



NichTek[®]

APPROVAL SHEET

ESTABLISHMENT: 2017.03.22

REVISION: 2021.07.27

Transient Voltage Suppressing Device ESD Protection

Series NO: D2550-5R5 V.5

D2550-5R5

Transient Voltage Suppressing Device

DFN2510 Package

ESD Protection

Features

- ◆ Protects two or four I/O lines
- ◆ Working voltages : 5.5V
- ◆ Low capacitance:0.1pf Typical between I/O channel
- ◆ Low leakage current
- ◆ Response Time is < 1 ns
- ◆ IEC61000-4-2 (ESD) ±20kV (air), ±20kV (contact)
- ◆ IEC61000-4-4 (EFT) 40A (5/50ns)
- ◆ IEC61000-4-5 (Lightning) 3.5A (8/20μs)

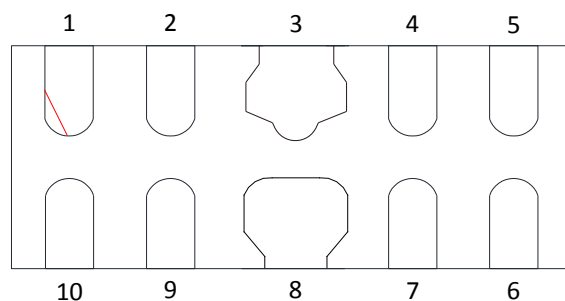
Mechanical Data

- ◆ DFN2510 package
- ◆ UL 94-V-0 flammability rating
- ◆ Solid-state silicon avalanche technology
- ◆ Meets MSL 1 Requirements
- ◆ ROHS compliant

Applications

- ◆ High Definition Multi-Media Interface (HDMI1.3/1.4/2.0)
- ◆ Digital Visual Interface (DVI)
- ◆ Display Port Interface
- ◆ Serial ATA
- ◆ PCI Express
- ◆ USB 1.1/2.0/3.0/3.1/OTG
- ◆ IEEE 1394 Firewire Ports
- ◆ Projection TV Monitors and Flat Panel Displays

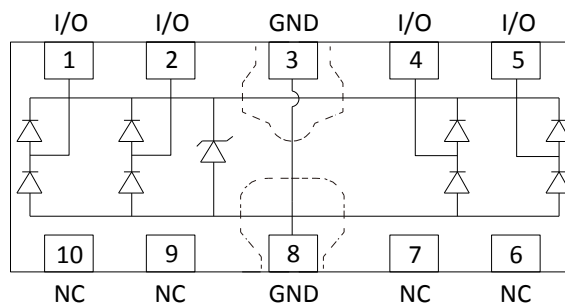
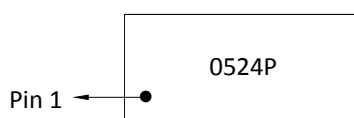
Pin Configuration



Bottom View

Marking Code

P/N	Marking Code
D2550-5R5	0524P



D2550-5R5

Transient Voltage Suppressing Device
DFN2510 Package
ESD Protection

Maximum Rating & Characteristic

 $T_A=25^{\circ}\text{C}$ Unless Otherwise Specified

Parameter	Symbol	Value	Units
Peak Pulse Power (tp=8/20μs waveform)	P_{PP}	45	Watts
Peak Pulse Current (tp=8/20μs waveform)	I_{PP}	3.5	A
ESD Rating per IEC61000-4-2 : Contact Air	V_{ESD}	20 20	KV
Lead Soldering Temperature	T_L	260	$^{\circ}\text{C}$
Operating Temperature Range	T_J	-55 ~ +150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

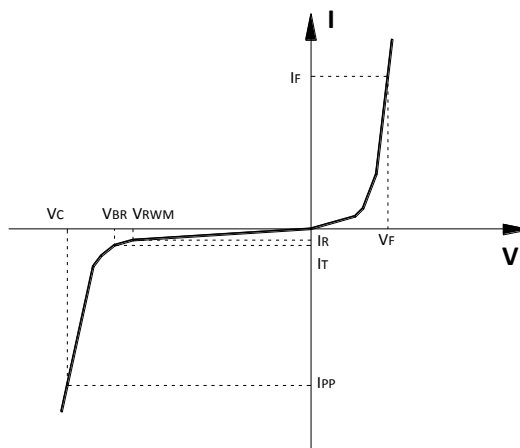
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

*Other voltages may be available upon request.

