

4-Line Ultra Low Capacitance TVS Array

Features

- Ultra low capacitance : 0.3pF typical (I/O to I/O)
- Ultra low leakage: nA level
- Low operating voltage : 5V
- Low clamping voltage
- Up to 4 data lines and one power line protects
- JEDEC SOT-23 6L package
- Complies with following standards :
 - IEC 61000-4-2(ESD) immunity test
Air discharge : $\pm 30\text{kV}$, Contact discharge : $\pm 25\text{kV}$
 - IEC61000-4-4 (EFT) 40A (5/50ns)
 - IEC61000-4-5 (Lightning) 5A (8/20us)
- RoHS Compliant

Mechanical Data

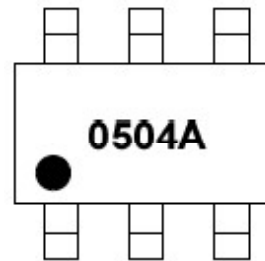
- Package : SOT-23-6L
- Case Material : "Green" Molding Compound.
- Lead Finish : Matte Tin
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity : Level 3 per J-STD-020
- Terminal Connections : See Diagram Below
- Marking Information : See Below

Applications

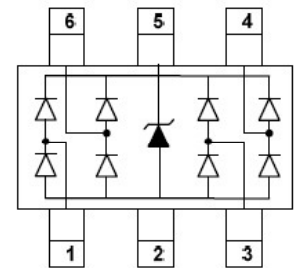
- USB 2.0 and USB 3.0 Ports
- USB OTG
- Digital Video Interface (DVI)
- Monitor and Flat Panel Displays
- PCI Express and Serial SATA Ports
- Gigabit Ethernet
- IEEE 1394 Firewire Ports
- Consumer products (STB, DVD, DSC, DVC...)



Marking



0504A = Device Marking Code
Dot denotes Pin1



Circuit and Pin Schematic

Absolute Maximum Ratings (Ta= 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20us)	Ppk	100	W
Peak Pulse Current (8/20us)	Ipp	5	A
ESD per IEC 61000-4-2 (Air)	V _{ESD}	± 30	kV
ESD per IEC 61000-4-2 (Contact)		± 25	
Operating Junction Temperature Range	T _J	-55 to +125	°C
Storage Temperature Range	T _{STG}	-55 to +150	°C

Electrical Characteristics (Ta= 25°C unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Reverse Working Voltage (Note 2)	V _{RWM}	-	-	5.0	V	
Breakdown Voltage (Note 2)	V _{BR}	6.0	-	-	V	I _T = 1mA,
Reverse Leakage Current (Note 2)	I _R	-	-	0.5	uA	V _{RWM} = 5V
Clamping Voltage (Note 2)	V _C	-	-	15	V	I _{PP} =1A(8×20us pulse)
Clamping Voltage (Note 2)	V _C	-	-	20	V	I _{PP} =5A(8×20us pulse)
Junction Capacitance (Note 3) (Note 2)	C _J	-	0.3	0.4	pF	f=1MHZ, V _R =0V
	C _J	-	-	0.8	pF	f=1MHZ, V _R =0V

- * Note 1 : I/O pins are Pin 1, 3, 4 and 6
 Note 2 : Any I/O pin to ground
 Note 3 : Between I/O pins

Ratings and Characteristics Curves (Ta=25°C unless otherwise noted)

