NSP8814, NSP8818

Transient Voltage Suppressors

Low Capacitance Surge Protection for High Speed Data

The NSP8814 and NSP8818 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) ±30 kV (Contact)
  IEC61000−4−5 (Lightning) 35 A (8/20 μs)
- 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°C unless otherwise noted)

Rating	Symbol	Value	Unit
Operating Junction Temperature Range	T_J	−55 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 Contact (ESD) IEC 61000−4−2 Air (ESD)	ESD	±30 ±30	kV kV
Maximum Peak Pulse Current 8/20 μs @ T_A = 25°C 10/700 μs @ T_A = 25°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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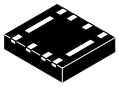
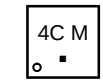
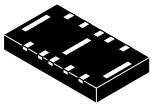
MARKING DIAGRAMS

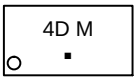


UDFN8
CASE 506CV





UDFN10
CASE 506CU



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

ORDERING INFORMATION

Device	Package	Shipping
NSP8814MUTAG	UDFN8 (Pb−Free)	3000 / Tape & Reel
NSP8818MUTAG	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.

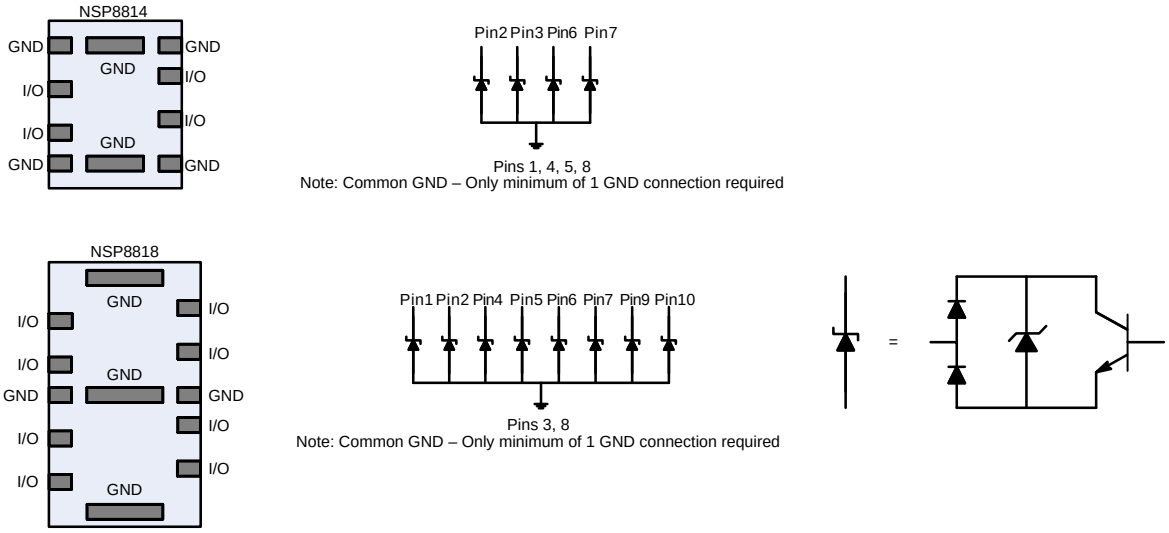
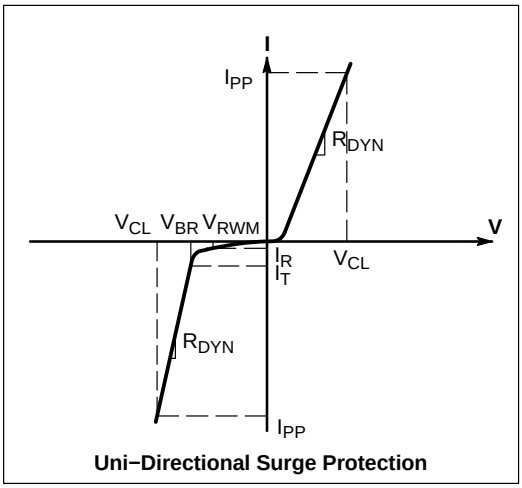


Figure 1. Pin Schematic

ELECTRICAL CHARACTERISTICS

(T_A = 25°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} $V_C = V_{HOLD} + (I_{PP} * R_{DYN})$



