

## Description

Transient Diverting Suppressors (TDS) are designed to provide high energy EOS protection with superior clamping and temperature characteristics when compared to standard TVS devices. The device uses a surge rated FET as the main protection element. During an EOS event, transient voltage increases beyond the rated breakdown voltage of the device. The FET in turn switches on and conducts transient current to ground. The TDS clamping voltage is nearly constant across the rated peak pulse current range due to the extremely low ON Resistance of the FET. Lower clamping voltage at maximum peak pulse current makes them more suitable for protecting today's sensitive IC's, when compared to standard TVS diodes.

TDS3621LP is designed to protect voltage bus or data lines with an operating voltage of 36V. It is rated for a high-energy transient current up to 24A ( $t_p = 8/20\mu s$ ) and may be used to meet the common industrial voltage surge standard of  $\pm 1kV$  per IEC 61000-4-5 ( $R_S = 42\Omega$ ,  $C_S = 0.5\mu F$ ).

TDS3621LP is in a small DFN 1.6 x 1.6 x 0.55mm 2-Lead package and represent significant board space savings over traditional SMAJ and SMBJ packaged devices.

## Applications

- USB Type-C
- VBUS Lines
- IoT Devices

## Dimensions

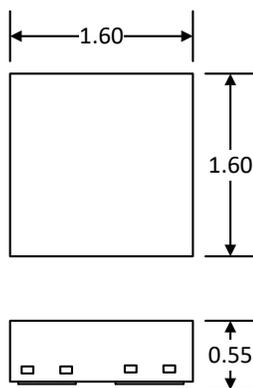


Figure (1) Nominal Dimensions Drawing

## Features

- High ESD withstand Voltage:  $\pm 30kV$  (Contact) &  $\pm 30kV$  (Air) per IEC 61000-4-2
- High peak pulse current capability: 24A ( $t_p = 8/20\mu s$ ), 1kV ( $t_p = 1.2/50\mu s$ ,  $R_S = 42\Omega$ ) per IEC 61000-4-5
- Protects one I/O or power line
- Working voltage 36V
- Solid-state technology

## Mechanical Characteristics

- Package: DFN 1.6 x 1.6 x 0.55mm 2-Lead
- Pb-free, Halogen Free, RoHS/WEEE Compliant
- Molding compound flammability rating: UL 94V-0
- Lead Finish: Lead-free
- Marking: Marking code and Date Code
- Packaging: Tape and Reel

## Functional Diagram

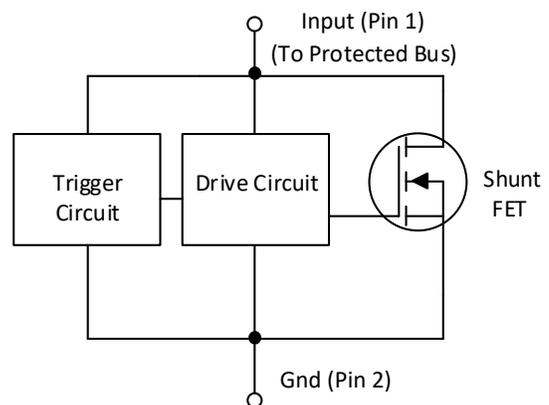


Figure (2) Functional diagram

## Absolute Maximum ESD Rating

RATING	SYMBOL	VALUE	UNITS
Peak Pulse Power ( $t_p = 8/20\mu s$ )	$P_{PK}$	1152	W
Peak Pulse Current ( $t_p = 8/20\mu s$ )	$I_{PP}$	24	A
Peak Pulse Current ( $t_p = 10/1000\mu s$ )	$I_{PP}$	1.3	A
ESD per IEC 61000-4-2 (Air) <sup>(1)</sup>	$V_{ESD}$	±30	kV
ESD per IEC 61000-4-2 (Contact) <sup>(1)</sup>		±30	kV
Operating Temperature	$T_{OP}$	-40 to +125	°C
Junction and Storage Temperature	$T_J$ and $T_{STG}$	-55 to +150	°C

Exceeding the above specifications may result in permanent damage to the device or device malfunction. Operation outside of the parameters specified in the Electrical Characteristics section is not recommended.

## Electrical Characteristics

$T_A = 25^\circ C$  unless otherwise specified. All data taken from Pin 1 to 2 unless otherwise specified.