Fig.1 Power Derating Curve

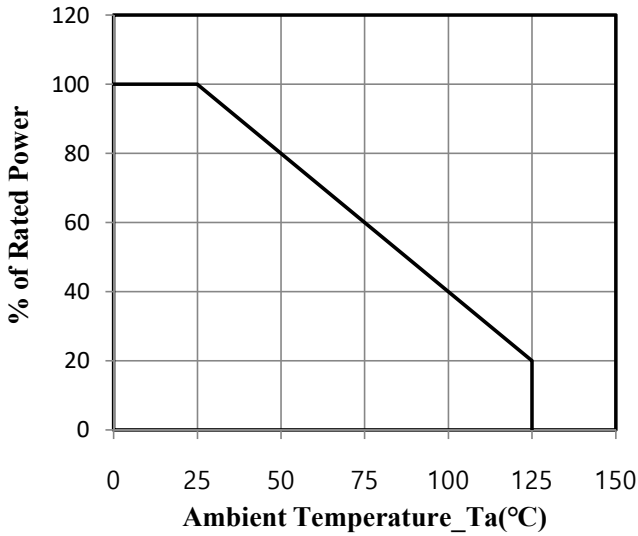


Fig.2 Peak Pulse Power vs. Pulse Time

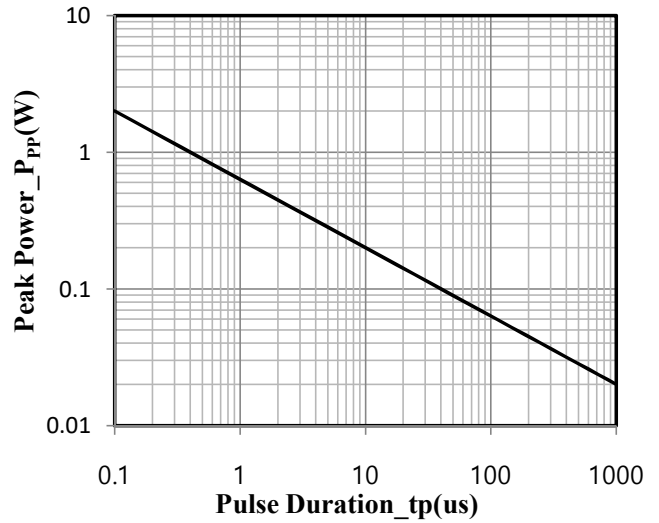


Fig.3 Clamping Voltage vs. Peak Pulse Current (tp=8/20us)

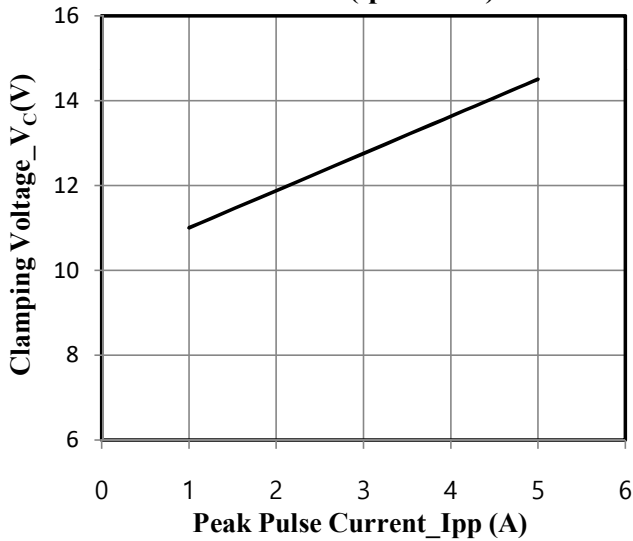


Fig.4 Junction Capacitance vs. Reverse Voltage

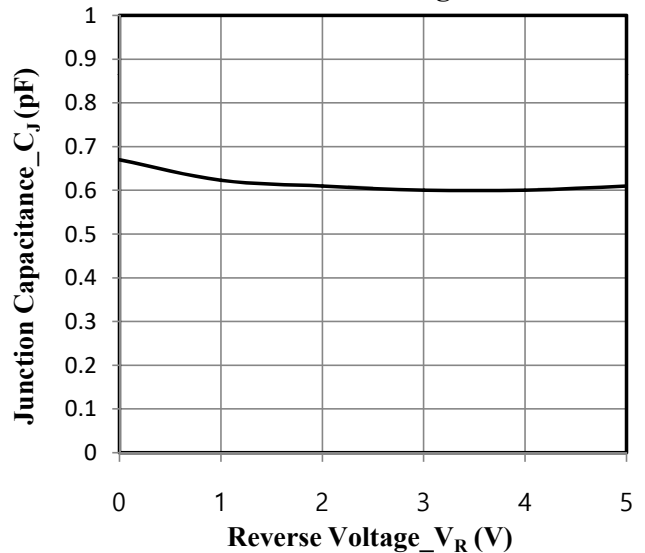


Fig.5 8 × 20us Pulse Waveform

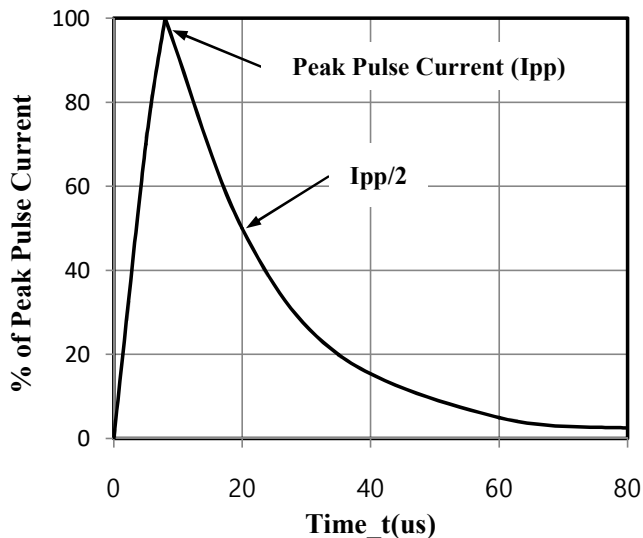
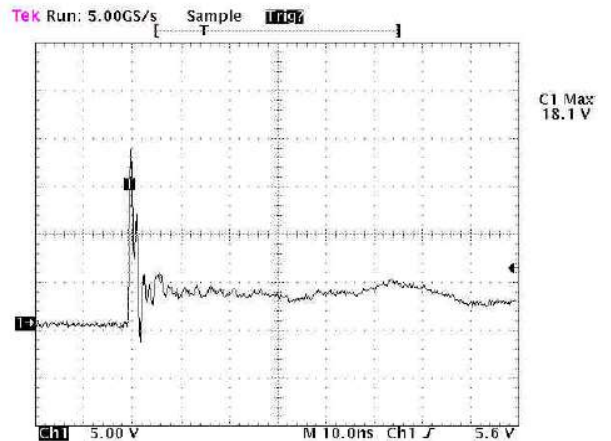
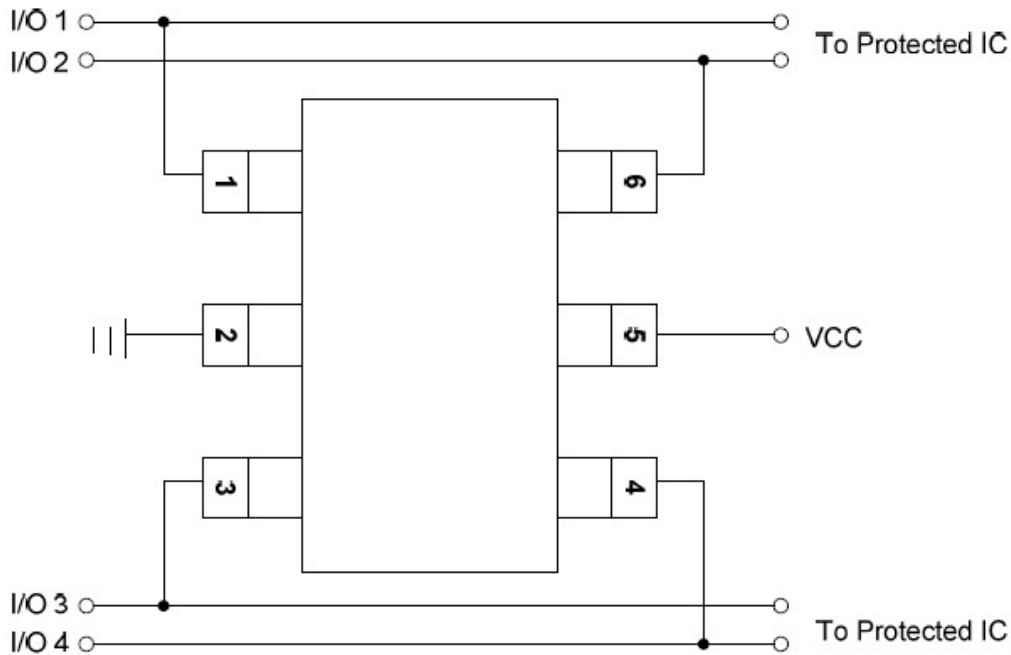


Fig. 6 ESD Clamping Voltage 8kV Contact per IEC61000-4-2

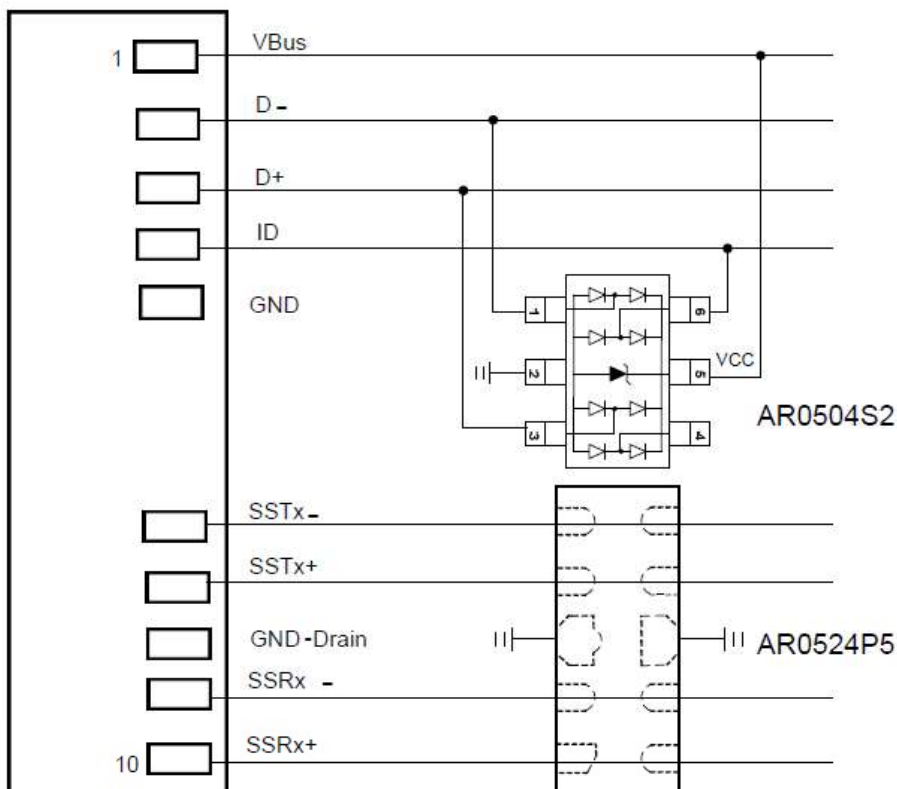


Typical Application

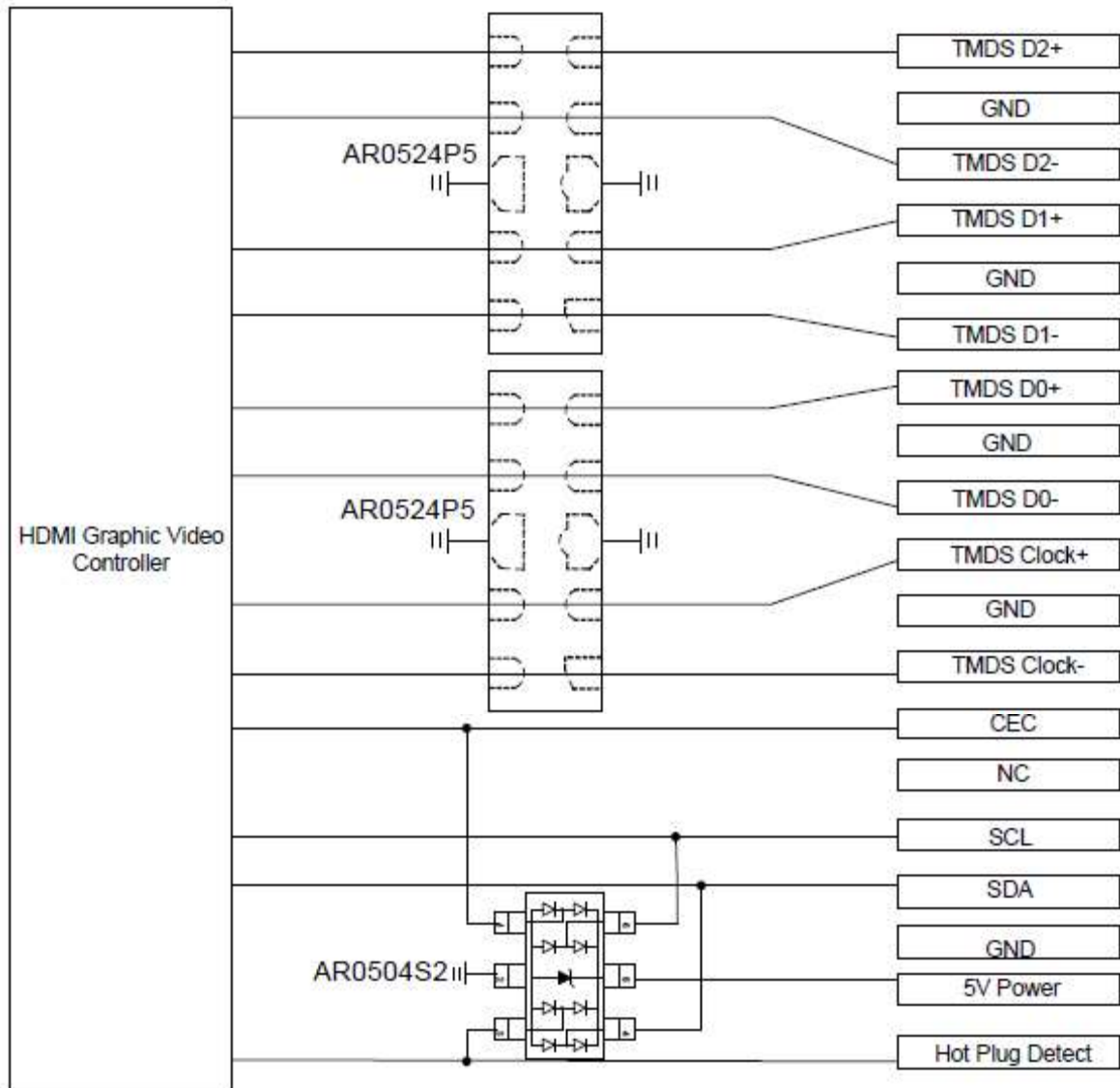
The AR0504S2 is designed to protect four data lines from transient over-voltages by clamping them to fixed reference. When the voltage on the protected line exceeds the reference voltage (plus diode VF) the steering diodes are forward biased, conducting the transient current away from the sensitive circuitry. Data lines are connected at pins 1, 3, 4 and 6. The negative reference (REF1) is connected at pin 2. This pin should be connected directly to a ground plane on the board for best results. The path length is kept as short as possible to minimize parasitic inductance. The positive reference (REF2) is connected at pin 5.



