Introduction:

Designers of today's electronic devices have demanded more functionality with greater flexibility and higher levels of user interaction. These circumstances have helped in driving the development of nanometer chipsets along with a multitude of user interfaces or ports. The confluence of these two has made electronic devices more susceptible to ESD and required the need for a more robust solution.

ESD Standards:

MIL-STD-883, Method 3015

Historically, analog and digital designers have been required to have ESD protection "on-chip" to protect the IC during manufacturing. The most commonly used ESD standard in the manufacturing environment is the MIL-STD-883, Method 3015 and it's also referred to as the Human Body Model (HBM). This model discharges a 100pF capacitor through a 1500Ω resistor into the device under test. The table below points out the four test levels as defined in the standard.

HBM Level	Contact Discharge (kV)	Peak Current (A)
1	±0.5	0.33
2	±1	0.67
3	±2	1.33
4	±4	2.67

The maximum level required for a typical IC had been ±2kV up until 2007, but today that level has been drastically reduced to ±0.5kV. Obviously, this has helped chip designers save valuable silicon area for more functionality, but in turn, it has made the IC much more susceptible to damage from ESD.

IEC61000-4-2

Conversely, equipment manufacturers have traditionally used an ESD standard defined by the IEC (International Electrotechnical Commission) for system or application level testing. This model uses a 150pF capacitor which is discharged through a 330Ω resistor. The table below displays the four test levels as defined in the standard.

IEC Level	Contact Discharge (kV)	Peak Current (A)
1	±2	7.5
2	±4	15
3	±6	22.5
4	±8	30

Most all manufacturers require that their equipment pass Level 4, or ±8kV, as a minimum, however, some are looking for increased reliability and require that their devices pass a much higher level like ±15kV or ±30kV.

Conclusions:

The system level ESD test defined by the IEC produces a substantial increase in peak current compared to the military standard. If an IC is rated for 0.5kV per the MIL-STD and the equipment manufacturer tests this same IC at 8kV per the IEC specification, the chip will see nearly a 100 fold increase in peak current (i.e. 0.33A vs. 30A)!

Ultimately, hardware or board designers must add supplementary ESD devices to protect these sensitive chipsets from the high level ESD threats seen in the field.

Solutions:

Littelfuse's Silicon Protection Arrays are an ideal choice for suppressing ESD as their speed and clamping levels are essential to protect today's integrated circuits unlike the previous MLV, MOV, and polymer technologies. The SPA™ portfolio offers a wide range of devices to suit the majority of application needs available in the market today, and this guide will steer the designer toward the appropriate ESD device for the particular application they're trying to protect.

Some of the applications discussed in this guide are:

- USB1.1/2.0/3.0
- HDMI
- DVI
- 10/100/1000 Ethernet
- eSATA
- 1394a/b
- LVDS
- Audio (Speaker/Microphone)
- Analog Video
- SIM Sockets
- Keypad/Push button
- LCD/Camera display interfaces

Many of these applications can be found in electronic devices such as:

- PC's
- Portable Medical Devices
- Set Top Boxes
- LCD TV's
- Portable Navigation Devices
- Keyboards/Mouse
- Mobile Handsets
- MP3/PMP's
- PDA's
- Digital Cameras
- SIM/SD Cards
- External Storage
- Router/Hub/Modem
- Smart Phones

Table of Contents

Product Selection Guide

Enhanced ESD Protection

Series	ESD Level (Contact)	I/O Capacitance @ 2.5V	V_{RWM}	Lightning (t_P=8/20µs)	Number of Channels	Package Options	Orderable Part Number
SP05	±20kV	30pF	5.5V	N/A	2	SOT23-3	SP0502BAHTG
						SC70-3	SP0502BAJTG
					4	SOT23-5	SP0504BAHTG
						SC70-5	SP0504BAJTG
					5	SOT23-6	SP0505BAHTG
						SC70-6	SP0505BAJTG
					6	MSOP-8	SP0506BAATG
SP1003	±25kV	17pF	5V	7A	1	SOD723	SP1003-01DTG

General ESD Protection

Series	ESD Level (Contact)	I/O Capacitance @ 2.5V	V_{RWM}	Lightning (t_P=8/20µs)	Number of Channels	Package Options	Orderable Part Number
SP1001	±8kV	8pF	5.5V	2A	2	SC70-3	SP1001-02JTG
						SOT553	SP1001-02XTG
					4	SC70-5	SP1001-04JTG
						SOT553	SP1001-04XTG
					5	SC70-6	SP1001-05JTG
						SOT563	SP1001-05XTG
SP1010	±8kV	3.5pF	6V	1A	4	µDFN-6 (1.25x1.0mm)	SP1010-04UTG
SP1011	±15kV	7pF	6V	2A	4	µDFN-6 (1.25x1.0mm)	SP1011-04UTG

Bidirectional ESD Protection

Series	ESD Level (Contact)	I/O Capacitance @ 2.5V	V_{RWM}	Lightning (t_P=8/20µs)	Number of Channels	Package Options	Orderable Part Number
SP1002	±8kV	5pF	6V	2A	1	SC70-3	SP1002-01JTG
					2	SC70-5	SP1002-02JTG
SP1004	±8kV	5pF	6V	2A	4	SOT953	SP1004-04VTG

Low Capacitance ESD Protection

Series	ESD Level (Contact)	I/O Capacitance @ 1.65V	V_{RWM}	Lightning (t_P=8/20µs)	Number of Channels	Package Options	Orderable Part Number
SP3001	±8kV	0.65pF	6V	2.5A	4	SC70-6	SP3001-04JTG
SP3002	±12kV	0.85pF	6V	4.5A	4	SC70-6	SP3002-04JTG
						SOT23-6	SP3002-04HTG
						µDFN-6 (1.6x1.6mm)	SP3002-04UTG
SP3003	±8kV	0.65pF	6V	2.5A	2	SC70-5	SP3003-02JTG
						SOT553	SP3003-02XTG
					4	SC70-6	SP3003-04JTG
						SOT563	SP3003-04XTG
						MSOP-10	SP3003-04ATG
SP3004	±12kV	0.85pF	6V	4A	4	SOT563	SP3004-04XTG
SP3010	±8kV	0.45pF	6V	3A	4	µDFN-10 (2.5x1.0mm)	SP3010-04UTG

Product Selection Guide

Low Clamp ESD Protection

Series	ESD Level (Contact)	I/O Capacitance @ 1.65V	V_{RWM}	Lightning (t_P=8/20µs)	Number of Channels	Package Options	Orderable Part Number
SP4001	±12kV	0.75pF	3.3V	4.5A	4	µDFN-6 (1.6x1.6mm)	SP4001-04UTG

Ethernet and Lightning Protection

Series	ESD Level (Contact)	I/O Capacitance @ 0V	V_{RWM}	Lightning (t_P=8/20µs)	Number of Channels	Package Options	Orderable Part Number
SP3050	±20kV	2.4pF	6V	10A	4	SOT23-6	SP3050-04HTG
SP4060	±30kV	4.4pF	2.5V	20A	8	MSOP-10	SP4060-08ATG
SP03-3.3	±30kV	16pF	3.3V	150A	2	SOIC-8	SP03-3.3BTG
SP03-6	±30kV	16pF	6V	150A	2	SOIC-8	SP03-6BTG
SPLV2.8	±30kV	4pF	2.8V	24A	4	SOIC-8	SPLV2.8-4BTG

EMI Filtering with ESD Protection

Series	ESD Level (Contact)	Line Capacitance @ 0V	V_{RWM}	Attenuation	Number of Channels	Package Options	Orderable Part Number
SP6001	±30kV	24pF	6V	≥ -30dB @ 1GHz	4	µDFN-8 (1.7x1.35mm)	SP6001-04UTG-1
					6	µDFN-12 (2.5x1.35mm)	SP6001-06UTG-1
					8	µDFN-16 (3.3x1.35mm)	SP6001-08UTG-1
SP6002	±30kV	30pF	6V	≥ -30dB @ 1GHz	4	µDFN-8 (1.7x1.35mm)	SP6002-04UTG-1
					6	µDFN-12 (2.5x1.35mm)	SP6002-06UTG-1

