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# TVS8814, TVS8818

## Transient Voltage Suppressors

### Low Capacitance TVS Protection for High Speed Data

The TVS8814 and TVS8818 transient voltage suppressors are designed specifically to protect 10/100 and GbE Ethernet signals from high levels of surge current. Low clamping voltage under high surge conditions make this device an ideal solution for protecting voltage sensitive lines leading to Ethernet transceiver chips. Low capacitance combined with flow-through style packaging allows for easy PCB layout and matched trace lengths necessary to maintain consistent impedance between high-speed differential lines. The integrated 4 and 8 lines of protection in flow-thru type packages offer a simplified solution with premier performance for 10/100 and GbE Ethernet applications.

#### Features

- Protection for the Following IEC Standards:  
IEC 61000-4-2 (ESD)  $\pm 30$  kV (Contact)  
IEC61000-4-5 (Lightning) 35 A (8/20  $\mu$ s)
- Flow-Thru Routing Scheme
- 2 pF Max, I/O to I/O
- UL Flammability Rating of 94 V-0
- This is a Pb-Free Device

#### Typical Applications

- 10/100 and GbE Ethernet
- MagJacks® / Integrated Magnetics
- Notebooks/Desktops/Servers

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Operating Junction Temperature Range	$T_J$	-55 to +125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Lead Solder Temperature – Maximum (10 Seconds)	$T_L$	260	$^\circ\text{C}$
IEC 61000-4-2 Contact (ESD) IEC 61000-4-2 Air (ESD)	ESD	$\pm 30$ $\pm 30$	kV kV
Maximum Peak Pulse Current 8/20 $\mu$ s @ $T_A = 25^\circ\text{C}$ 10/700 $\mu$ s @ $T_A = 25^\circ\text{C}$	$I_{PP}$	35 20	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.

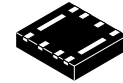
See Application Note AND8308/D for further description of survivability specs.



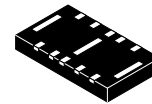
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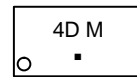
#### MARKING DIAGRAMS



UDFN8  
CASE 506CV



UDFN10  
CASE 506CU



- XX = Specific Device Code
- M = Date Code
- = Pb-Free Package

#### ORDERING INFORMATION

Device	Package	Shipping
TVS8814MUTAG	UDFN8 (Pb-Free)	3000 / Tape & Reel
TVS8818MUTAG	UDFN10 (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.

# TVS8814, TVS8818

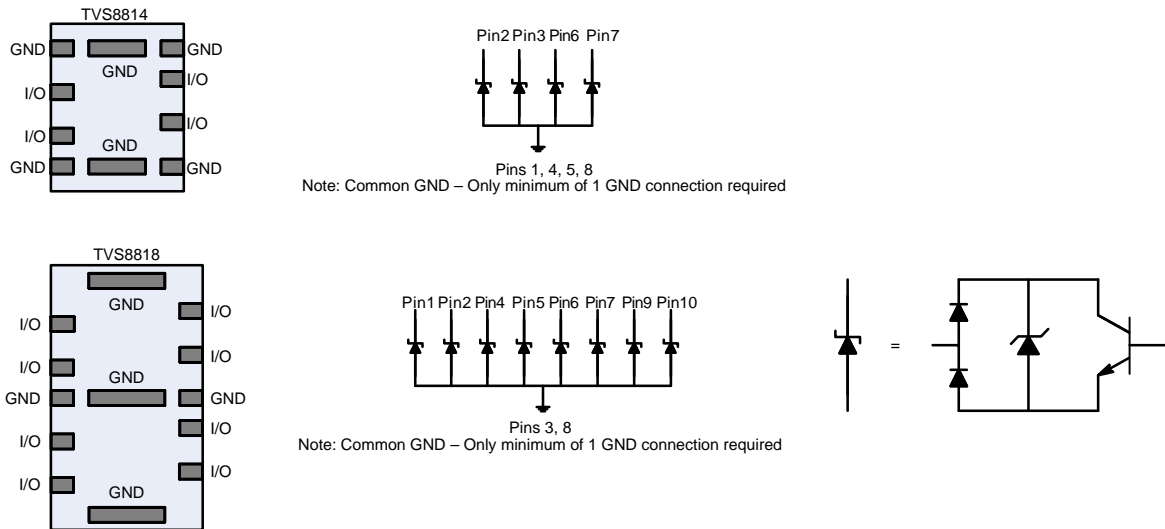
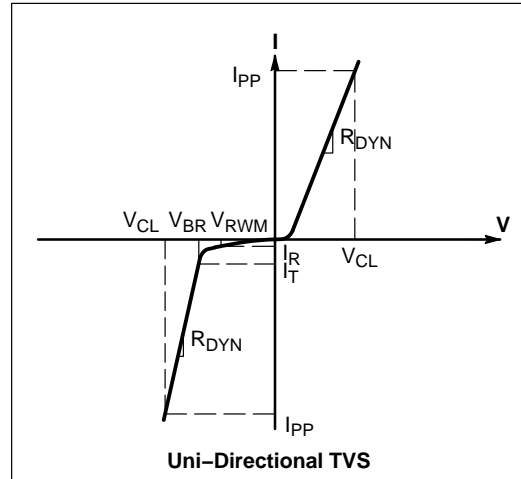


