$$Z_{thp(j-c)} = f(t_p); D = t_p/t_c = t_p * f$$

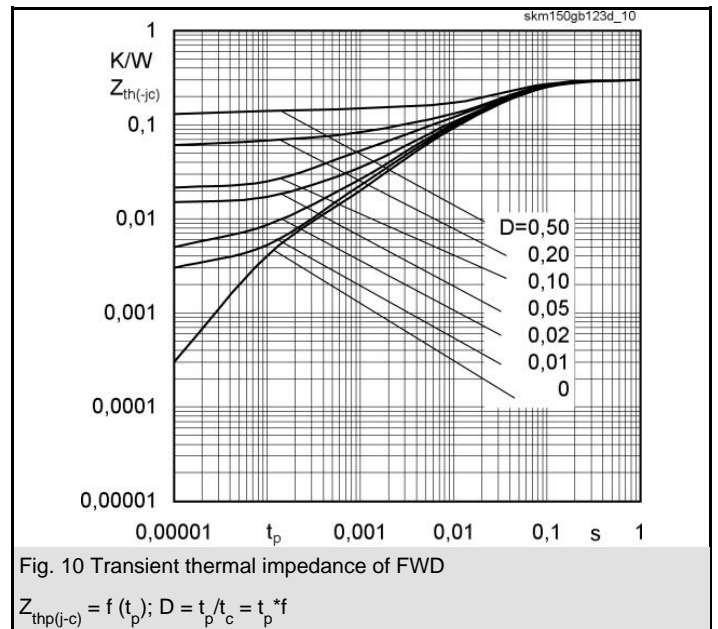


Fig. 10 Transient thermal impedance of FWD

$$Z_{thp(j-c)} = f(t_p); D = t_p/t_c = t_p * f$$

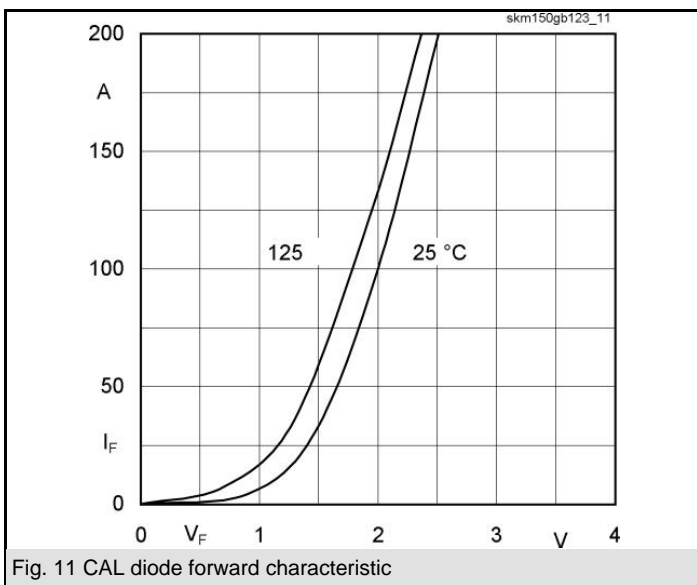


Fig. 11 CAL diode forward characteristic

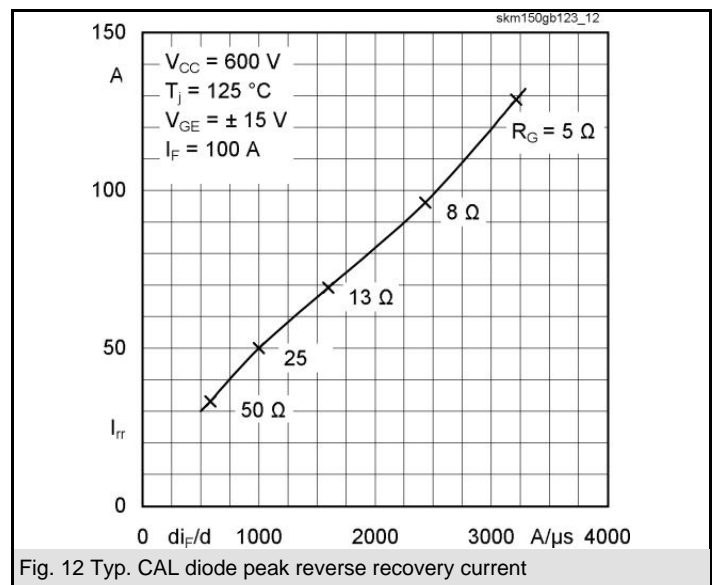
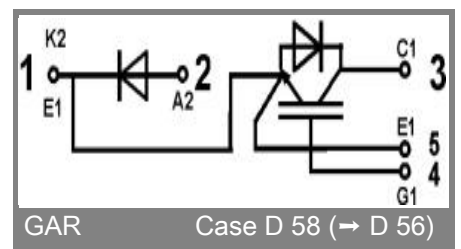
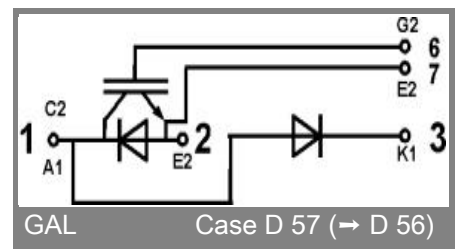
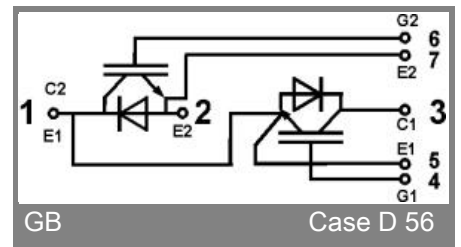
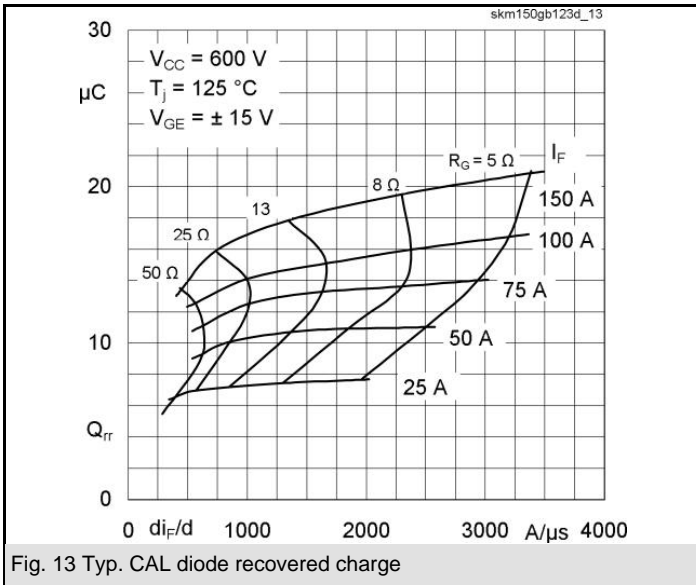


Fig. 12 Typ. CAL diode peak reverse recovery current

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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