

4-Line Ultra-low Capacitance TVS Diode Array

Description

The RCLAMP0544P-SL is an ultra low capacitance TVS diode ,utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data .The small size, ultra-low capacitance and high ESD surge protection make RCLAMP0544P-SL an ideal choice to protect HDMI, MDDI, USB 3.0 and other high speed ports.

Features

- Ultra low capacitance (IO to IO typical value:0.3pF)
- No insertion loss to 3.0GHz
- Working voltage: 5V
- Low clamping voltage
- Up to 4 lines protects
- RoHS Compliant

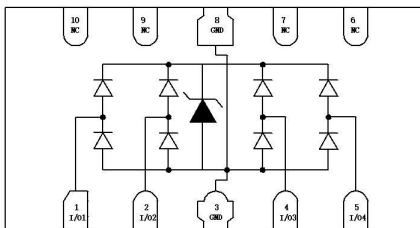
Mechanical Characteristics

- Package: DFN2510-10 (2.5×1.0×0.5mm)
- Lead Finish: Matte Tin
- Case Material: “Green” Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020

Applications

- HDMI, USB and MDDI ports
- Set-top box and Digital TV
- Video graphics cards
- Digital Video Interface (DVI)
- PCI Express and Serial SATA Ports
- Notebook Computers

Figuration & Symbol



Pin and Circuit Schematic

Part Number	Packaging	Reel Size
RCLAMP0544P-SL	3000/Tape & Reel	7 inch

Absolute Maximum ratings($T_A=25^{\circ}\text{C}$, RH=45%~75%, unless otherwise noted)

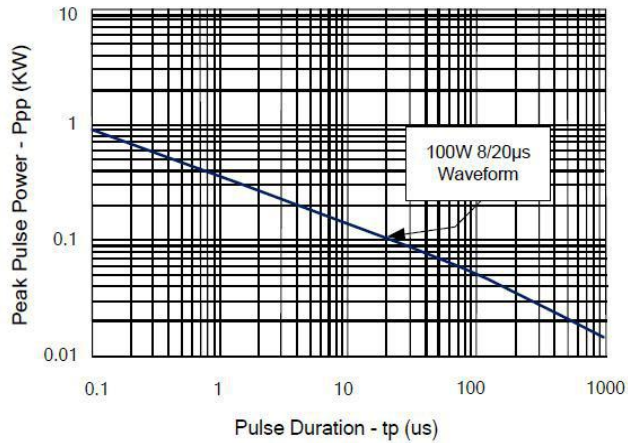
Parameter	Symbol	Value	Unit
Peak Pulse Power ($t_p=8/20\mu\text{s}$ waveform)	P_{ppp}	100	W
Peak Pulse Current (8/20 μs)	I_{pp}	5	A
ESD per IEC 61000-4-2 (Air)	V_{ESD}	± 15	kV
ESD per IEC 61000-4-2 (Contact)		± 8	
Operating Temperature Range	T_J	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^{\circ}\text{C}$

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise Specified)

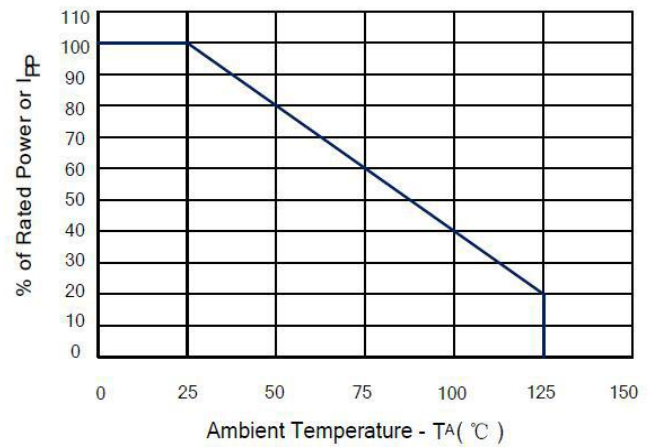
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			5	V	
Breakdown Voltage	V_{BR}	6		10	V	$I_T = 1\text{mA}$
Reverse Leakage Current	I_R			1	μA	$V_{RWM} = 5.0\text{ V}$
Clamping Voltage	V_C			9	V	$I_{PP} = 1\text{A}$ (8 x 20 μs pulse), any I/O pin to ground
Clamping Voltage	V_C			15	V	$I_{PP} = 5\text{A}$ (8 x 20 μs pulse), any I/O pin to ground
Junction Capacitance	C_J		0.3	0.4	pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$, between I/O pins
Junction Capacitance	C_J			0.8	pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$, any I/O pin to ground