Figure 1. Pin Schematic

## ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter
$V_{RWM}$	Working Peak Voltage
$I_R$	Maximum Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$V_{HOLD}$	Holding Reverse Voltage
$I_{HOLD}$	Holding Reverse Current
$R_{DYN}$	Dynamic Resistance
$I_{PP}$	Maximum Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$ $V_C = V_{HOLD} + (I_{PP} * R_{DYN})$



## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	Any I/O to GND (Note 1)			3.0	V
Forward Voltage	$V_F$	$I_F = 10\text{ mA}$ , GND to All IO Pins	0.5	0.85	1.1	V
Breakdown Voltage	$V_{BR}$	$I_T = 1\text{ mA}$ , I/O to GND	3.2	3.5	5.0	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 3.0\text{ V}$ , I/O to GND			0.5	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 1\text{ A}$ , Any I/O to GND (8/20 $\mu\text{s}$ pulse)			5.0	V
Clamping Voltage	$V_C$	$I_{PP} = 10\text{ A}$ , Any I/O to GND (8/20 $\mu\text{s}$ pulse)			6.0	V
Clamping Voltage	$V_C$	$I_{PP} = 25\text{ A}$ , Any I/O to GND (8/20 $\mu\text{s}$ pulse)			10	V
Clamping Voltage	$V_C$	$I_{PP} = 35\text{ A}$ , Any I/O to GND (8/20 $\mu\text{s}$ pulse)			15	V
Clamping Voltage	$V_C$	IEC61000-4-2, $\pm 8\text{ kV}$ Contact	See Figures 7 and 8			V
Junction Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ between I/O Pins		1.5	2.0	pF
Junction Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ between I/O Pins and GND			5.0	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- 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.

