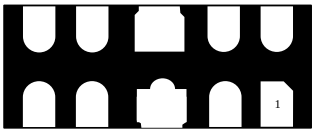
3.3V 4-Line Transient Voltage Suppressor

Features

- Solid-state silicon-avalanche technology
- Low operating and clamping voltage
- Up to four I/O lines of protection
- Low leakage
- Low operating voltage:3.3V



DFN2510-10L

IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) ±18kV (air), ±15kV (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 8A (8/20μs)

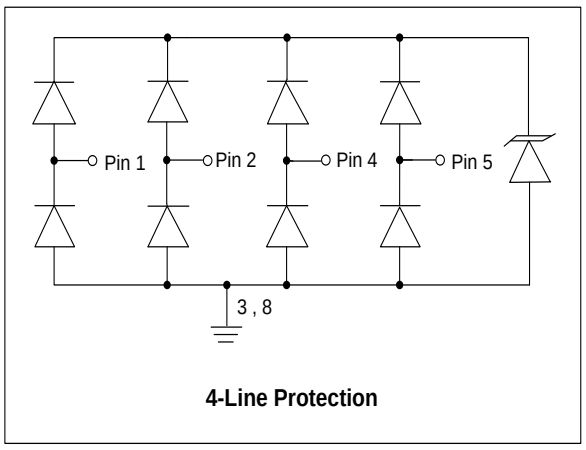
Mechanical Characteristics

- DFN2510-10L package
- Marking : Marking Code
- Packaging : Tape and Reel
- RoHS Compliant & HF
- Device meets MSL1 requirement

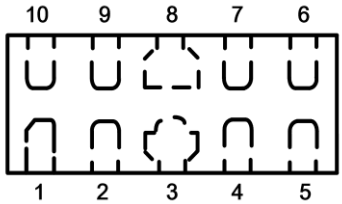
Applications

- USB2.0 and USB 3.0
- HDMI 1.3, HDMI 1.4
- SATA and eSATA
- DVI
- IEEE 1394
- PCI Express
- Portable Electronics and Notebooks

Schematic & PIN Configuration



4-Line Protection



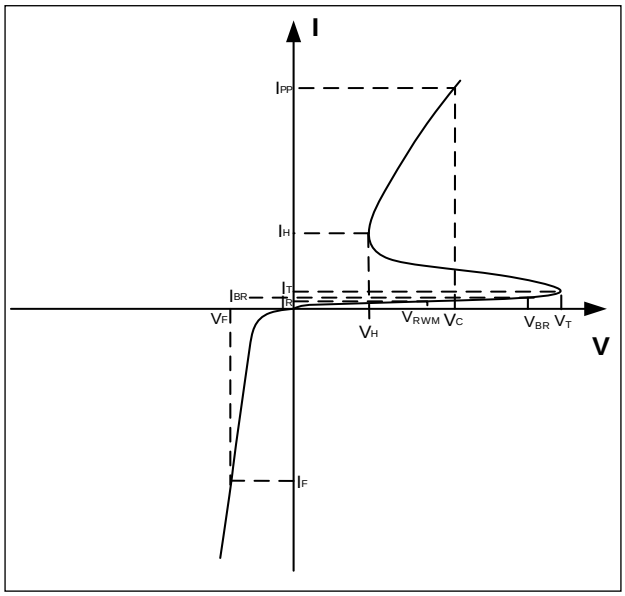
Pin	Identificaion
1,2,4,5	Input Lines
6,7,9,10	Output Lines (No Internal Connection)
3,8	Ground

Absolute Maximum Rating

Parameter	Symbol	Value	Unit
Peak Pulse Power (t_p = 8/20μs)	P_{PP}	48	Watts
Peak Pulse Current (t_p = 8/20μs)	I_{PP}	8	A
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Parameters (T=25℃)

Symbol	Parameter
I_{PP}	Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Reverse Stand-Off Voltage
I_R	Reverse Leakage Current @ V_{RWM}
I_{BR}	Reverse Breakdown Current
V_{BR}	Reverse Breakdown Voltage @ I_{BR}
V_T	Reverse Trigger Voltage
I_T	Reverse Trigger Current
V_H	Reverse Holding Voltage
I_H	Reverse Holding current
V_F	Forward Voltage
I_F	Forward Current



Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	V_{RWM}	Any I/O pin to ground			3.3	V
Reverse Breakdown Voltage	V_{BR}	I_{BR}= 1mA Any I/O pin to ground	3.7			V
Reverse Leakage Current	I_R	V_{RWM} = 3.3V Any I/O pin to ground			500	nA
Holding current	I_H	T=25°C		9		mA
Forward Voltage	V_F	I_F=10mA	0.5		1.2	V
Clamping Voltage	V_C	I_{pp}=8A, t_p=8/20μs Any I/O pin to ground		4.5	6	V
ESD Clamping Voltage (1)	V_C	I_{PP} = 4A t_p = 0.2/100ns		2.5		V
ESD Clamping Voltage (1)	V_C	I_{PP} = 16A t_p = 0.2/100ns		5.6		V
Dynamic Resistance (1) (2)	R_{DYN}	TLP=0.2/100ns		0.26		Ω
Junction Capacitance	C_j	V_R =2.5V, f = 1MHz I/O pin to GND		0.35	0.45	pF
		V_R = 2.5V, f = 1MHz Between I/O pins		0.2	0.3	pF

Note1.TLP Setting:t_p=100ns, t_r=0.2ns, I_{TLP} and V_{TLP} sample window:t_1=70ns to t_2=90ns.

Note2.Dynamic resistance calculated from I_{PP}=4A to I_{PP}=16A using “Best Fit”.

Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

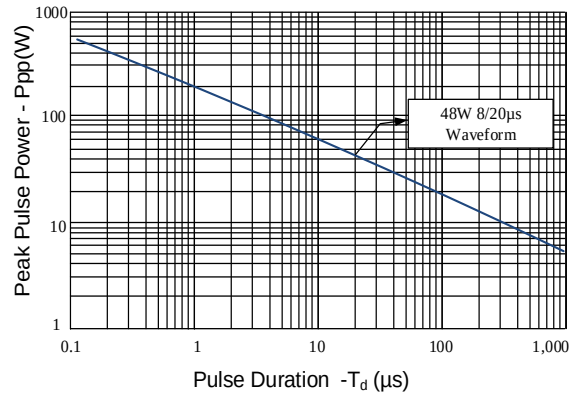


Figure 2: Power Derating Curve

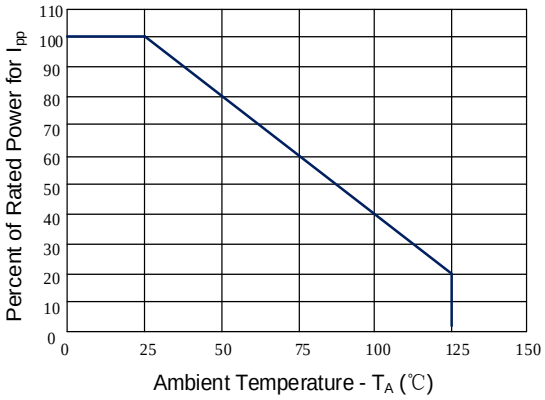


Figure 3: Clamping Voltage vs. Peak Pulse Current

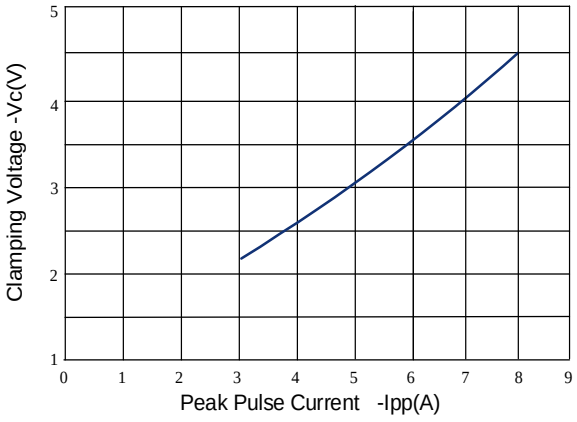


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

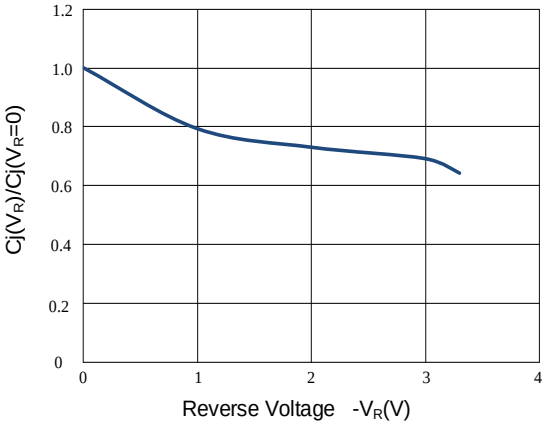


Figure 5: 8/20μs Pulse Waveform

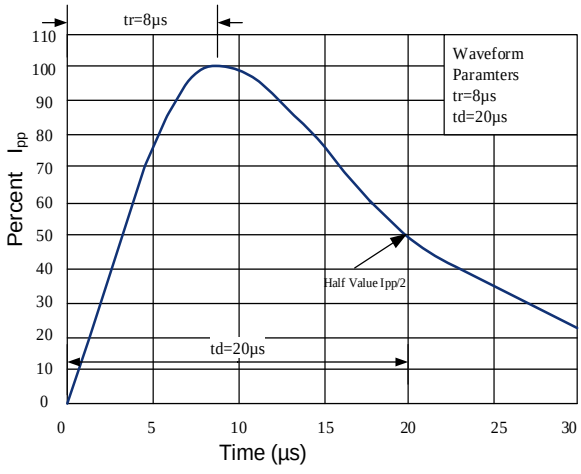
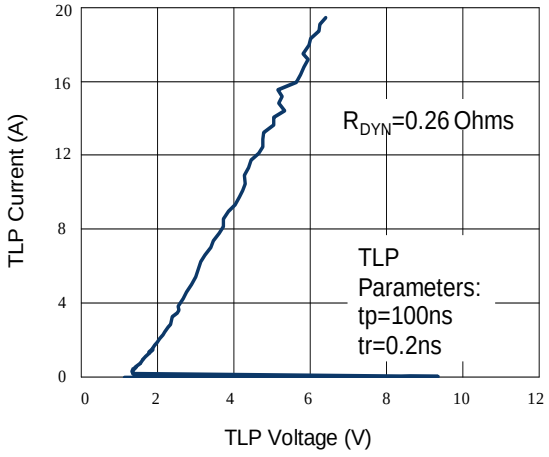
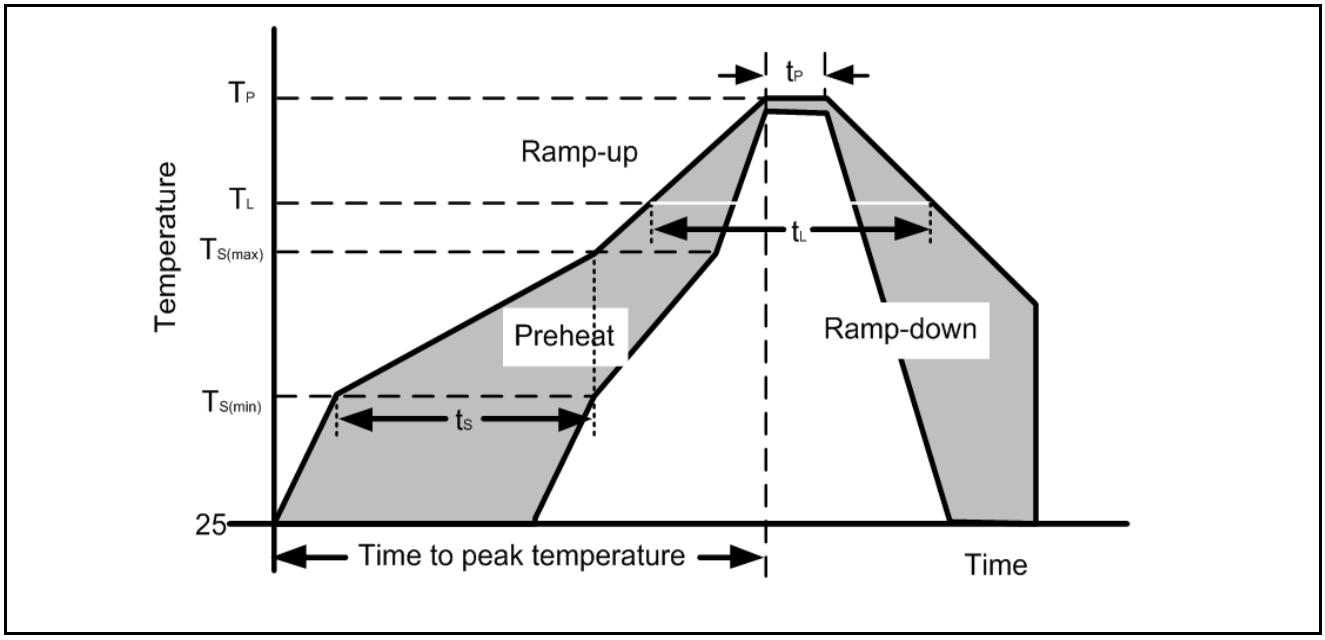


