

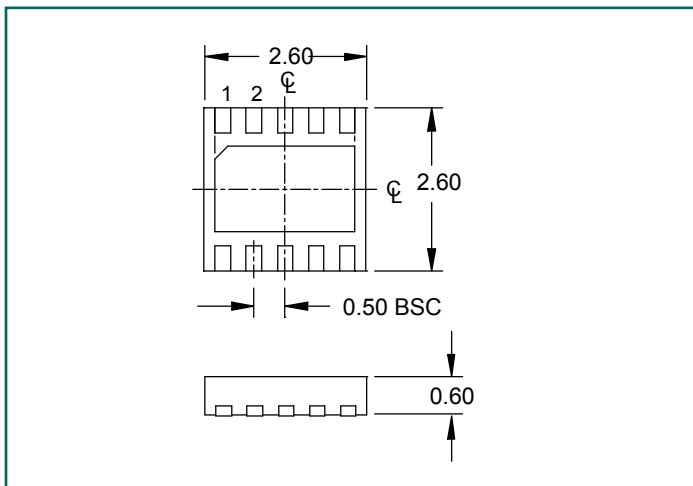
### PROTECTION PRODUCTS

#### Description

TClamp®2512N and TClamp3312N are specifically designed to provide secondary surge and ESD protection for Ethernet and telecom interfaces. They integrate low capacitance, surge-rated steering diodes with a high power transient voltage suppressor (TVS) to provide up to 120A (tp=8/20us) of lightning surge protection. Capacitance is limited to 8pF maximum from line-to-line to ensure correct signal transmission on high-speed lines.

TClamp2512N and TClamp3312N are in a 10-pin SLP2626P10 package measuring 2.6 x 2.6 x 0.60mm. Leads are spaced at a pitch of 0.5mm and are finished with lead-free NiPdAu. They may be used to meet Telcordia GR-1089-CORE short-haul (intra-building) surge requirements and are particularly well suited for applications where board space is at a premium such as integrated connectors/magnetics and carrier class Ethernet equipment.

#### Nominal Dimensions (mm)



#### Features

- Transient Protection to
  - ♦ Bellcore 1089 (Intra-Building) 120A (8/20μs)
  - ♦ IEC 61000-4-2 (ESD) 30kV (Air), 30kV (Contact)
  - ♦ IEC 61000-4-4 (EFT) 4kV (5/50ns)
  - ♦ IEC 61000-4-5 (Lightning) 120A (8/20μs)
- Small SLP package saves board space
- Working Voltage Options: 2.5V and 3.3V
- Low Capacitance: 8pF Maximum (Line-to-Line)
- Low Dynamic Resistance
- Solid-State Silicon-Avalanche Technology

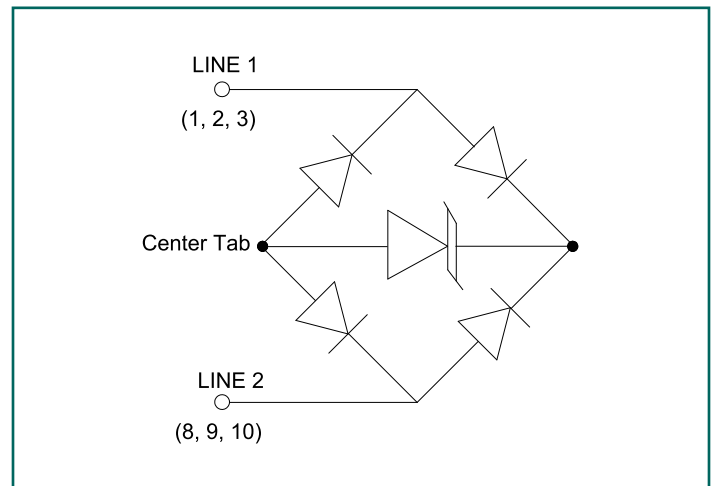
#### Mechanical Characteristics

- SLP2626P10 Package
- Nominal Dimensions: 2.6 x 2.6 x 0.60mm
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Lead Finish: matte NiPdAu
- Molding Compound Flammability Rating: UL 94V-0
- Marking : Marking Code + Date Code
- Packaging : Tape and Reel

#### Applications

- 10/100/1000 Ethernet
- Integrated magnetics
- Access Equipment
- Central Office Equipment
- Customer Premise Equipment

#### Schematic and Pin Configuration



## Absolute Maximum Ratings

| Rating  | Symbol           | Value       | Units |
|---|------------------|-------------|-------|
| Peak Pulse Power (tp = 8/20μs)                      | P <sub>PK</sub>  | 2300        | W     |
| Peak Pulse Current (tp = 8/20μs)                    | I <sub>PP</sub>  | 120         | A     |
| ESD per IEC 61000-4-2 (Contact) <sup>(1), (3)</sup> | V <sub>ESD</sub> | ±30         | kV    |
| Operating Temperature                               | T <sub>J</sub>   | -40 to +85  | °C    |
| Storage Temperature                                 | T <sub>STG</sub> | -55 to +150 | °C    |

## Electrical Characteristics (T=25°C unless otherwise specified)

| TClamp2512N                            |                  |   |          |      |      |       |    |
|--|------------------|---|----------|------|------|-------|----|
| Parameter                              | Symbol           | Conditions  | Min.     | Typ. | Max. | Units |    |
| Reverse Stand-Off Voltage              | V <sub>RWM</sub> | -40°C to 85°C   |          |      | 2.5  | V     |    |
| Punch-Through Voltage                  | V <sub>PT</sub>  | I <sub>PT</sub> = 2μA<br>Line 1 or Line 2 to Center Tab         | 2.7      |      | 4.5  | V     |    |
| Reverse Leakage Current                | I <sub>R</sub>   | V <sub>RWM</sub> = 2.5V   | T = 25°C |      | 0.01 | 0.100 | μA |
|  |                  |   | T = 85°C |      | 0.02 | 0.250 | μA |
| Clamping Voltage <sup>(2)</sup>        | V <sub>C</sub>   | I <sub>PP</sub> = 100A, tp = 8/20μs<br>Line 1 to Line 2         |          | 14.5 | 18   | V     |    |
| Dynamic Resistance <sup>(3), (4)</sup> | V <sub>BO</sub>  | tp = 0.2/100ns (TLP)<br>Line 1 to Line 2                        |          |      | 0.12 | Ohms  |    |
| Junction Capacitance                   | C <sub>J</sub>   | V <sub>R</sub> = 0V, f = 1MHz<br>Line 1 to Line 2               |          | 5    | 8    | pF    |    |
|  |                  | V <sub>R</sub> = 0V, f = 1MHz<br>Line 1 or Line 2 to Center Tab |          | 10   | 15   | pF    |    |

### Notes:

- (1): ESD Gun return path to Ground Reference Plane (GRP)
- (2): Measured using an 8/20us constant current source waveform.
- (3): Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I<sub>TLP</sub> and V<sub>TLP</sub> averaging window: t<sub>1</sub> = 70ns to t<sub>2</sub> = 90ns.
- (4): Dynamic resistance calculated from I<sub>TLP</sub> = 4A to I<sub>TLP</sub> = 16A

## Absolute Maximum Ratings

### Electrical Characteristics (T=25°C unless otherwise specified)

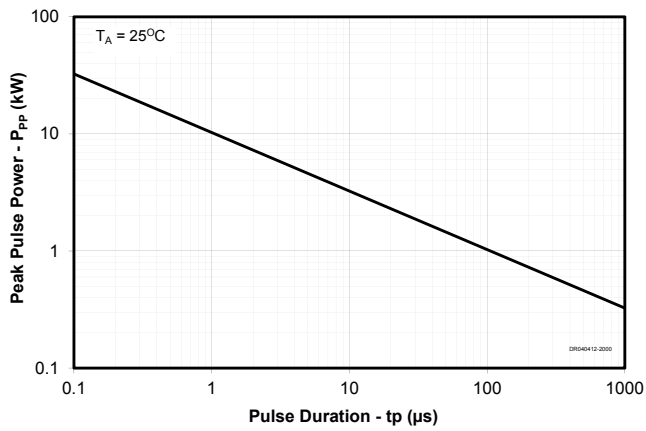
| TClamp3312N                            |           |   |          |      |      |       |         |
|--|-----------|---|----------|------|------|-------|---------|
| Parameter                              | Symbol    | Conditions  | Min.     | Typ. | Max. | Units |         |
| Reverse Stand-Off Voltage              | $V_{RWM}$ | -40°C to 85°C   |          |      | 3.3  | V     |         |
| Punch-Through Voltage                  | $V_{PT}$  | $I_{PT} = 2\mu A$<br>Line 1 or Line 2 to Center Tab       | 3.5      |      | 5.5  | V     |         |
| Reverse Leakage Current                | $I_R$     | $V_{RWM} = 3.3V$  | T = 25°C |      | 0.01 | 0.100 | $\mu A$ |
|  |           |   | T = 85°C |      | 0.02 | 0.250 | $\mu A$ |
| Clamping Voltage <sup>(2)</sup>        | $V_C$     | $I_{PP} = 100A$ , $t_p = 8/20\mu s$<br>Line 1 to Line 2   |          | 15   | 20   | V     |         |
| Dynamic Resistance <sup>(3), (4)</sup> | $V_{BO}$  | $t_p = 0.2/100ns$ (TLP)<br>Line 1 to Line 2               |          |      | 0.12 | Ohms  |         |
| Junction Capacitance                   | $C_J$     | $V_R = 0V$ , $f = 1MHz$<br>Line 1 to Line 2               |          | 5    | 8    | pF    |         |
|  |           | $V_R = 0V$ , $f = 1MHz$<br>Line 1 or Line 2 to Center Tab |          | 10   | 15   | pF    |         |

Notes:

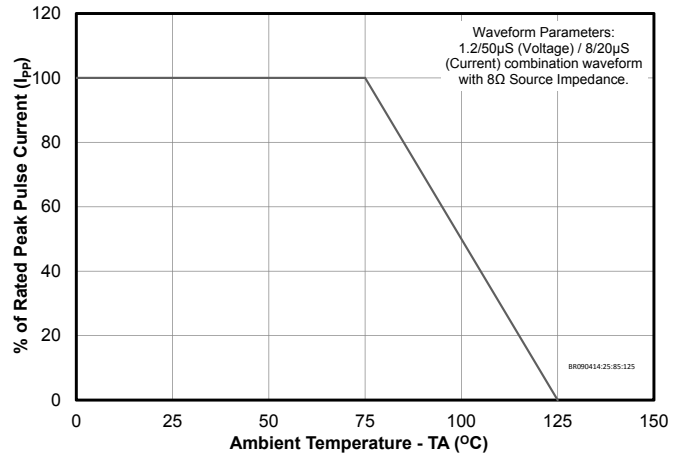
- (1): ESD Gun return path to Ground Reference Plane (GRP)
- (2): Measured using an 8/20us constant current source waveform.
- (3): Transmission Line Pulse Test (TLP) Settings:  $t_p = 100ns$ ,  $t_r = 0.2ns$ ,  $I_{TLP}$  and  $V_{TLP}$  averaging window:  $t_1 = 70ns$  to  $t_2 = 90ns$ .
- (4): Dynamic resistance calculated from  $I_{TLP} = 4A$  to  $I_{TLP} = 16A$

# Typical Characteristics

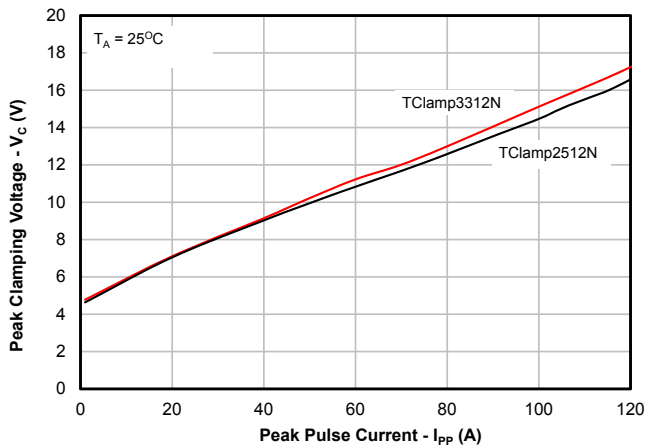
### Non-Repetitive Peak Pulse Power vs. Pulse Time