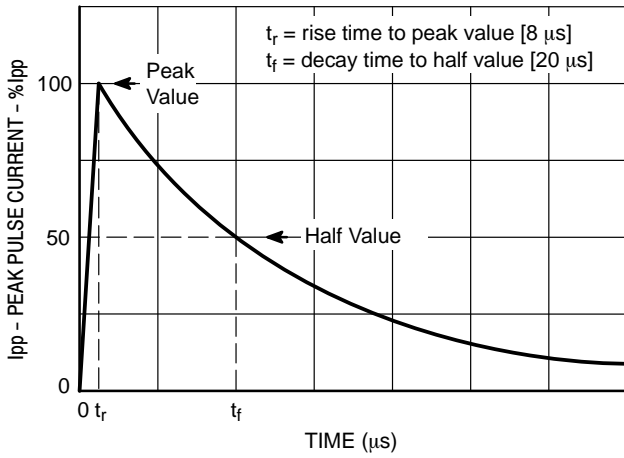


Figure 2. IEC61000-4-5 8/20  $\mu$ s Pulse Waveform

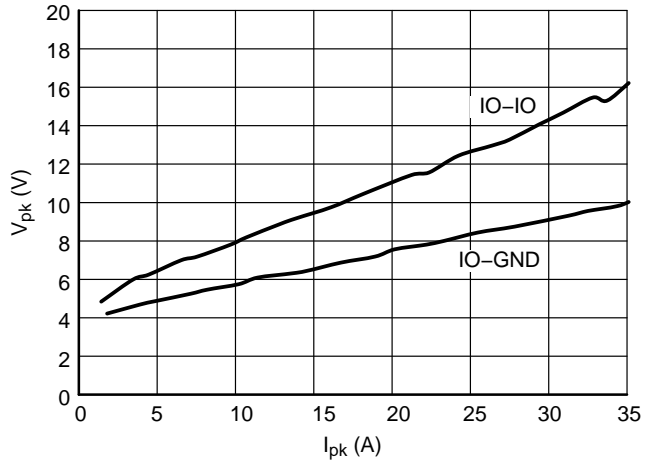


Figure 3. Clamping Voltage vs. Peak Pulse Current ( $t_p = 8/20 \mu$ s per Figure 2)

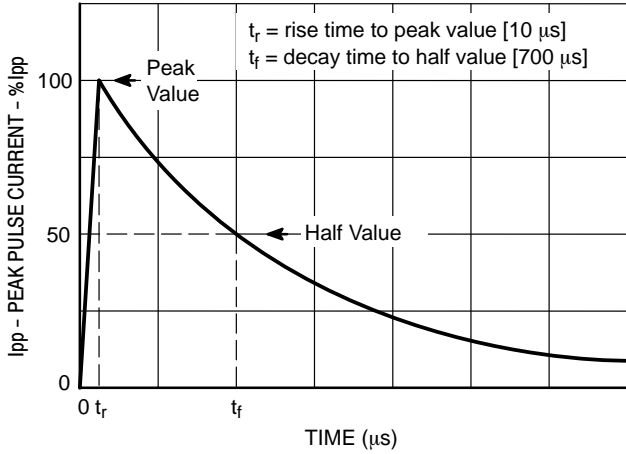


Figure 4. IEC61000-4-5 10/700  $\mu$ s Pulse Waveform

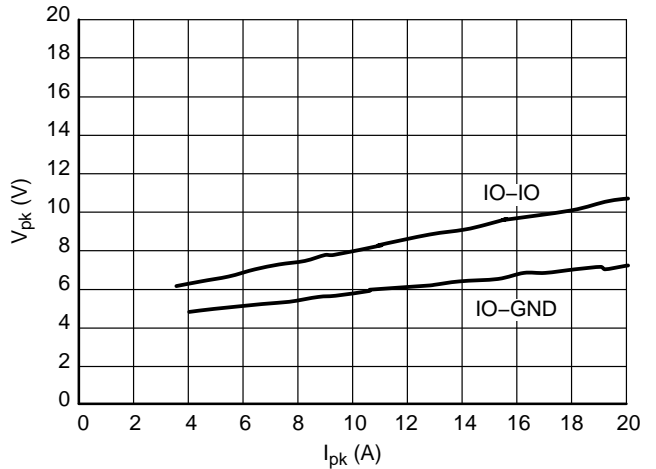


Figure 5. Clamping Voltage vs. Peak Pulse Current ( $t_p = 10/700 \mu$ s per Figure 4)