1. Pulse Waveform per Figure 1.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{RWM}	Reverse Working Voltage	Any I/O to Ground			5.5	V
V_{BR}	Reverse Breakdown Voltage	$I_T = 1\text{mA}$, Any I/O to Ground	6.0			V
I_R	Reverse Leakage Current	$V_{RWM} = 5.5\text{V}$, Any I/O to Ground			0.5	μA
V_F	Forward Voltage	$I_F = 15\text{mA}$		0.85	1.2	V
V_C	Clamping Voltage	$I_{PP}=1\text{A}$, tp =8/20μs, Any I/O to Ground		8.6	9.8	V
		$I_{PP} = 3.5\text{A}$, tp =8/20μs, Any I/O to Ground		11.4	15	V
R_{dyn}	dynamic resistance	positive transient negative transient		0.48 0.35		Ω
C_j	Junction Capacitance	$V_R=0\text{V}$, f = 1MHz, Between I/O pins		0.1	0.25	pF
		$V_R=0\text{V}$, f = 1MHz, Any I/O pin to Ground		0.36	0.6	pF

Symbol	Parameter
V_{RWM}	Reverse Working voltage
V_{BR}	Reverse Breakdown voltage @ I_T
V_C	Clamping Voltage@ I_{PP}
V_F	Forward Voltage
I_F	Forward Current
I_T	Test Current
I_R	Reverse Leakage current @ V_{RWM}
I_{PP}	Peak pulse current
C_j	Junction Capacitance



D2550-5R5

DFN2510 Package

Transient Voltage Suppressing Device

ESD Protection

Characteristic Curve

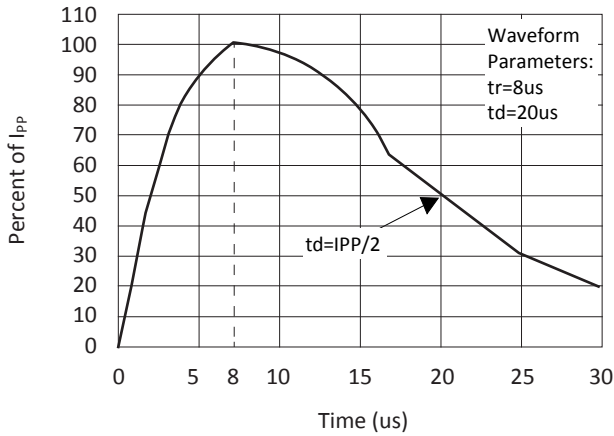


Fig 1 - Pulse Waveform

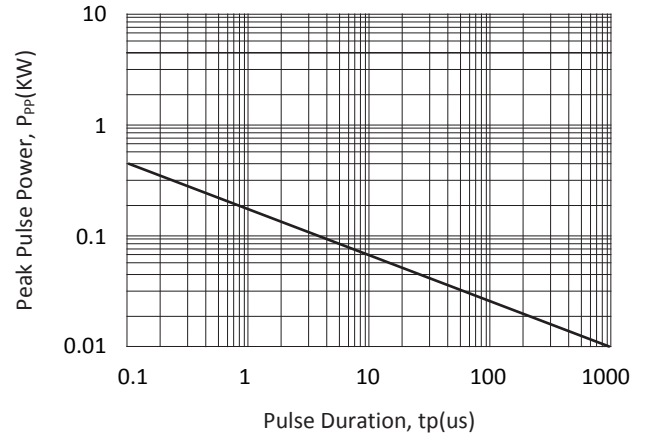


Fig 2 - Peak Pulse Power vs. Pulse Time

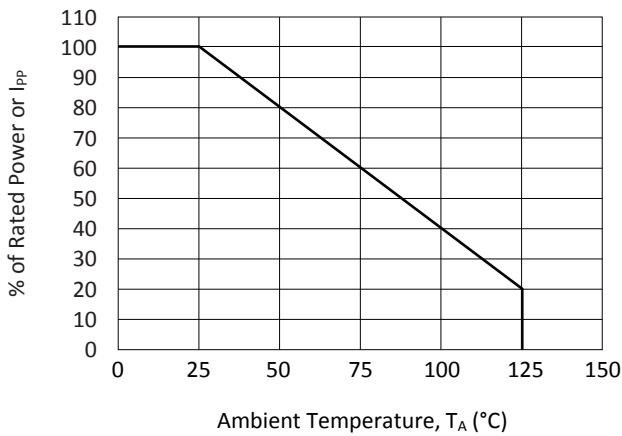


Fig 3 - Power Derating Curve

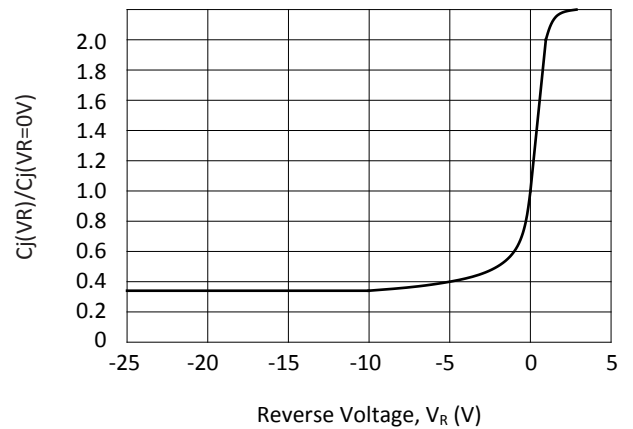


Fig 4 - Junction Capacitance vs. Reverse Voltage

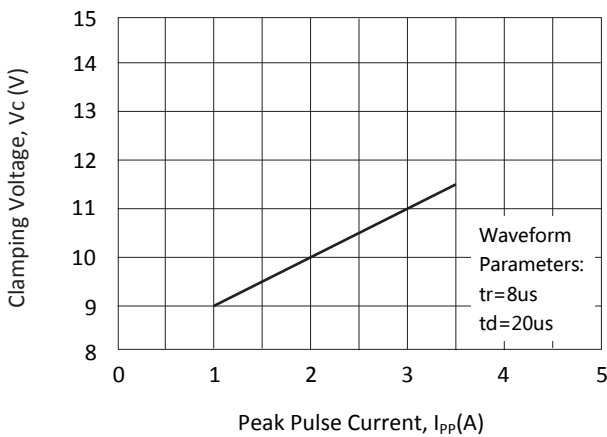


Fig 5 - Clamping Voltage vs. Peak Pulse Current

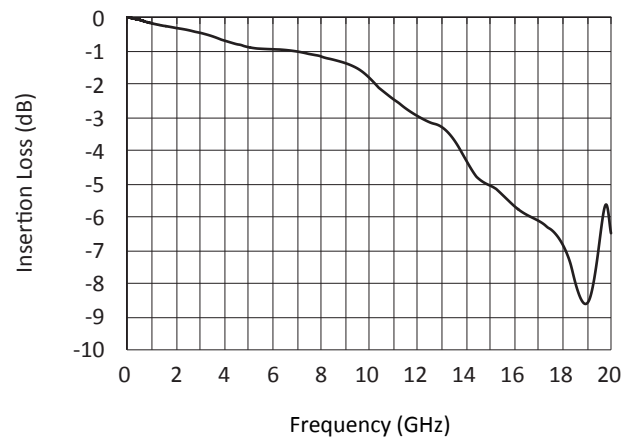


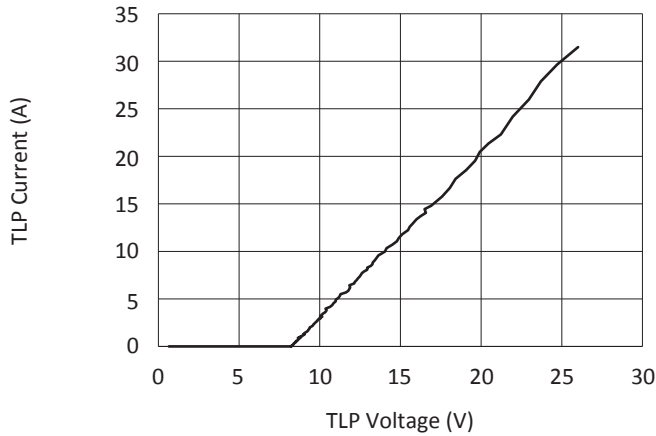
Fig 6 - Insertion Loss vs. Frequency (IO to GND)