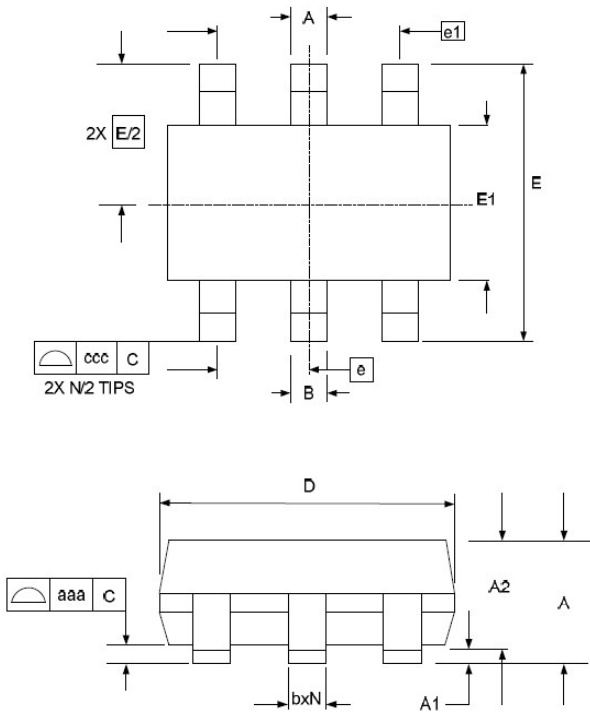
AR0504S2 on USB 3.0 Port Application



AR0504S2 on HDMI Port Application

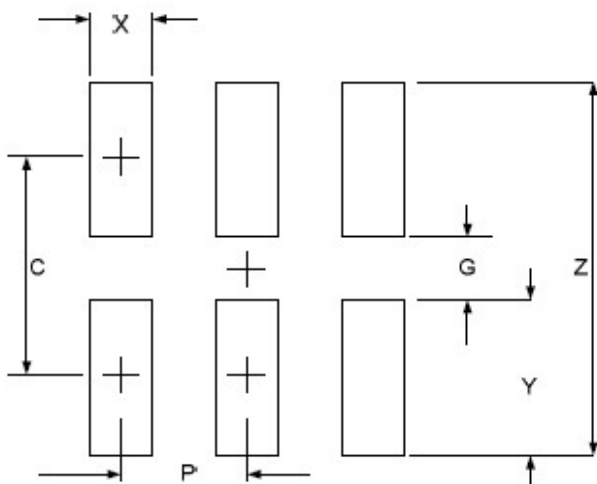


SOT23-6 Package Outline Drawing



SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90		1.45	0.035		0.057
A1	0.00		0.15	0.000		0.006
A2	0.90	1.15	1.30	0.035	0.045	0.051
b	0.25		0.50	0.010		0.020
c	0.08		0.22	0.003		0.009
D	2.80	2.90	3.10	0.110	0.114	0.122
E1	1.50	1.60	1.75	0.060	0.063	0.069
E	2.80 BSC			0.110 BSC		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
N	6			6		
aaa	0.10			0.004		
ccc	0.20			0.008		

Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
C	2.50	0.098
G	1.40	0.055
P	0.95	0.037
X	0.60	0.024
Y	1.10	0.043
Z	3.60	0.141