

2-CHANNEL LOW CAPACITANCE ESD PROTECTION ARRAY

**Product Summary**

<b>V<sub>F</sub> (Typ)</b>	<b>V<sub>P</sub> (Typ)</b>	<b>C<sub>OUT</sub> (Typ)</b>
0.8V	5V	1.5pF

**Description**

DM1231-02SO is a high-performance device suitable for protecting two high-speed channels. This product is assembled in SOT26 package. It has high ESD surge capability and low capacitance.

**Applications**

Typically Used for High Speed Ports such as:

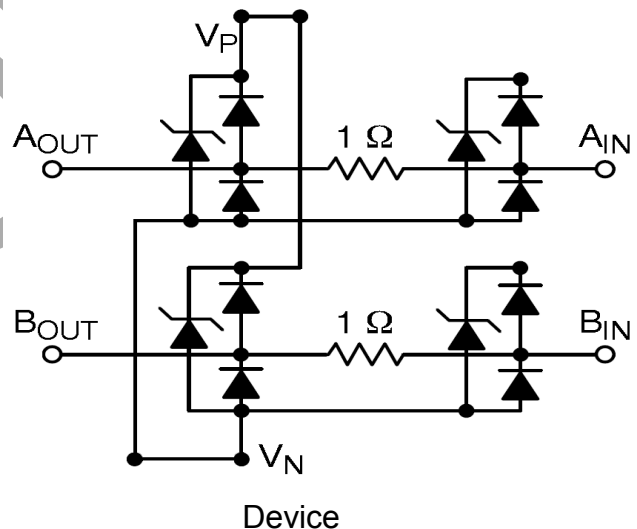
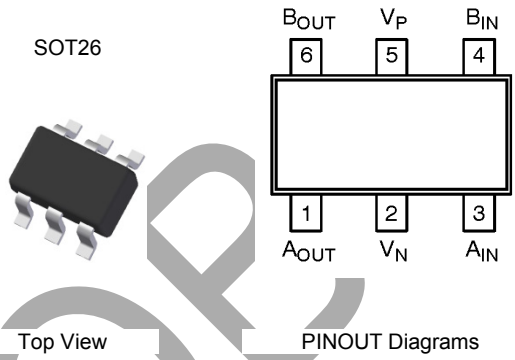
- USB 2.0
- IEEE1394
- HDMI
- Laptop and Personal Computers
- Flat Panel Displays
- Video Graphics Displays
- SIM Ports

**Features**

- Contact discharge per IEC61000-4-2 standard: ±12 kV (OUT Pins), ±4 kV(IN Pins)
- Withstands over 1000 ESD Strikes
- 1.5pF Typical Capacitance from OUT to V<sub>N</sub>
- Two channels of ESD Protection
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

**Mechanical Data**

- Case: SOT26
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020 (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Weight: 0.016 grams (Approximate)

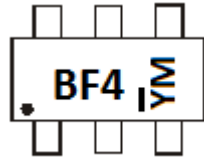


**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DM1231-02SO-7	Standard	BF4	7	8	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

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**Marking Information**


BF4= Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: D = 2016)  
 M = Month (ex: 9 = September)  
 Note: "—" represents internal code

**Date Code Key**

Year Code	2015	2016	2017	2018	2019	2020
	C	D	E	F	G	H

Month Code	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1	2	3	4	5	6	7	8	9	O	N	D

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Value	Unit
Operating Supply Voltage (V <sub>P</sub> )	6	V
Diode Forward Current(A <sub>OUT</sub> /B <sub>OUT</sub> Side)	8	mA
Continuous Current through Signal Pins (IN to OUT) 1,000 hours	125	mA
ESD Protection – Contact Discharge (Note5)	±12	kV
	±4	kV