Typical Performance Characteristics ($T_A=25^\circ\text{C}$ unless otherwise Specified)

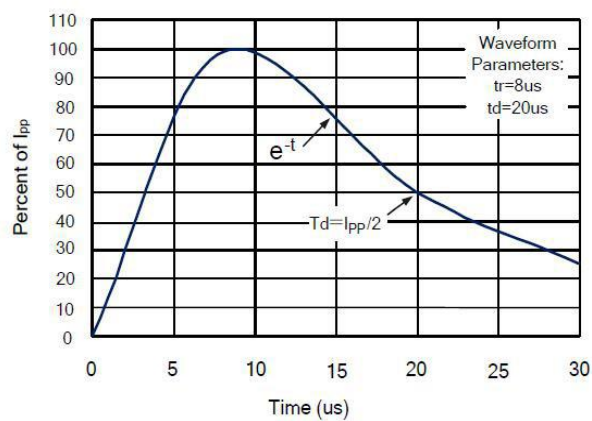
Non-Repetitive Peak Pulse Power vs. Pulse Time



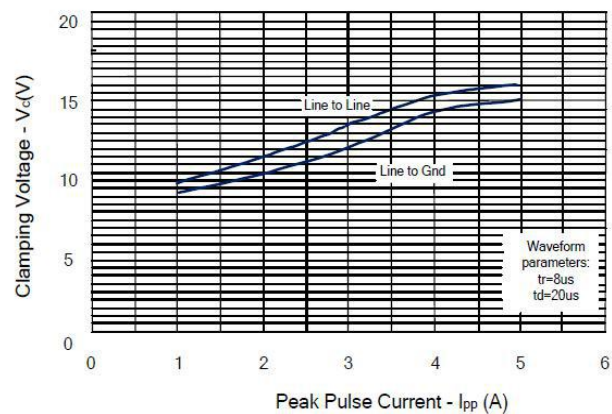
Power Derating curve



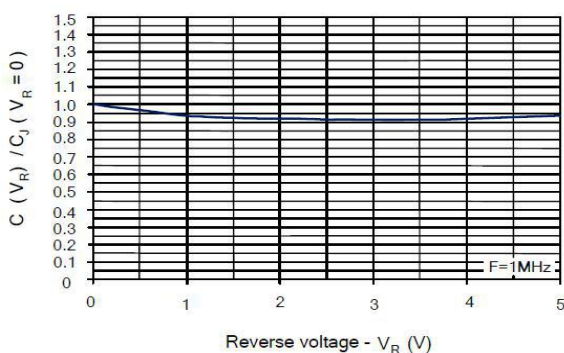
Pulse Waveform



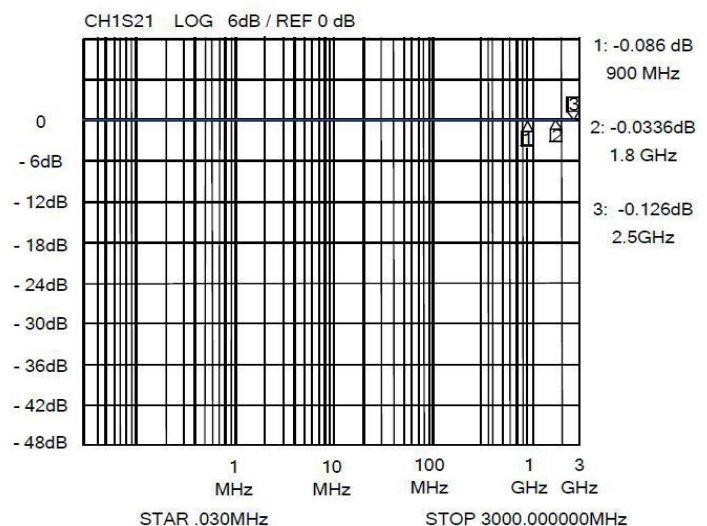
Clamping Voltage vs. Peak Pulse Current



Normalized Capacitance vs. Reverse Voltage