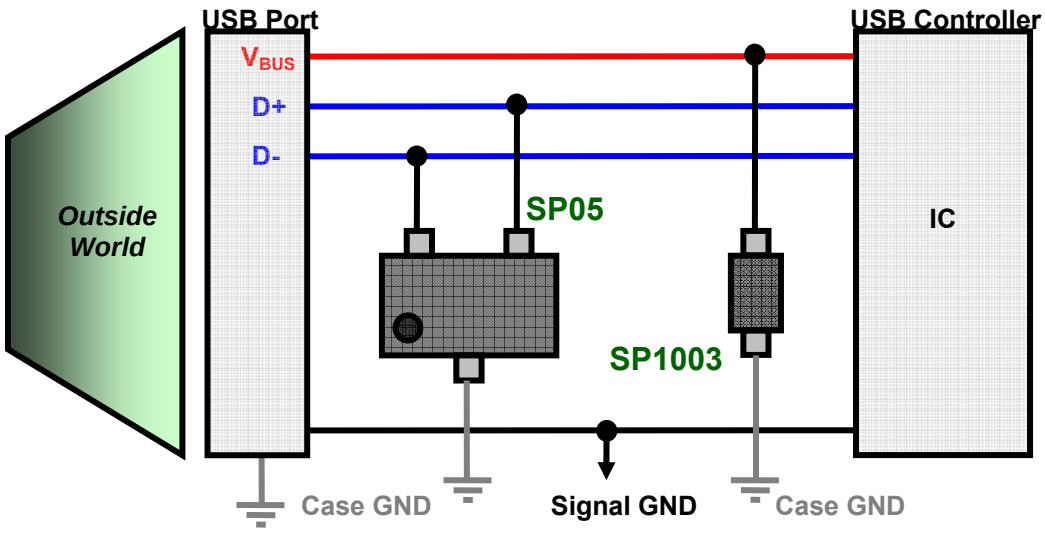
Application Guide
USB1.1

Considerations:

● Each port operates at either 1.5Mbps or 12Mbps (low and full speed respectively)
→ Slower speeds can tolerate higher capacitance devices

● Requires 2 channels of data line protection per port (i.e. D+/D-)
→ A 4 channel device can be useful if protecting a USB stack of 2 ports to make the ESD footprint as small as possible
→ V_{BUS} can be protected separately with a single channel device *(0402 shown)*

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP0502BAJTG	±20kV	30pF	2	5.5V	SC70-3
SP1001-02XTG	±8kV	12pF	2	5.5V	SOT553
SP1001-04XTG	±8kV	12pF	4	5.5V	SOT553
SP1003-01DTG	±25kV	30pF	1	5.0V	SOD723

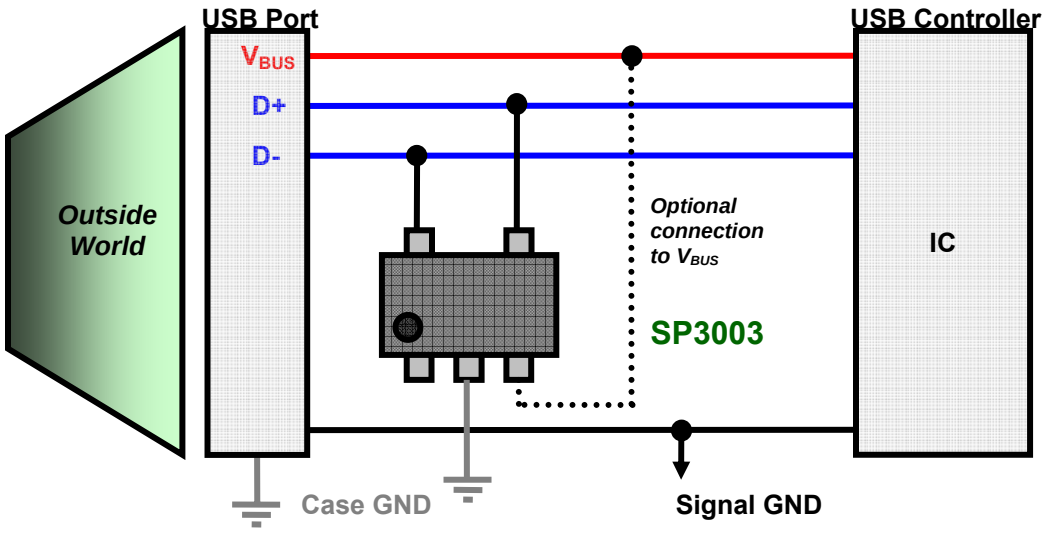
Application Guide
USB2.0

Considerations:

● Each port can operate up to 480Mbps
→ The high data rate requires a low capacitance device to preserve signal integrity

● Requires 2 channels of data line protection per port (i.e. D+/D-)
→ A 4 channel device can be useful if protecting a USB stack of 2 ports to make the ESD footprint as small as possible
→ V_{BUS} can be protected by connecting it to the V_{CC} pin on the diode array or by using a separate single channel device as previously shown (i.e. SP1003)

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP3003-02XTG	±8kV	0.65pF	2	6V	SOT553
SP3004-04XTG	±12kV	0.85pF	4	6V	SOT563
SP3002-04UTG	±12kV	0.85pF	4	6V	µDFN-6 (1.6x1.6mm)

Application Guide
USB3.0

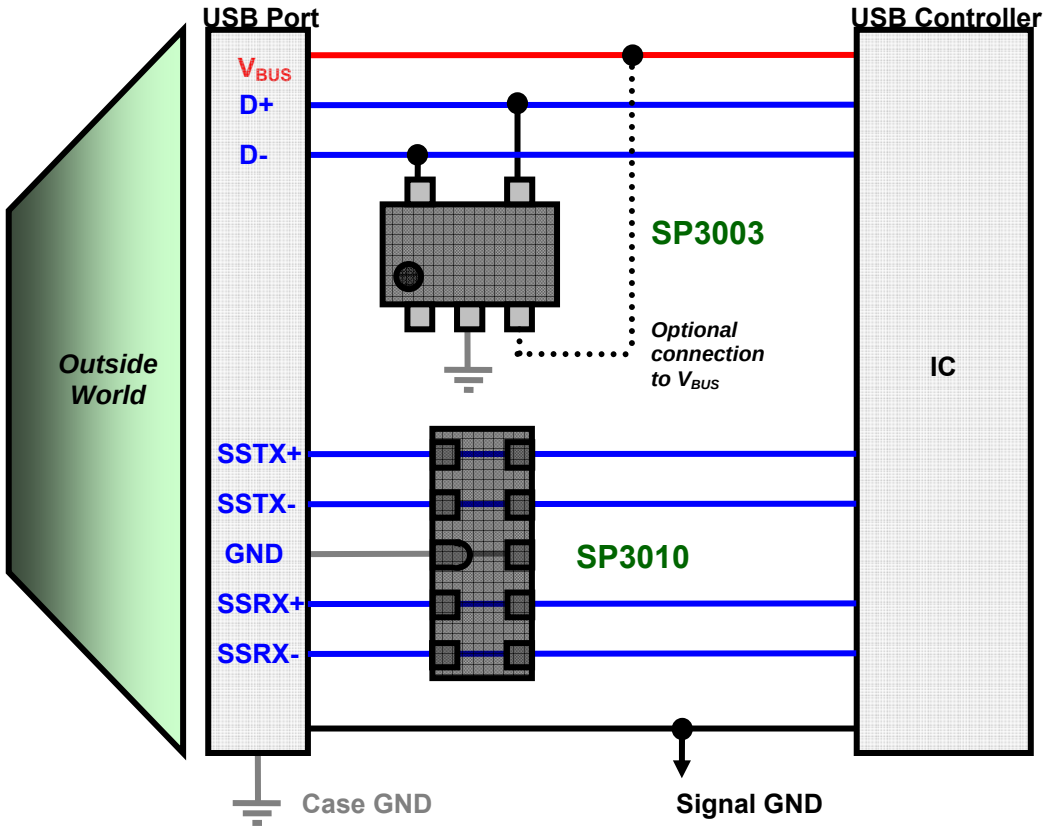
Considerations:

- Each port depending upon what it's connected to can operate:
  - → Up to 5Gbps over the new super-speed data pairs
  - → Up to 480Mbps on the legacy data pair

- Requires 4 channels of ultra-low capacitance protection for the super-speed data pair (i.e. SSTX+/- and SSRX+/-)

- Requires 2 channels of protection for the legacy D+/D- data pair
  - → V_{BUS} can be protected by connecting it to the V_{CC} pin on the SPA or by using a separate single channel device

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP3003-02XTG	±8kV	0.65pF	2	6V	SOT553
SP3010-04UTG	±8kV	0.45pF	4	6V	µDFN-10 (2.5x1.0mm)

Application Guide
HDMI

Considerations:

● Each port has 3 differential lanes of data (i.e. D0±, D1±, D2±) plus a clock (CLK±)
→ For HDMI 1.1-1.2 the throughput is a total of 4.95Gbps (1.65Gbps per lane)
→ For HDMI 1.3 the throughput is a total of 10.2Gbps (3.4Gbps per lane)