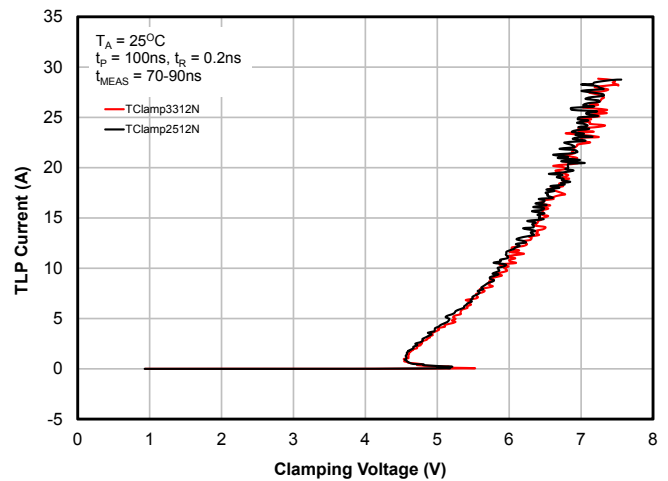
### Power Derating Curve



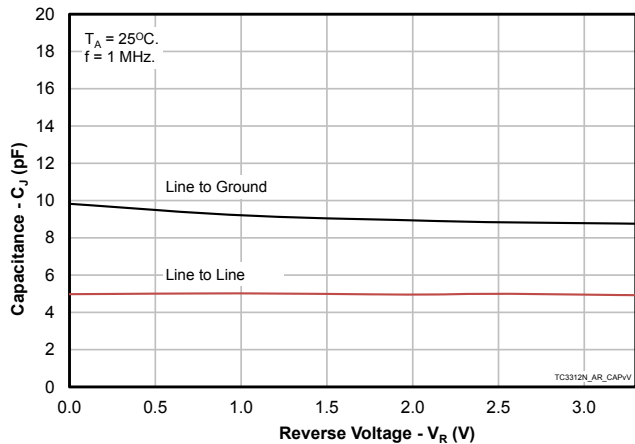
### Clamping Voltage vs. Peak Pulse Current