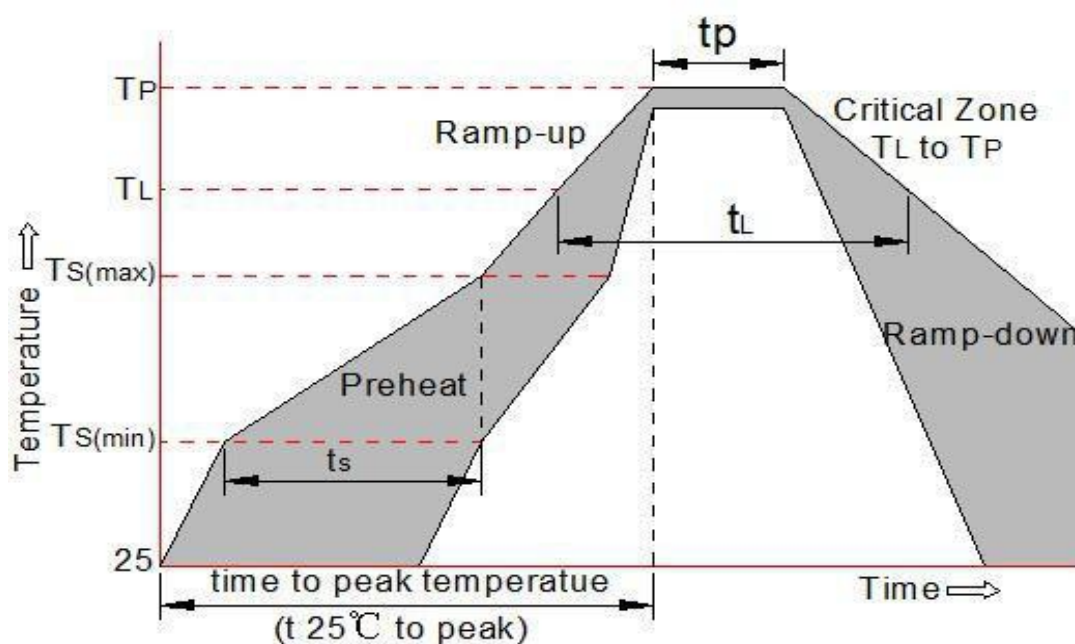
Insertion Loss S21 - I/O to GND



Soldering Parameters

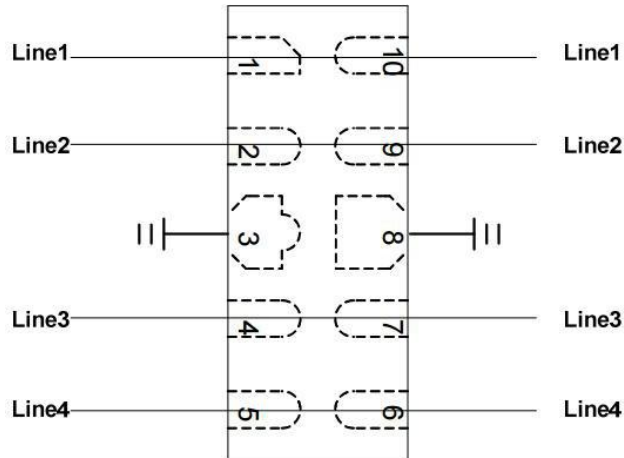
Reflow Condition		Pb-Free assembly(see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time (Min to Max) (t_s)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L) (Liquid us)	+217°C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_p)		8 min. Max
Do not exceed		+260°C

