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PESD2CAN

CAN bus ESD protection diode

1. Product profile

1.1 General description

PESD2CAN in a small SOT23 Surface-Mounted Device (SMD) plastic package designed to protect two automotive Controller Area Network (CAN) bus lines from the damage caused by ElectroStatic Discharge (ESD) and other transients.

1.2 Features and benefits

- Max. peak pulse power: $P_{PP} = 230 \text{ W}$ at $t_p = 8/20 \text{ } \mu\text{s}$
- Low clamping voltage: $V_{CL} = 41 \text{ V}$ at $I_{PP} = 5 \text{ A}$
- Ultra low leakage current: $I_{RM} < 1 \text{ nA}$
- ESD protection up to 30 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 5 \text{ A}$ at $t_p = 8/20 \text{ } \mu\text{s}$
- AEC-Q101 qualified

1.3 Applications

- CAN bus protection
- Automotive applications

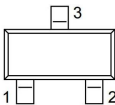
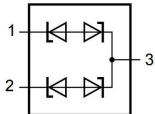
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage		-	-	24	V
C_d	diode capacitance	$f = 1 \text{ MHz}; V_R = 0 \text{ V}$	-	25	30	pF

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode 1		
2	cathode 2		
3	common cathode		

006aaa155

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3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD2CAN	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PESD2CAN	6R*

[1] * = placeholder for manufacturing site code.

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
P _{PP}	peak pulse power	t _p = 8/20 μs	^{[1][2]} -	230	W
I _{PP}	peak pulse current	t _p = 8/20 μs	^{[1][2]} -	5	A
Per device					
T _j	junction temperature		-	150	°C
T _{amb}	ambient temperature		-55	+150	°C
T _{stg}	storage temperature		-65	+150	°C

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1 to 3 or 2 to 3.

Table 6. ESD maximum ratings

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
V _{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	^{[1][2]} -	30	kV
		machine model	^[2] -	400	V
		MIL-STD-883 (human body model)	^{[1][2]} -	16	kV

[1] Device stressed with ten non-repetitive ESD pulses.

[2] Measured from pin 1 to 3 or 2 to 3.

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Table 7. ESD standards compliance

Standard	Conditions
Per diode	
IEC 61000-4-2; level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
MIL-STD-883; class 3B (human body model)	> 8 kV

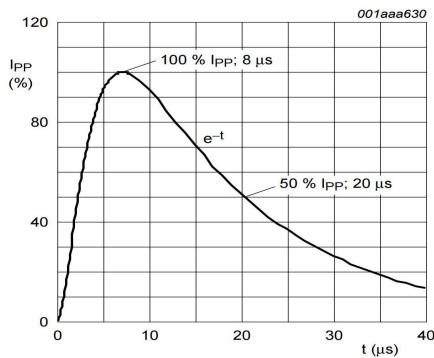


Fig 1. 8/20 μ s pulse waveform according to IEC 61000-4-5

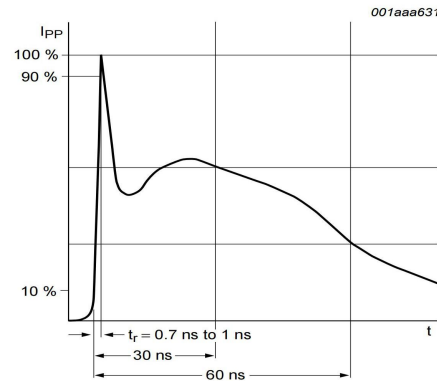


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

Table 8. Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse standoff voltage		-	-	24	V
I_{RM}	reverse leakage current	$V_{RWM} = 24\text{ V}$	-	< 1	10	nA
V_{BR}	breakdown voltage	$I_R = 1\text{ mA}$	26.2	28	30.3	V
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}$	-	25	30	pF
V_{CL}	clamping voltage	$I_{PP} = 1\text{ A}$	[1][2]	-	34	V
		$I_{PP} = 5\text{ A}$	[1][2]	-	41	V
r_{dif}	differential resistance	$I_R = 1\text{ mA}$	-	-	300	Ω

[1] Non-repetitive current pulse 8/20 μ s exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1 to 3 or 2 to 3.

