

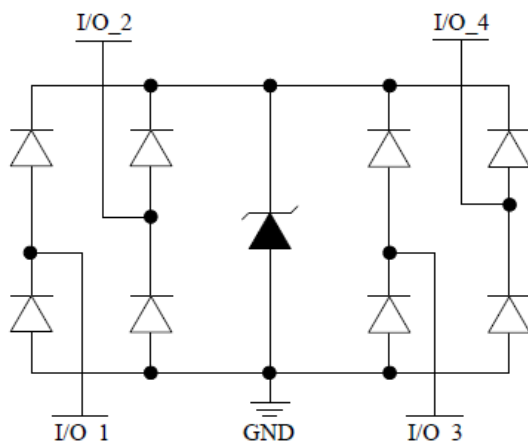
### Description

HWET05141P is an ultra-low - capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With Maximum capacitance 0.65pF only, HWET05141P 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), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc. HWET05141P uses ultra-small DFN-10L package. Each HWET05141P device can protect four high-speed data lines. The combined features of ultra-low capacitance, ultra-small size and high ESD robustness make HWET05141P ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the HWET05141P guarantees a minimum stress on the protected IC.

### Mechanical Characteristics

- DFN-10L package
- Flammability Rating: UL 94V-0
- Marking: Part number
- Packaging: Tape and Reel

### Circuit Diagram



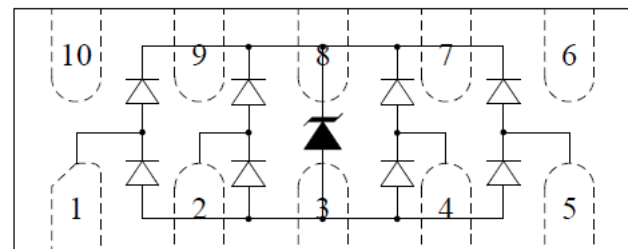
### Features

- Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD)  $\pm 25\text{kV}$  (Air)
  - $\pm 17\text{kV}$  (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - Cable Discharge Event (CDE)
- Package optimized for high-speed lines
- Ultra-small package (2.5mm\*1.0mm\*0.55mm)
- Protects four data lines
- Low capacitance: 0.4pF Typical(I/O-GND)
- Low leakage current: 0.1 $\mu$  A @ VRWM (Typ.)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for  $\pm 8\text{kV}$  contact discharge

### Applications

- Serial ATA
- PCI Express
- Desktops, Servers and Notebooks
- MDDI Ports
- USB2.0/3.0 Power and Data Line Protection
- Display Ports
- High Definition Multi-Media Interface (HDMI)
- Digital Visual Interfaces (DVI)

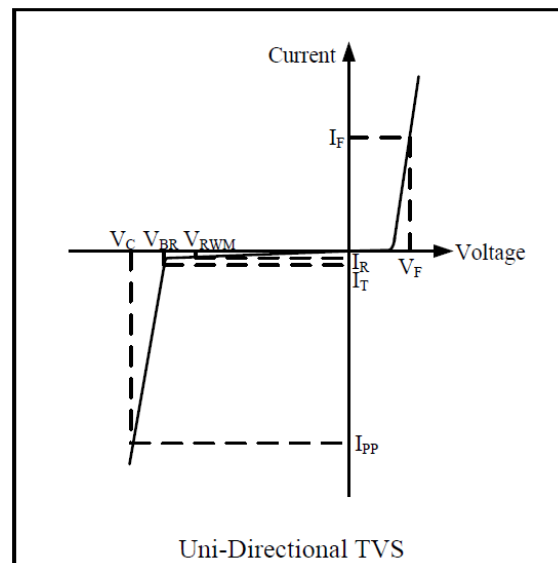
### Pin Configuration



DFN-10L  
(Top View)

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

Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Reverse Breakdown Voltage @ $I_T$
$I_T$	Test Current for Reverse Breakdown
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$C_{ESD}$	Parasitic Capacitance
$V_R$	Reverse Voltage
$f$	Small Signal Frequency
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$

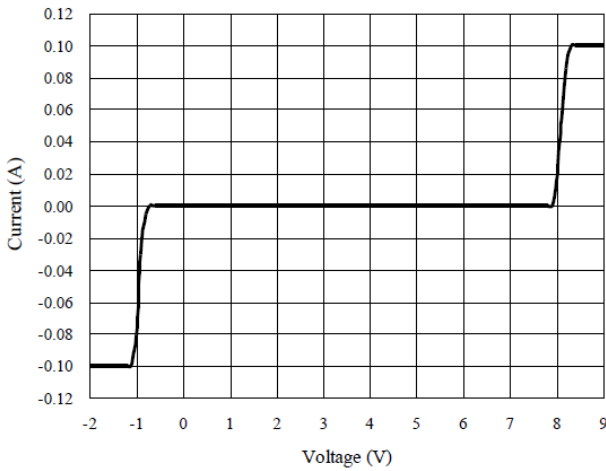


Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				5	V
$I_R$	$V_{RWM} = 5V, T = 25^{\circ}C$ Between I/O and GND		0.1	1	$\mu A$
$V_{BR}$	$I_T = 1mA$ Between I/O and GND	6	8	10	V
$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O and GND			12	V
$V_C$	$I_{PP} = 8.0A, t_p = 100ns^{(1)}$ $I_{PP} = 16.0A, t_p = 100ns$		14		V
$R_{dyn}$	IEC61000-4-2 0-6KV, $T=25^{\circ}C$ Contact, I/O to GND		0.9		$\Omega$
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and GND		0.4	0.5	pF
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and I/O		0.2	0.25	pF

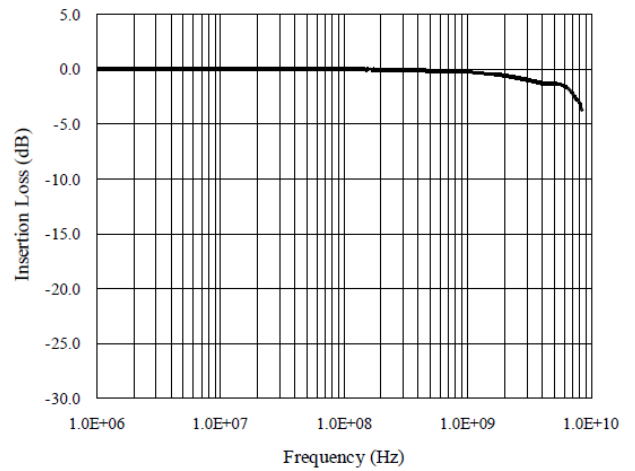
### Absolute Maximum Rating

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current( $t_p=8/20\mu s$ )(I/O pins)	5	A
$V_{ESD}$	ESD per IEC 61000-4-2 (Air)	$\pm 25$	kV
	ESD per IEC 61000-4-2 (Contact)	$\pm 17$	
$T_{OPT}$	Operating Temperature	-55/+125	$^{\circ}C$
$T_{STG}$	Storage Temperature	-55/+150	$^{\circ}C$