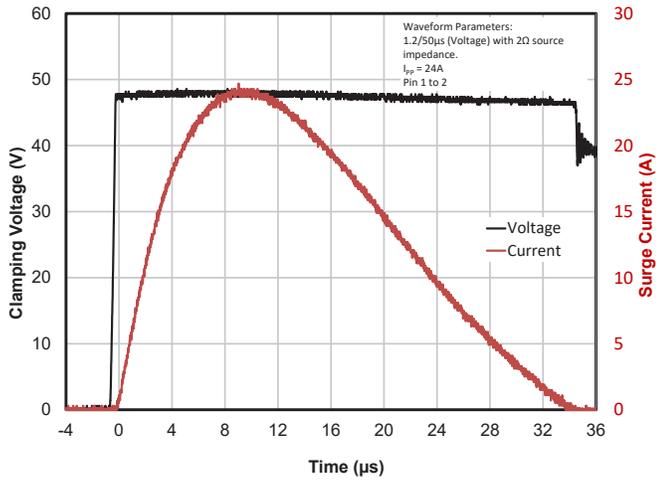
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse Stand-Off Voltage	$V_{RWM}$				36	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1mA$	43.5	46.9	49	V
Forward Voltage	$V_F$	$I_t = 1mA$ , Pin 2 to Pin 1		0.6		V
Reverse Leakage Current	$I_R$	$V_{RWM} = 36V$ ,		11	60	nA
Clamping Voltage <sup>(2)</sup>	$V_C$	$I_{PP} = 24A$ , $t_p = 8/20\mu s$		47.1	49.7	V
Dynamic Resistance <sup>(2),(3)</sup>	$R_{DYN}$	$t_p = 8/20\mu s$		37		mΩ
Junction Capacitance	$C_J$	$V_R = 36V$ , $f = 1MHz$		80		pF

### Notes:

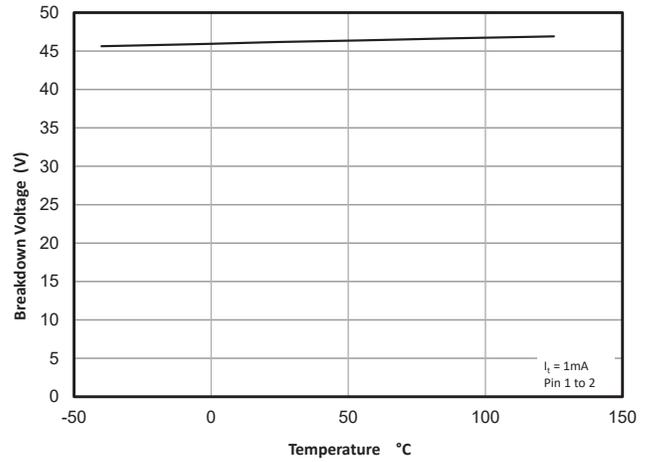
- 1) ESD gun return path connected to ESD ground plane.
- 2) Parameter guaranteed by design.
- 3) Dynamic resistance measured between 1A and IPP ( $t_p = 8/20\mu s$ )

Typical Characteristics

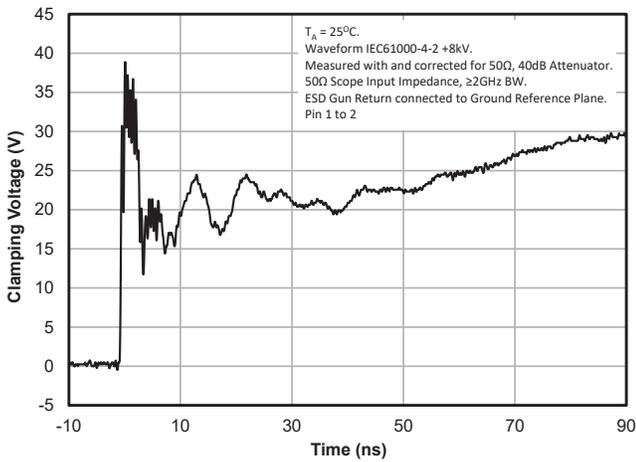
Clamping Voltage ( $t_p=1.2/50\mu s$ ,  $I_{pp}=24A$ )