Uni−Directional Surge Protection

ELECTRICAL CHARACTERISTICS (T_A = 25°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 mA, GND to All IO Pins	0.5	0.85	1.1	V
Breakdown Voltage	V_{BR}	I_T = 1 mA, I/O to GND	3.2	3.5	5.0	V
Reverse Leakage Current	I_R	V_{RWM} = 3.0 V, I/O to GND			0.5	μA
Clamping Voltage	V_C	I_{PP} = 1 A, Any I/O to GND (8/20 μs pulse)			5.0	V
Clamping Voltage	V_C	I_{PP} = 10 A, Any I/O to GND (8/20 μs pulse)			6.0	V
Clamping Voltage	V_C	I_{PP} = 25 A, Any I/O to GND (8/20 μs pulse)			10	V
Clamping Voltage	V_C	I_{PP} = 35 A, Any I/O to GND (8/20 μs pulse)			15	V
Clamping Voltage	V_C	IEC61000−4−2, ±8 kV Contact	See Figures 7 and 8			V
Junction Capacitance	C_J	V_R = 0 V, f = 1 MHz between I/O Pins		1.5	2.0	pF
Junction Capacitance	C_J	V_R = 0 V, f = 1 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.

1. Surge protection 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.

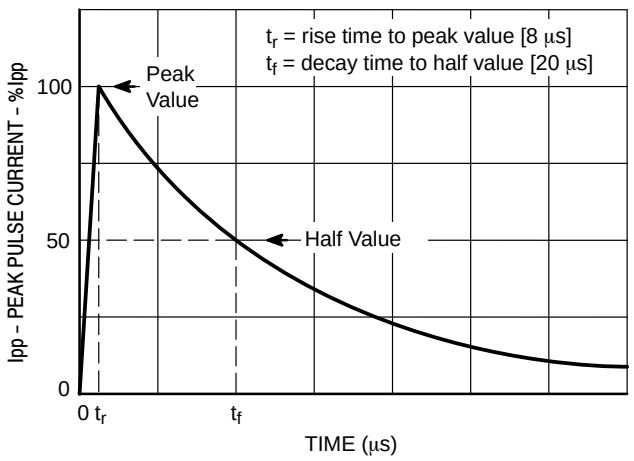


Figure 2. IEC61000−4−5 8/20 μs Pulse Waveform

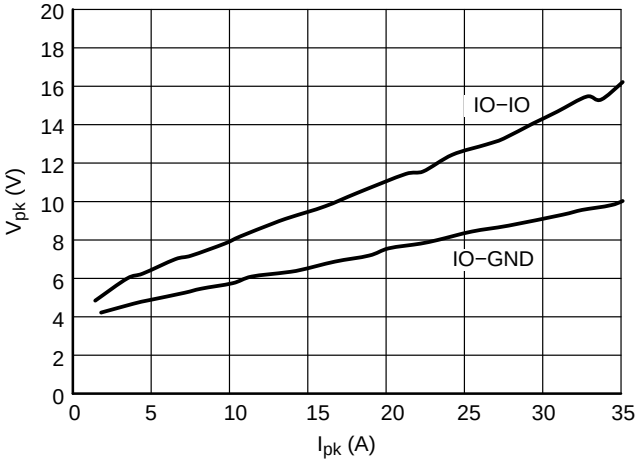


Figure 3. Clamping Voltage vs. Peak Pulse Current (t_p = 8/20 μs per Figure 2)