## Voltage Sweeping of I/O to GND

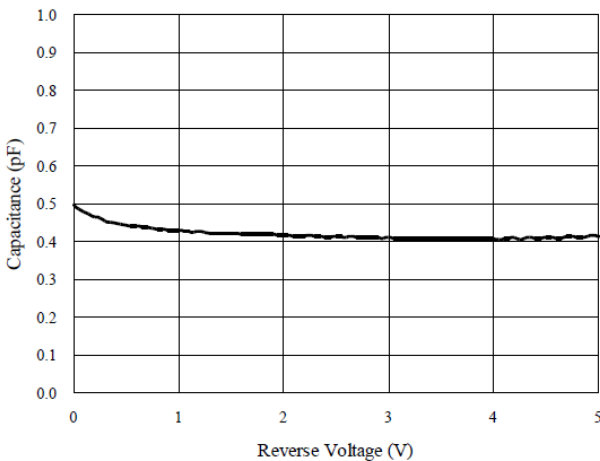


## Insertion Loss S21 of I/O to GND

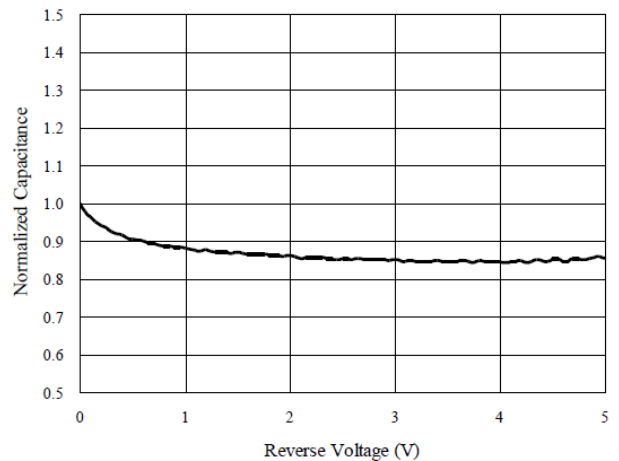


## Capacitance vs. Voltage of I/O to GND (f = 1MHz)

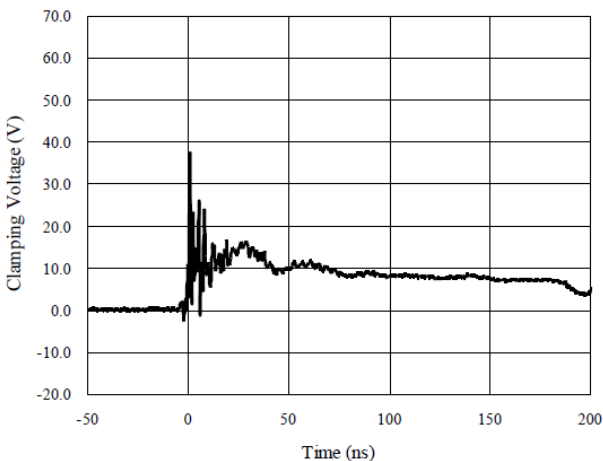
Capacitance vs. Reverse Voltage



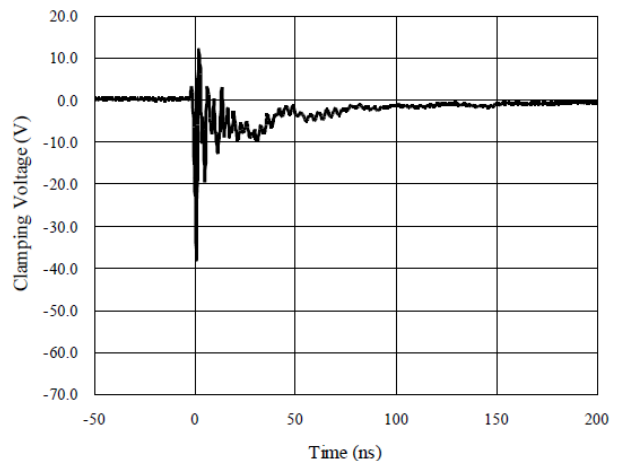
Normalized Capacitance vs. Reverse Voltage