**Thermal Characteristics**

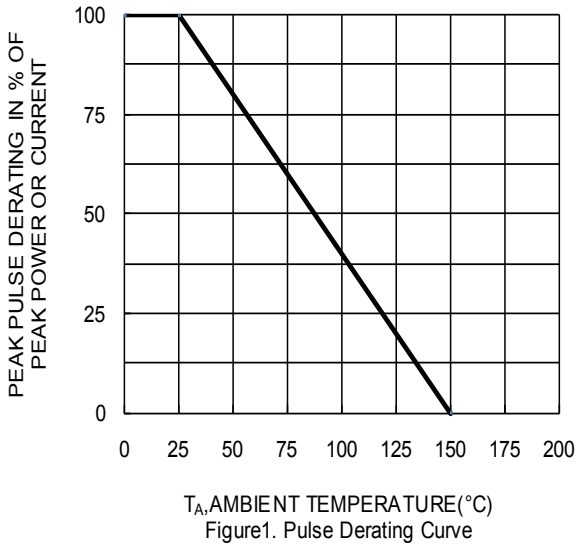
Characteristic	Symbol	Value	Unit
Power Dissipation Typical (Note 6)	P <sub>D</sub>	300	mW
Thermal Resistance, Junction to Ambient Typical (Note 6)	R <sub>θJA</sub>	417	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
Operating Supply Voltage	V <sub>P</sub>	—	5	5.5	V	—
Reverse Current (Note 7)	I <sub>R</sub>	—	—	1	μA	V <sub>P</sub> = 5V, V <sub>P</sub> to V <sub>N</sub>
Diode Forward Voltage	V <sub>F</sub>	0.6	0.8	0.95	V	I <sub>F</sub> = 8mA, Top Diode
Diode Forward Voltage	V <sub>F</sub>	0.6	0.8	0.95	V	I <sub>F</sub> = 8mA, Bottom Diode
Residual ESD Peak Current on RDUP(Resistance of Device Under Protection)	I <sub>RES</sub>	—	2.3	—	A	IEC 61000-4-2 contact mode 8kV, RDUP = 5Ω
Channel Clamping Voltage (Note 8)	V <sub>CL_Positive</sub>	—	+9	—	V	I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20μs
	V <sub>CL_Negative</sub>	—	-1.4	—	V	Zap at OUT, Measure at IN
Dynamic Resistance	R <sub>DYN_Positive</sub>	—	0.4	—	Ω	I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20μs
	R <sub>DYN_Negative</sub>	—	0.3	—	Ω	Zap at OUT, Measure at IN
Channel Input Capacitance(Note 9)	C <sub>OUT</sub>	—	1.5	—	pF	f = 1MHz, V <sub>P</sub> = 5V, V <sub>OSC</sub> = 2.5V, V <sub>OSC</sub> = 30mV
Channel to Channel Capacitance Match	ΔC <sub>OUT</sub>	—	0.02	—	pF	f = 1MHz, V <sub>P</sub> = 5V, V <sub>OSC</sub> = 2.5V, V <sub>OSC</sub> = 30mV
Series Resistance	R <sub>S</sub>	—	1	—	Ω	—
Channel to Channel Resistance Match	ΔR <sub>S</sub>	—	±10	±30	mΩ	—

- Notes:
- Standard test condition is IEC61000-4-2 level 4 test circuit with each (A<sub>OUT</sub>/B<sub>OUT</sub>) pin subjected to ±12kV contact discharge for 1000 pulses. **Discharges are timed at 1 second intervals and all 1000 strikes are completed in one continuous test run.**
  - Device mounted on FR-4 PCB pad layout (2oz copper) as shown on Diodes, Inc. suggested pad layout, which can be found on our website at <http://www.diodes.com/package-outlines.html>.
  - Short duration pulse test used to minimize self-heating effect.
  - Clamping voltage value is based on an 8x20μs peak pulse current (I<sub>pp</sub>) waveform.
  - Capacitance measured from V<sub>OUT</sub> to V<sub>N</sub> with V<sub>IN</sub> floating.