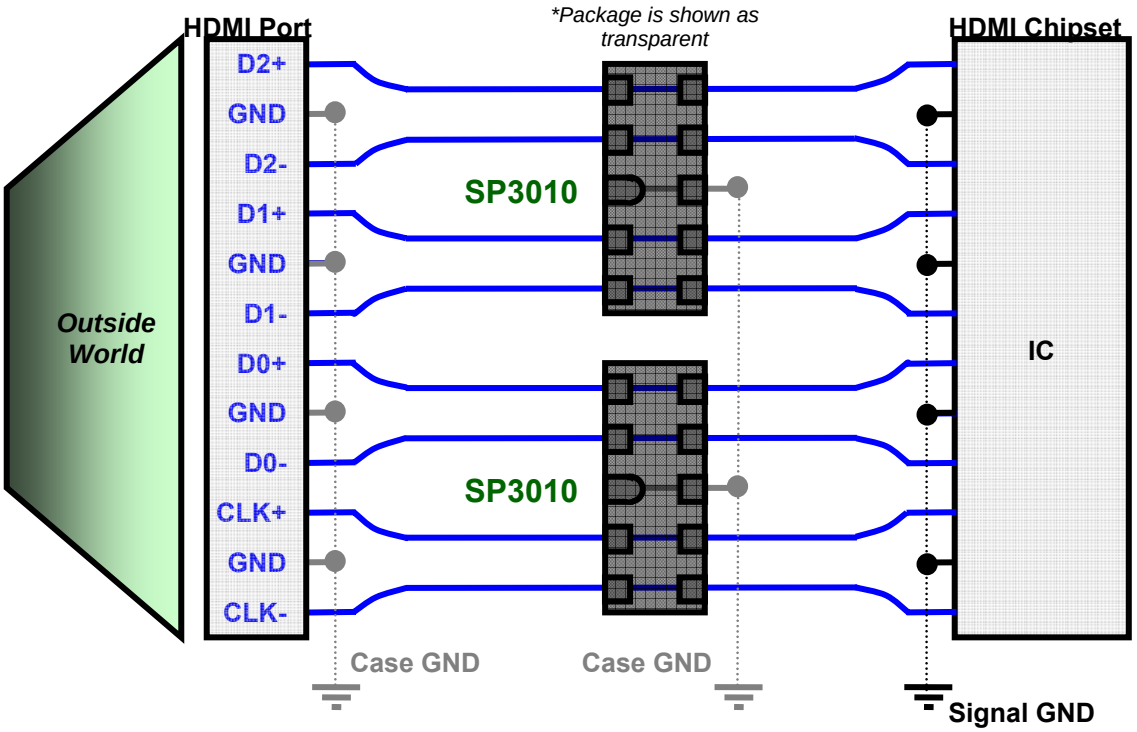
● To maintain the differential impedance per the HDMI Compliance Test Specification (and consequently signal integrity) a very low capacitance device must be used

● To maintain the differential impedance the designer should avoid using 90º angles and vias.
→ This can be accomplished by the use of an ESD device that offers a "straight-through" routing scheme

● Requires 8 channels of protection per port (D0±, D1±, D2±, CLK±)

● The V_{CC} pin on the SP3003-04ATG should be "NC" if backdrive is a concern. There is no V_{CC} pin on the SP3010-04UTG.

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP3010-04UTG	±8kV	0.45pF	4	6V	µDFN-10 (2.5x1.0mm)
SP3003-04ATG	±8kV	0.65pF	4	6V	MSOP-10

Application Guide
DVI

Considerations:

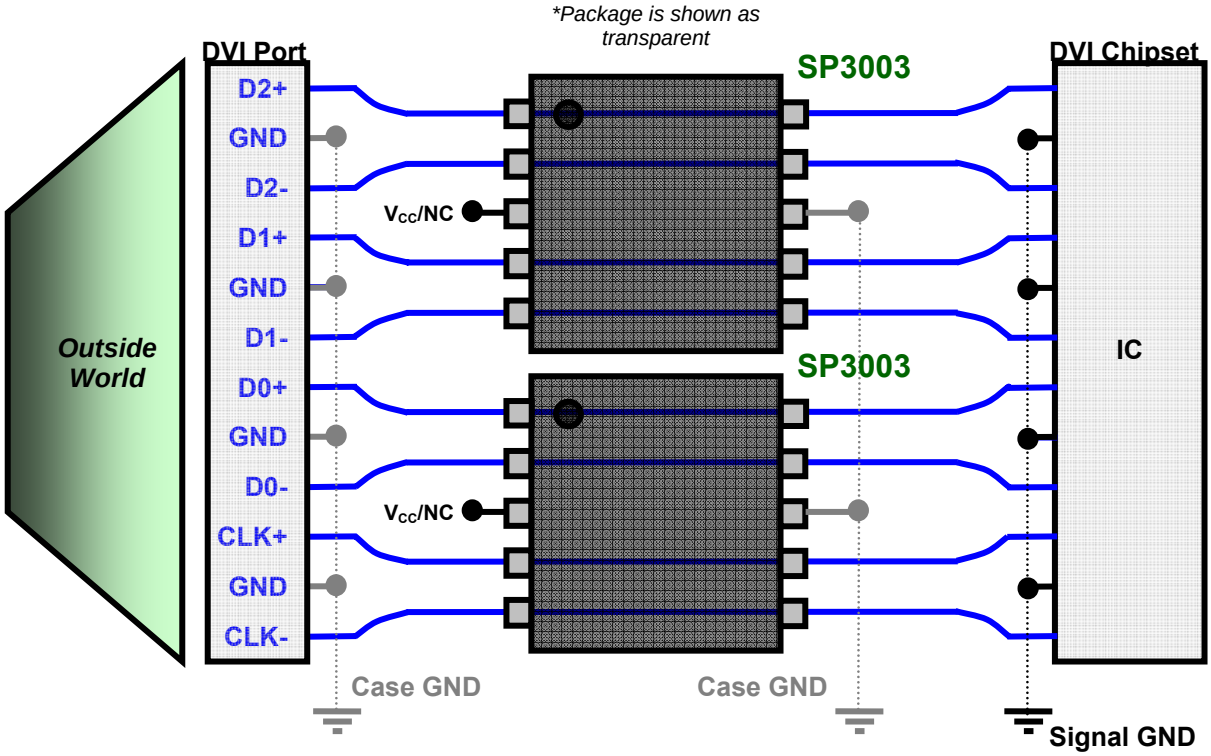
- A DVI port may have single or dual link capability
  - → Each link has 3 differential lanes of data (i.e. D0±, D1±, D2±) plus a clock (CLK±)
  - → For single link, the maximum throughput can approach a total of 4.95Gbps or 1.65Gbps per lane
  - → For dual link, the maximum throughput can approach a total of 8Gbps or 2.67Gbps per lane

- To maintain signal integrity a very low capacitance device must be used

- To maintain the differential impedance the designer should avoid using 90º angles and vias.
  - → This can be accomplished by the use of an ESD device that offers a "straight-through" routing scheme

- Requires 8 channels of protection per port (D0±, D1±, D2±, CLK±)

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP3003-04ATG	±8kV	0.65pF	4	6V	MSOP-10
SP3010-04UTG	±8kV	0.45pF	4	6V	µDFN-10 (2.5x1.0mm)

