

## Description

The uGuard2804 TVS diode is a low capacitance TVS (Transient Voltage Suppressor) device specifically designed to meet the EOS (Electrical Over-Stress) protection requirements of Gigabit Ethernet interfaces. The uGuard2804 is designed to protect sensitive PHY (physical layer) chips from damage due to EOS events such as electrostatic discharge (ESD), lightning, electrical fast transients (EFT), and cable discharge events (CDE). The uGuard2804 is constructed with a proprietary process that ensures low leakage (“idle”) current and low junction capacitance when used in low voltage applications. The device has minimal change in junction capacitance, as a function of bias voltage variations, which facilitates stable operation on GbE lines and interfaces. The uGuard2804 is in an 8-pin SO-8 package with lead-free matte tin lead finish. The combination of low clamping voltage, high surge capability, low “idle” current and low capacitance makes the uGuard2804 an ideal solution for protecting sensitive GbE systems in accordance with the transient protection immunity requirements of GR-1089.

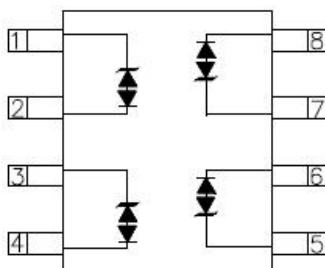
## Features

- High ESD withstand Voltage:  $\pm 15\text{kV}$  (air),  $\pm 8\text{kV}$  (contact) per IEC 61000-4-2
- Multiple surge event capability (1000 events) per IEC 61000-4-2 Level 4
- High peak power capability (120W)
- Flow-through design minimizes parasitic inductance for reduced voltage overshoot
- Protects two line pairs
- Low reverse “idle” current: 30nA typical ( $V_R=2.8\text{V}$ )
- Low variation in capacitance vs. bias voltage: 1.3pF Typical ( $V_R = 0$  to 2.8V)
- Low working voltage: 2.8V
- Solid-state silicon design – no inherent wear out mechanism

## Mechanical Characteristics

- JEDEC SO-8 package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Lead Finish: Matte tin
- Molding compound flammability rating: UL 94V-0
- Marking: Marking code, date code
- Packaging: Tape and Reel

## Circuit Diagram



## Applications

- 10/100/1000 Ethernet
- Integrated magnetics/RJ-45 connectors
- LAN/WAN Equipment
- User interface
- Integrated Circuit (IC)  $V_{bus}$
- Peripheral power and accessory ports

**Ordering Information:**

Device	Package	Shipping
uGuard2804	SO-8 (Pb-Free)	3000pcs / reel

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

**Maximum Ratings** @ $T_A=25^{\circ}\text{C}$  unless otherwise specified

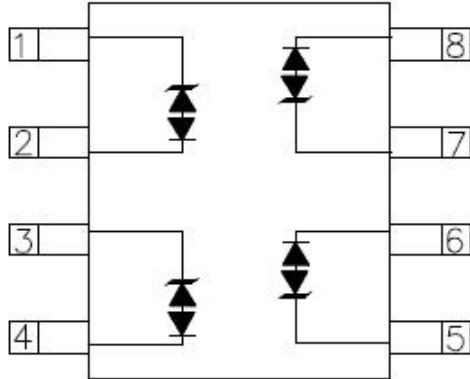
Parameter	Symbol	Value	Unit
Peak Pulse Power ( $t_p = 8/20\mu\text{s}$ )	$P_{pk}$	120	W
Peak Pulse Current ( $t_p=8/20\mu\text{s}$ )	$I_{PP}$	10	A
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$V_{ESD}$	+/- 15 +/- 8	KV
Operating Junction Temperature Range	$T_J$	-40 to + 125	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to + 150	$^{\circ}\text{C}$

**Electrical Characteristics:**

Characteristics	Symbol	Condition	Typ.	Max.	Units
Reverse Stand-Off Voltage	$V_{RWM}$	-	-	2.8	V
Reverse Leakage Current	$I_R$	@ $V_{RWM} = 2.8\text{V}$	0.03	0.05	$\mu\text{A}$
Clamping Voltage	$V_C$	@ $I_{PP} = 1\text{A}$ , $t_p=8/20\mu\text{s}$	-	6	V
Clamping Voltage	$V_C$	@ $I_{PP} = 10\text{A}$ , $t_p=8/20\mu\text{s}$	-	12	V
Variation in capacitance with reverse bias		@ $V_R = 0$ to $2.8\text{V}$ , $f_{SIG} = 1\text{MHz}$ Pins 1, 8 to 2, 7 and pins 3, 6 to 4, 5	1.3	-	pF
Junction Capacitance	$C_j$	@ $V_R = 2.8\text{V}$ , $f_{SIG} = 1\text{MHz}$ Pins 1, 8 to 2, 7 and pins 3, 6 to 4, 5	3.2	6	pF