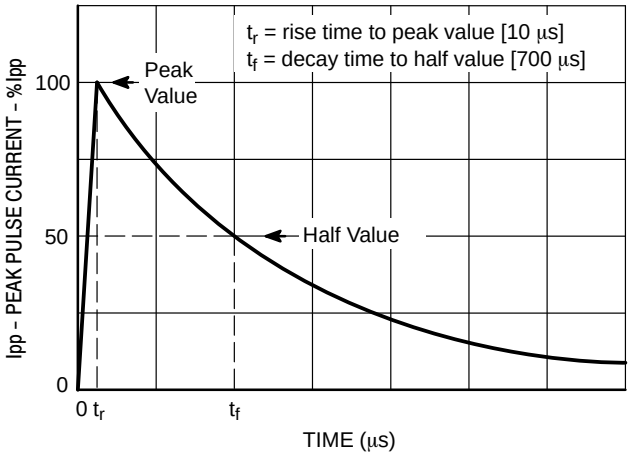


Figure 4. IEC61000−4−5 10/700 μs Pulse Waveform

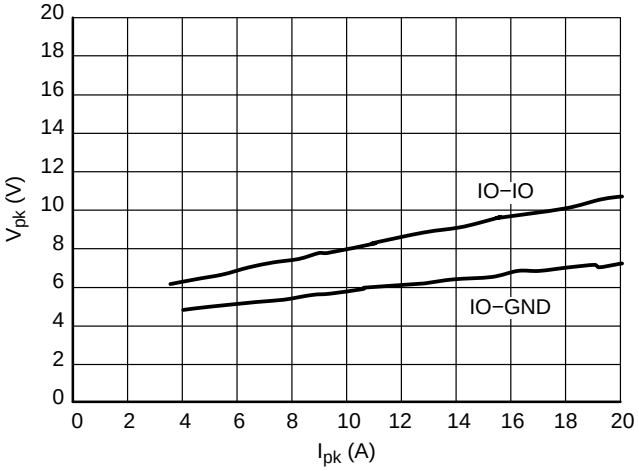


Figure 5. Clamping Voltage vs. Peak Pulse Current (t_p = 10/700 μs per Figure 4)

