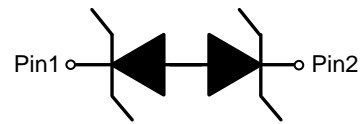


ESD5431N
1-Line, Bi-directional, Transient Voltage Suppressors
<http://www.sh-willsemi.com>
Descriptions

The ESD5431N is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to power lines, low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning.

The ESD5431N may be used to provide ESD protection up to $\pm 30\text{kV}$ (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 10A (8/20 μs) according to IEC61000-4-5.

The ESD5431N is available in DFN1006-2L package. Standard products are Pb-free and Halogen-free.


DFN1006-2L (Bottom View)

Circuit diagram
Features

- Stand-off voltage: $\pm 3.3\text{V}$ Max.
- Transient protection for each line according to IEC61000-4-2 (ESD): $\pm 30\text{kV}$ (contact discharge)
IEC61000-4-4 (EFT): 40A (5/50ns)
IEC61000-4-5 (surge): 10A (8/20 μs)
- Capacitance: $C_J = 17.5\text{pF}$ typ.
- Low leakage current: $I_R = 1\text{nA}$ typ.
- Low clamping voltage: $V_{CL} = 8\text{V}$ typ. @ $I_{PP} = 16\text{A}$ (TLP)
- Solid-state silicon technology



1 = Device code

* = Month code (A~Z)

Marking (Top View)
Applications

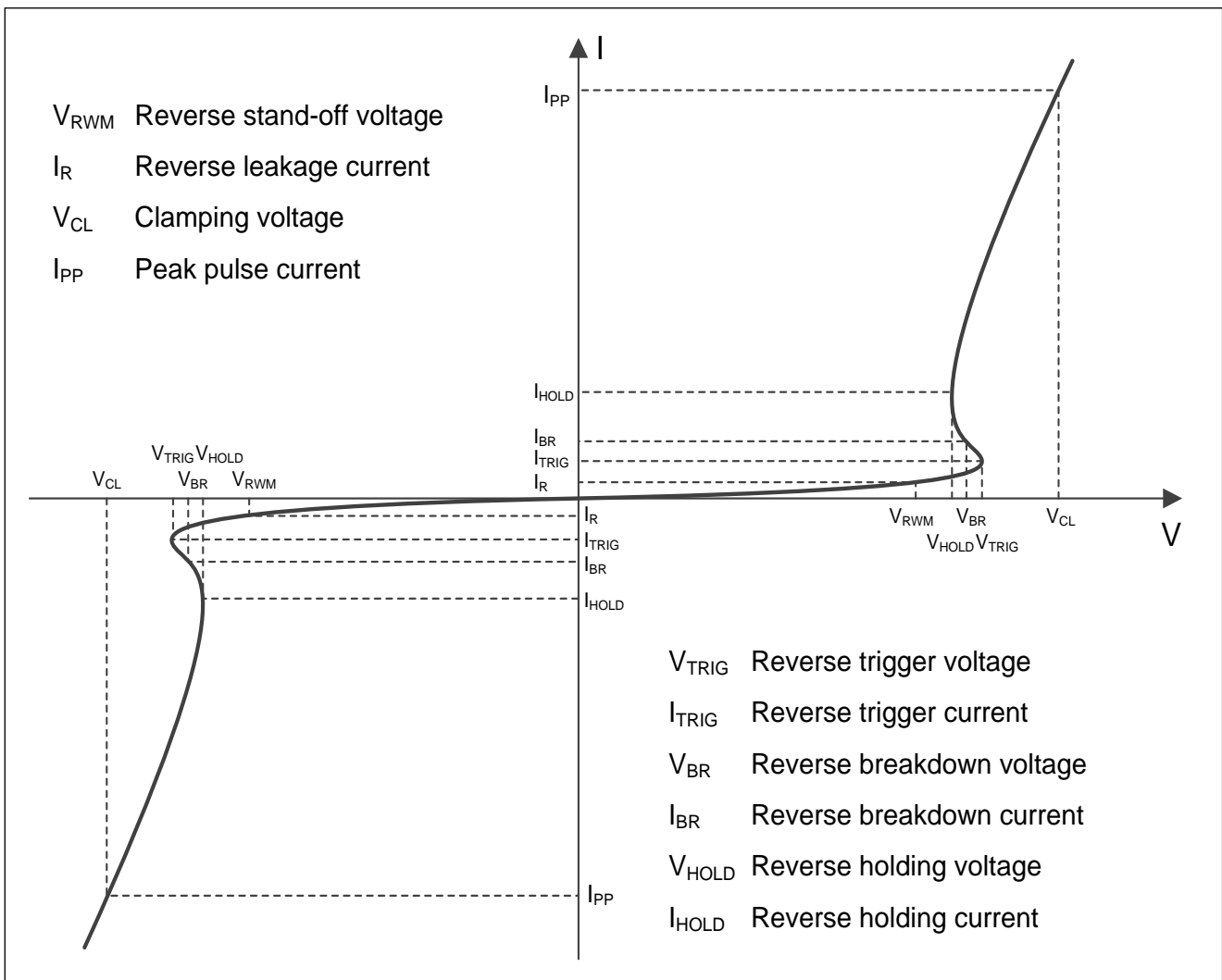
- Cellular handsets
- Computers and peripherals
- Microprocessors
- Power lines
- Portable Electronics
- Notebooks

