

Features

- Transient protection for high-speed data lines
IEC61000-4-2 (ESD) $\pm 15\text{kV}$ (Air)
 $\pm 15\text{kV}$ (Contact)
IEC61000-4-5 (Lightning) 6.0A (8/20 μs)
- Small package saves board space
- Protects four I/O lines
- Low capacitance: 0.60pF@0V(Typical)(I/O-GND)
- Low leakage current: 0.01 μA @ V_{RWM} (Maximum)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for $\pm 15\text{kV}$ contact discharge

Description

TT0354TP-FxX is an ultra-low capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 0.6pF only, it is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC61000-4-2 (ESD), Level 4 ($\pm 15\text{kV}$ air, $\pm 8\text{kV}$ contact discharge), IEC61000-4-5 (Lightning) (6A, 8/20 μs).

The TT0354TP-FxX comes in a ROHS compliant and Halogen Free 2.5mm x 1.0mm x 0.55mm DFN2510-10L package.

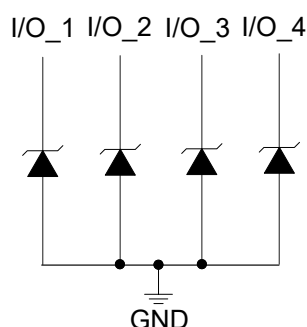
Applications

- Portable applications
- Communication systems
- Computers and peripherals
- High speed data lines:
 - USB 2.0/3.0/3.1(Gen 1)
 - HDMI 1.3/1.4
 - eSATA
 - DisplayPort

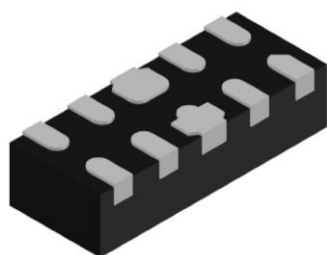
Mechanical Characteristics

- Package: DFN2510-10L
- Marking: Part number
- Packaging: Tape and Reel
- ROHS compliant
- Moisture Sensitivity Level(MSL Level-1)

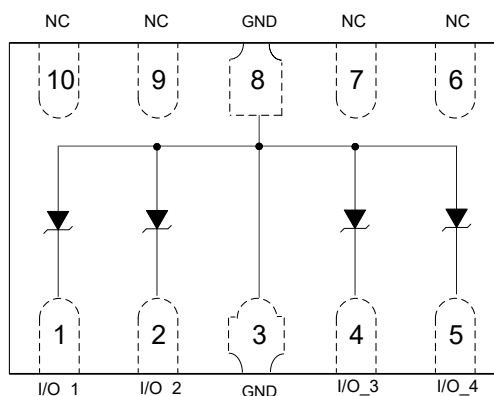
Circuit Diagram



Pin Configuration



DFN2510-10L
(Bottom View)

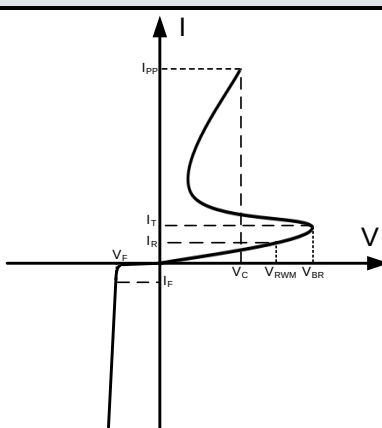


DFN2510-10L
(Top View)

Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20 μ s)	6	A
P_{PK}	Peak Pulse Power (8/20 μ s)	20	W
V_{ESD}	ESD per IEC61000-4-2 (Air)	± 15	kV
	ESD per IEC61000-4-2 (Contact)	± 15	
HBM	Human body model	± 2500	V
CDM	Charged device model	± 1000	V
MM	Machine model	± 200	V
T_{OPT}	Operating Temperature	-55/+125	°C
T_{STG}	Storage Temperature	-55/+150	°C

Electrical Characteristics (T = 25°C)