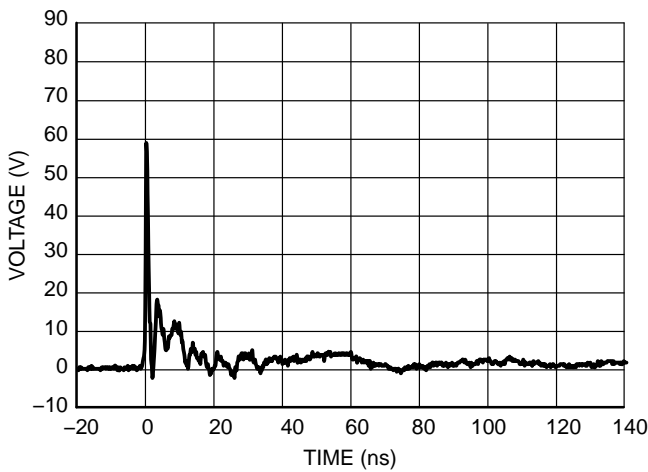


Figure 6. IEC61000-2-4 +8 kV Contact Clamping Voltage

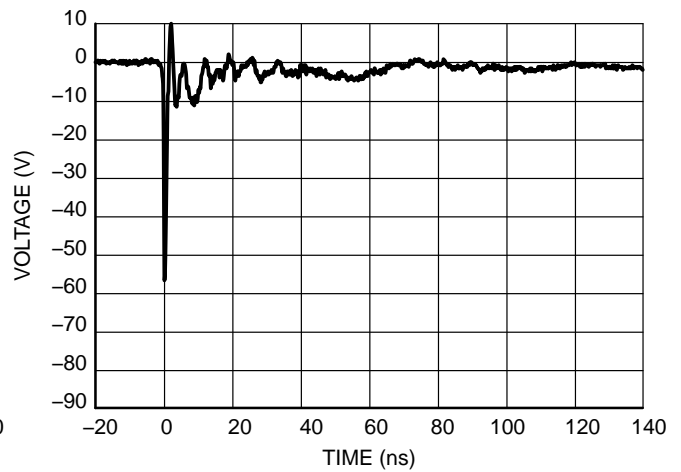


Figure 7. IEC61000-2-4 -8 kV Contact Clamping Voltage

# TVS8814, TVS8818

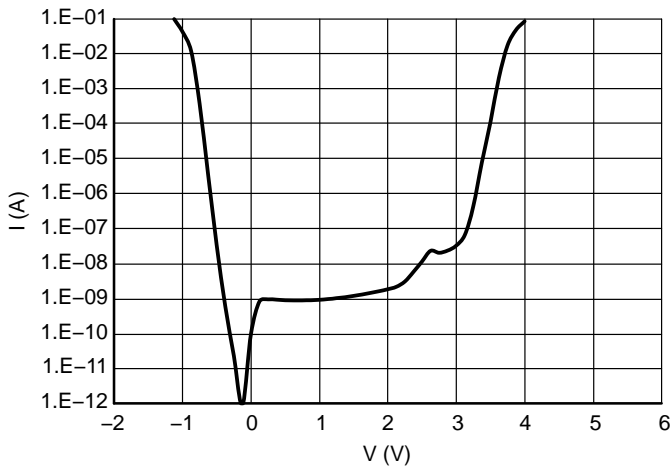