Order information

| Device | Package | Shipping |
|---------------|------------|-----------------|
| ESD5431N-2/TR | DFN1006-2L | 10000/Tape&Reel |

Absolute maximum ratings

| Parameter | Symbol | Rating | Unit |
|---|-----------|----------|-------------|
| Peak pulse power ($t_p = 8/20\mu s$) | P_{pk} | 100 | W |
| Peak pulse current ($t_p = 8/20\mu s$) | I_{PP} | 10 | A |
| ESD according to IEC61000-4-2 air discharge | V_{ESD} | ± 30 | kV |
| ESD according to IEC61000-4-2 contact discharge | | ± 30 | |
| Junction temperature | T_J | 125 | $^{\circ}C$ |
| Operating temperature | T_{OP} | -40~85 | $^{\circ}C$ |
| Lead temperature | T_L | 260 | $^{\circ}C$ |
| Storage temperature | T_{STG} | -55~150 | $^{\circ}C$ |

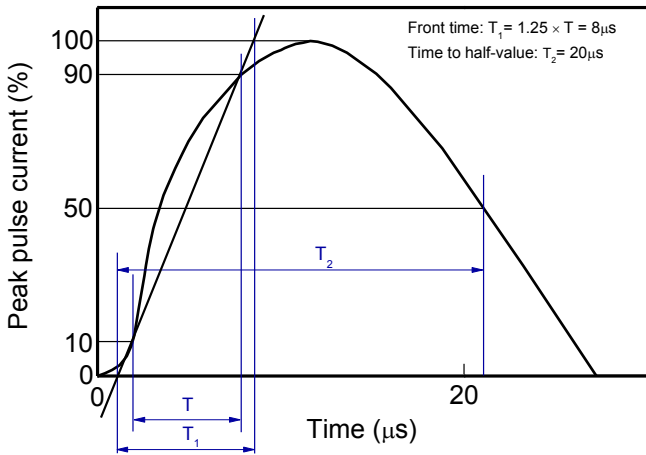
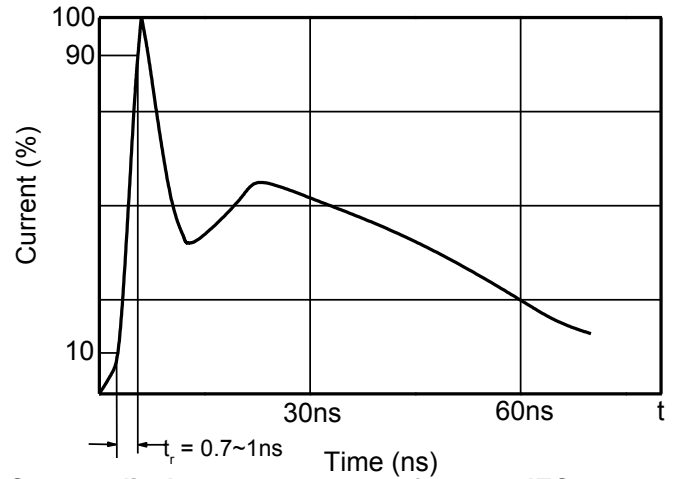
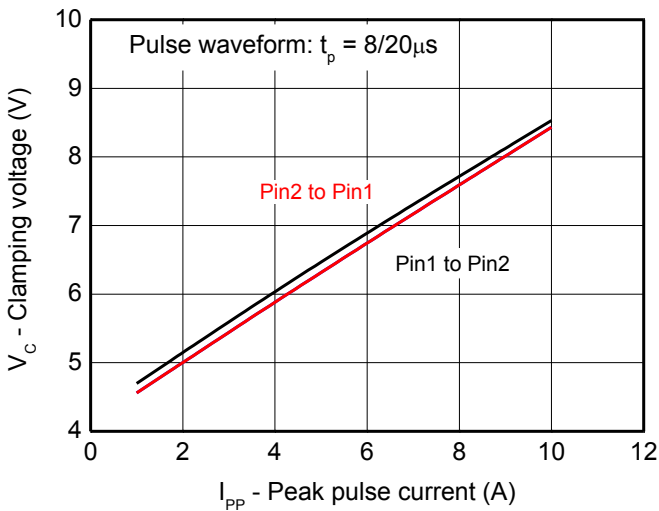
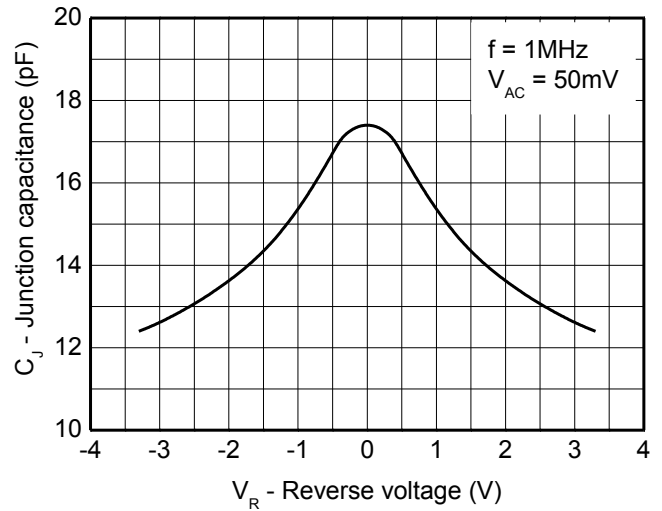
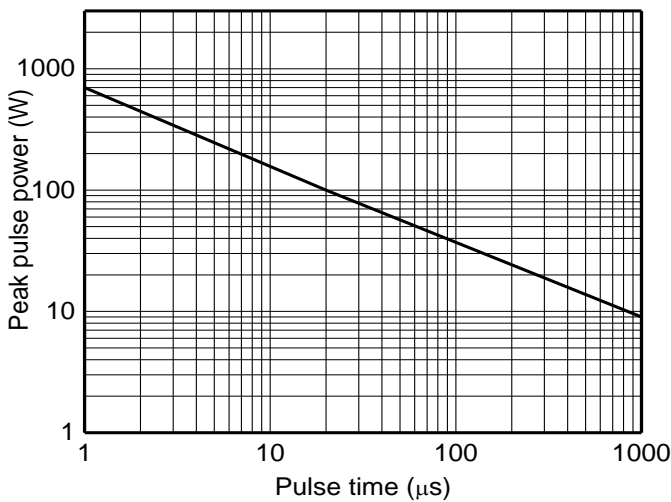
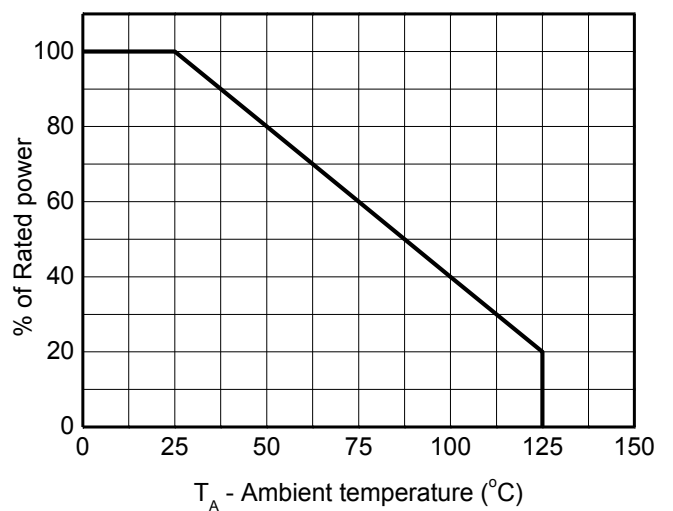
Electrical characteristics ($T_A=25^{\circ}C$, unless otherwise noted)