Application Guide
10/100 Ethernet

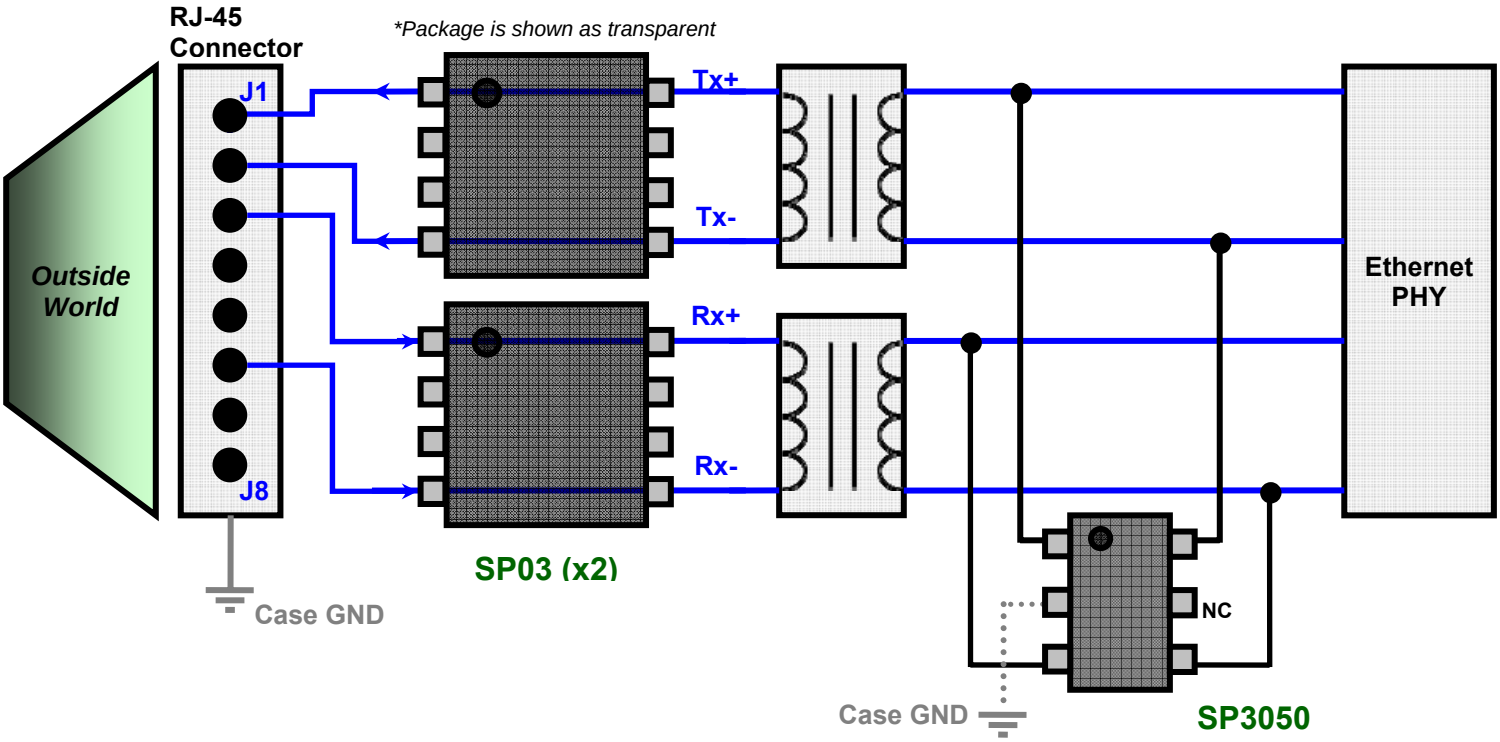
Considerations:

● 10/100 relates to the data rate in Mbps (i.e. 10Mbps and 100Mbps)
→ For 10 Base-T, data is transmitted over 2 UTP (unshielded twisted pairs) using a 10MHz clock
→ For 100Base-TX, data is transmitted over 2 UTP using a 125MHz clock

● For these data rates the parasitic capacitance needs to be taken into account to preserve signal integrity

● The 4 data lines below (Tx+/- and Rx+/-) are being protected against intra-building (i.e. 100A, t_P=8/20us) lightning transients by a two stage protection scheme

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20µs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP03-xBTG	±30kV	150A	16pF	2	3.3V,6V	SOIC-8
SP3050-04HTG	±20kV	10A	2.4pF	4	6V	SOT23-6

Application Guide
1000/Gigabit Ethernet

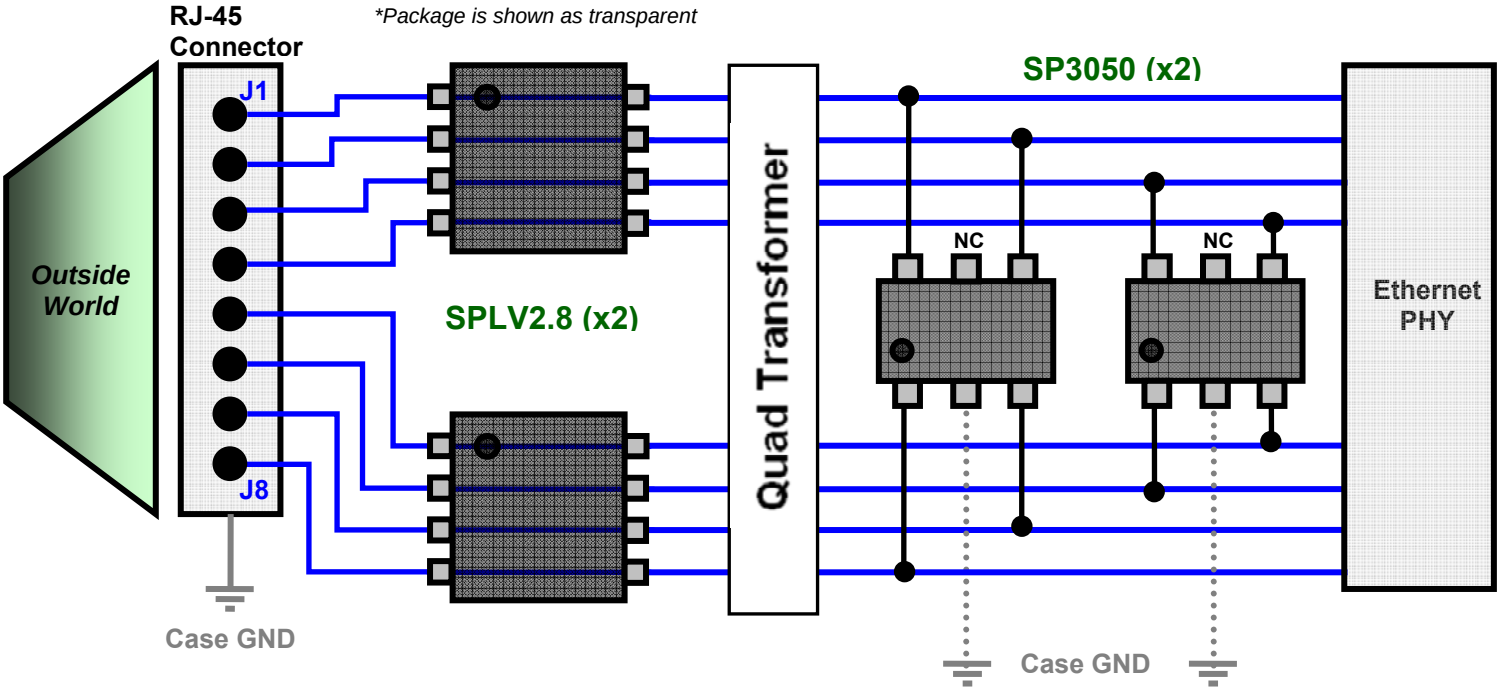
Considerations:

● 1000 relates to the data rate in Mbps (i.e. 1000Mbps)
→ For 1000Base-T data is transmitted over 4 UTP (unshielded twisted pairs) using a 125MHz clock

● For this data rate the parasitic capacitance should certainly be taken into account

● The 8 data lines below (Tx0:3 and Rx0:3) are being protected against lightning transients by a two stage protection scheme
→ The SP03 series (x4) should be used in place of the SPLV2.8-4 if higher levels of protection are required
→ The SP4060 series can be used in place of the SP3050 devices if the voltage does not exceed 2.5V

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20µs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SPLV2.8-4BTG	±30kV	24A	4pF	4	2.8V	SOIC-8
SP3050-04HTG	±20kV	10A	2.4pF	4	6V	SOT23-6
SP4060-08ATG	±30kV	20A	4.4pF	8	2.5V	MSOP-8

Application Guide
10/100/1000 Ethernet (ESD only)