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T<sub>A</sub>, AMBIENT TEMPERATURE (°C)  
Figure 1. Pulse Derating Curve

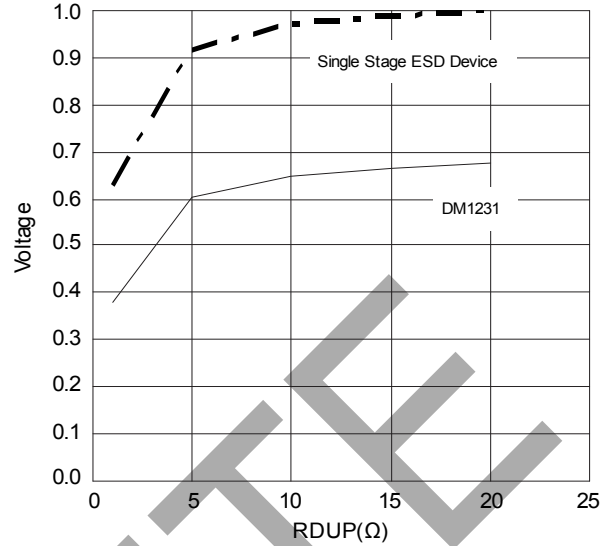


Figure 2. IEC61000-4-2 V<sub>peak</sub> vs. Loading (RDUP)

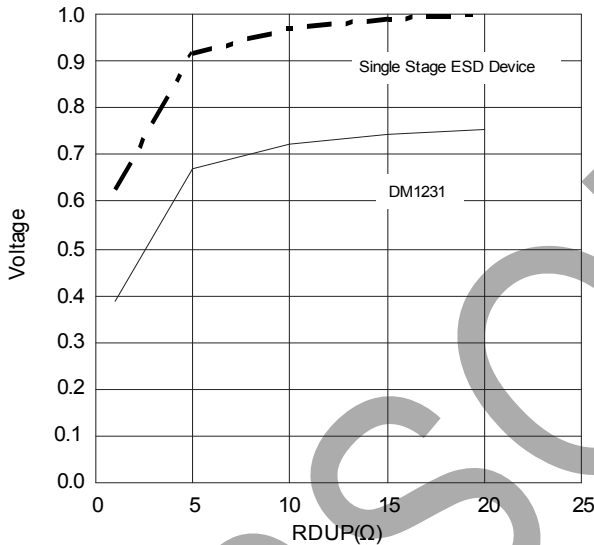


Figure 3. IEC61000-4-2 V<sub>clamp</sub> vs. Loading (RDUP)

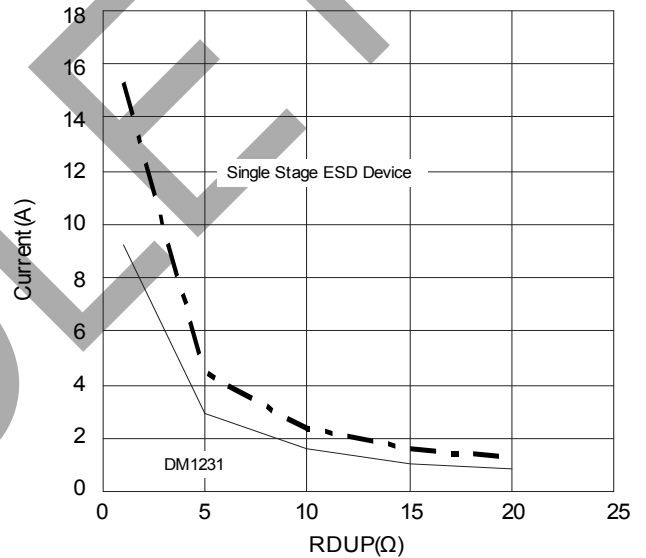


Figure 4. IEC61000-4-2  
I<sub>RES</sub> (Residual ESD Peak Current) vs. Loading (RDUP)