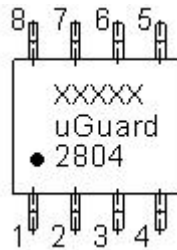
**Technical Data**  
Data Sheet N1867 REV.-

**Circuit Diagram**



The uGuard2804 is designed to protect four high-speed data lines (two differential pairs) from transient over-voltages which result from lightning and ESD. Data line inputs/outputs are connected at pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5.

**Marking Diagram:**

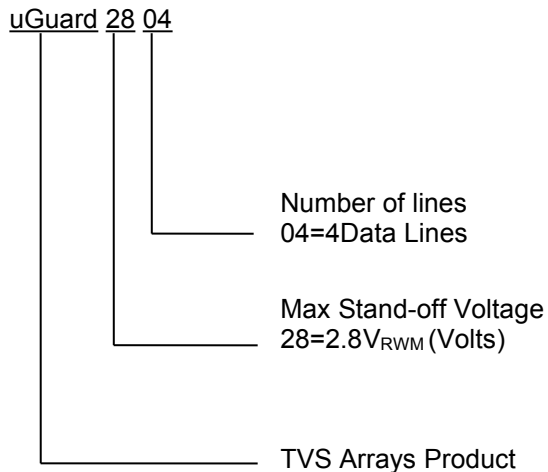


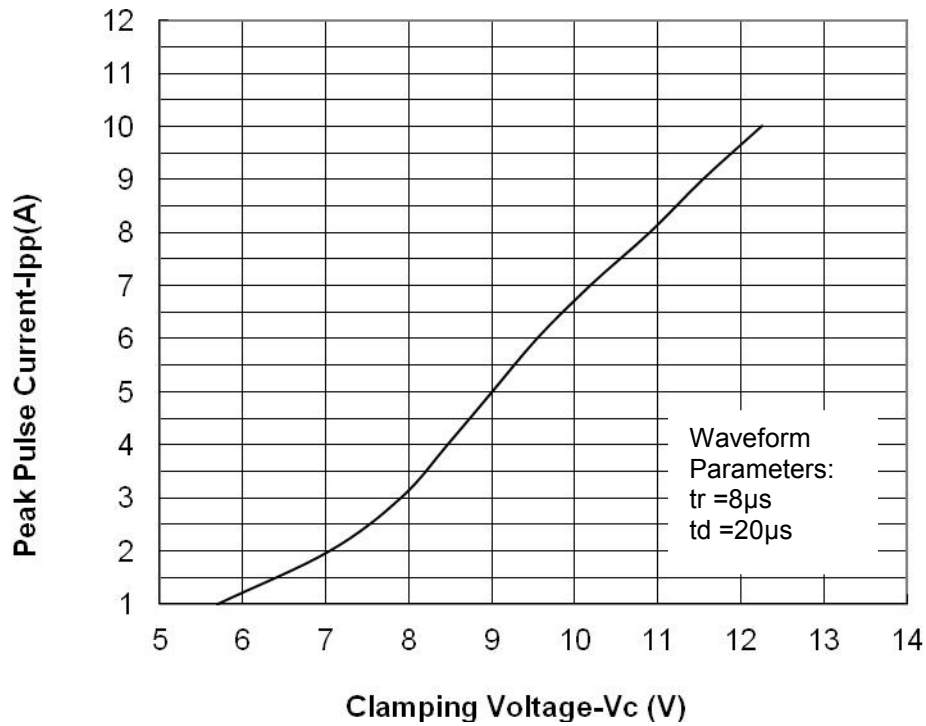
Where XXXXX is YYWWL