D2550-5R5

DFN2510 Package

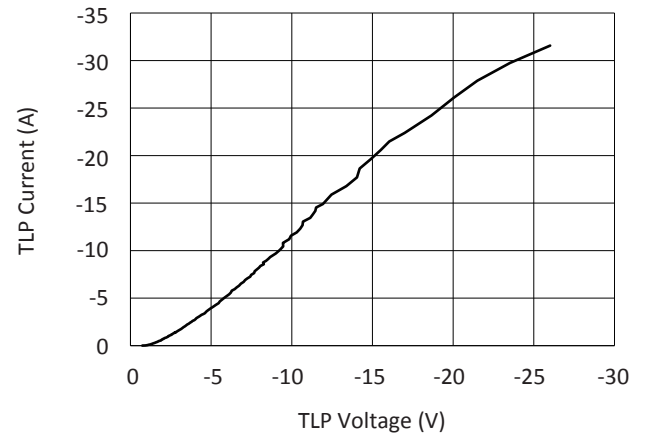
Transient Voltage Suppressing Device

ESD Protection



Transmission Line Pulsing (TLP) Measurement
(tperiod=100ns, tr=10ns)

Fig 7 - Positive TLP plot IO to GND



Transmission Line Pulsing (TLP) Measurement
(tperiod=100ns, tr=10ns)