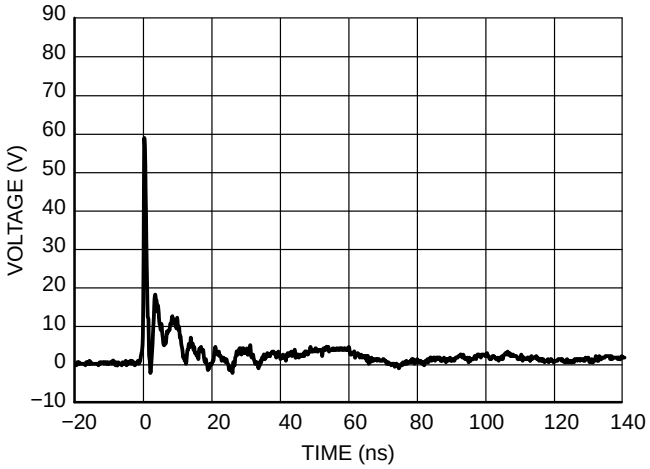


Figure 6. IEC61000−2−4 +8 kV Contact Clamping Voltage

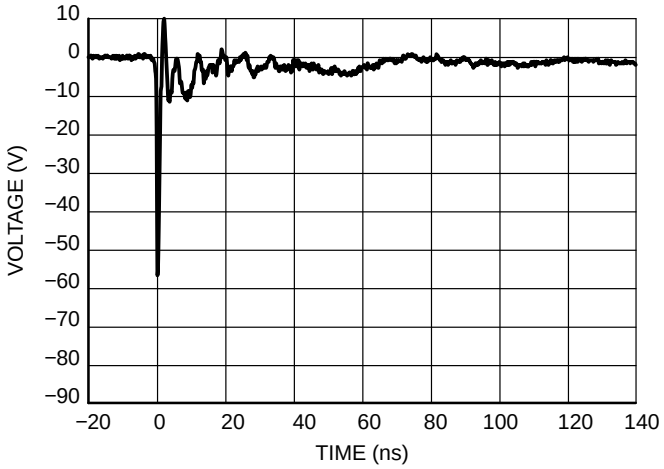


Figure 7. IEC61000−2−4 −8 kV Contact Clamping Voltage

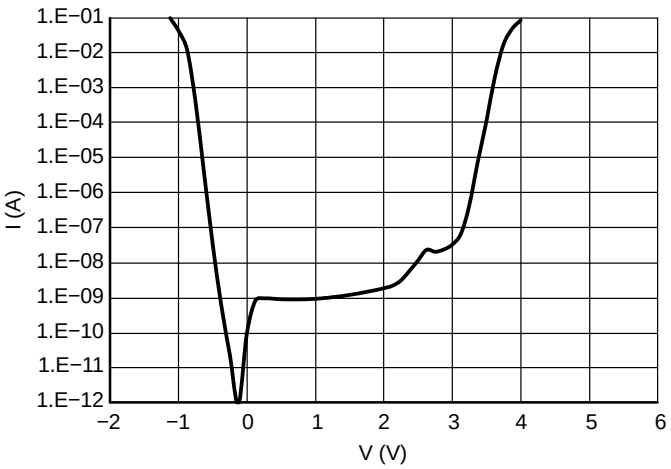


Figure 8. IV Characteristics

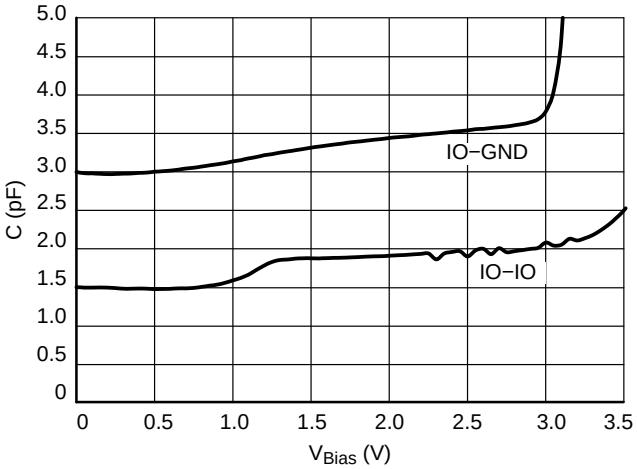


Figure 9. CV Characteristics