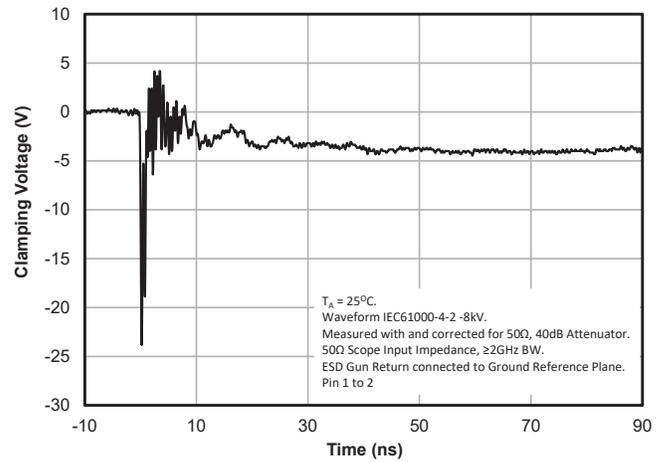
Breakdown Voltage vs. Temperature



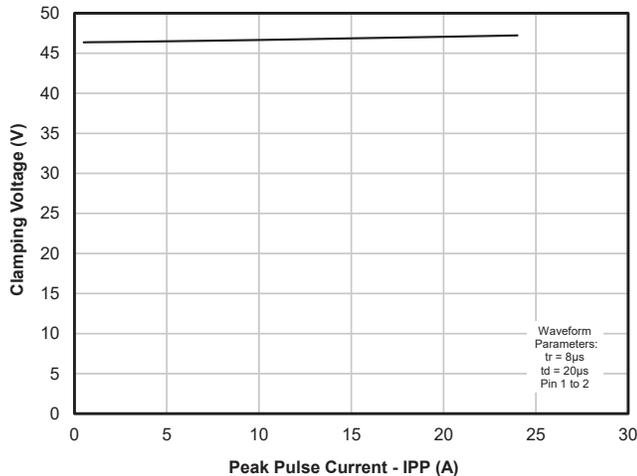
ESD Clamping (+8kV Contact per IEC 61000-4-2)



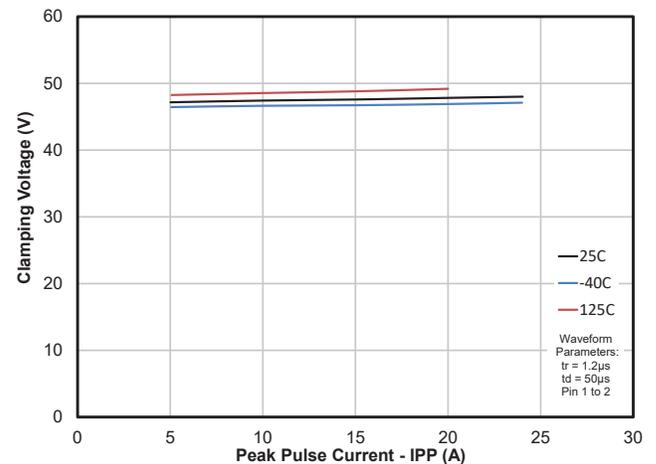
ESD Clamping (-8kV Contact per IEC 61000-4-2)



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

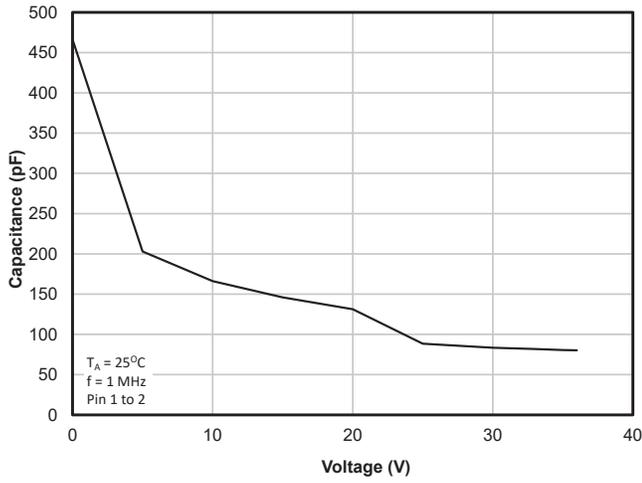


Clamping Voltage vs. Temperature ( $t_p=8/20\mu s$ )

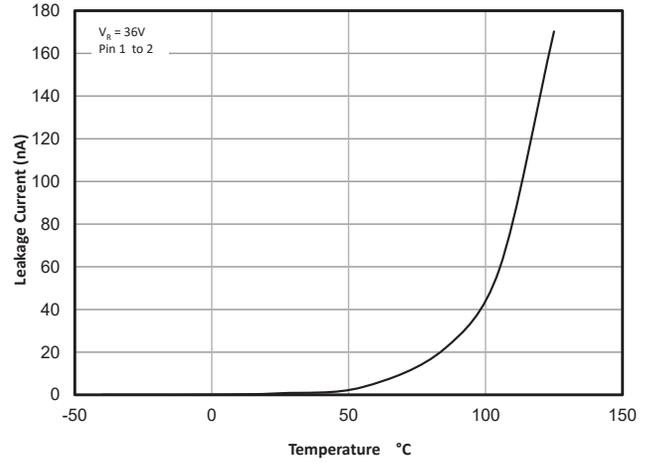


Typical Characteristics

Capacitance vs. Voltage



Leakage Current vs. Temperature

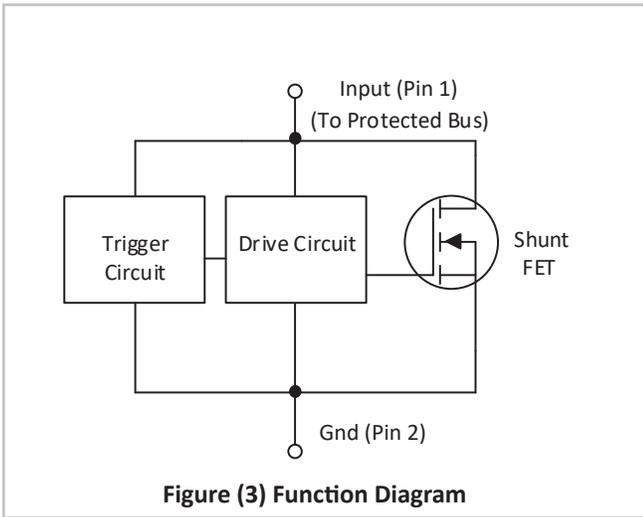


Application Information

DESCRIPTION

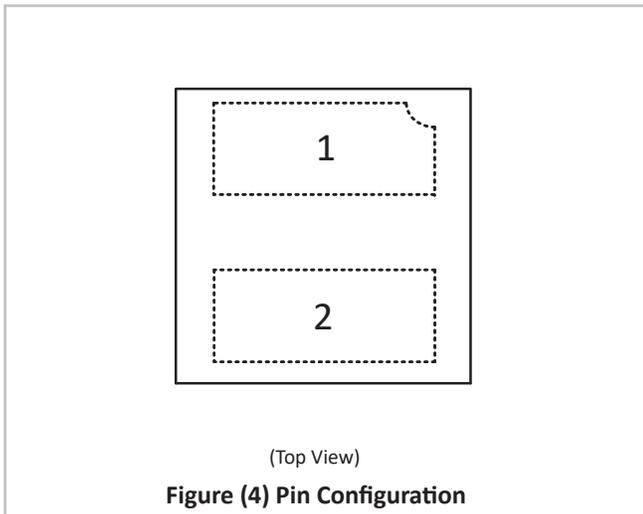
Transient Diverting Suppressors(TDS) are designed to provide high energy EOS protection with superior clamping and temperature characteristics when compared to standard TVS devices.

This device uses a surge rated FET as the main protection element. During an EOS event, transient voltage increases beyond the breakdown voltage of the trigger circuit. This in turn activates the drive circuit and turns on the shunt FET which conducts transient current to ground. The TDS has an extremely low dynamic resistance and exhibits a nearly constant clamping voltage across the rated peak pulse current range.