Recommendation reflow profile

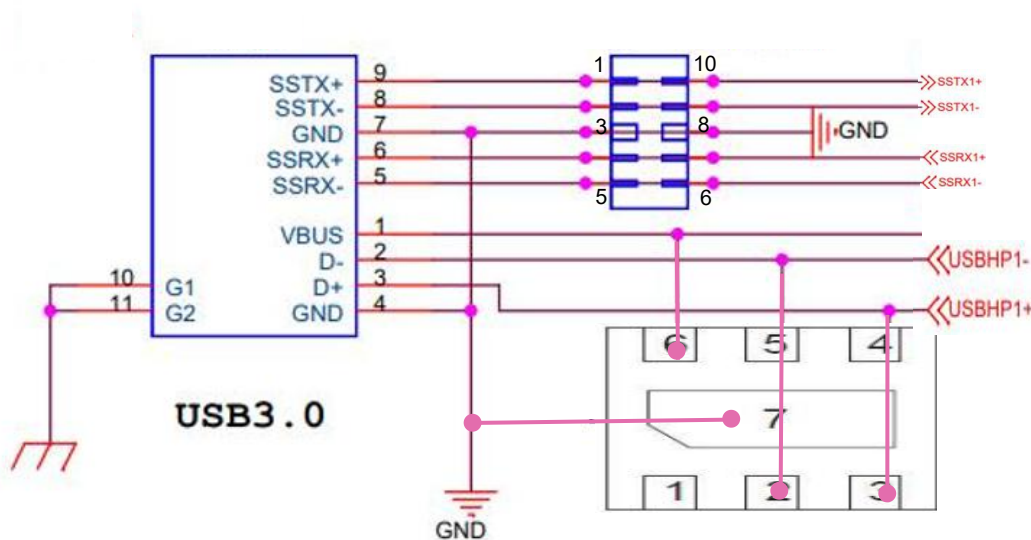


Typical Application

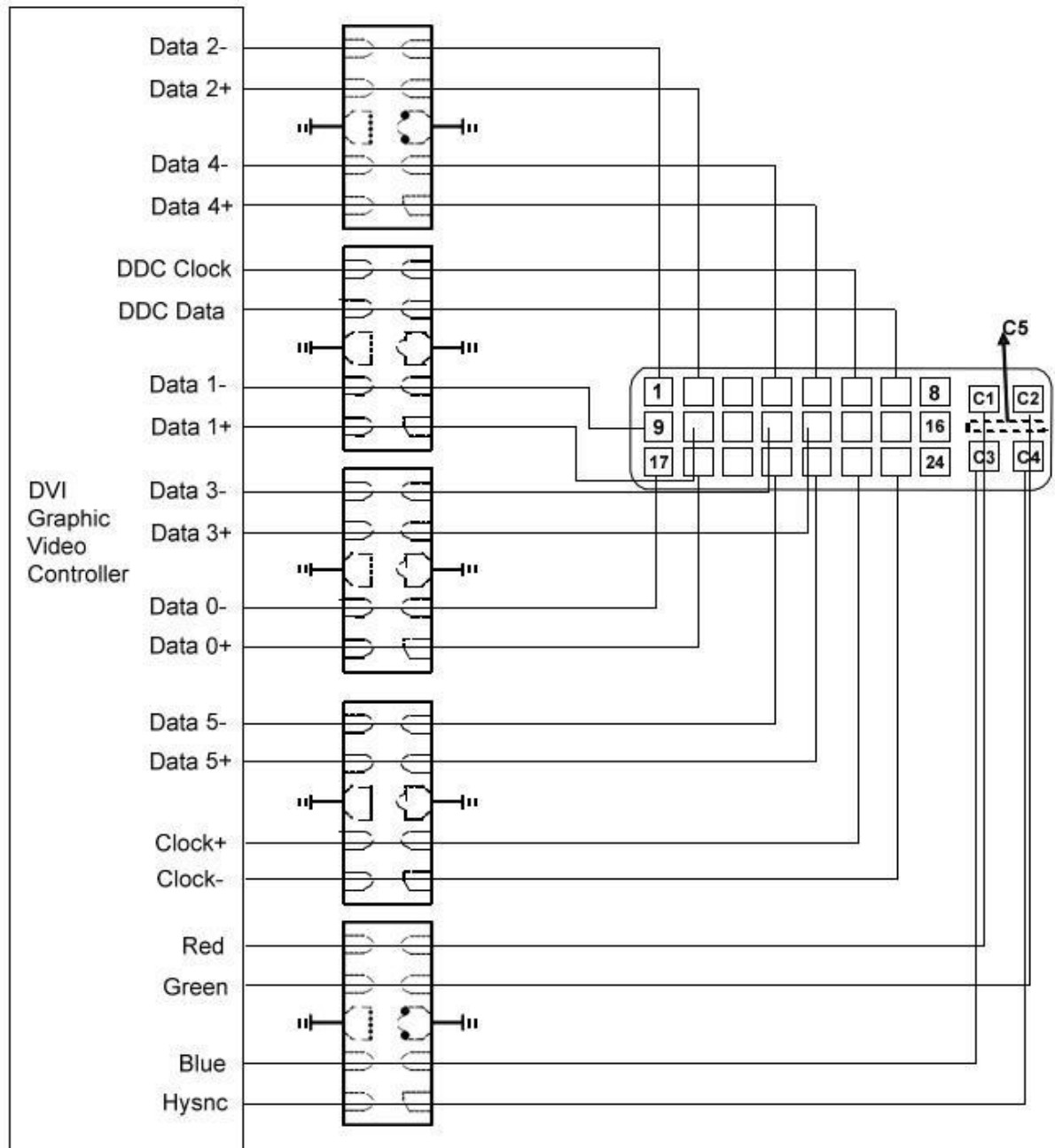
The RCLAMP0544P-SL is designed for easy PCB layout by allowing the traces to run straight through the device. The PCB traces could be used to connect the pin pairs for each line. For example, line 1 enters at pin 1 and exits at pin 10 and the PCB trace connects Pin 1 and Pin 10 together. Ground is connected at Pin 3 and Pin 8.



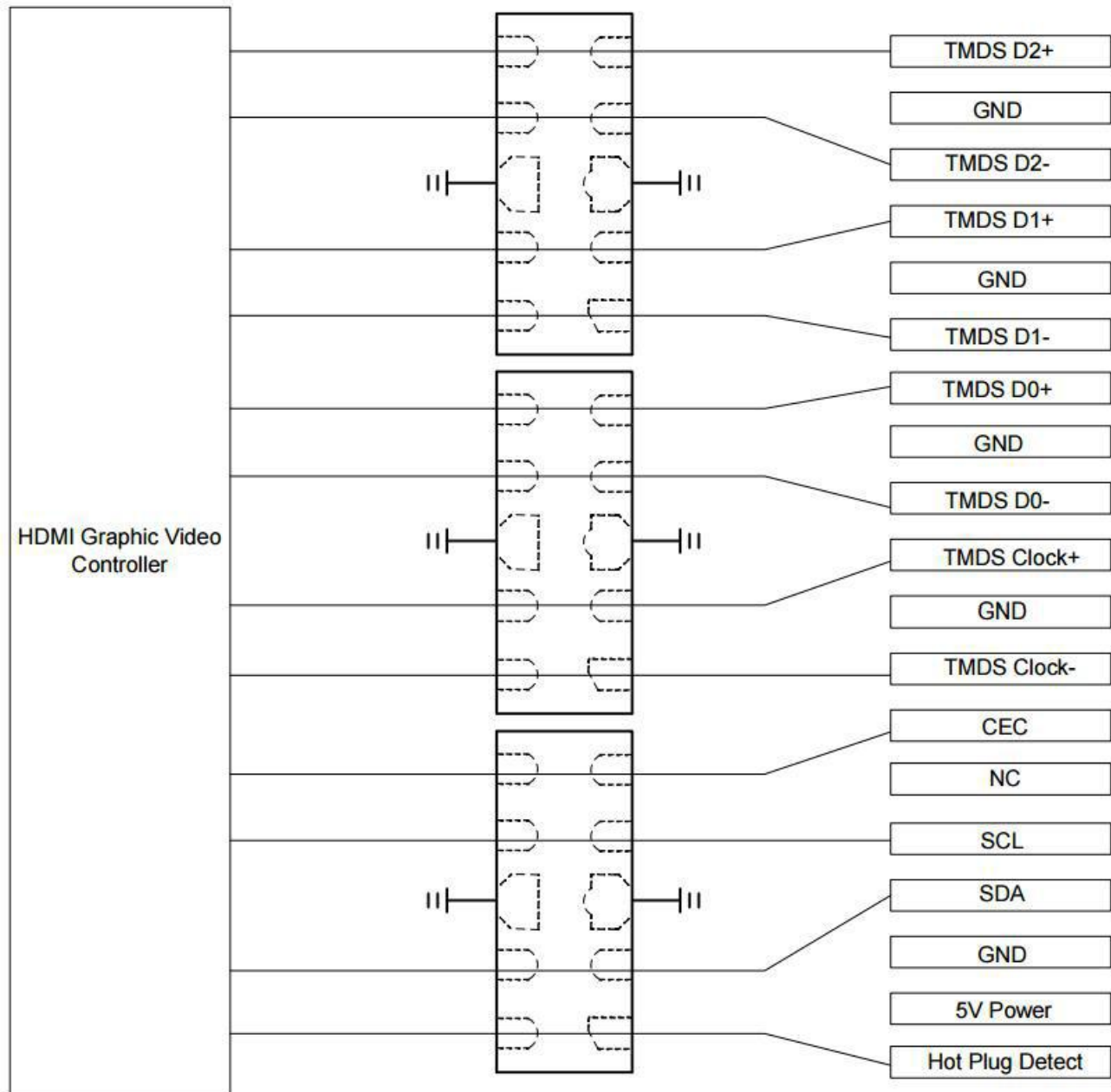
RCLAMP0544P - S L On USB 3.0 Port Application



