TVS4201MR6

Transient Voltage Suppressors

Low Clamping Voltage Surge Protection Diode Array

The TVS4201MR6 transient voltage suppressor is designed to protect high speed data lines from ESD, EFT, and lightning surges.

Features

- Protection for the Following IEC Standards:
  IEC 61000−4−2 (ESD) ±30 kV (Contact)
  IEC 61000−4−5 (Lightning) 25 A (8/20 μs)
- Low Clamping Voltage
- Low Leakage
- UL Flammability Rating of 94 V−0
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- High Speed Communication Line Protection
- USB 1.1 and 2.0 Power and Data Line Protection
- Digital Video Interface (DVI)
- Monitors and Flat Panel Displays

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Power Dissipation 8/20 μs @ T_A = 25°C (Note 1)	P_{pk}	500	W
Operating Junction Temperature Range	T_J	−40 to +125	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C
Lead Solder Temperature − Maximum (10 Seconds)	T_L	260	°C
IEC 61000−4−2 Air (ESD) IEC 61000−4−2 Contact (ESD)	ESD	±30 ±30	kV
IEC 61000−4−4 (5/50 ns)	EFT	40	A

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Non−repetitive current pulse per Figure 1 (Pin 5 to Pin 2)

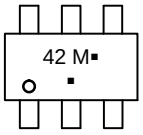
See Application Note AND8308/D for further description of survivability specs.

ON Semiconductor®

www.onsemi.com

TSOP−6
CASE 318G

MARKING DIAGRAM

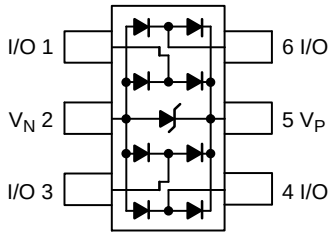


42 = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

PIN CONFIGURATION AND SCHEMATIC



ORDERING INFORMATION

Device	Package	Shipping
TVS4201MR6T1G	TSOP−6 (Pb−Free)	3000 / Tape & Reel
SZTVS4201MR6T1G	TSOP−6 (Pb−Free)	3000 / Tape & Reel

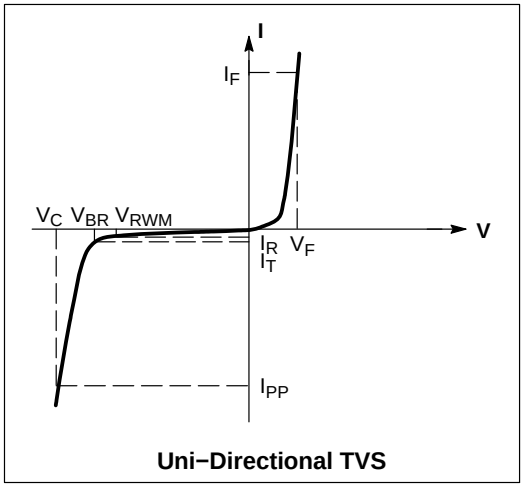
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

Symbol	Parameter
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Working Peak Reverse Voltage
I_R	Maximum Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
I_F	Forward Current
V_F	Forward Voltage @ I_F
P_{pk}	Peak Power Dissipation
C	Capacitance @ V_R = 0 and f = 1.0 MHz

*See Application Note AND8308/D for detailed explanations of datasheet parameters.



Uni−Directional TVS

ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}	(Note 2)			5.0	V
Breakdown Voltage	V_{BR}	I_T=1 mA, (Note 3)	6.0			V
Reverse Leakage Current	I_R	V_{RWM} = 5 V			1.0	μA
Clamping Voltage (t_p = 8/20 μs per Figure 1)	V_C	I_{PP} = 1 A, Any I/O to GND			8.5	V
		I_{PP} = 5 A, Any I/O to GND			9.0	
		I_{PP} = 8 A, Any I/O to GND			10	
		I_{PP} = 25 A, Any I/O to GND			12	
Junction Capacitance	C_J	V_R = 0 V, f=1 MHz between I/O Pins and GND		3.0	5.0	pF
Junction Capacitance	C_J	V_R = 0 V, f=1 MHz between I/O Pins		1.5	3.0	pF

2. TVS devices are normally selected according to the working peak reverse voltage (V_{RWM}), which should be equal or greater than the DC or continuous peak operating voltage level.
3. V_{BR} is measured at pulse test current I_T.