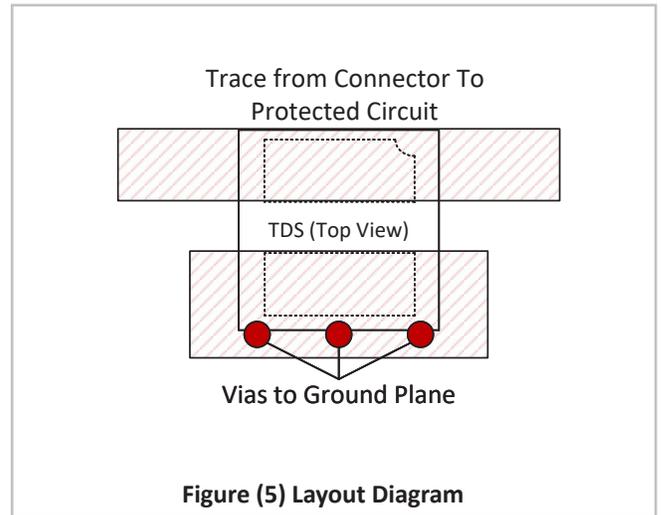
PIN CONFIGURATION

TDS3621LP is in a 1.6 x 1.6mm, 2-pin DFN package. The input or connection to the protected bus is made at pin 1. Ground connection is made at pin 2. Ground connection with multiple vias is recommended.

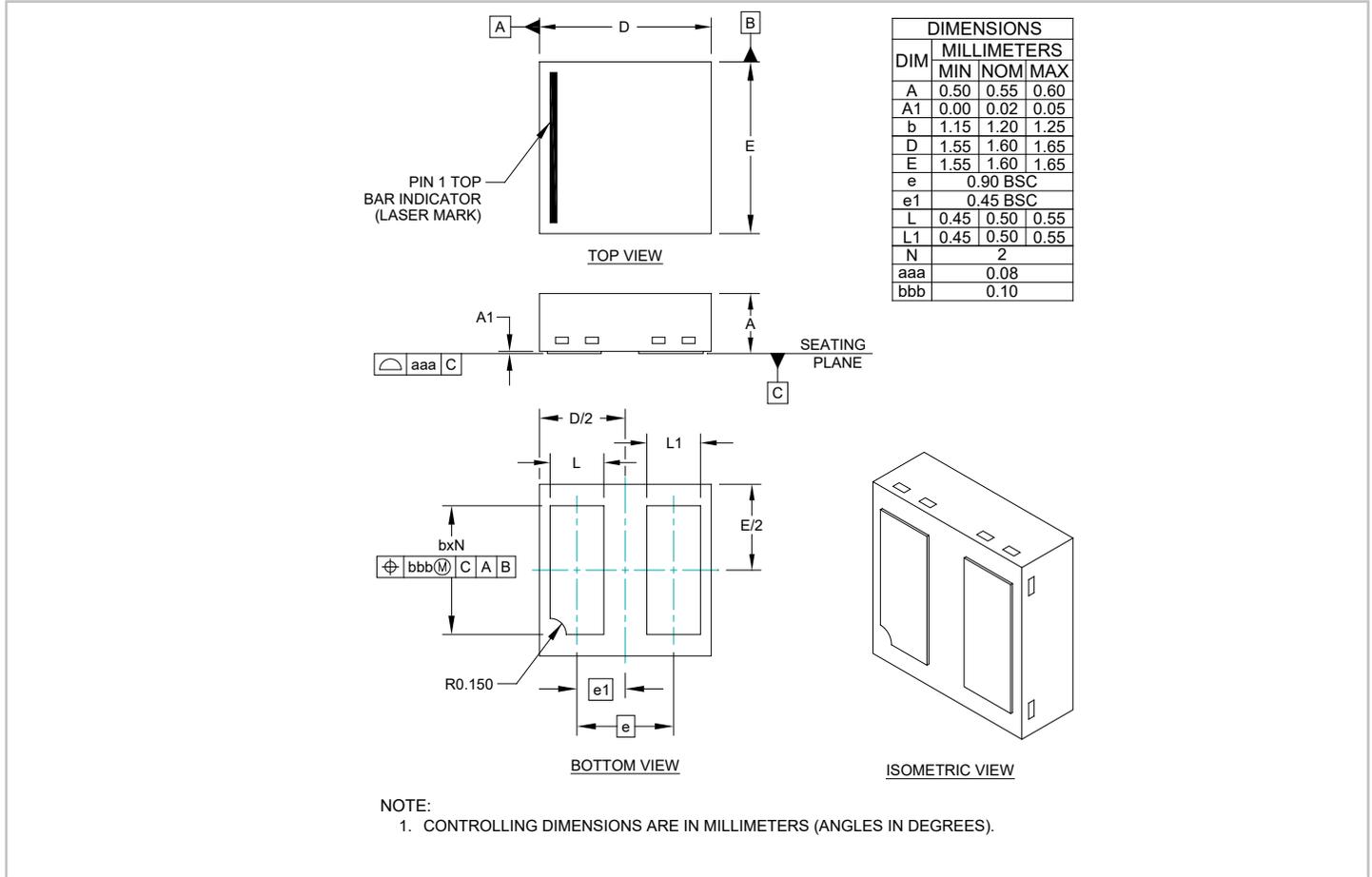


LAYOUT GUIDELINES

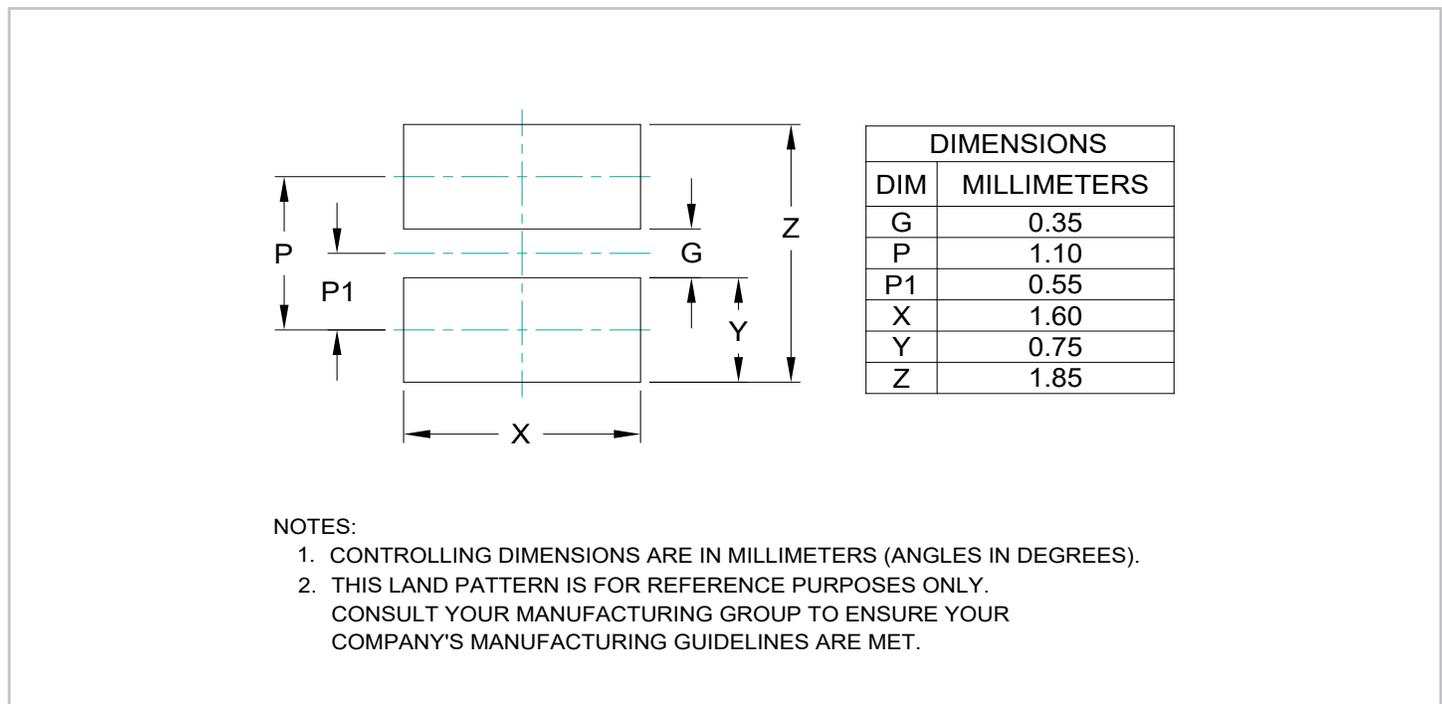
Figure 5 shows a recommended layout. Ground connection with multiple vias is recommended.



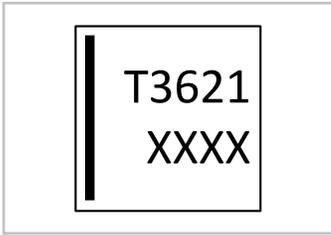
Outline Drawing - DFN 1.6 x 1.6 x 0.55 mm, 2 Lead



Landing Pattern - DFN 1.6 x 1.6 x 0.55 mm, 2 Lead



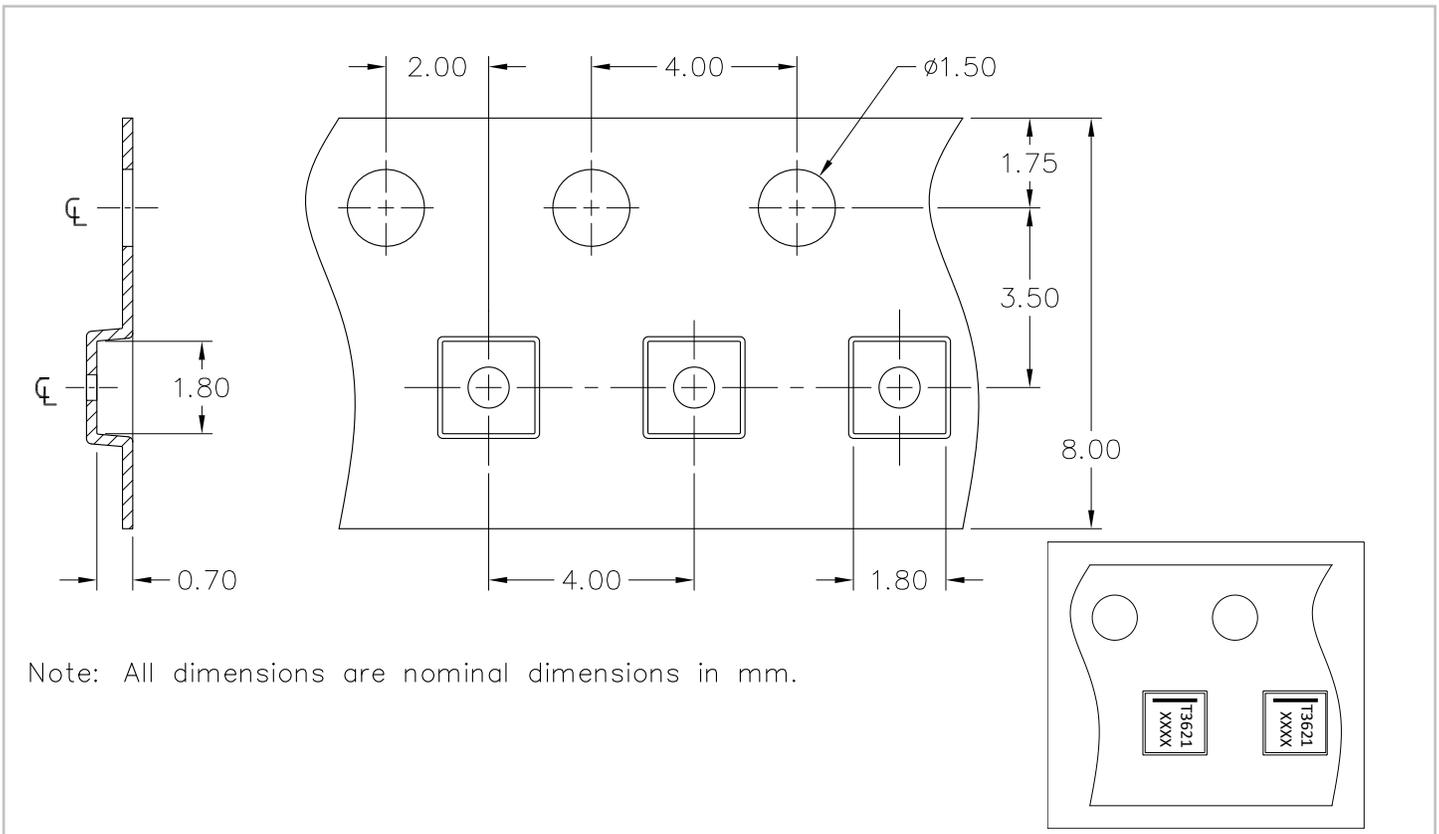
## Marking Code



Note:

1. Bar indicates Pin 1 location.
2. XXXX Date Code

## Tape and Reel Specification



## Order Information

PART NUMBER	QTY PER REEL	DESCRIPTION
TDS3621LP.C	3,000	7" Reel

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