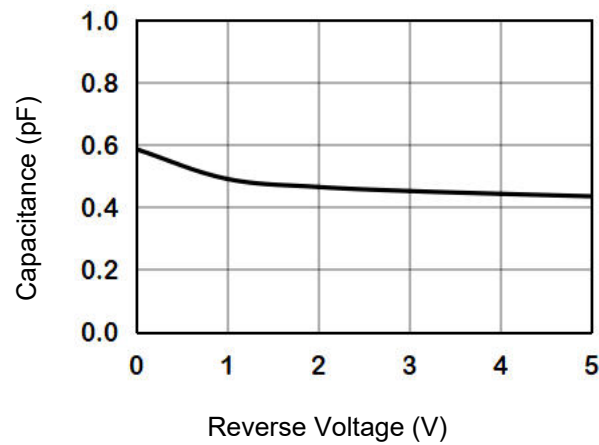
Symbol	Parameter	Diagram
V_{RWM}	Nominal Reverse Working Voltage	
I_R	Reverse Leakage Current @ V_{RWM}	
V_{BR}	Reverse Breakdown Voltage @ I_T	
I_T	Test Current for Reverse Breakdown	
V_C	Clamping Voltage @ I_{PP}	
I_{PP}	Maximum Peak Pulse Current	
C_{ESD}	Parasitic Capacitance	
I_F	Forward Current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

Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				3.3	V
I_R	$V_{RWM} = 3.3V$, $T = 25^\circ C$ Between I/O and GND		1	10	nA
V_{BR}	$I_T = 1mA$ Between I/O and GND	5.5	6.2		V
V_C	$I_{PP} = 6A$, $t_p = 8/20\mu s$ Between I/O and GND		3.2		V
V_C	$I_{PP} = 8.0A$, $t_p = 100ns^{(1)}$		3.00		V
	$I_{PP} = 16.0A$, $t_p = 100ns^{(1)}$		4.00		V
R_{dyn}	$I_{PP} = 12.0A$, $t_p = 100ns^{(1)}$		0.15		Ω
C_{ESD}	$V_R = 0V$, $f = 1MHz$ Between I/O and GND		0.60	0.65	pF
	$V_R = 3.3V$, $f = 1MHz$ Between I/O and GND		0.48		pF

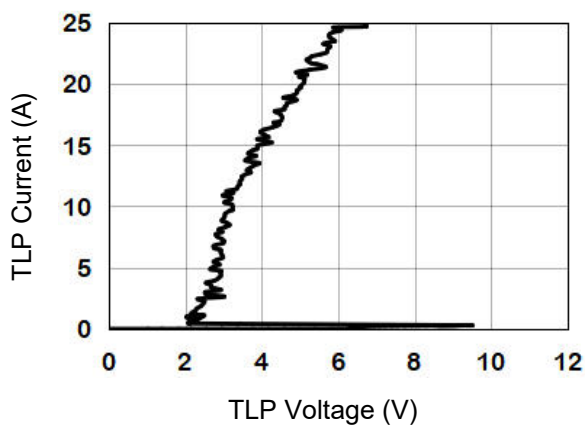
Notes:(1)Measurements performed using a 100ns Transmission Line Pulse(TLP) system,Between I/O and GND.

Typical Performance Characteristics

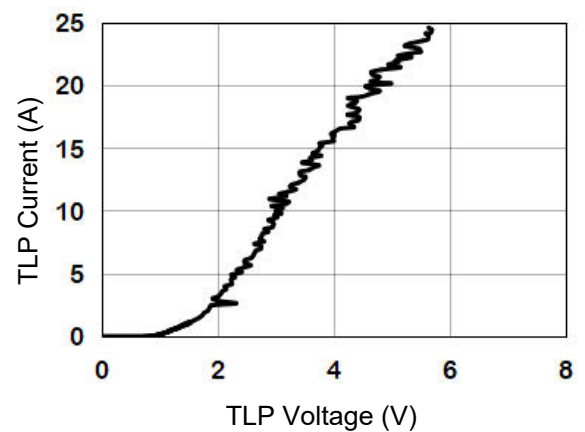
Capacitance vs Reverse Voltage I/O to GND