Figure 8. IV Characteristics

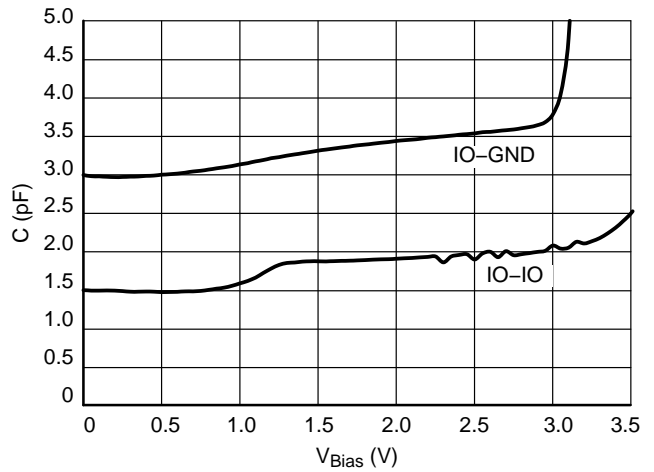


Figure 9. CV Characteristics

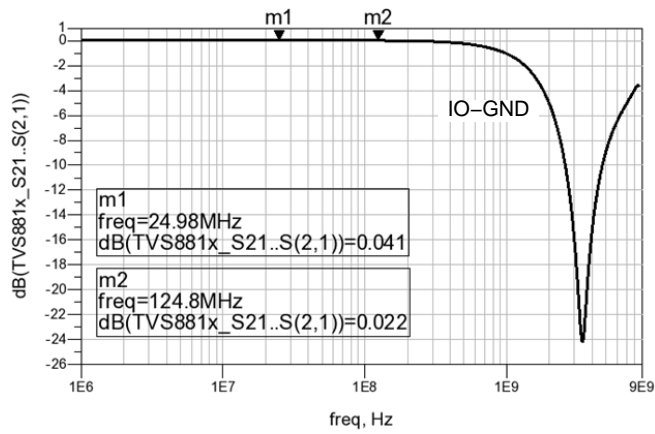


Figure 10. RF Insertion Loss

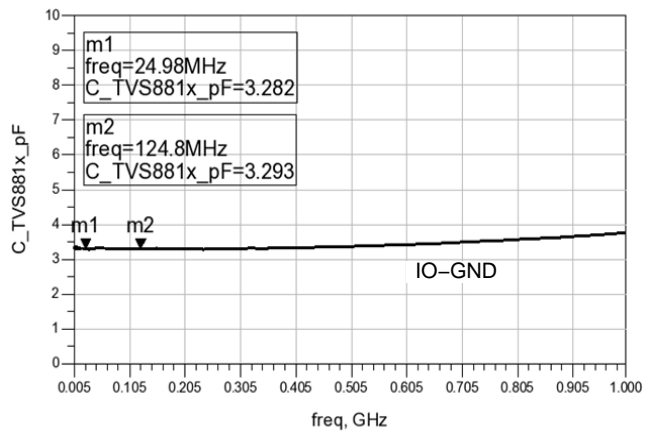


Figure 11. Capacitance Over Frequency