Definitions of electrical characteristics

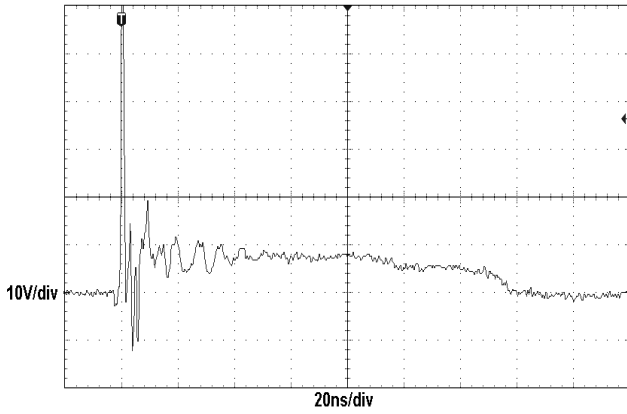
Electrical characteristics (T_A=25 °C, unless otherwise noted)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------------|-------------------|--|------|------|------|------|
| Reverse stand-off voltage | V _{RWM} | | | | ±3.3 | V |
| Reverse leakage current | I _R | V _{RWM} = 3.3V | | 1 | 100 | nA |
| Reverse breakdown voltage | V _{BR} | I _{BR} = 1mA | 3.4 | | | V |
| Reverse holding voltage | V _{HOLD} | I _{HOLD} = 50mA | 3.4 | | | V |
| Clamping voltage ¹⁾ | V _{CL} | I _{PP} = 16A, t _p = 100ns | | 8 | | V |
| Clamping voltage ²⁾ | V _{CL} | V _{ESD} = 8kV | | 8 | | V |
| Clamping voltage ³⁾ | V _{CL} | I _{PP} = 1A, t _p = 8/20μs | | | 6 | V |
| | | I _{PP} = 5A, t _p = 8/20μs | | | 8 | V |
| | | I _{PP} = 10A, t _p = 8/20μs | | | 10 | V |
| Dynamic resistance ¹⁾ | R _{DYN} | | | 0.20 | | Ω |
| Junction capacitance | C _J | V _R = 0V, f = 1MHz | | 17.5 | 22 | pF |
| | | V _R = 3.3V, f = 1MHz | | 12.5 | 16 | pF |

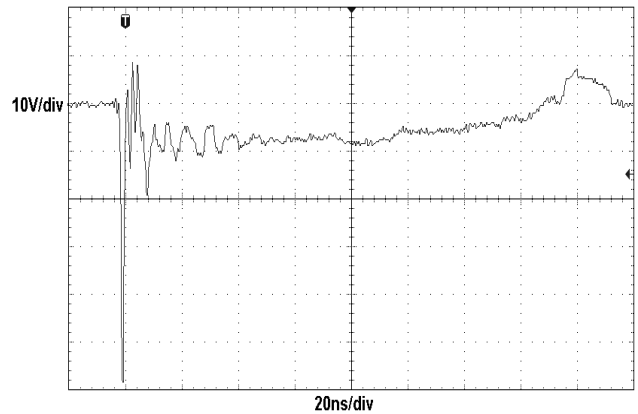
Notes:

- 1) TLP parameter: Z₀ = 50Ω, t_p = 100ns, t_r = 2ns, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

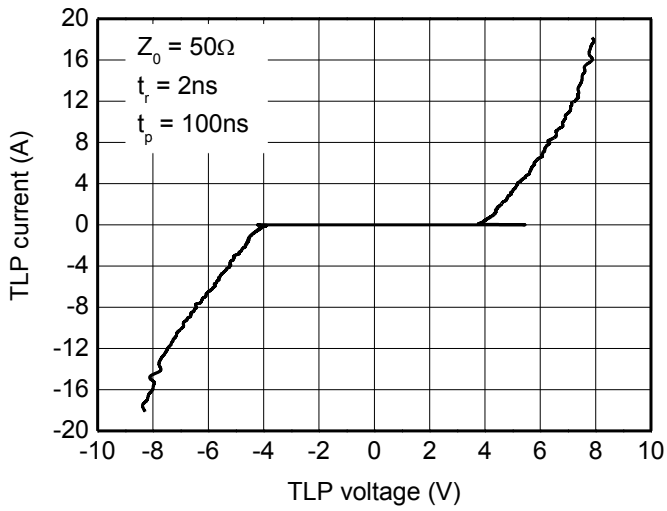
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