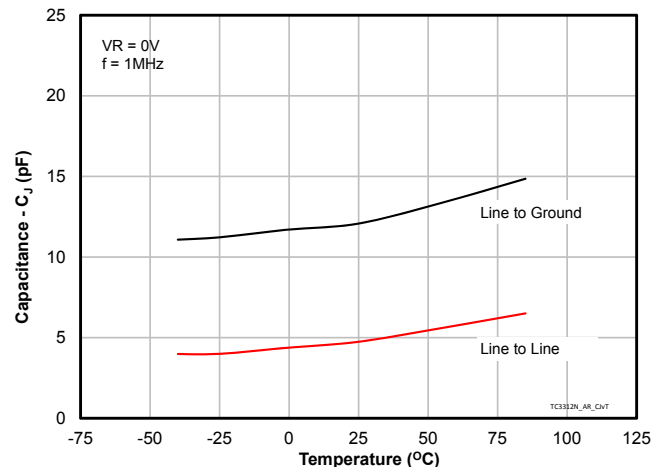
### TLP Characteristic



### Capacitance vs. Reverse Voltage

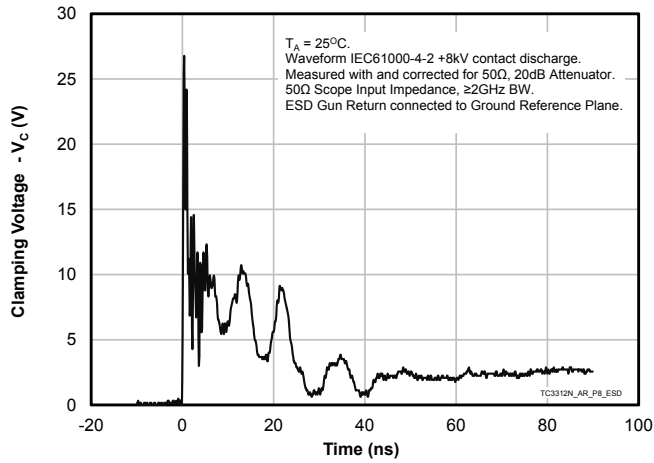


### Capacitance vs. Temperature

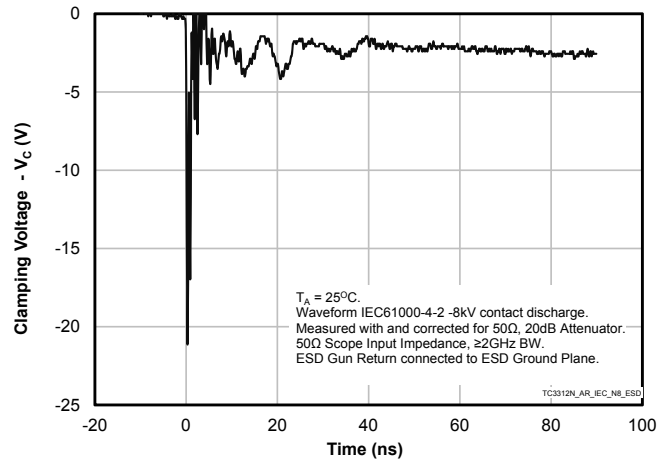


# Typical Characteristics

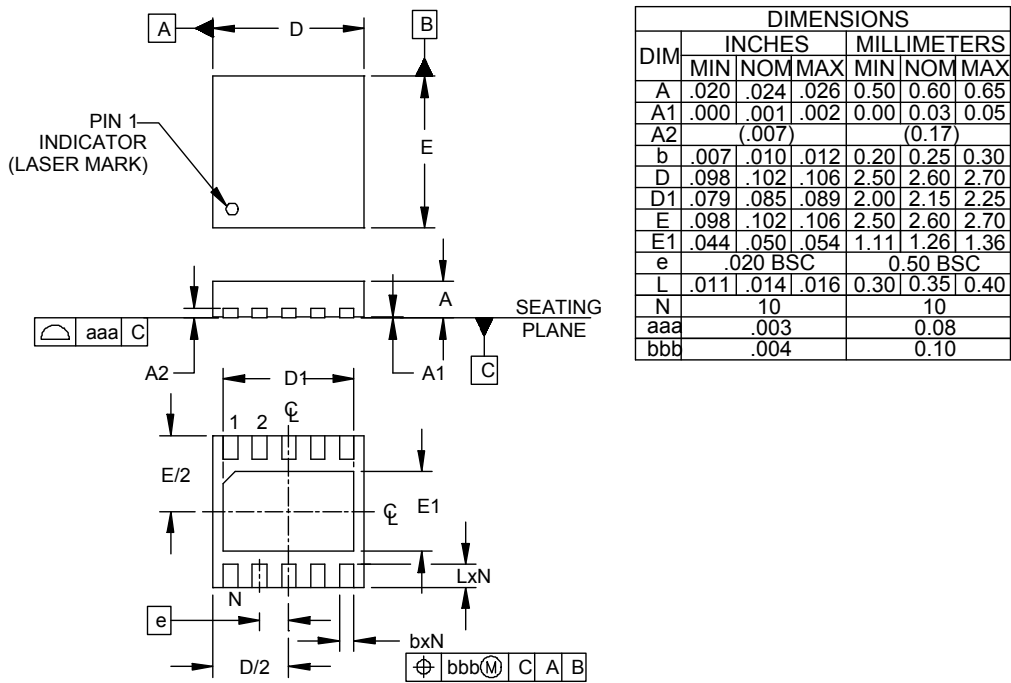
### ESD Clamping (+8kV Contact per IEC 61000-4-2)



### ESD Clamping (-8kV Contact per IEC 61000-4-2)

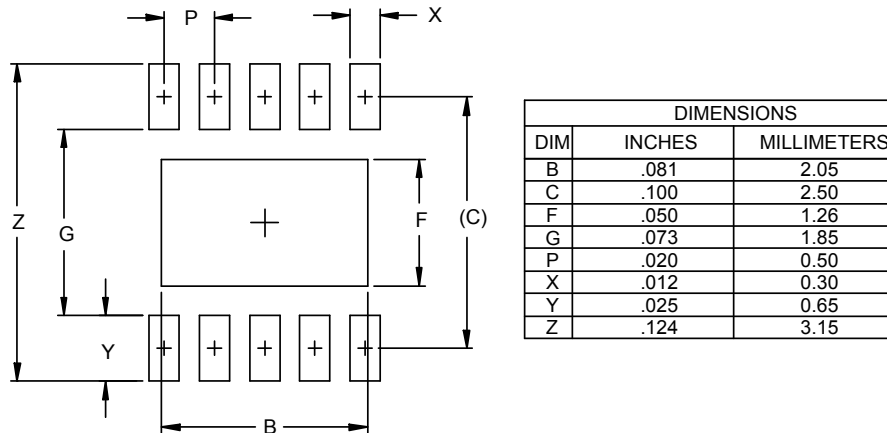


# Outline Drawing - SLP2626P10



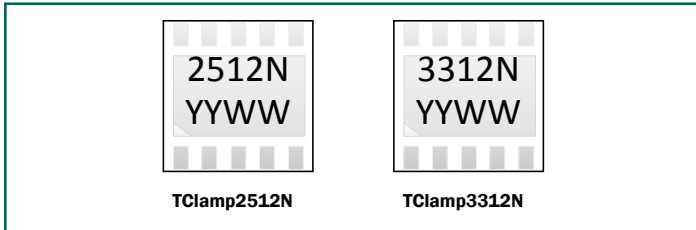
- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
  2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

# Land Pattern - SLP2626P10



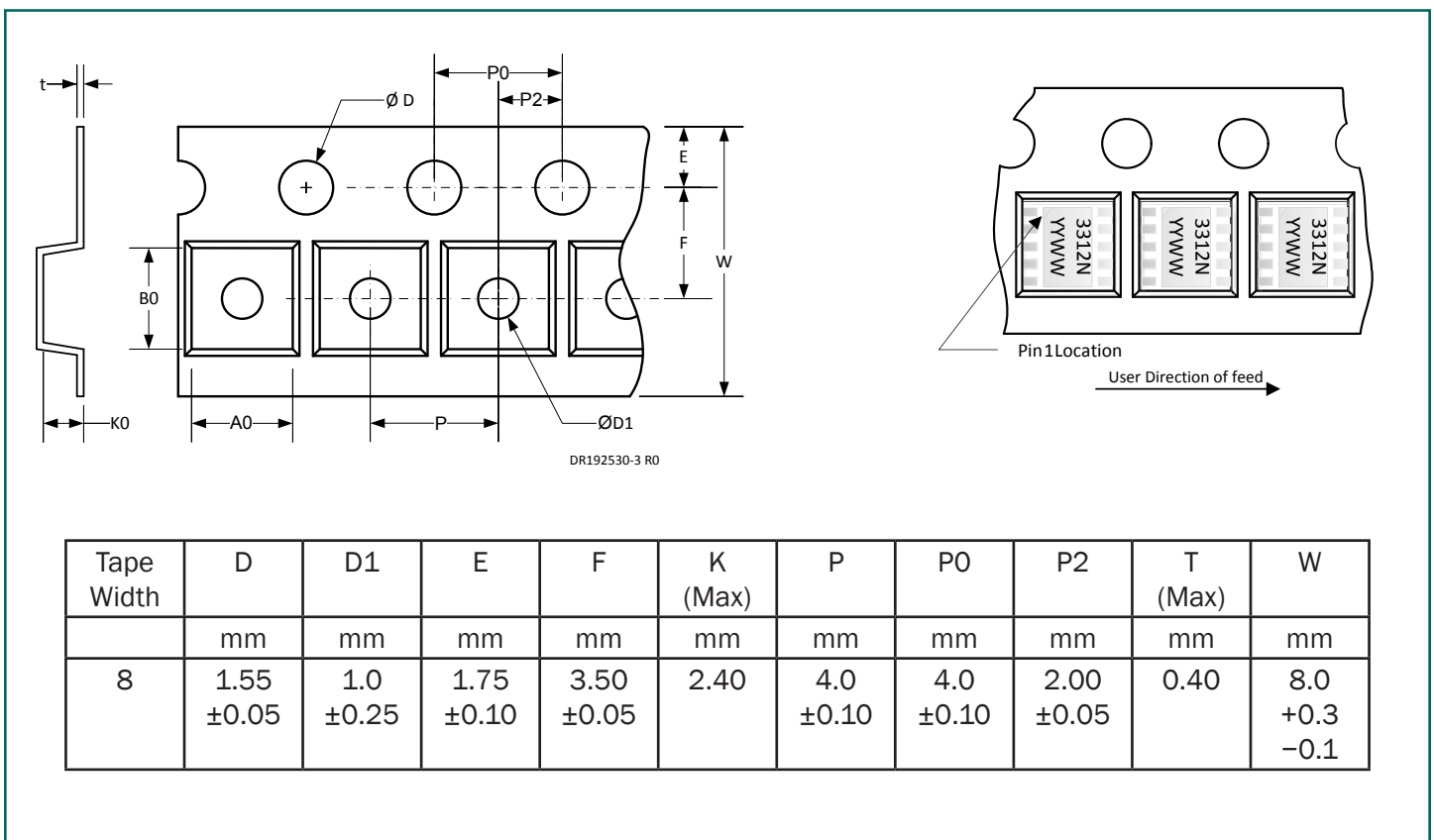
- NOTES:
1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

## Marking Example



Notes:  
 YW = Alphanumeric character Date Code

## Tape and Reel Specification



## Ordering Information

| Part Number     | Working Voltage | Qty per 7 Inch Reel |
|-----------------|-----------------|---------------------|
| TClamp2512N.TCT | 2.5V            | 3000                |
| TClamp3312N.TCT | 3.3V            | 3000                |

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