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

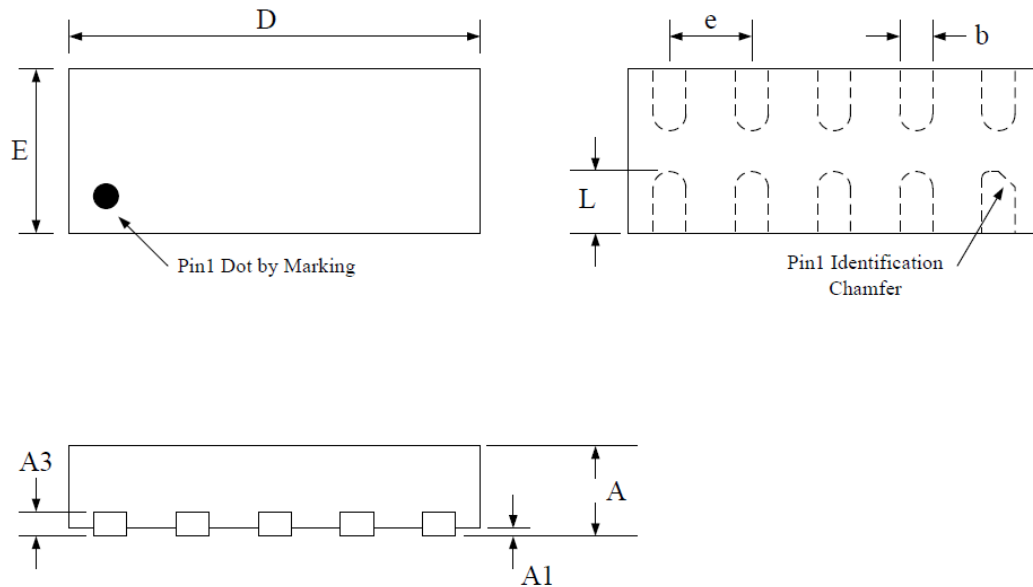


## ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



### Package Outline

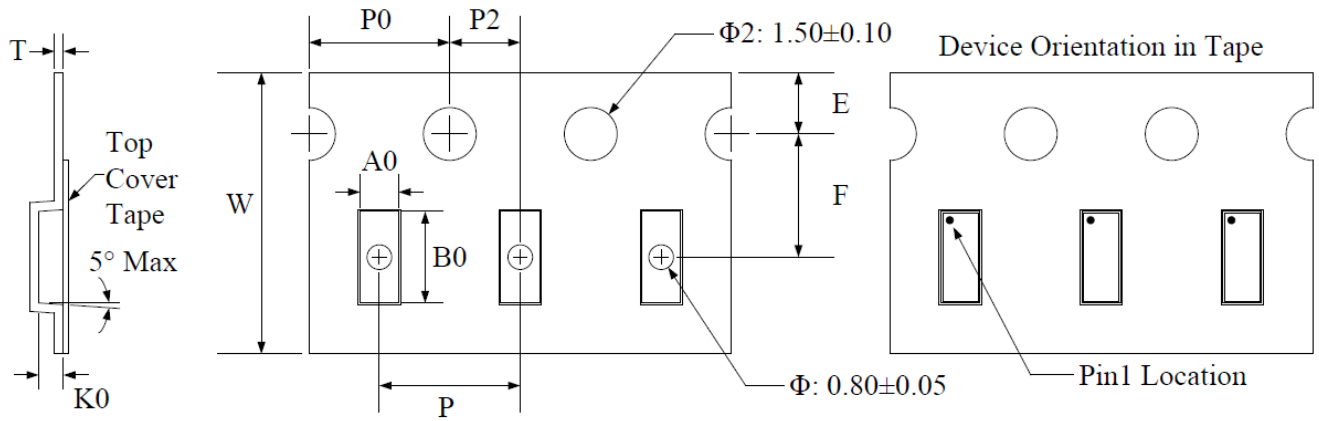
- DFN-10L package
- Thermally-Enhanced
- MSL-1 Level



Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions (mm)		Dimensions (Inches)	
	Minimum	Maximum	Minimum	Maximum
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
A3	0.15REF.		0.006REF.	
b	0.150	0.250	0.006	0.010
D	2.450	2.550	0.096	0.100
E	0.950	1.050	0.037	0.041
e	0.500 BSC		0.020 BSC	
L	0.300	0.400	0.012	0.016

### Tape and Reel Specification



Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.3 -0.1	1.23±0.05	2.7±0.05	0.7±0.05	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	0.25±0.02