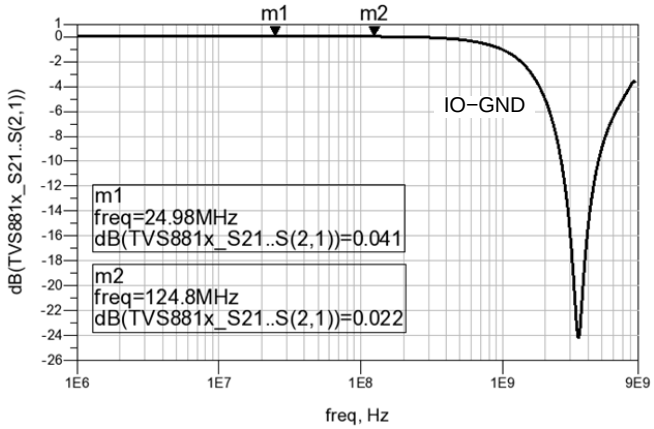


Figure 10. RF Insertion Loss

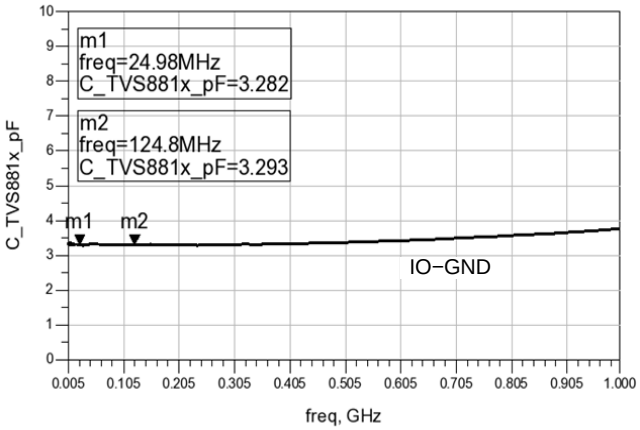


Figure 11. Capacitance Over Frequency

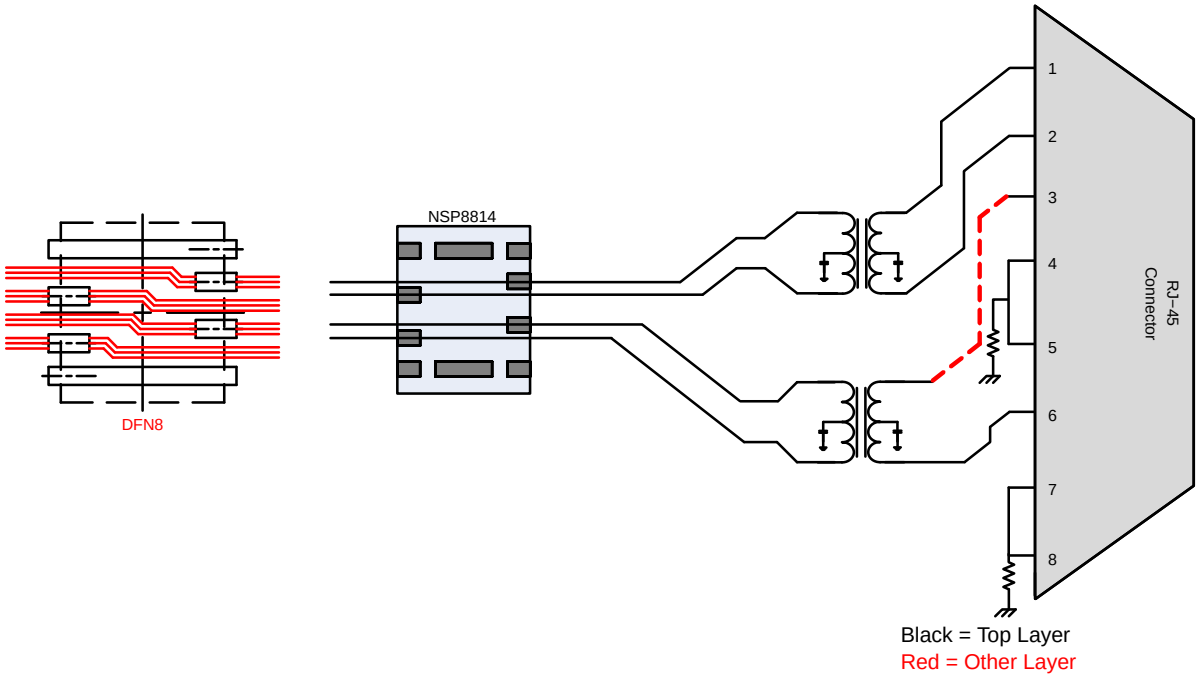


Figure 12. 10/100 Ethernet Layout Diagram and Flow−thru Routing Scheme

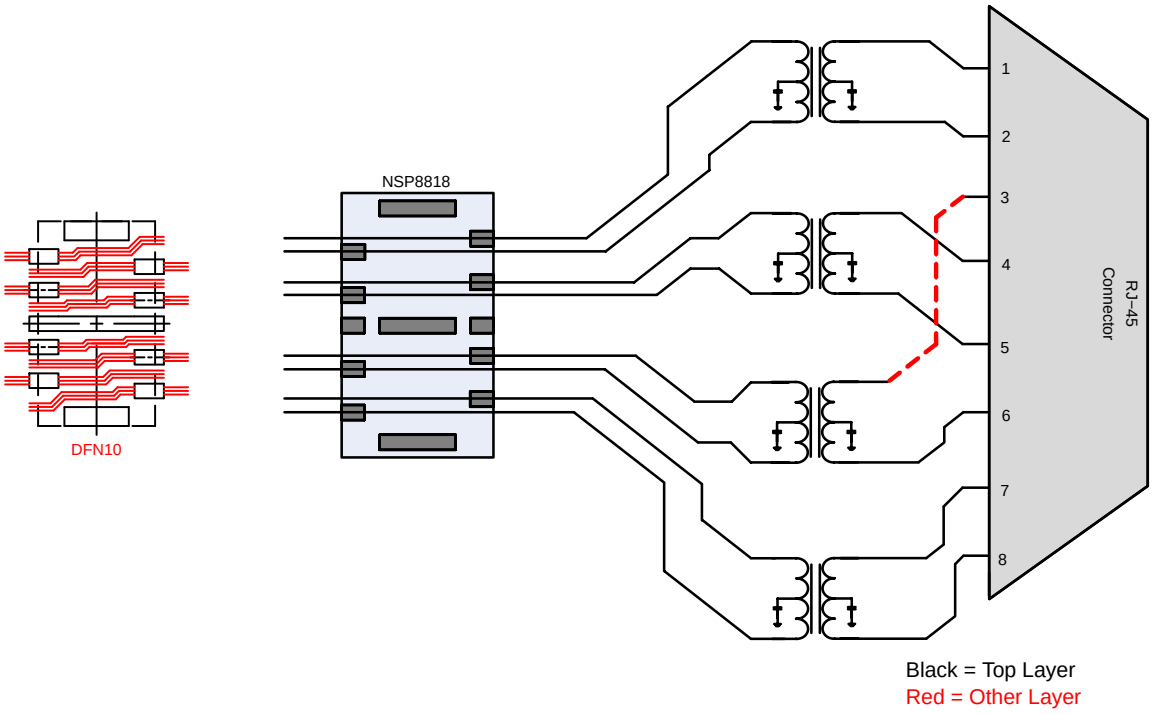
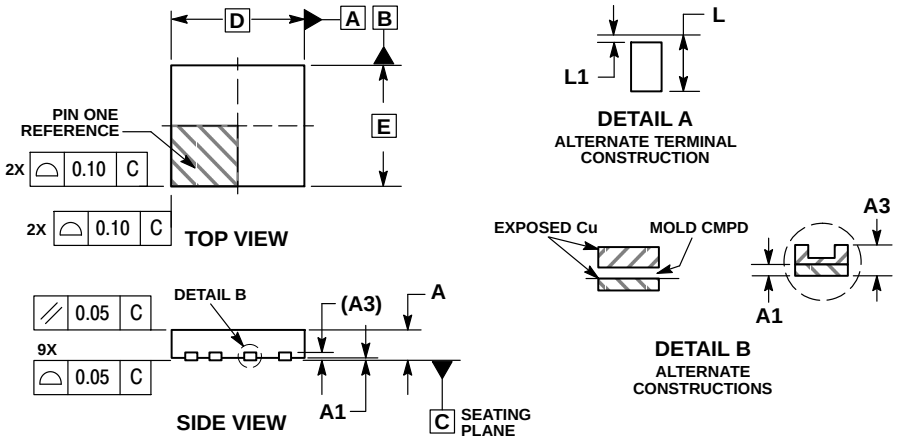