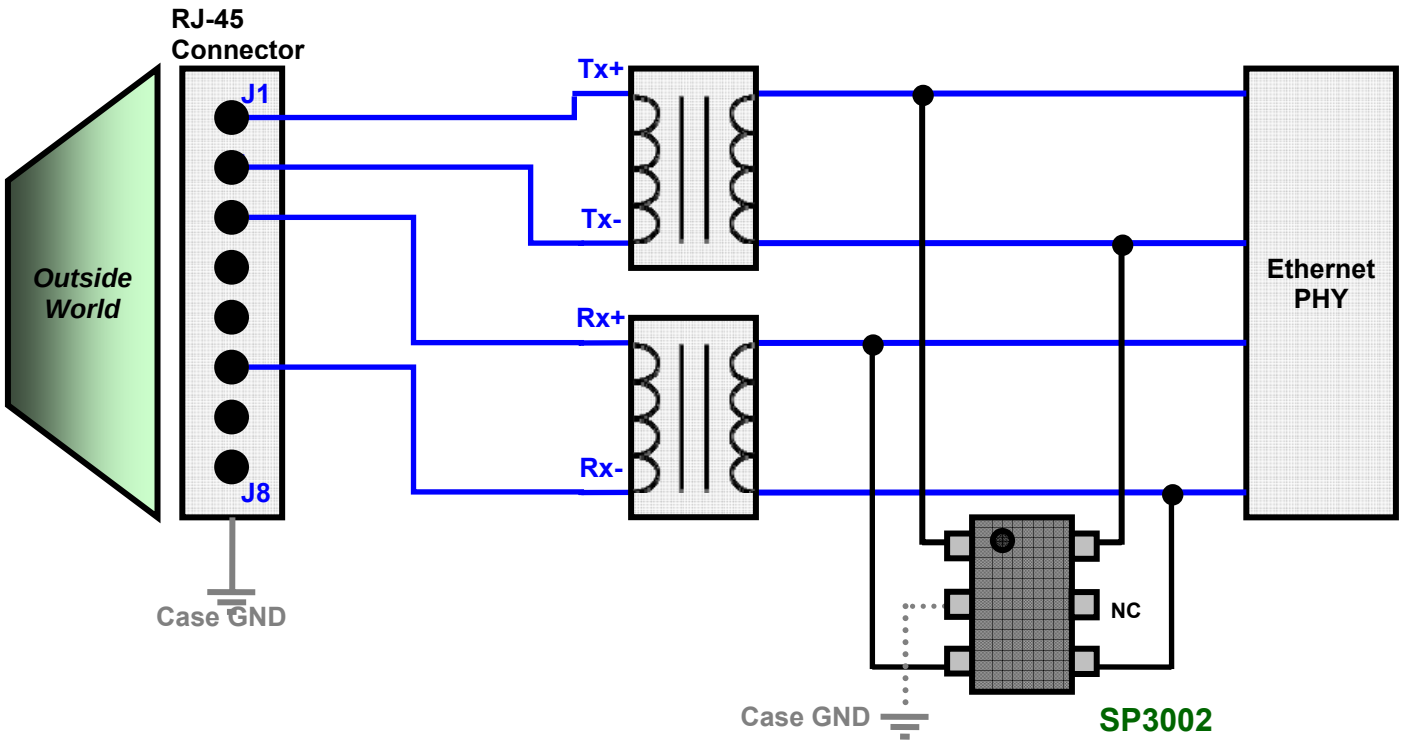
Considerations:

● Some Ethernet ports only need be protected for ESD and not for lightning induced transients
→ These are sometimes referred to as “2M” ports or 2 Meter ports

● Parasitic capacitance should be taken into account especially for Gigabit Ethernet

● The 4 data lines below (Tx+/- and Rx+/-) are being protected against ESD by a low capacitance SP3002 which is suitable for all Ethernet data rates
→ In fact, any low capacitance SP30xx device is suitable for any “ESD only” Ethernet application

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20µs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP3002-04JTG	±12kV	4.5A	0.85pF	4	6V	SC70-6
SP3003-04XTG	±8kV	2.5A	0.65pF	4	6V	SOT563
SP3004-04XTG	±12kV	4A	0.85pF	4	6V	SOT563

Application Guide
eSATA

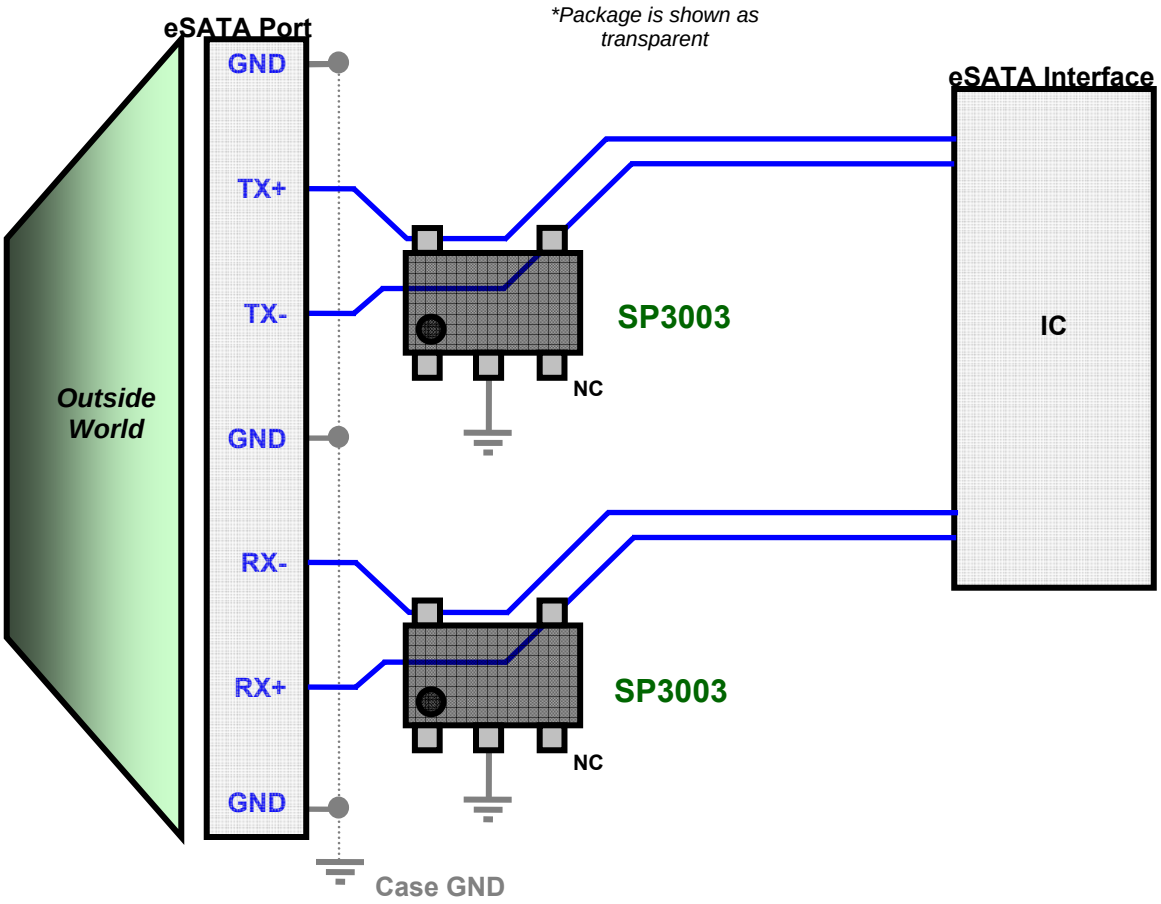
Considerations:

- eSATA is a subset of the SATA protocol that uses 2 differential pairs for communication
  - → Four lines need to be protected per port (i.e. TX+/TX- and RX+/RX-)
  - → Currently eSATA is capable of running raw data rates of 1.5Gbps (Gen 1) and 3.0Gbps (Gen 2).

- These high bus speeds require very low capacitance devices to prevent signal degradation

- To maintain the line impedance the designer should avoid using 90º angles and vias

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP3003-02XTG	±8kV	0.65pF	2	6V	SOT553
SP3010-04UTG	±8kV	0.45pF	4	6V	µDFN-10 (2.5x1.0mm)
SP3003-04JTG	±8kV	0.65pF	4	6V	SC70-6

Application Guide
1394a/b

Considerations:

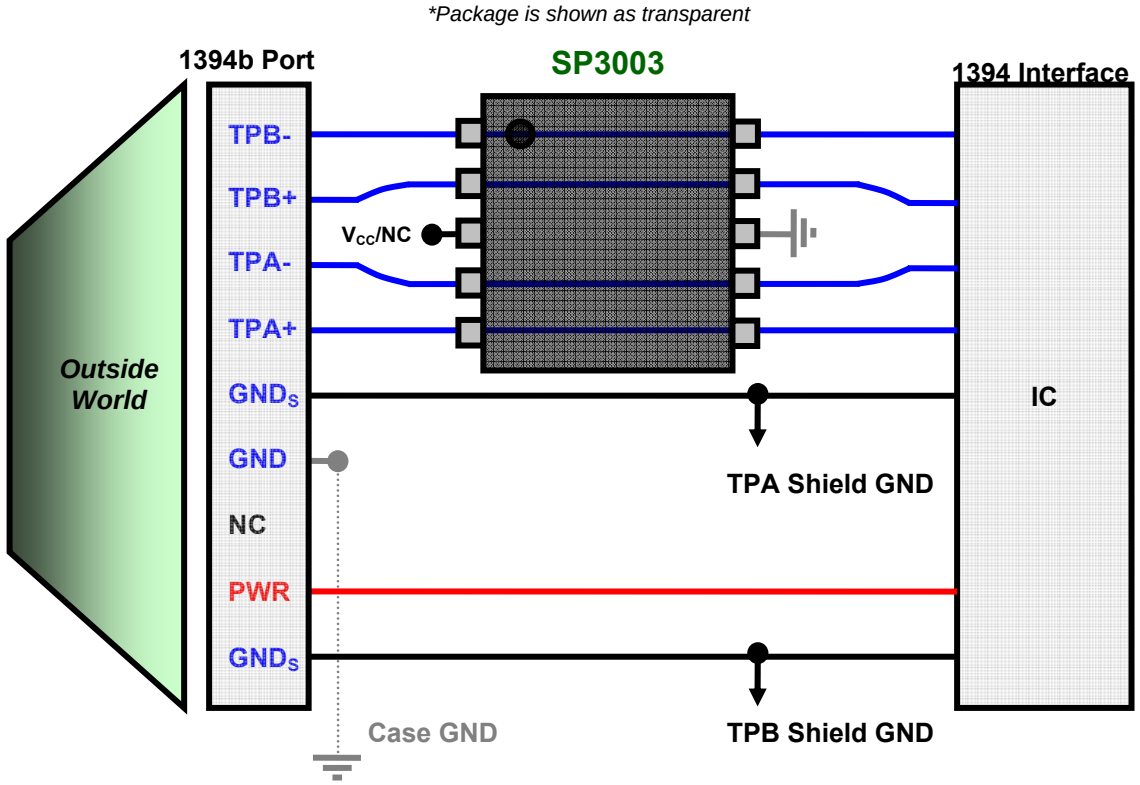
- 1394a (FireWire 400 or S400) was the original (1st generation) implementation
  - → Allowed for two connectors, powered (6 pin) and unpowered (4 pin)
  - → Data rates up to 400Mbps using 2 differential pair

- 1394b (FireWire 800 or S800) was the 2nd generation
  - → Required a new 9 pin connector but was backwards compatible to S400
  - → Data rates up to 800Mbps using 2 differential pair

- 1394b also had provisions for 1600Mbps and 3200Mbps (or S1600 and S3200)
  - → Uses same 9 pin connector as S800

- S800, S1600, and S3200 require very low capacitance devices for the high speed data rates
  - → Protection of 4 data lines is needed (i.e. TPB+/TPB- and TPA+/TPA-)

Application Schematic:



Recommended SPA Devices:

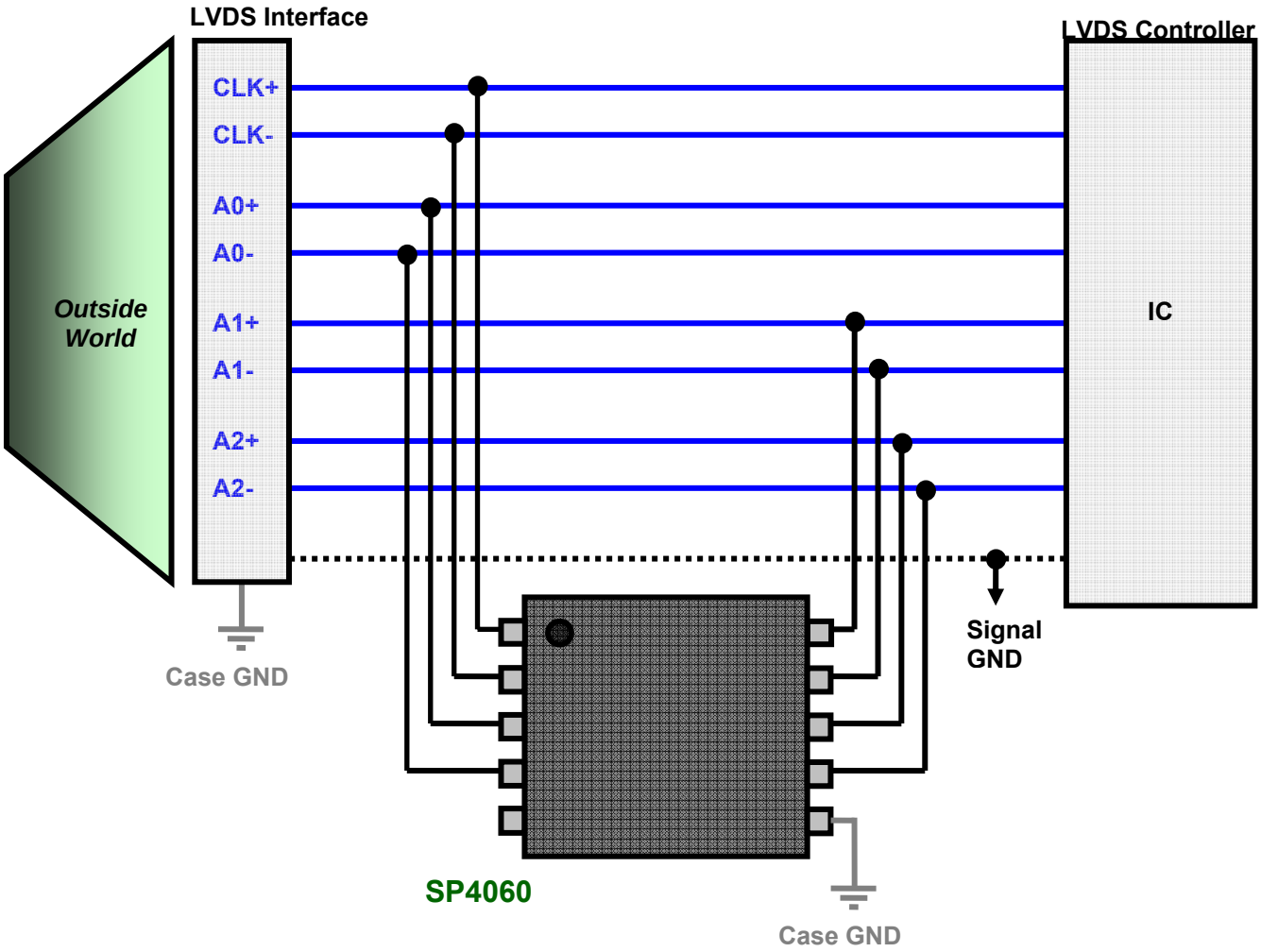
Ordering Number	ESD Level (Contact)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP3003-04ATG	±8kV	0.65pF	4	6V	MSOP-10
SP3010-04UTG	±8kV	0.45pF	4	6V	µDFN-10 (2.5x1.0mm)

Application Guide
LVDS (Low Voltage Differential Signaling)

Considerations:

● LVDS is a low noise, low-voltage signal scheme that uses a small current (typically 3.5mA) to generate a voltage drop across a 100Ω resistor to convey information or data
→ Data rates can vary per application but the ANSI/TIA/EIA-644-A standard recommends a maximum of 655Mbps.
● The medium/high speed bus requires a low capacitance device in 1-6pF range (typically)
→ LVDS schemes will vary in terms of the total number of channels used
→ Protection of 8 data lines is shown below (i.e. CLK+/CLK- and Ax+/Ax-)

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20μs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP4060-08ATG	±30kV	20A	4.4pF	8	2.5V	MSOP-10
SP3050-04HTG	±20kV	10A	2.4pF	4	6V	SOT23-6

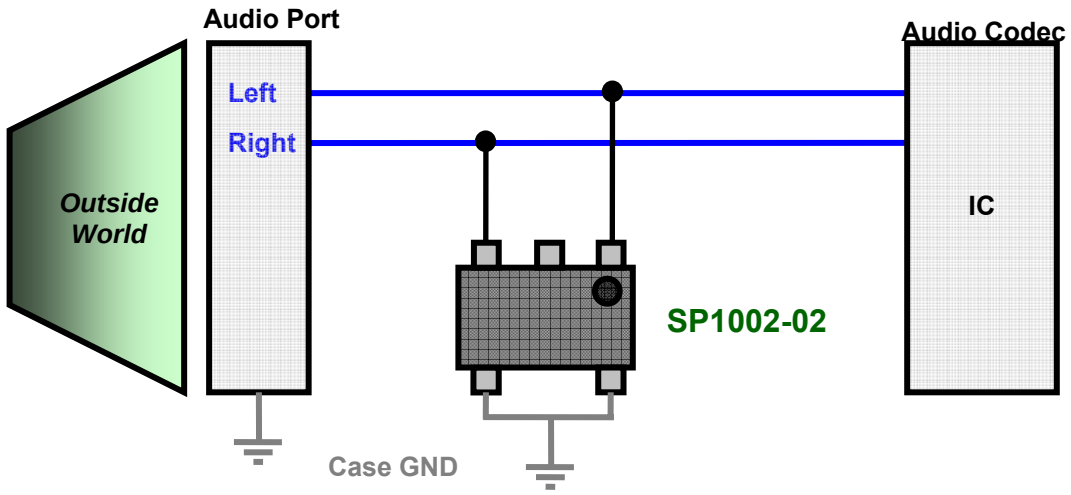
Application Guide
Audio (Speaker/Microphone)