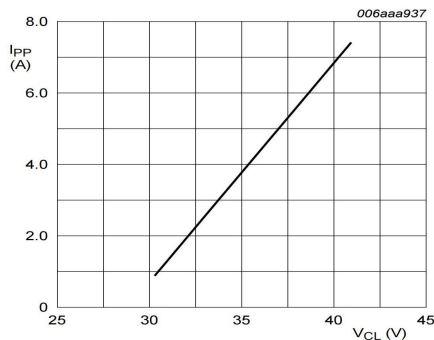


Fig 3. Peak pulse current as a function of clamping voltage; typical values

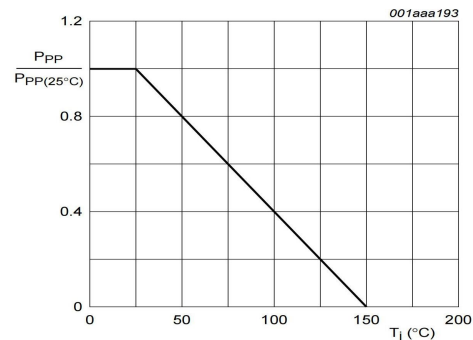
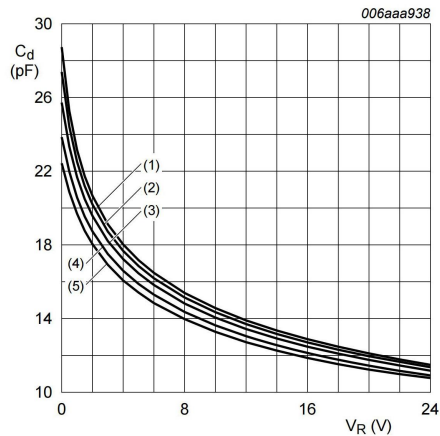


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values

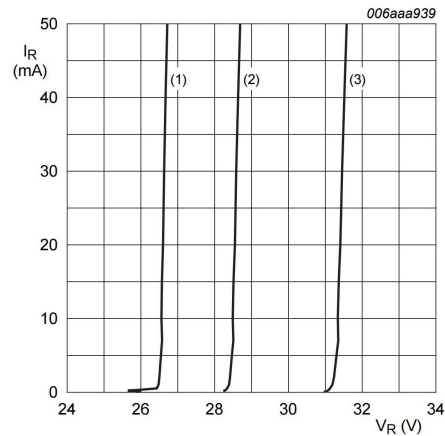
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$f = 1 \text{ MHz}$

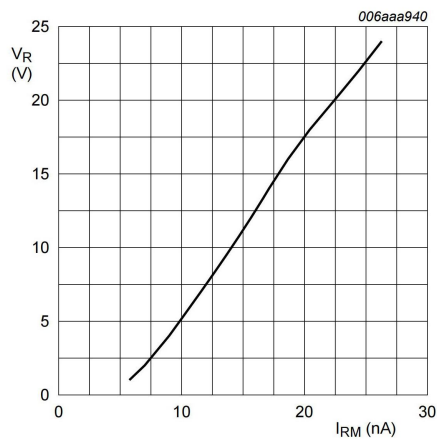
- (1) $T_{\text{amb}} = 150^\circ\text{C}$
- (2) $T_{\text{amb}} = 125^\circ\text{C}$
- (3) $T_{\text{amb}} = 85^\circ\text{C}$
- (4) $T_{\text{amb}} = 25^\circ\text{C}$
- (5) $T_{\text{amb}} = -40^\circ\text{C}$

Fig 5. Diode capacitance as a function of reverse voltage; typical values



- (1) $T_{\text{amb}} = -55^\circ\text{C}$
- (2) $T_{\text{amb}} = 25^\circ\text{C}$
- (3) $T_{\text{amb}} = 150^\circ\text{C}$

Fig 6. Reverse current as a function of reverse voltage; typical values



$T_{\text{amb}} = 150^\circ\text{C}$

I_R is less than 1 nA at -55°C and 25°C .