Figure 13. GbE Ethernet Layout Diagram and Flow−thru Routing Scheme

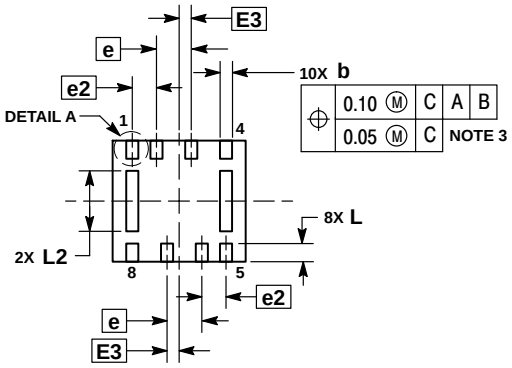
PACKAGE DIMENSIONS

UDFN8 2.2x2, 0.575P
CASE 506CV
ISSUE A

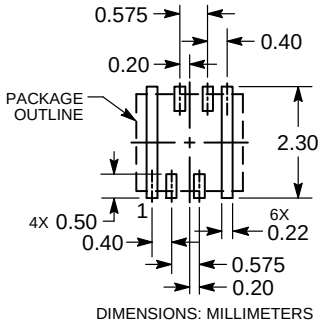


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 MM FROM TERMINAL TIP.

	MILLIMETERS	
DIM	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



RECOMMENDED MOUNTING FOOTPRINT

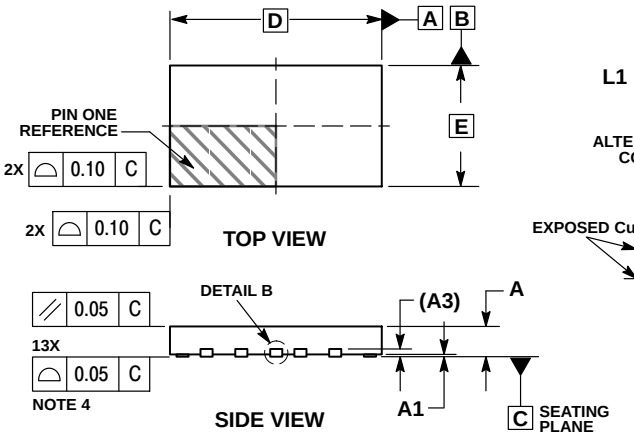


DIMENSIONS: MILLIMETERS

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

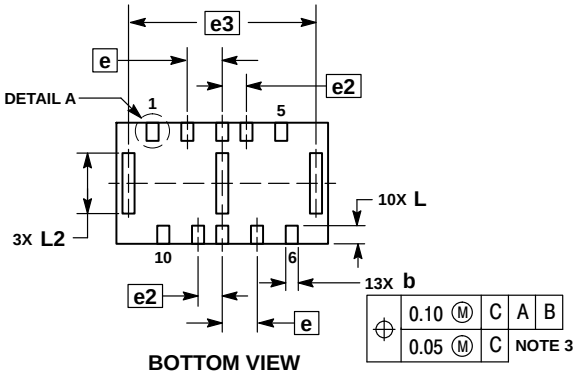
PACKAGE DIMENSIONS

UDFN10 3.5x2, 0.575P
CASE 506CU
ISSUE O

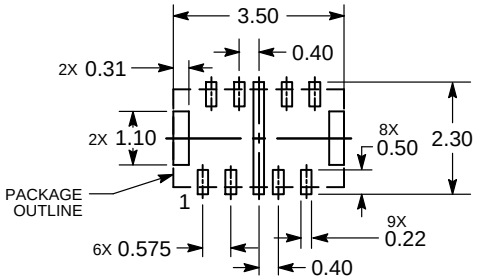


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 MM FROM TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	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*



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.

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