8/20μs waveform per IEC61000-4-5

Contact discharge current waveform per IEC61000-4-2

Clamping voltage vs. Peak pulse current

Capacitance vs. Reverse voltage

Non-repetitive peak pulse power vs. Pulse time

Power derating vs. Ambient temperature

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


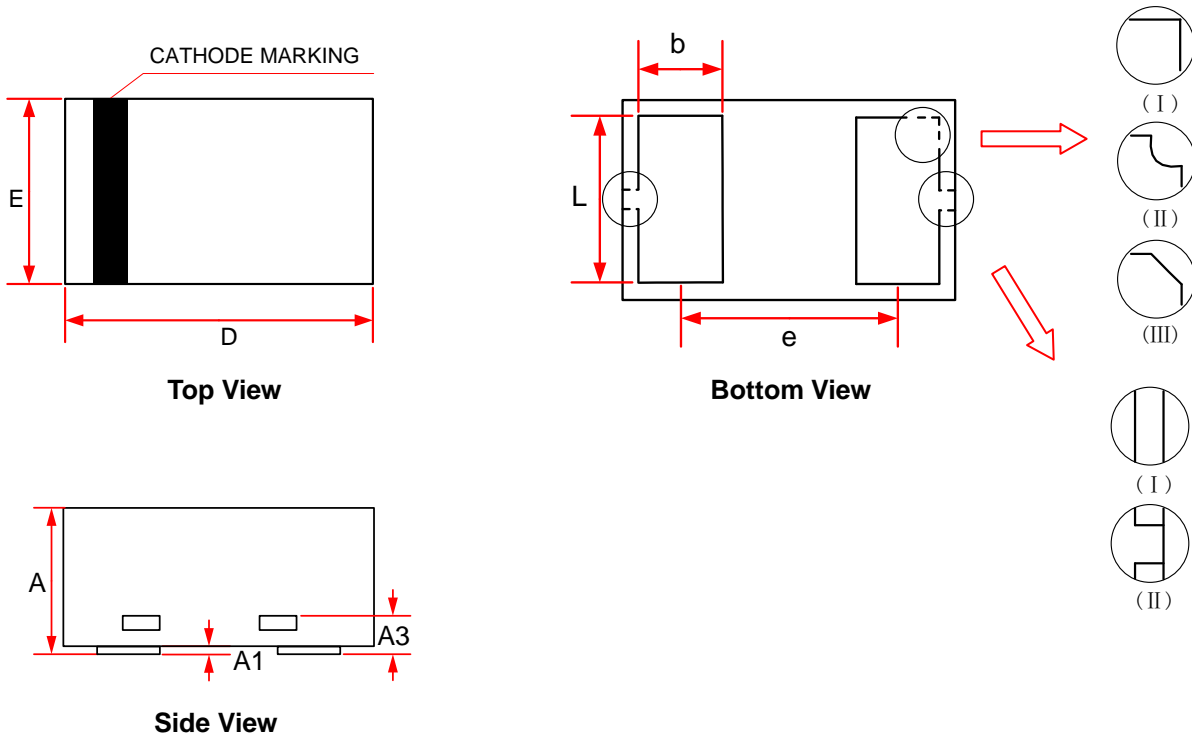
ESD clamping
 (+8kV contact discharge per IEC61000-4-2)



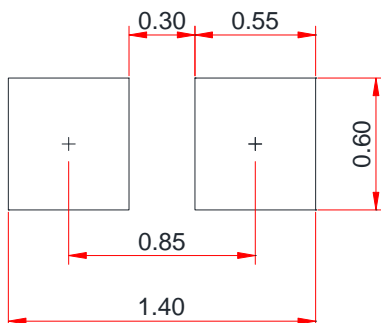
ESD clamping
 (-8kV contact discharge per IEC61000-4-2)