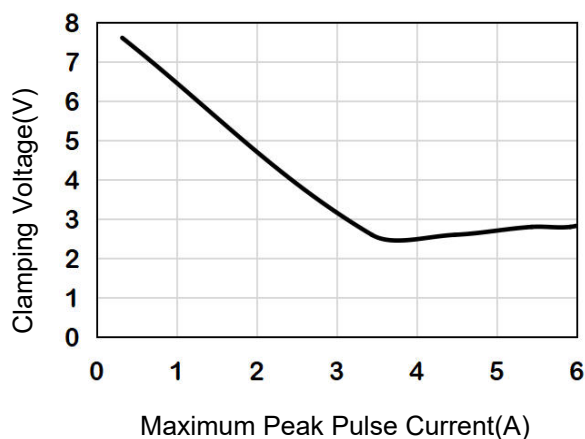
TLP Measurement of I/O to GND



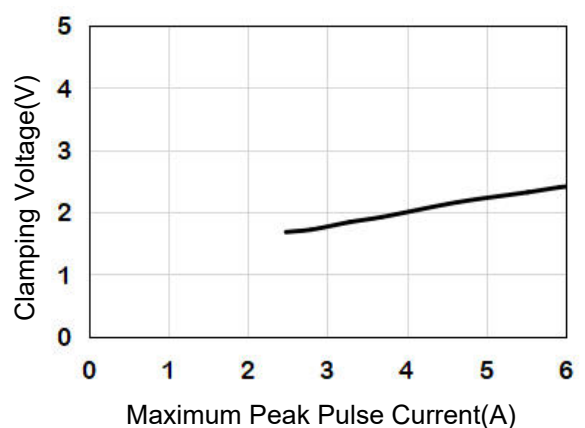
TLP Measurement of GND to I/O



8/20us Current I/O to GND

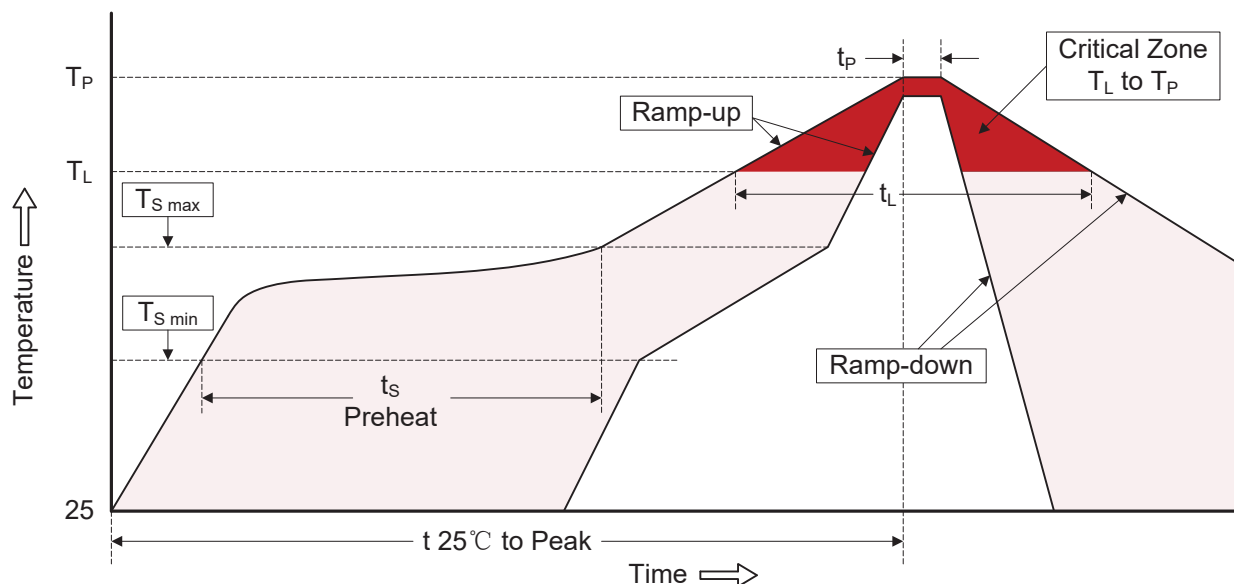


8/20us Current GND to I/O



Recommended Soldering Conditions

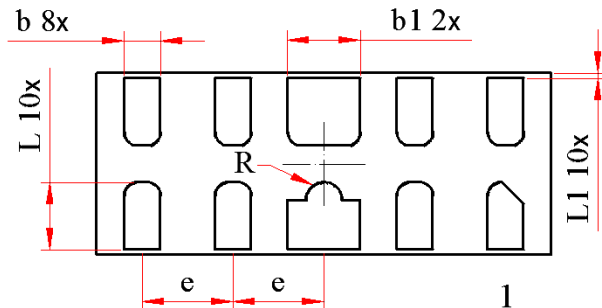
Reflow Soldering



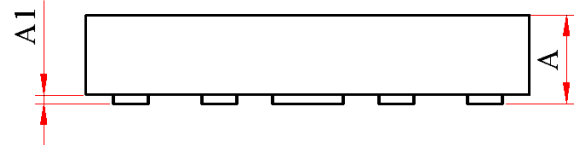
Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.
Preheat -Temperature Min ($T_{S\ min}$) -Temperature Max ($T_{S\ max}$) -Time (min to max) (t_s)	150°C 200°C 60-180 seconds
$T_{S\ max}$ to T_L -Ramp-up Rate	3°C/second max.
Time maintained above: -Temperature (T_L) -Time (t_L)	217°C 60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20-40 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