Fig 7. Reverse voltage as a function of reverse leakage current; typical values

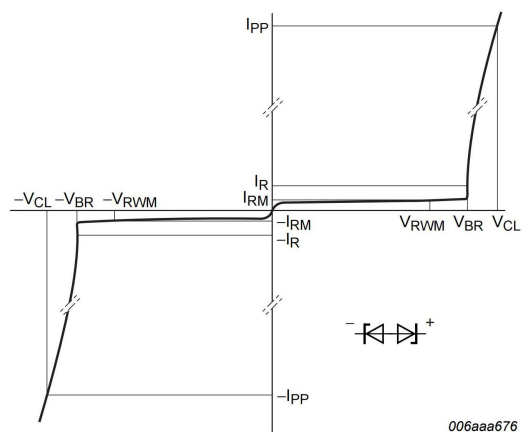


Fig 8. V-I characteristics for a bidirectional ESD protection diode

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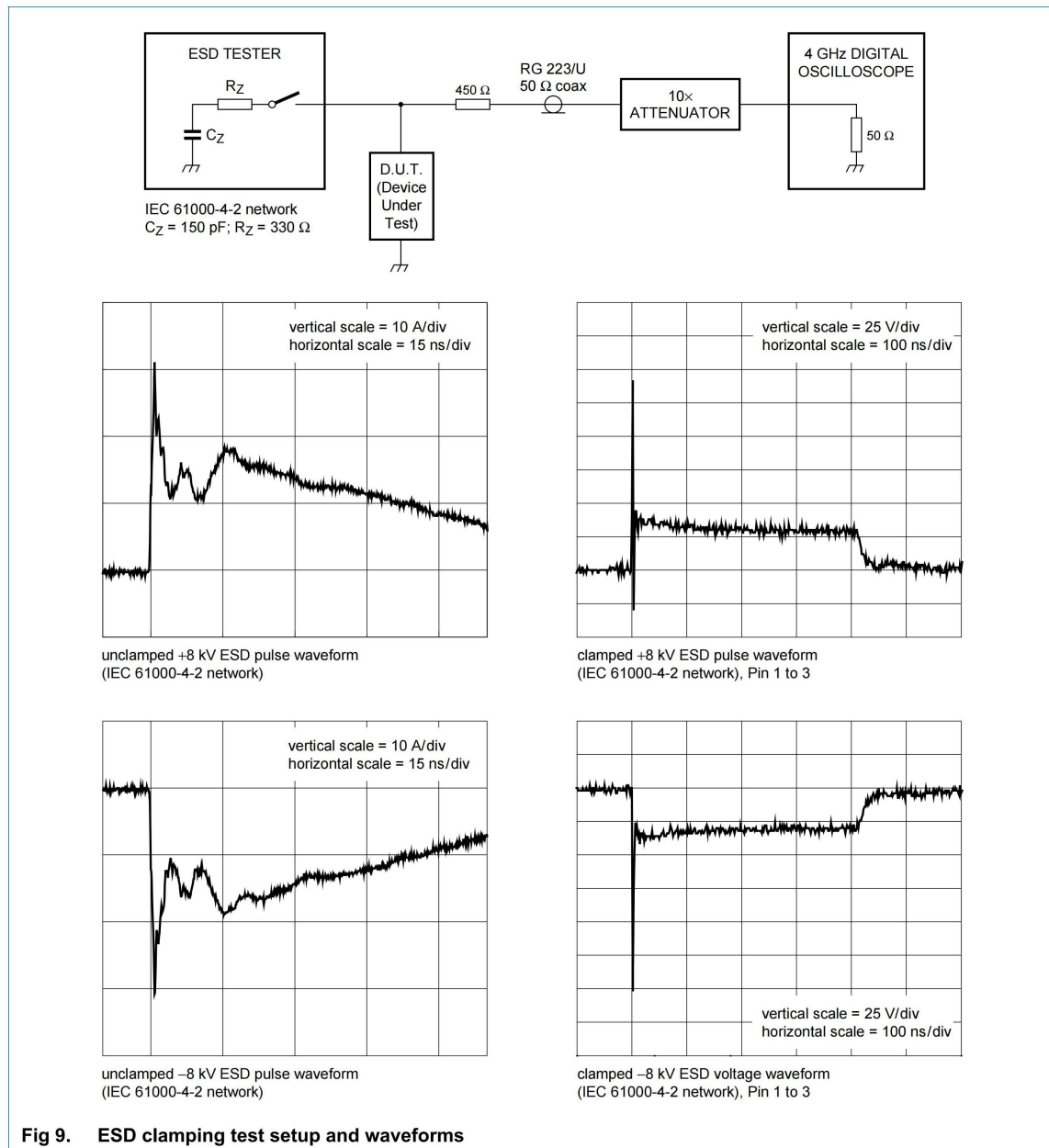


Fig 9. ESD clamping test setup and waveforms

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Ordering Information

PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SOT-23	R1	0.008	3000	30000	240000	7"

Package Outline Dimensions (SOT-23)

Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.15	0.035	0.045
A1	-	0.10	-	0.004
A2	0.90	1.05	0.035	0.041
b	0.30	0.50	0.012	0.020
c	0.10	0.20	0.004	0.008
D	2.80	3.00	0.110	0.118
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
e	0.950TYP		0.037TYP	
e1	1.80	2.00	0.071	0.079
L	0.550REF		0.022REF	
L1	0.30	0.50	0.012	0.020
θ	-	8°	-	8°

Suggested Pad Layout

Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
J	0.75	0.85	0.030	0.033
K	0.85	0.95	0.033	0.037
M	1.95	2.05	0.077	0.081
N	1.85	1.95	0.073	0.077