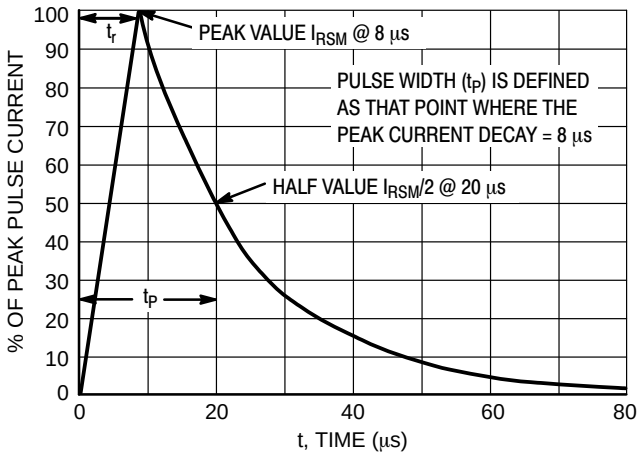


Figure 1. IEC61000−4−5 8/20 μs Pulse Waveform

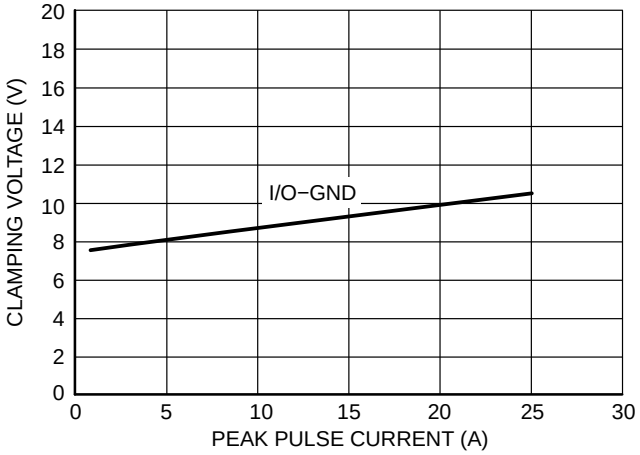


Figure 2. Clamping Voltage vs. Peak Pulse Current (t_p = 8/20 μs per Figure 1)

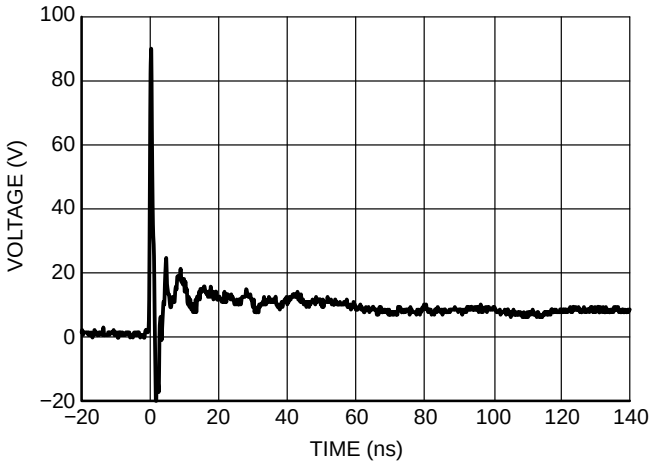


Figure 3. IEC61000−4−2 +8 kV Contact Clamping Voltage

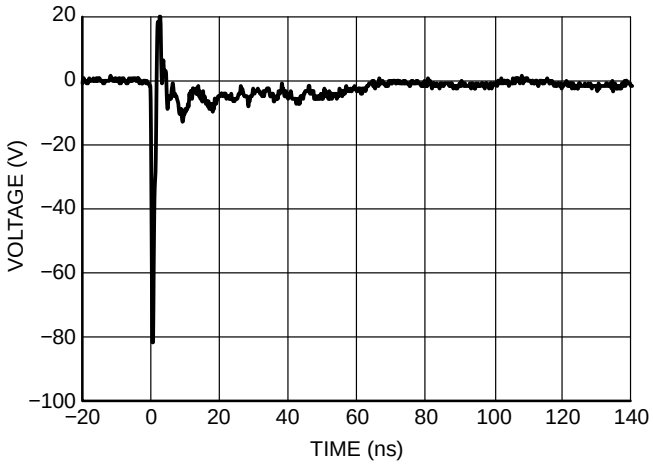


Figure 4. IEC61000−4−2 −8 kV Contact Clamping Voltage

IEC 61000−4−2 Spec.

Level	Test Voltage (kV)	First Peak Current (A)	Current at 30 ns (A)	Current at 60 ns (A)
1	2	7.5	4	2
2	4	15	8	4
3	6	22.5	12	6
4	8	30	16	8

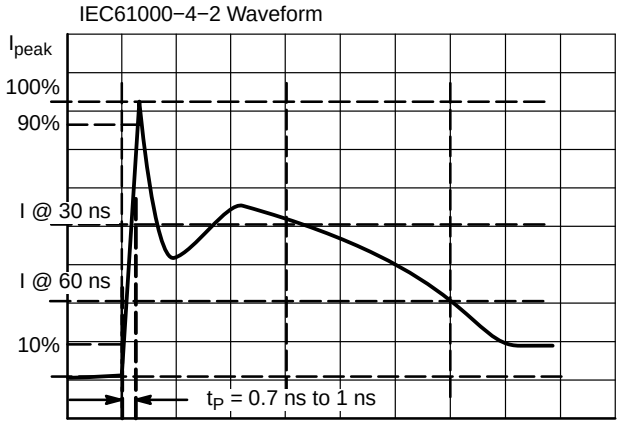


Figure 5. IEC61000−4−2 Spec

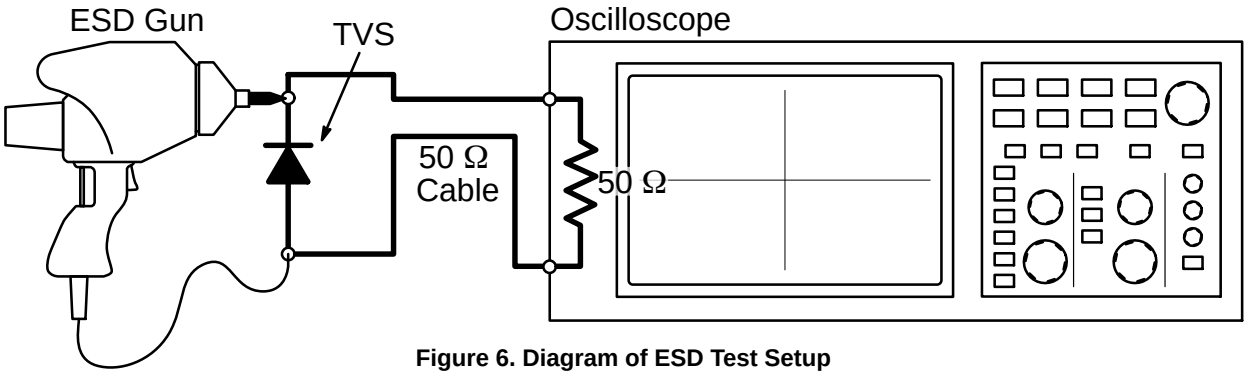


Figure 6. Diagram of ESD Test Setup

The following is taken from Application Note AND8308/D − Interpretation of Datasheet Parameters for ESD Devices.

ESD Voltage Clamping

For sensitive circuit elements it is important to limit the voltage that an IC will be exposed to during an ESD event to as low a voltage as possible. The ESD clamping voltage is the voltage drop across the ESD protection diode during an ESD event per the IEC61000−4−2 waveform. Since the IEC61000−4−2 was written as a pass/fail spec for larger systems such as cell phones or laptop computers it is not clearly defined in the spec how to specify a clamping voltage at the device level. ON Semiconductor has developed a way to examine the entire voltage waveform across the ESD protection diode over the time domain of an ESD pulse in the form of an oscilloscope screenshot, which can be found on the datasheets for all ESD protection diodes. For more information on how ON Semiconductor creates these screenshots and how to interpret them please refer to AND8307/D.

TYPICAL PERFORMANCE CURVES

(T_J = 25°C unless otherwise noted)

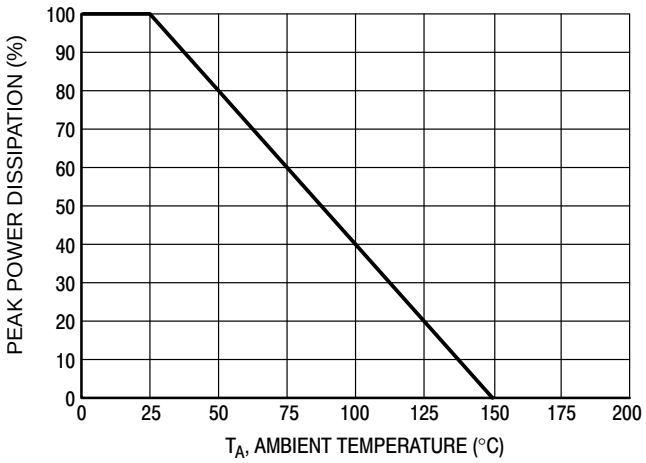


Figure 7. Pulse Derating Curve

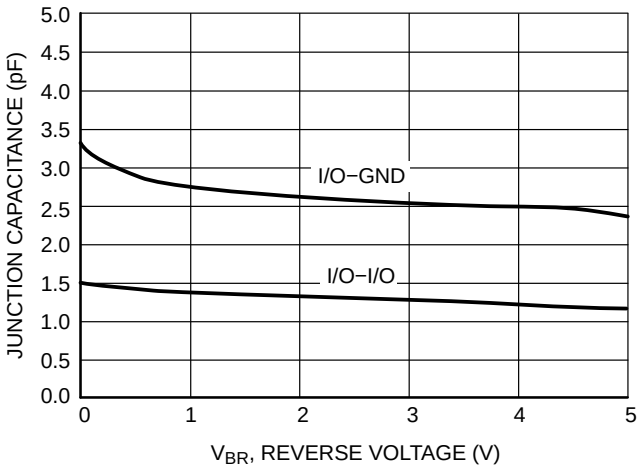


Figure 8. Junction Capacitance vs Reverse Voltage

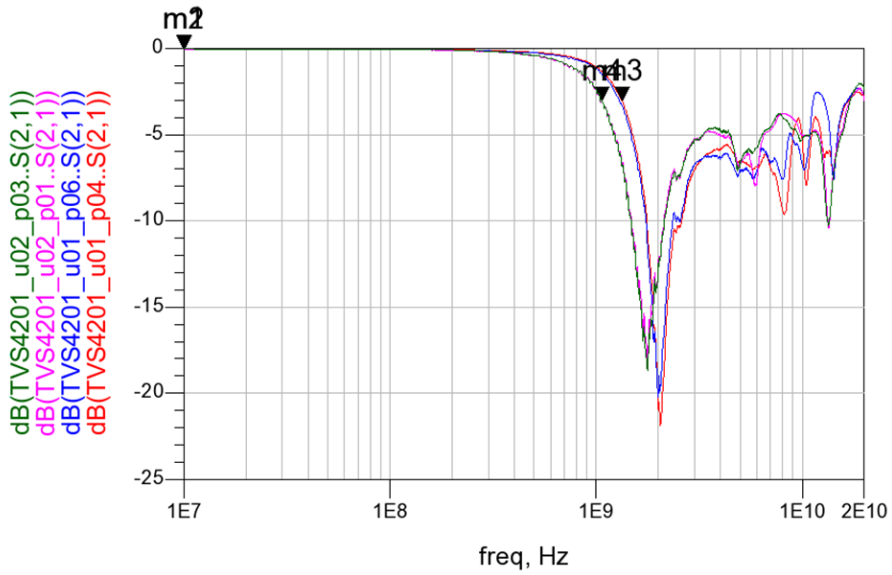


Figure 9. RF Insertion Loss

TYPICAL APPLICATIONS

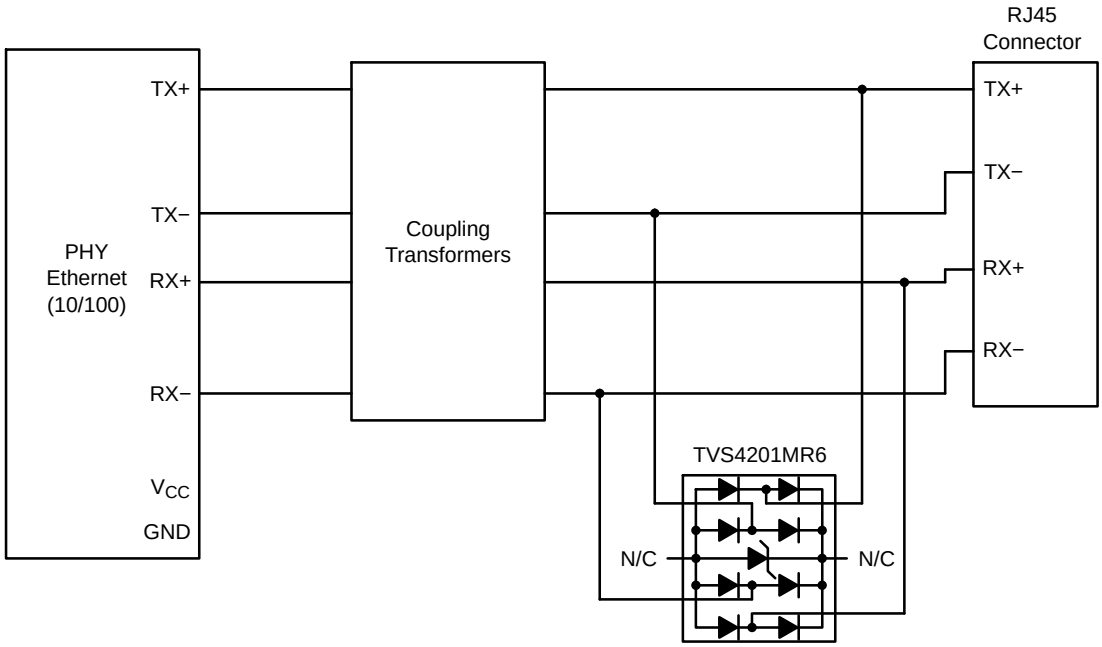


Figure 10. Protection for Ethernet 10/100 (Differential mode)

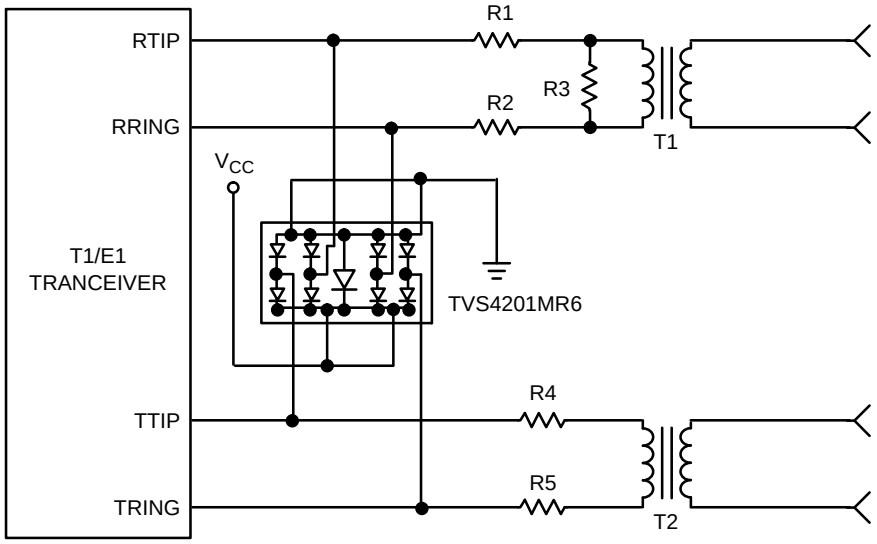
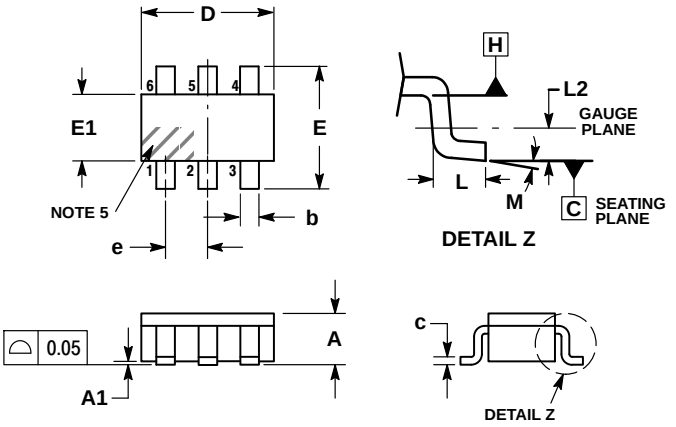


Figure 11. TI/E1 Interface Protection

TVS4201MR6

PACKAGE DIMENSIONS

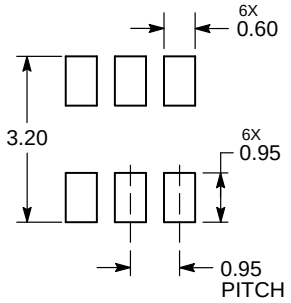
TSOP−6
CASE 318G−02
ISSUE V



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

	MILLIMETERS		
DIM	**MIN**	**NOM**	**MAX**
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2	0.25 BSC		
M	0°	–	10°

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

ON Semiconductor:

TVS4201MR6T1G SZTVS4201MR6T1G