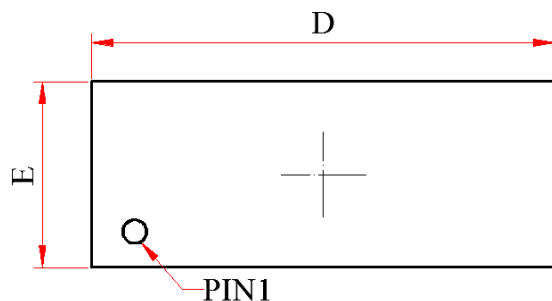
Package Outline, DFN2510-10L



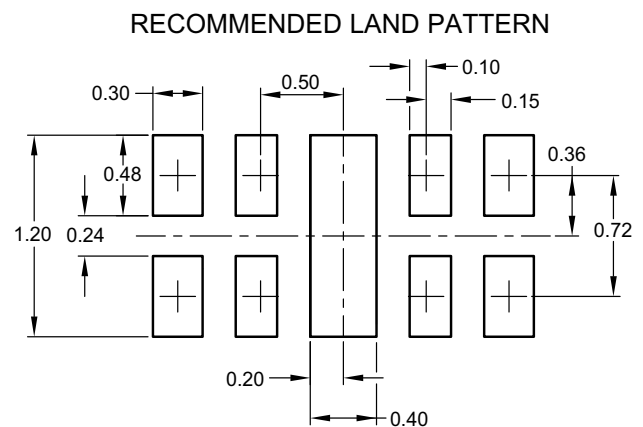
Bottom View



Side View

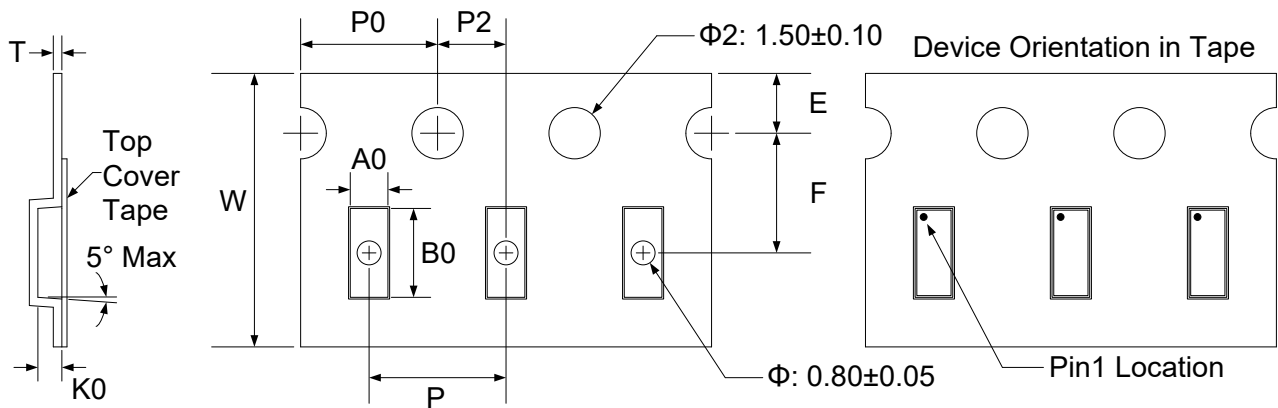


Top View



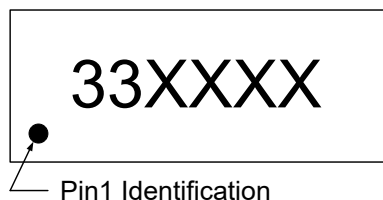
Symbol	Dimension In Millimeters			Dimension In Inches		
	Normal	Min	Max	Normal	Min	Max
A	--	0.450	0.550	--	0.018	0.026
A1	0.050	0.025	0.075	0.002	0.001	0.003
D	2.500	2.450	2.550	0.098	0.096	0.100
E	1.000	0.950	1.050	0.039	0.037	0.041
b	0.200	0.150	0.250	0.008	0.006	0.010
b1	0.400	0.350	0.450	0.016	0.014	0.018
L	0.370	0.320	0.420	0.015	0.013	0.017
L1	0.030	0.000	0.060	0.001	0.000	0.002
R	0.100 REF			0.004 REF		
e	0.500 BSC			0.020 BSC		

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

Marking Codes



Note:

- (1) "33" is part number, fixed.
- (2) "XXXX" is the identification number.

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0354TP-FxX	3.3V	3,000	7 Inch