

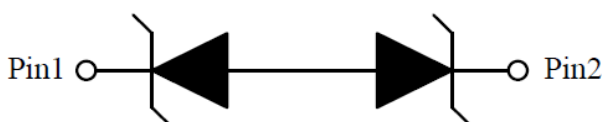
### ■ Description

HWES2521PB is a low-capacitance Transient Voltage Suppressor (TVS) array designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces.

With typical capacitance of 3.0pF only, HWES2521PB is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD), Level 4 ( $\pm 15\text{kV}$  air,  $\pm 8\text{kV}$  contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), IEC 61000-4-5 (Surge) (23A, 8/20 $\mu\text{s}$ ), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

HWES2521PB is in a uDFN-2L package. Each HWES2521PB device can protect one high-speed line pair. The “flow-thru” design minimizes trace inductance and reduces voltage overshoot associated with ESD events. The combined features of low capacitance and high ESD robustness make HWES2521PB ideal for portable applications such as cellular phones and MP3 players. The low clamping voltage of the HWES2521PB guarantees a minimum stress on the protected IC.

### ■ Circuit Diagram



### ■ Features

- Transient protection for high-speed data lines IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (Air)  $\pm 30\text{kV}$  (Contact)
- IEC 61000-4-4 (EFT) 40A (5/50 ns)
- IEC 61000-4-5 (Surge) 18A (8/20 $\mu\text{s}$ )
- Package optimized for high-speed lines
- Provides protection for one line pair
- Low capacitance: 3.0pF @ 2.5V (Typical)
- Low leakage current: 0.01 $\mu\text{A}$  @  $V_{\text{RWM}}$  (Typical)
- Low operating and clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for  $\pm 8\text{kV}$  contact discharge

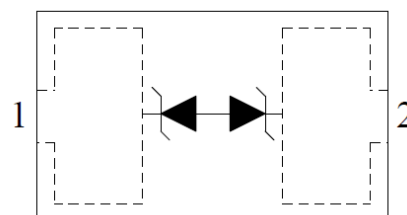
### ■ Applications

- Portable instruments
- Desktops, Servers and Notebooks
- Cellular Phones
- MP3 Players
- Keypads, Side Keys

### ■ Mechanical Characteristics

- uDFN-2L package
- Flammability Rating: UL 94V-0
- Marking: Part number
- Packaging: Tape and Reel

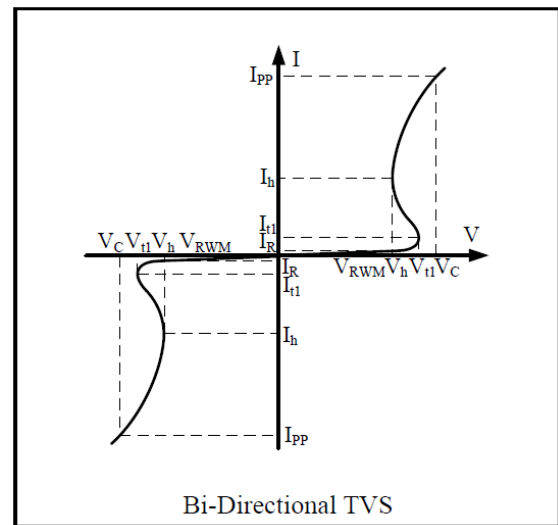
### ■ Pin Configuration



uDFN-2L  
(Top View)

### Electrical characteristics (Ta = 25 °C)

Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{t1}$	Trigger Voltage
$I_{t1}$	Trigger Current @ $V_{t1}$
$V_h$	Holding Voltage
$I_h$	Holding Current @ $V_h$
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$C_{ESD}$	Parasitic Capacitance
$C_{\Delta}$	Variation in $C_{ESD}$ with Reverse Bias