Considerations:

● Audio ports typically have signals that swing above and below GND (i.e. ±2.5V)
→ If no bias is applied, a bidirectional protection device should be used
→ These devices will not clip the analog signal as they only conduct or turn on above ±6V
→ Protection of 2 data lines is shown below (i.e. Left and Right)

● Some audio ports will bias the data bus so that the signal never swings below GND (i.e. 0-5V)
→ If a bias is applied, a unidirectional OR bidirectional protection device could be used as neither device would clip the analog signal
→ The SP1001-02XTG is a good option in this case (not shown for Left and Right but is listed below)

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20µs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP1002-02JTG	±8kV	2A	5pF	2	6V	SC70-5
SP1002-01JTG	±8kV	2A	5pF	1	6V	SC70-3
SP1001-02XTG	±8kV	2A	8pF	2	6V	SOT553

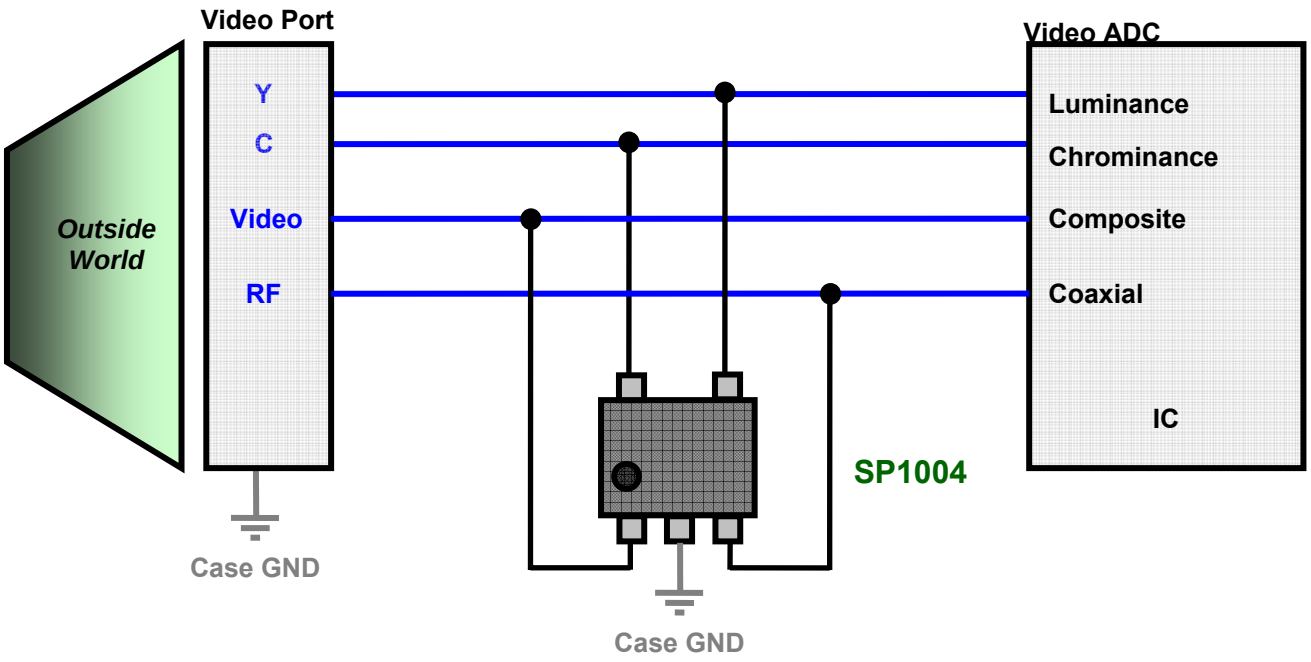
Application Guide
Analog Video

Considerations:

- Analog video ports typically have signals that swing above and below GND (i.e. ±2V)
  → A bidirectional protection device should be used as these devices will not clip the analog signal

- S-Video, Composite, and RF/Coaxial are a few of the common low-speed analog video signals in use today
  →Typical bus speeds will not exceed 5MHz so capacitance is not much of a concern
  → Protection of the three are shown below (Y, C, Video, and RF)

Application Schematic:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20µs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP1004-04VTG	±8kV	2A	5pF	4	6V	SOT953
SP1002-01JTG	±8kV	2A	5pF	1	6V	SC70-3
SP1002-02JTG	±8kV	2A	5pF	2	6V	SC70-5

Application Guide
Keypad/Push Buttons

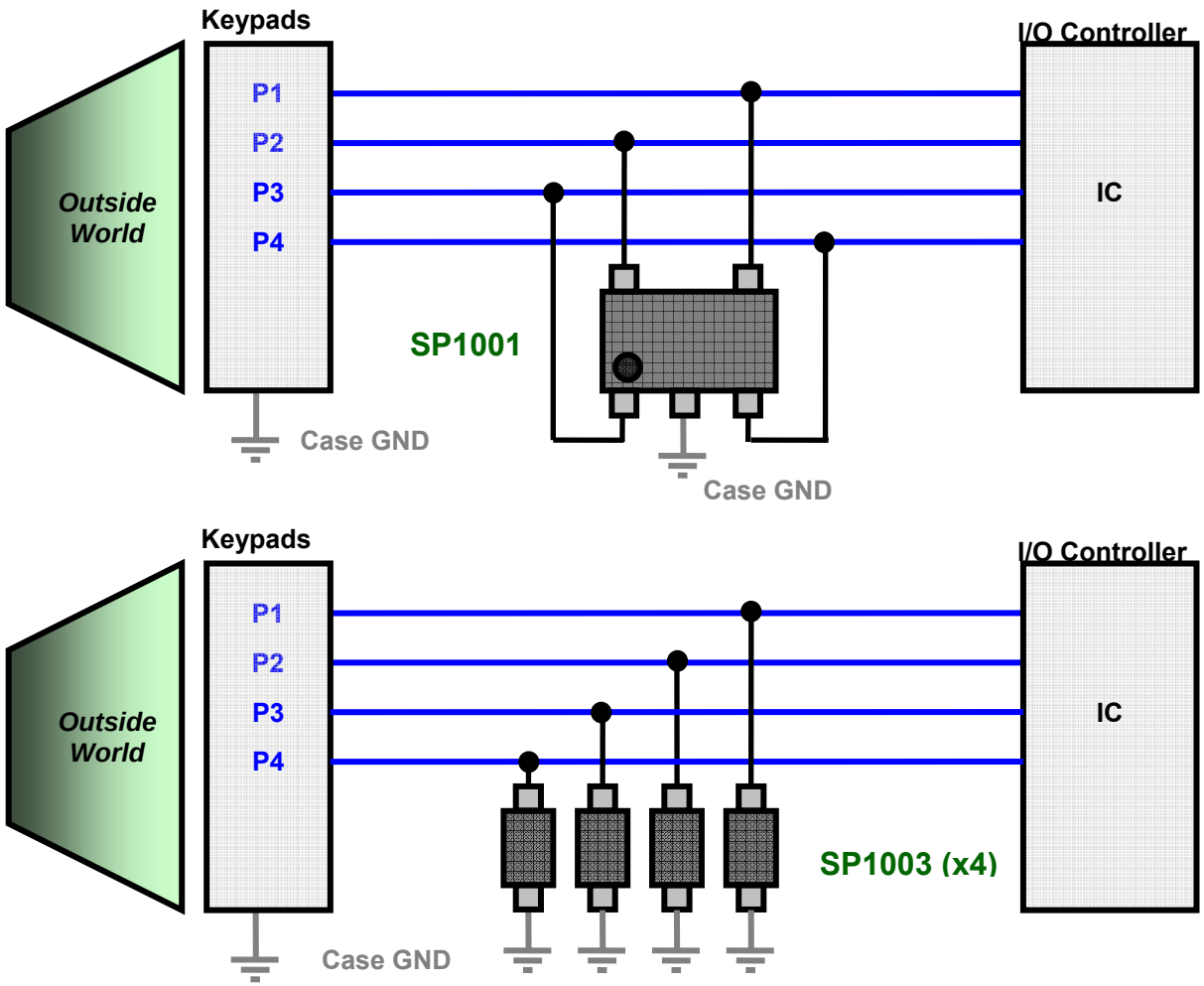
Considerations:

- Keypads and push buttons on electronic devices are particularly susceptible to ESD due to constant human interaction
  → Most are DC switches that operate at less than 5V, and for most applications capacitance will not be a concern