Fig 8 - Negative TLP plot IO to GND

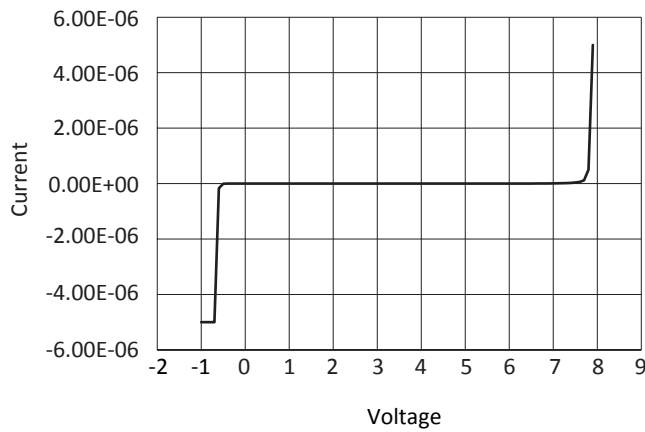


Fig 9 - I-V Curve

D2550-5R5

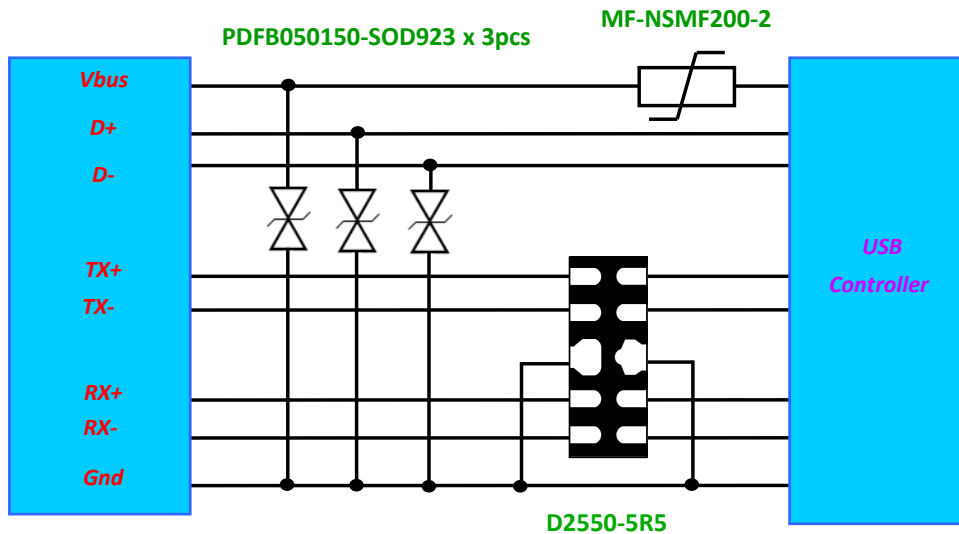
Transient Voltage Suppressing Device

DFN2510 Package

ESD Protection

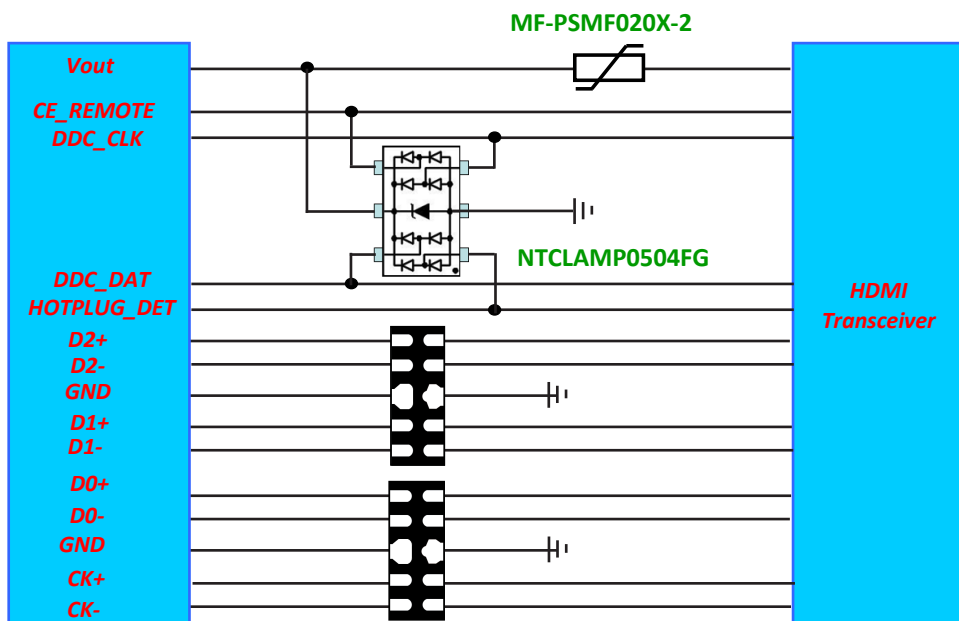
Application Information

USB 3.0



ESD Level: $\pm 8KV/15KV$
Compliance with IEC61000-4-2

HDMI



ESD Level: $\pm 8KV/15KV$
Compliance with IEC61000-4-2

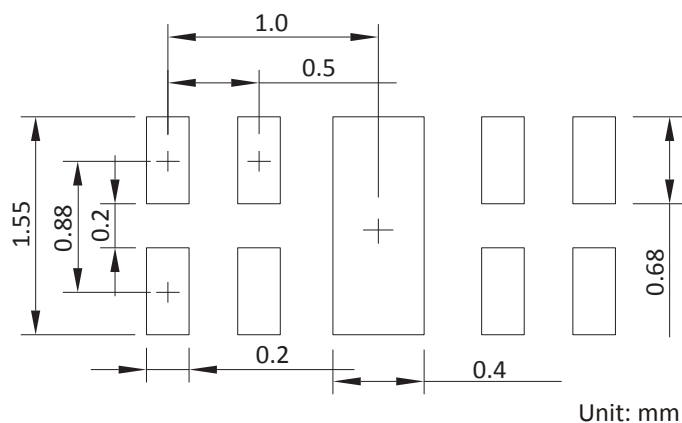
D2550-5R5

Transient Voltage Suppressing Device

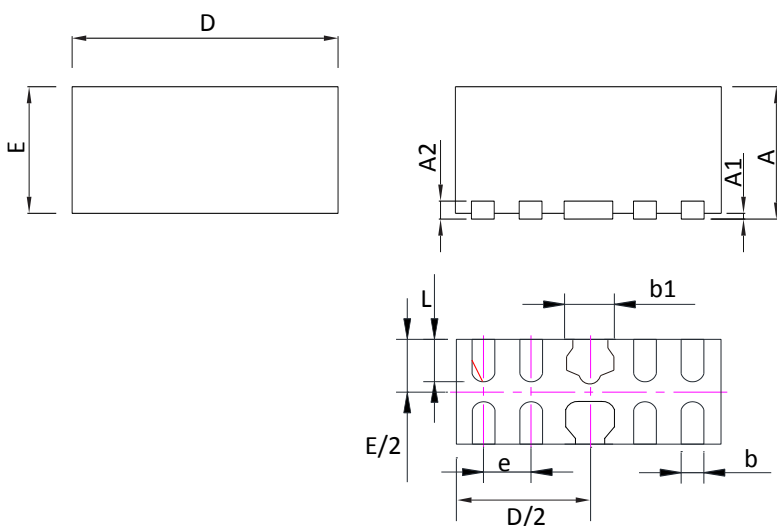
DFN2510 Package

ESD Protection

Recommended PAD Layout



Package Outline & Dimension



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.45	0.65	0.018	0.026
A1	0.05REF		0.002REF	
A2	0.15REF		0.006REF	
b	0.15	0.25	0.006	0.010
b1	0.3	0.5	0.012	0.020
D	2.424	2.576	0.095	0.101
E	0.924	1.076	0.036	0.042
e	0.5REF		0.020REF	
L	0.3	0.45	0.012	0.018

Standard Packing

P/N	Qty per Reel	Reel Size
D2550-5R5	3,000 pcs	7 inch