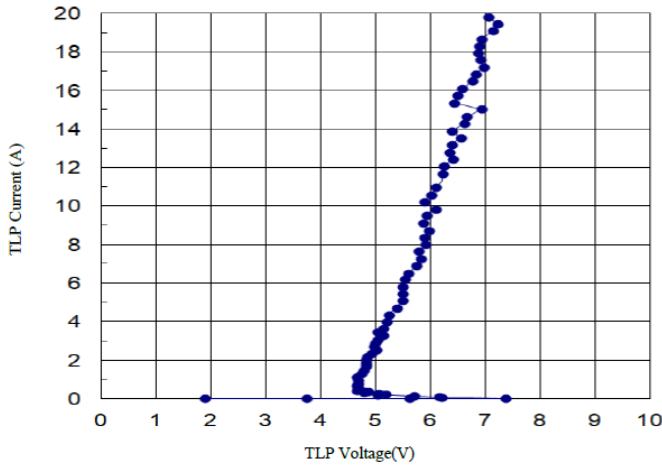


Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				2.5	V
$I_R$	$V_{RWM} = 2.5V, T = 25^{\circ}C$		0.01	0.05	$\mu A$
$V_{t1}$	$I_{t1} = 1\mu A$		6.5		V
$V_h$	$I_h = 1mA$	3		4	V
$V_C$	$I_{PP} = 10A, t_p = 8/20\mu s$			7.5	V
$V_C$	$I_{PP} = 18A, t_p = 8/20\mu s$			11.0	V
$C_{ESD}$	$V_R = 2.5V, f = 1MHz$		3	5	pF

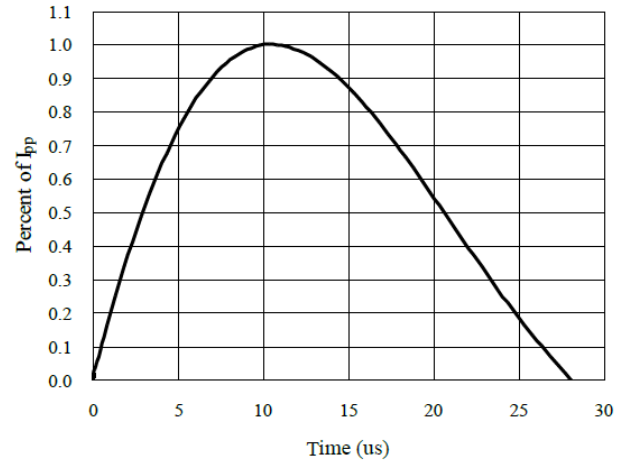
### Absolute Maximum Rating

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current (8/20 $\mu s$ )	18	A
$P_{PK}$	Peak Pulse Power (8/20 $\mu s$ )	200	Watts
$V_{ESD}$	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$\pm 30$ $\pm 30$	kV
$T_{OPT}$	Operating Temperature	-45 to +85	$^{\circ}C$
$T_{STG}$	Storage Temperature	-55 to +150	$^{\circ}C$

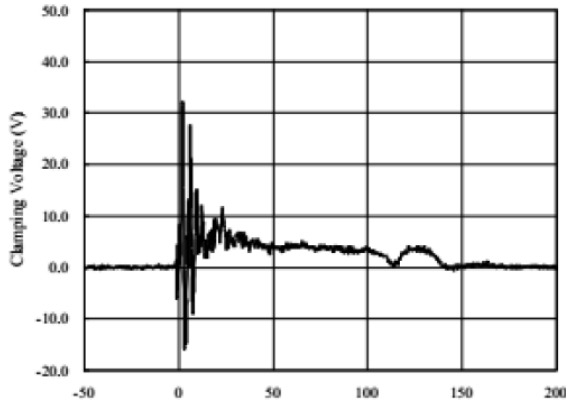
### TLP Measurement of I/O to GND



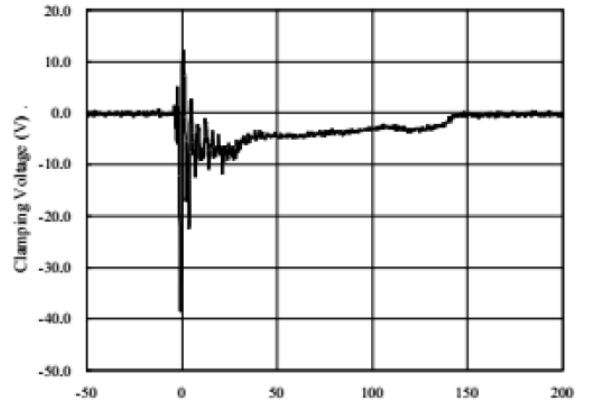
### 8/20μs Pulse Waveform



### ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)

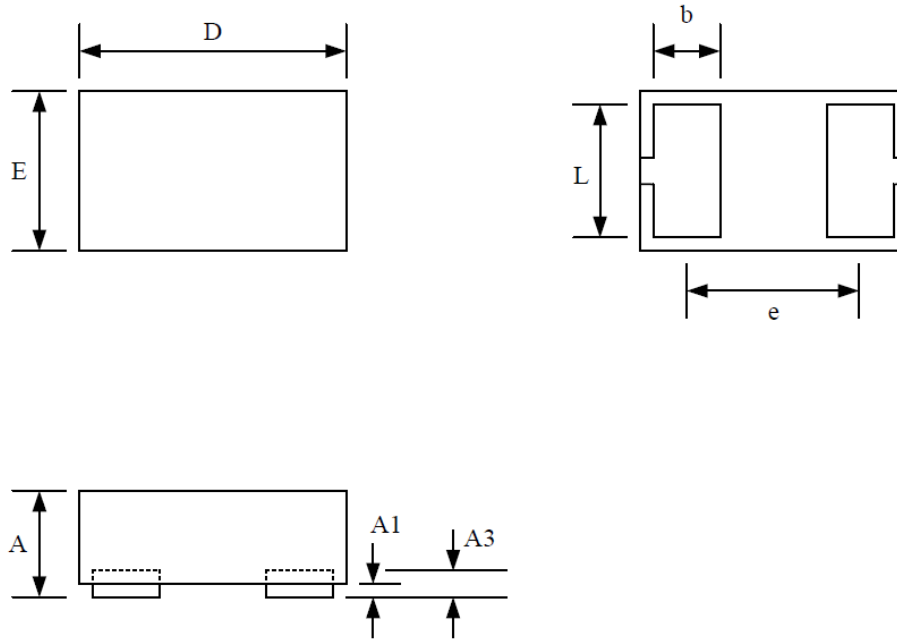


### ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



### Package Outline

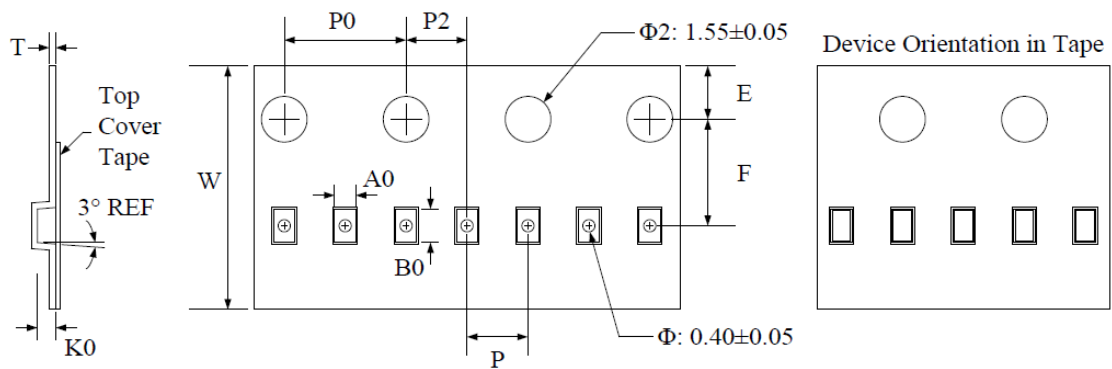
- uDFN-2L package
- 2 leads, very small package



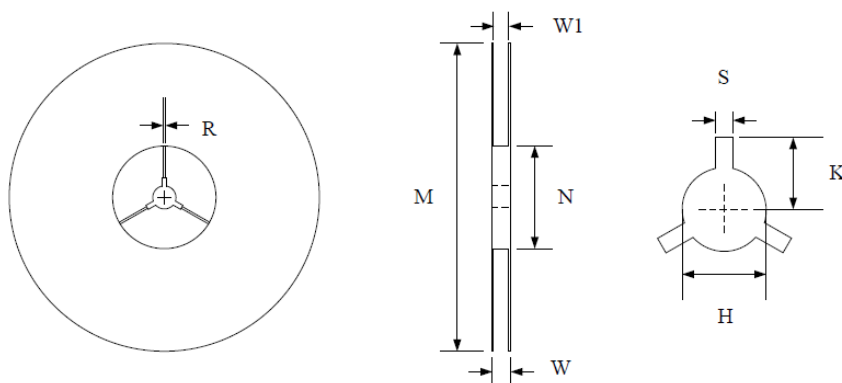
Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Minimum	Maximum	Minimum	Maximum
A	0.400	0.550	0.016	0.022
A1	0.000	0.050	0.000	0.002
A3	0.125 REF		0.005 REF	
D	0.950	1.050	0.037	0.041
E	0.550	0.650	0.022	0.026
b	0.200	0.300	0.008	0.012
e	0.650 BSC		0.026 BSC	
L	0.450	0.550	0.018	0.022

### Tape and Reel Specification



Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00±0.1	0.7±0.05	1.15±0.05	0.55±0.05	1.75±0.1	3.5±0.05	2.0±0.1	4.0±0.1	2.0±0.05	0.2±0.05



Symbol	Reel Size	M	N	W	W1	H	S	K	R
Dimensions (mm)	Φ178	178.0±1.0	60.0±1.0	11.5±0.5	9.0±0.5	13.0±0.5	2.0±0.1	11.0±0.2	1.0±0.05