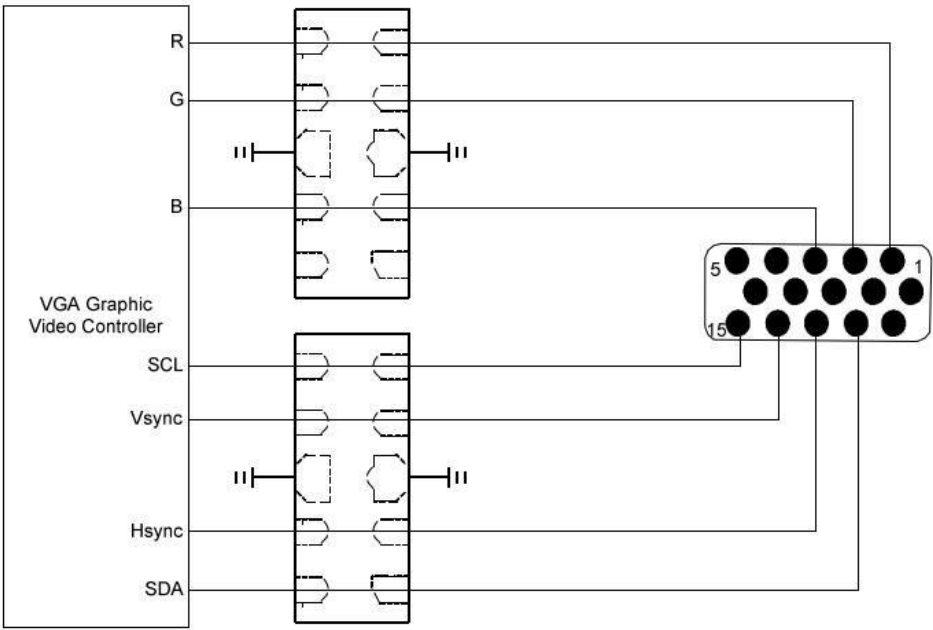
RCLAMP0544P - S L On DVI Port Application



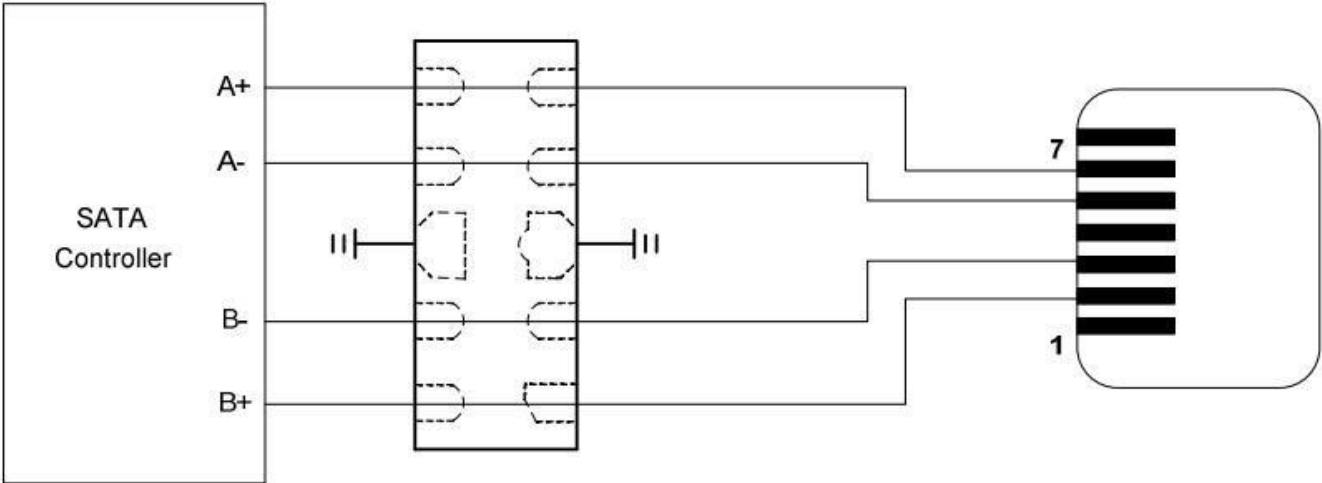
RCLAMP0544P - S L On HDMI Port Application