# TVS8814, TVS8818

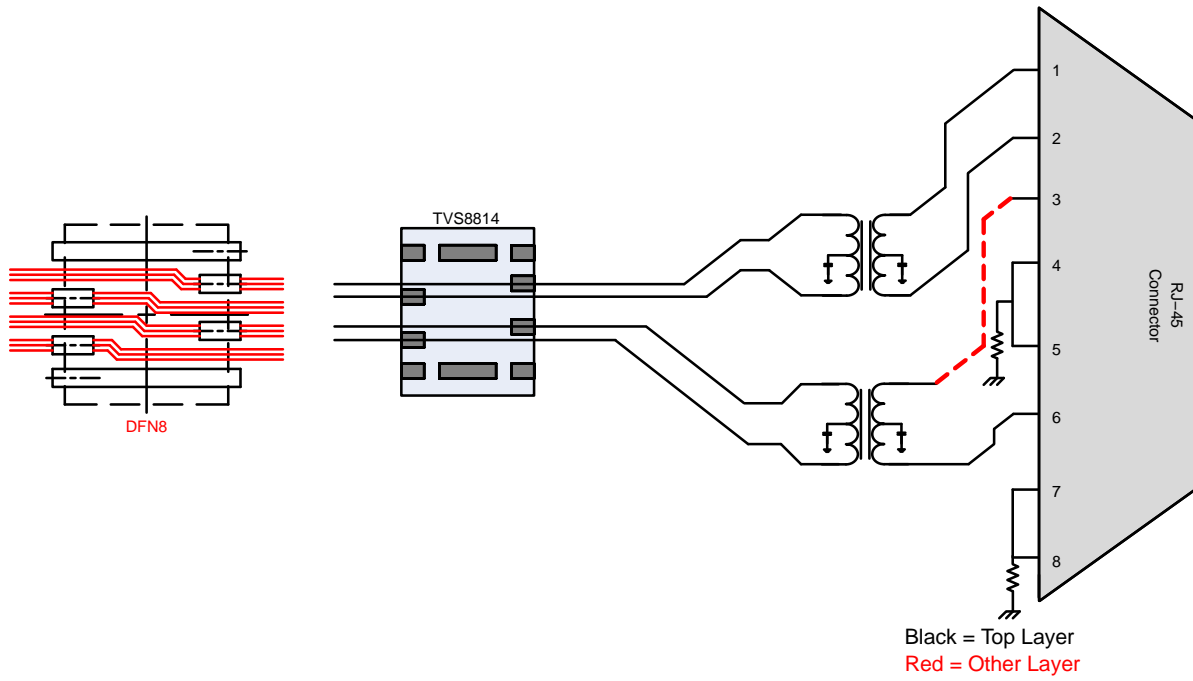


Figure 12. 10/100 Ethernet Layout Diagram and Flow-thru Routing Scheme

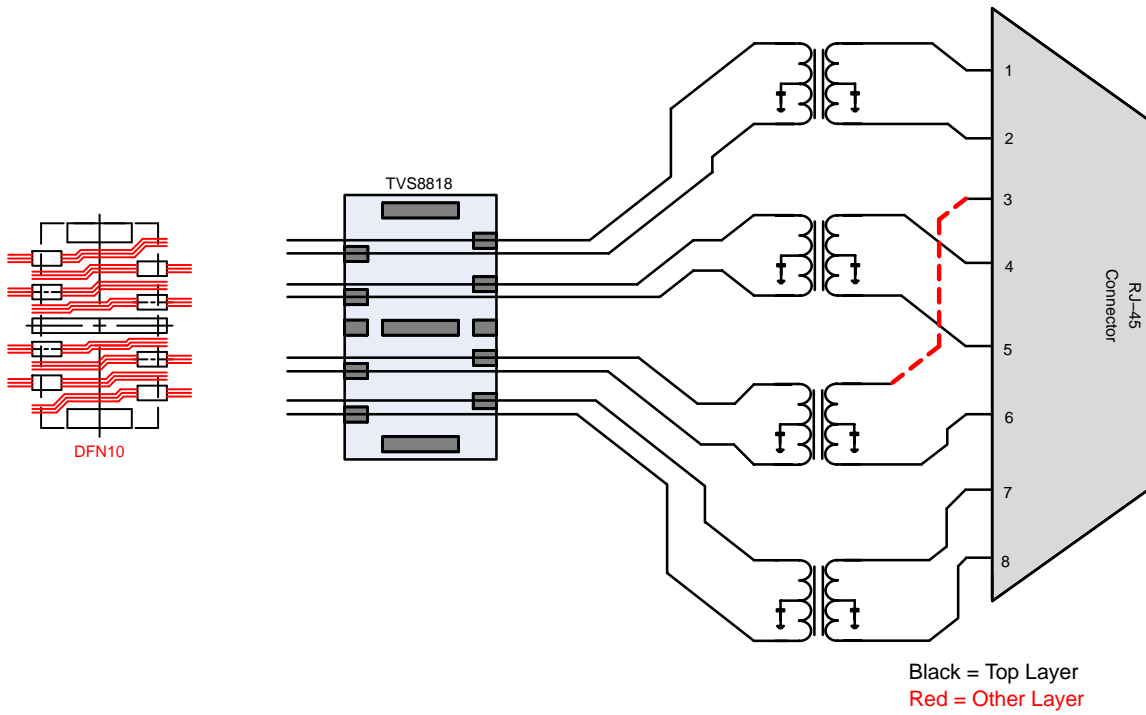
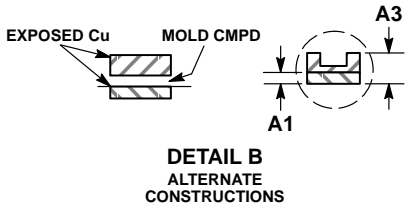
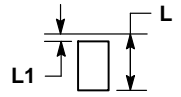
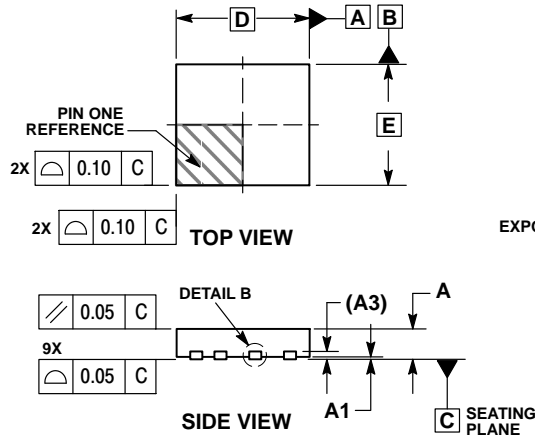