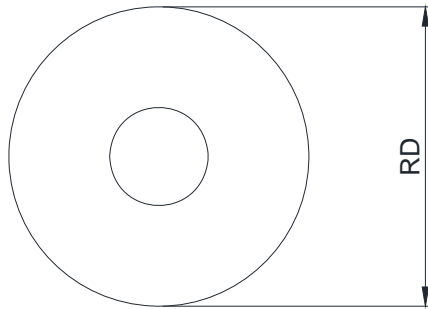
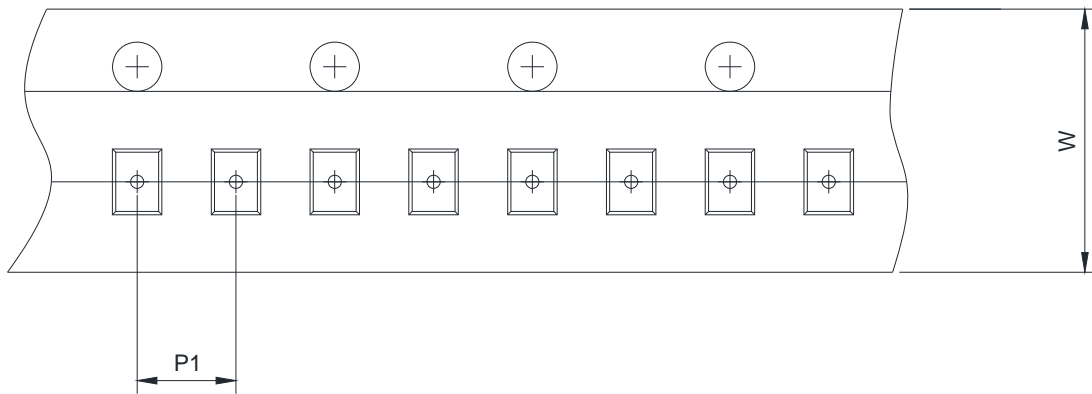
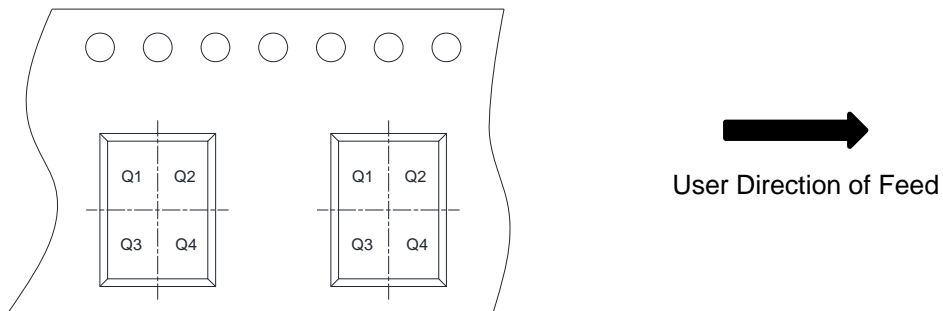
TLP Measurement

PACKAGE OUTLINE DIMENSIONS
DFN1006-2L


| Symbol | Dimensions in Millimeters | | |
|--------|---------------------------|-------|-------|
| | Min. | Typ. | Max. |
| A | 0.340 | 0.450 | 0.530 |
| A1 | 0.000 | 0.020 | 0.050 |
| A3 | 0.125 Ref. | | |
| D | 0.950 | 1.000 | 1.075 |
| E | 0.550 | 0.600 | 0.675 |
| b | 0.200 | 0.250 | 0.300 |
| L | 0.450 | 0.500 | 0.550 |
| e | 0.650 BSC | | |

Recommended PCB Layout (Unit: mm)

Notes:

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


| | | | |
|------|---|---|--|
| RD | Reel Dimension | <input checked="" type="checkbox"/> 7inch | <input type="checkbox"/> 13inch |
| W | Overall width of the carrier tape | <input checked="" type="checkbox"/> 8mm | <input type="checkbox"/> 12mm |
| P1 | Pitch between successive cavity centers | <input checked="" type="checkbox"/> 2mm | <input type="checkbox"/> 4mm <input type="checkbox"/> 8mm |
| Pin1 | Pin1 Quadrant | <input checked="" type="checkbox"/> Q1 | <input checked="" type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> Q4 |

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