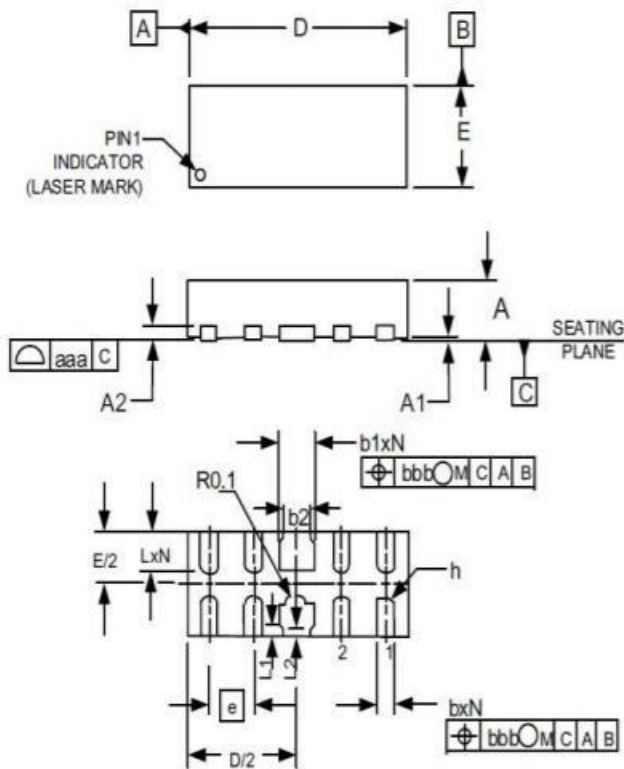
RCLAMP0544P - S L On VGA Port Application



RCLAMP0544P - S L On eSATA Port Application

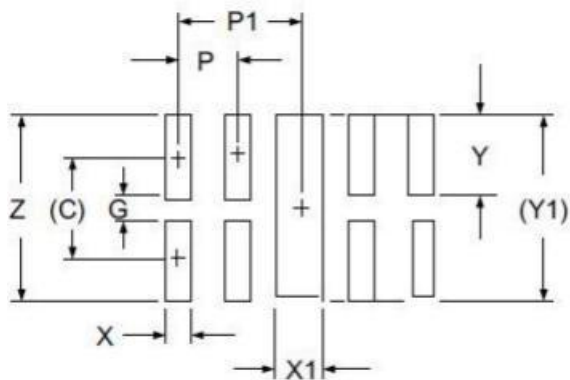


Package Mechanical Data



SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	.017	.020	.022
A1	0.000	0.001	0.002	0.00	0.02	0.05
A2	(0.15)			(.006)		
b	0.10	0.20	0.25	.006	.008	.010
b1	0.35	0.40	0.45	.014	.016	.018
b2	0.20	0.25	0.45	.005	.010	.018
D	2.45	2.50	2.55	.096	.098	.100
E	0.95	1.00	1.05	.037	.039	.041
e	0.50 BSC			.020 BSC		
L	0.35	0.40	0.45	.014	.016	.018
L1	0.00	0.075	0.10	.000	.003	.004
L2	0.00	0.05	0.05	.000	.002	.003
h	0.00	0.12	0.15	.000	.005	.006
h	0.07	0.12	0.17	0.003	0.005	0.007
N	8			8		
aaa	0.08			0.003		
Bbb	0.10			0.004		

Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
C	(0.875)	(.034)
G	0.20	.008
P	0.50	0.02
P1	1.00	.039
X	0.25	.010
X1	0.45	.018
Y	0.675	.027
Y1	(1.55)	(.061)
Z	1.55	.061