uGuard2804 = Part Name  
YY = Year  
WW = Week  
L = Lot Number

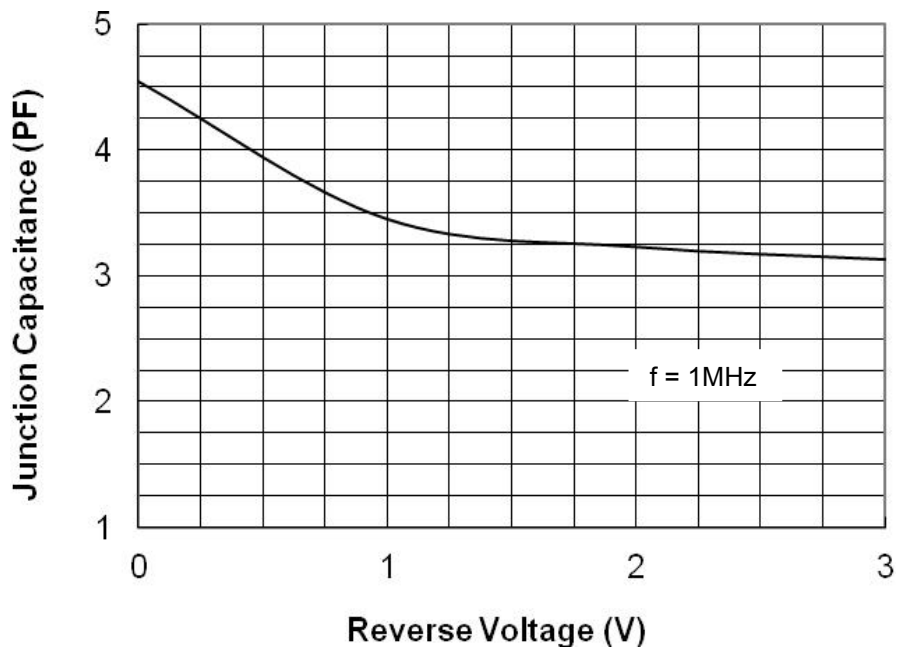
**Cautions:** Molding resin  
Epoxy resin UL:94V-0

**Part Name Information**



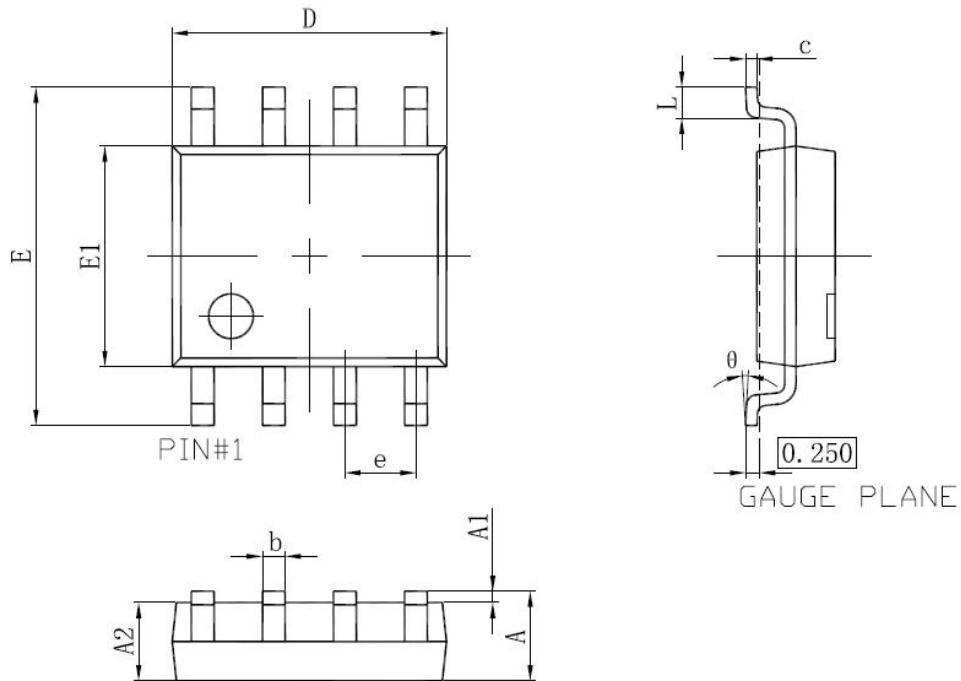


**Fig. 1 Typical Clamping Voltage vs. Peak Pulse**



**Fig. 2 Junction Capacitance vs. Reverse Voltage**

**Mechanical Dimensions (In mm/Inches):**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.031
θ	0°	8°	0°	8°

**SO-8(CJ)**

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