- The number of ports will vary with the particular application, but as an example, 4 data lines are shown below (i.e.Px)

- For space constrained applications the SP1003 may be considered as the SOD723 is an equivalent 0402 footprint

Application Schematics:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20µs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP1001-04XTG	±8kV	2A	8pF	4	6V	SOT553
SP1011-04UTG	±15kV	2A	7pF	4	6V	uDFN-6 (1.25x1.0mm)
SP1003-01DTG	±25kV	7A	17pF	1	6V	SOD723

Application Guide
SIM Socket

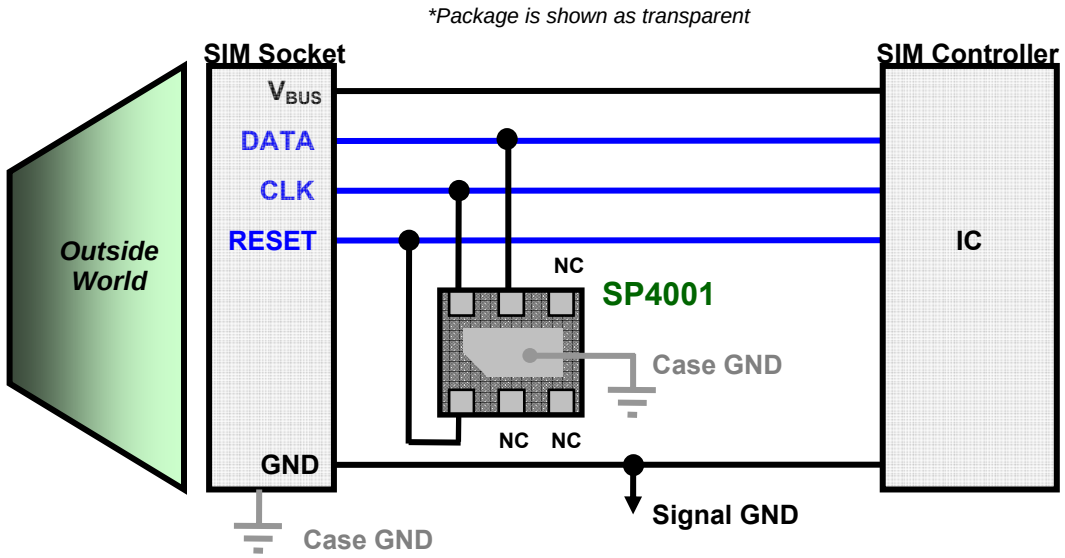
Considerations:

- The SIM (Subscriber Identification Module) card has 3 data lines that are low-speed and low-voltage
  → Given the low speed of the signals, the capacitance will not be a concern

- The low-voltage signal lines are best protected by a device which has a low standoff voltage or V_{RWM}
  → This allows the protection to turn on "earlier" in response to an over-voltage or ESD event

- Protection of the 3 data lines is shown below (i.e. CLK, DATA, and RESET)

Application Schematics:



Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Lightning (t_P=8/20µs)	I/O Capacitance	# of Channels	V_{RWM}	Packaging
SP4001-04UTG	±12kV	4.5A	0.75pF	4	3.3V	µDFN-6 (1.6x1.6mm)
SP3002-04UTG	±12kV	4.5A	0.85pF	4	6V	µDFN-6 (1.6x1.6mm)

Application Guide
LCD and Camera Interfaces (Mobile)

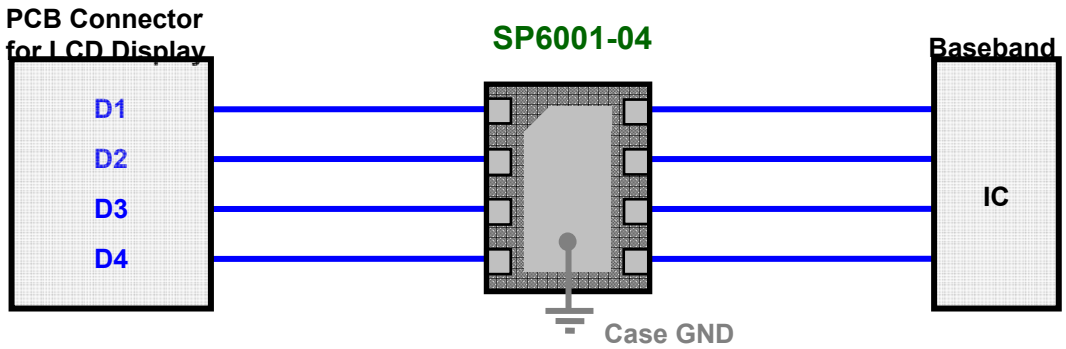
Considerations:

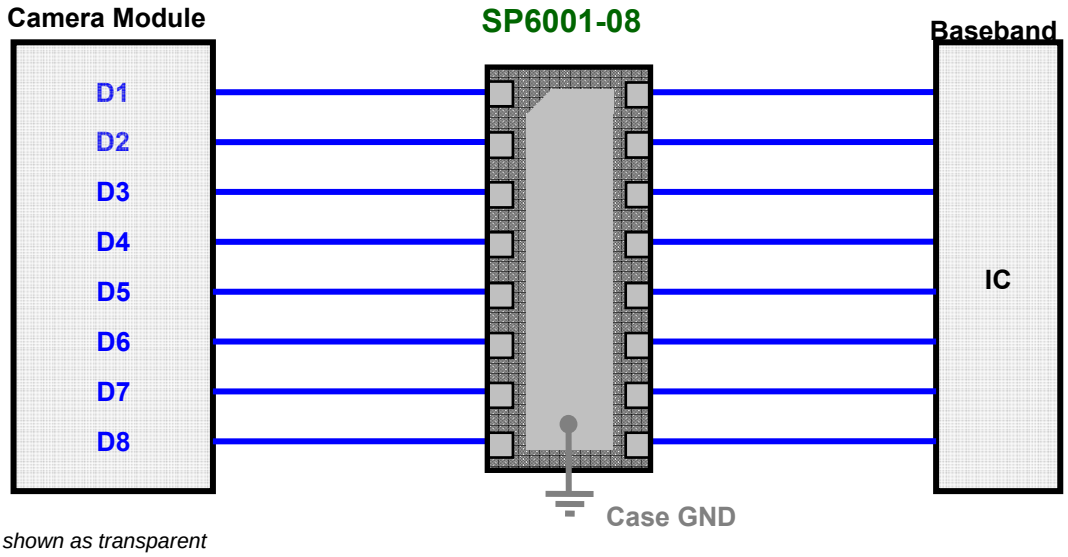
- LCD and camera interfaces in mobile devices are vulnerable to EMI from the cellular band
  → Frequencies between 800-3000MHz should be attenuated to prevent distortion on the display

- The pixel clocks vary depending upon the display size but the frequency will typically fall between 5-65MHz
  → This corresponds to data rates between 10-60Mbps and with these speeds line capacitances need to be considered
  → In the majority of applications line capacitances of 20-40pF will not cause signal integrity issues

- The protection schemes below for data lines Dx are only examples and will vary with the particular application

Application Schematic:





**Packages are shown as transparent*

Recommended SPA Devices:

Ordering Number	ESD Level (Contact)	Cut-off Frequency	Line Capacitance	# of Channels	V_{RWM}	Packaging
SP6001-0xUTG-1	±30kV	115MHz	24pF	4/6/8	6V	µDFN-8/12/16
SP6002-0xUTG-1	±30kV	100MHz	30pF	4/6	6V	µDFN-8/12

Appendix A

SPA Package Comparison Table

Package	Length* (mm)	Width* (mm)	Height (mm)	Lead Pitch (mm)
SOIC-8	4.9	6.0	1.55	1.27
MSOP-8	3.0	4.9	0.95	0.65
MSOP-10	3.0	4.9	0.95	0.5
SOT23-5/6	2.9	2.8	1.2	0.95
SOT23-3	2.9	2.35	1.0	0.95
SC70-5/6	2.0	2.2	0.9	0.65
SC70-3	2.0	2.2	0.95	0.66
SOT553	1.6	1.6	0.55	0.5
SOT563	1.6	1.6	0.55	0.5
SOT953	1.0	1.0	0.48	0.35
SOD723	1.42	0.6	0.48	N/A
µDFN-6	1.6	1.6	0.5	0.5
	1.25	1.0	0.5	0.4
µDFN-8	1.7	1.35	0.5	0.4
µDFN-10	2.5	1.0	0.5	0.5
µDFN-12	2.5	1.35	0.5	0.4
µDFN-16	3.3	1.35	0.5	0.4

**Includes the package leads*