Figure 13. GbE Ethernet Layout Diagram and Flow-thru Routing Scheme

# TVS8814, TVS8818

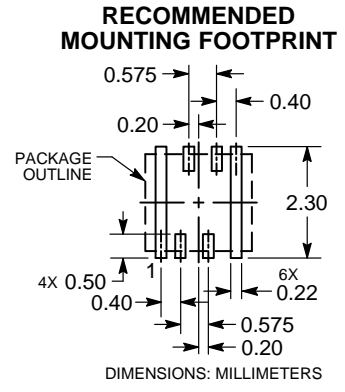
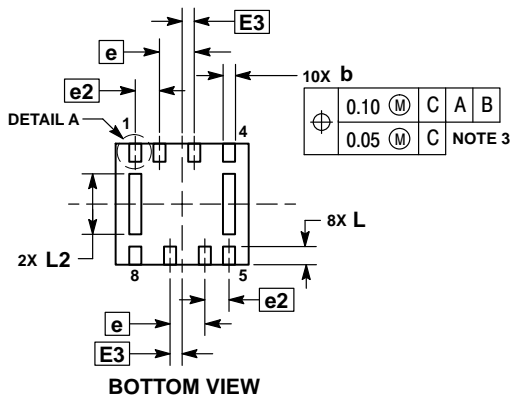
## PACKAGE DIMENSIONS

UDFN8 2.2x2, 0.575P  
CASE 506CV  
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. DIMENSIONS b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 MM FROM TERMINAL TIP.

DIM	MILLIMETERS	
	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127 REF	
b	0.15	0.25
D	2.20 BSC	
E	2.00 BSC	
E3	0.20 BSC	
e	0.575 BSC	
e2	0.40 BSC	
L	0.25	0.35
L1	0.05	0.15
L2	0.95	1.05

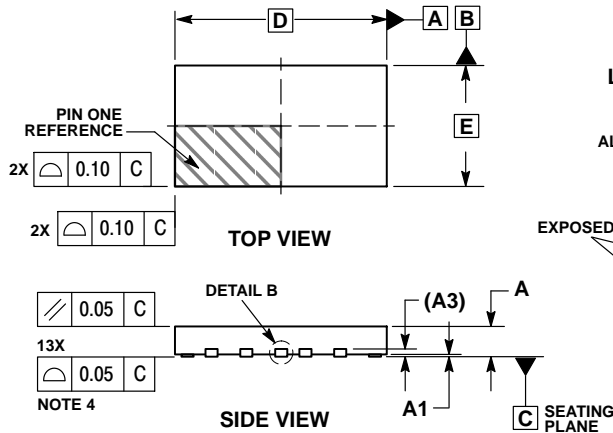


\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# TVS8814, TVS8818

## PACKAGE DIMENSIONS

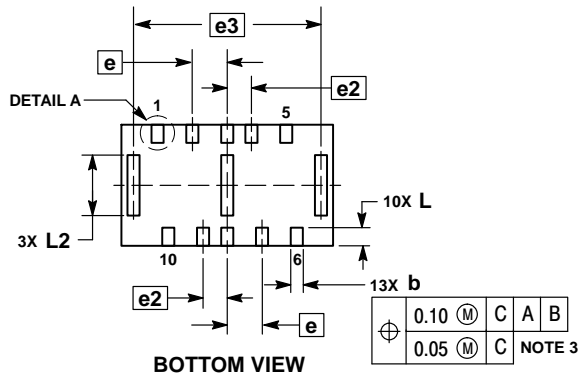
UDFN10 3.5x2, 0.575P  
CASE 506CU  
ISSUE O



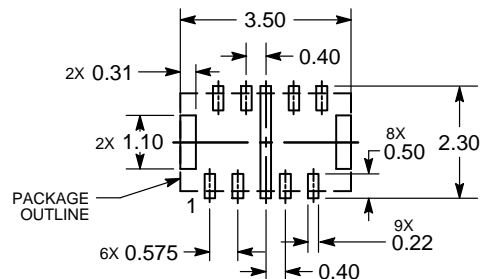
**NOTES:**

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2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 MM FROM TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127 REF	
b	0.15	0.25
D	3.50 BSC	
E	2.00 BSC	
e	0.575 BSC	
e2	0.40 BSC	
e3	3.10 BSC	
L	0.25	0.35
L1	0.05	0.15
L2	0.95	1.05



**RECOMMENDED MOUNTING FOOTPRINT\***



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