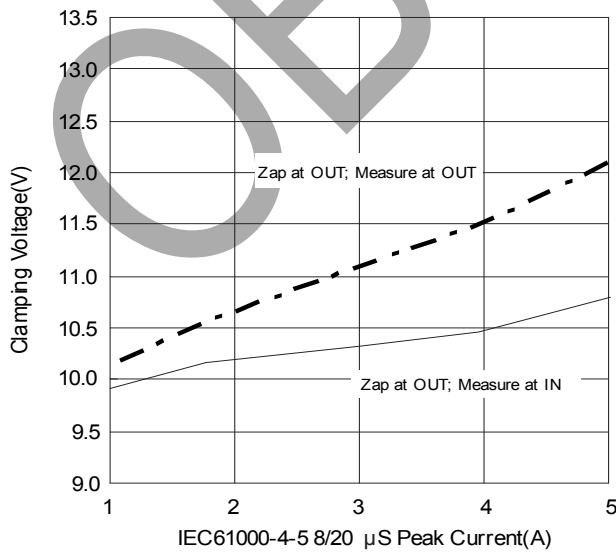


Figure 5. Clamping Voltage vs. Peak Current

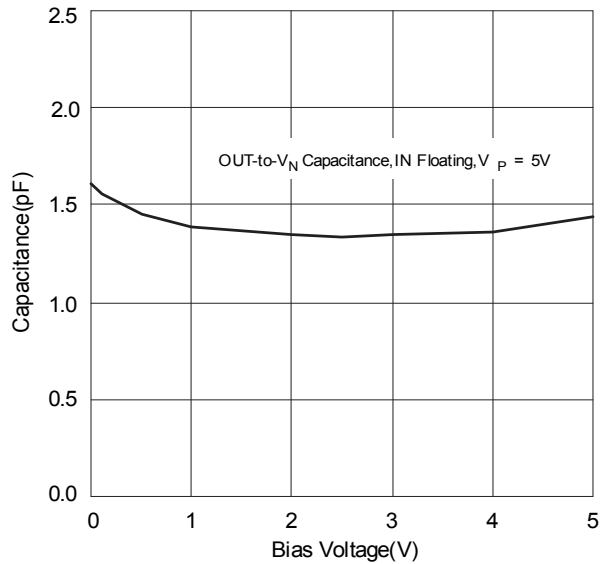
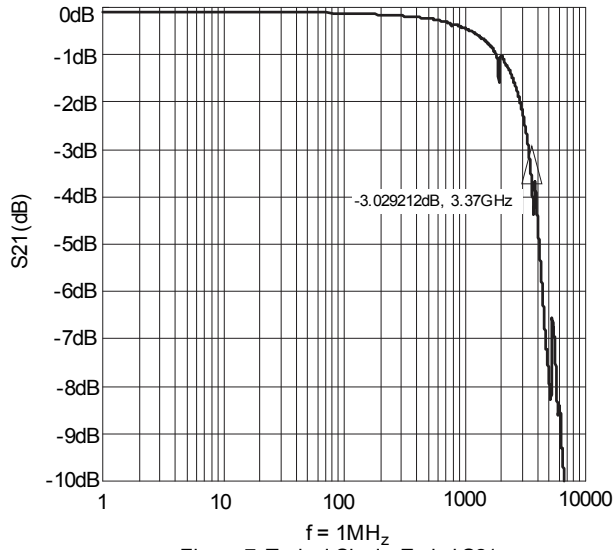


Figure 6. Capacitance vs. Bias Voltage

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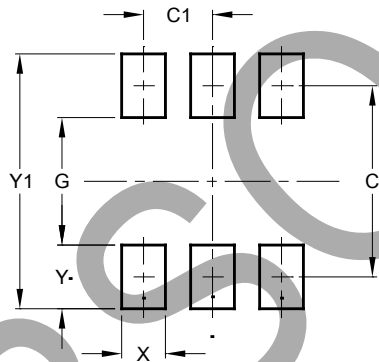


f = 1MHz  
Figure 7, Typical Single-Ended S21 plot (1dB/div, 1MHz to 10GHz)

### Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

#### SOT26 (SC74R)

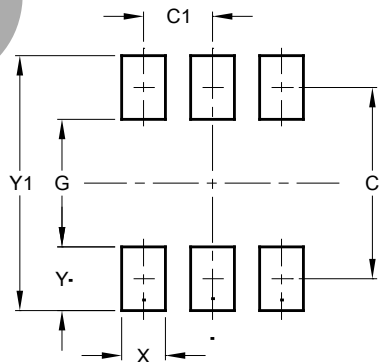


Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

### Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

#### SOT26 (SC74R)



Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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