Figure 6: TLP I-V Curve



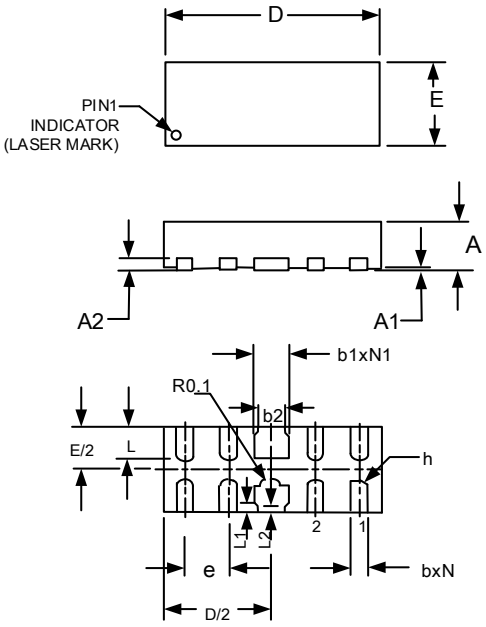
Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	Temperature Min ($T_{S(min)}$)	150°C
	Temperature Max ($T_{S(max)}$)	200°C
	Time (min to max) (t_S)	60 – 190 secs
Average ramp up rate (Liquidus Temp) (T_L) to peak		5°C/second max
$T_{S(max)}$ to T_L——Ramp-up Rate		5°C/second max
Reflow	Temperature (T_L) (Liquidus)	217°C
	Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260+0/-5 °C
Time within actual peak Temperature (t_P)		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		280°C



Package Dimension

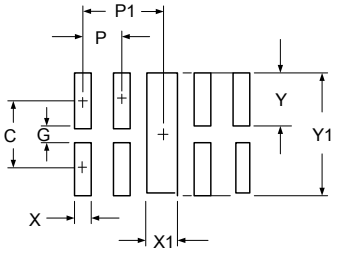
PACKAGE OUTLINE



DFN2.5×1-10L

SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	0.00	0.02	0.05
A2		0.15 BSC	
b	0.15	0.20	0.25
b1	0.35	0.40	0.45
b2	0.20	0.25	0.45
D	2.45	2.50	2.55
E	0.95	1.00	1.05
e		0.50 BSC	
L	0.35	0.40	0.45
L1	0.00	0.075	0.10
L2	0.00	0.05	0.08
h	0.00	0.12	0.15
N		8	
N1		2	

MOUNTING PAD



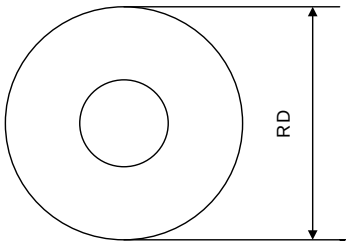
DIMENSIONS	
DIM	MILLIMETERS
C	0.875
G	0.20
P	0.50
P1	1.00
X	0.25
X1	0.45
Y	0.675
Y1	1.55

Notes:

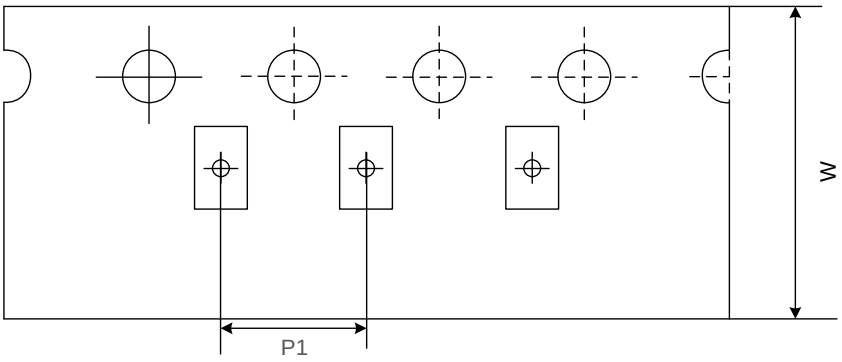
Controlling Dimension: Millimeter.

Tape And Reel Information

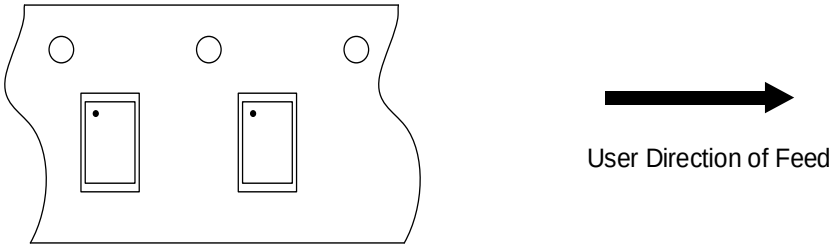
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimensions	7 inch
W	Overall width of the carrier tape	8 mm
P1	Pitch between successive cavity centers	4 mm

Ordering Information

Part	Package	Marking	Packing Information
ES334RTPH	DFN2510-10L	 3KC=Specific Device Code X=Month Code	3k/Reel

Revision History and Checking Table

No.	Version	Date	Revision Item	Request	Function & Spec Checking	Package Checking	Tape Checking
1	1.0	2023-01-11	Released Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying