



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





Microsemi

LX7202-xx

EMI Filter & ESD Protection for Up Stream USB Ports

PRODUCTION DATA SHEET

DESCRIPTION

The LX7202 is an integrated Universal Serial Bus (USB) line termination device with an EMI filter and ESD protection diodes. This device offers a cost effective and compact solution for one USB upstream port. The USB specification requires line termination resistors on both the D+ and D- lines. These resistors ensure signal integrity by matching the cable impedance to that of the differential driver. The 1.5 k Ω pull-up resistor identifies the appropriate data line for full speed or low speed operation.

The 47 pF capacitor completes the high frequency filter and controls the edge rate of the USB signals. The LX7202 protects both D+ and D- data lines and the voltage bus from ESD. The TVS protection diodes exceed the requirements of IEC61000-4-2, level 4, 15kV (air discharge) and 8kV (contact discharge). The integrated configuration of the LX7202 minimizes board space and allows for ideal placement near the connector. The LX7202 is ideal for use in USB hubs, peripherals and portable appliances.

IMPORTANT: For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

KEY FEATURES

- Bi-directional EMI/RFI low-pass filter
- Line termination with integrated ESD protection
- Low TVS operating voltage (5.25V)
- Low leakage current
- Integrated single die construction
- Available with 15 or 22 Ω Series Resistance
- Crosses from Semtech STF202

APPLICATIONS

- USB 1.1 and USB 2.0 Full Speed Compliant
- Peripherals
- Computers and Printers
- Mobile phones
- Pagers and PDA's
- Digital Cameras

PACKAGE ORDER INFO

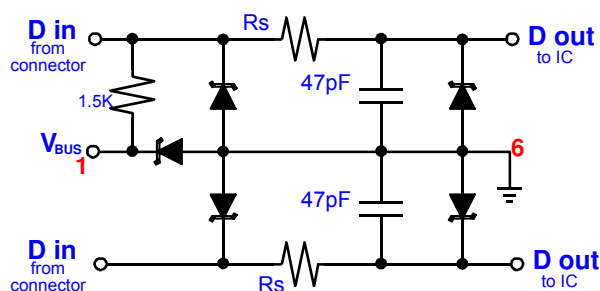
T _J (°C)	SF	Plastic 6-Pin SOT23	Package Marking	Tape & Reel Quantity (Reel Size)
-40 to 125		LX7202-15ISF	2021	3K (7inches)
-40 to 125		LX7202-22ISF	2022	

Note: Append the letter "T" to the part number
For Tape & Reel Ordering

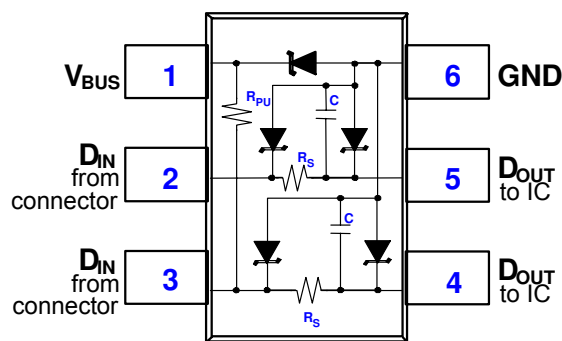
BENEFITS

- Filter response characterized up to 6 GHz
- <2dB insertion loss in the pass band
- >20dB attenuation in the 800-900 MHz range
- >12dB attenuation in the WLAN frequencies of 2.4GHz and 5.0-6.0 GHz

PRODUCT HIGHLIGHT



Circuit Diagram



Functional Schematic with PinOut



Microsemi®

LX7202-xx

EMI Filter & ESD Protection for Up Stream USB Ports

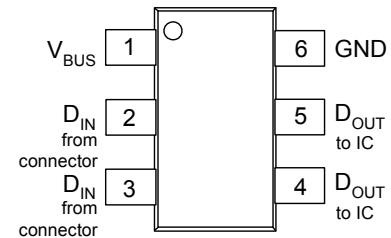
PRODUCTION DATA SHEET

ABSOLUTE MAXIMUM RATINGS

Steady State Power	100mW
ESD Air Discharge per IEC61000-4-2	16KV
ESD Contact Discharge per IEC61000-4-2	10KV
Lead Soldering Temperature (10 Seconds)	260°C
Operating Temperature	-40°C to +125°C
Storage Temperature Range	-55°C to +150°C

Note: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of specified terminal.

PACKAGE PIN OUT



SF PACKAGE
(Top View)

THERMAL DATA

SF Plastic SOT-23 6-Pin

THERMAL RESISTANCE-JUNCTION TO CASE, θ_{JC}	62 °C/W
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	96 °C/W

Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.

The θ_{JA} numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

FUNCTIONAL PIN DESCRIPTION

Name	Description
VBUS	Bus Voltage
DIN	Data In
GND	Ground
DOUT	Data Out

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, the following specifications apply over the operating ambient temperature $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$ except where otherwise noted.

Parameter	Symbol	Test Conditions	LX7202-xx			Units
			Min	Typ	Max	
Stand-Off Voltage	VR_{WM}				5.25	V
Breakdown Voltage	V_{BR}	$I_R = 1\text{mA}$	6			V
Leakage Current	I_R	$VR_{WM} = 5.25\text{V}, T = 25^\circ\text{C}$			1	μA
Series Resistance (-15)	R_S	Each Line	13.5	15	16.5	Ω
Series Resistance (-22)	R_S	Each Line	19.8	22	24.2	Ω
Temperature Coefficient of R_S	T_{COEFF}	Each Line		200		ppm
Pull Up Resistance	R_{PU}	Each Line	1.35	1.5	1.65	K Ω
Capacitor	C	Each Line		47		pF
Total Capacitance	C_{TOT}	Between I/O Pins and Ground, Each Device $VR = 0\text{V}, f = 1\text{MHz}$	54	60	66	pF



EMI Filter & ESD Protection for Up Stream USB Ports

APPLICATION CIRCUITS



Figure 2 – Connection for Full Speed Operation



APPLICATION INFORMATION (CONTINUED)

LOW SPEED DEVICE

The USB v1.1 specification offers a 1.5 Mbps data transfer rate known as Low-Speed which requires a 1.5 k Ω pull-up resistor to be connected to the D- line. Slew rate control is accomplished with 47pF attached to the transceiver before the R_S.

- Voltage Supply (Vbus) is connected to Pin 1
- Ground is connected to Pin 6
- D+ from the connector is routed to Pin 2 and Pin 5 to the D+ line of the USB Transceiver
- D- from the connector is routed to Pin 3 (1.5 k Ω pull-up resistor) and Pin 4 to the D- line of the USB Transceiver

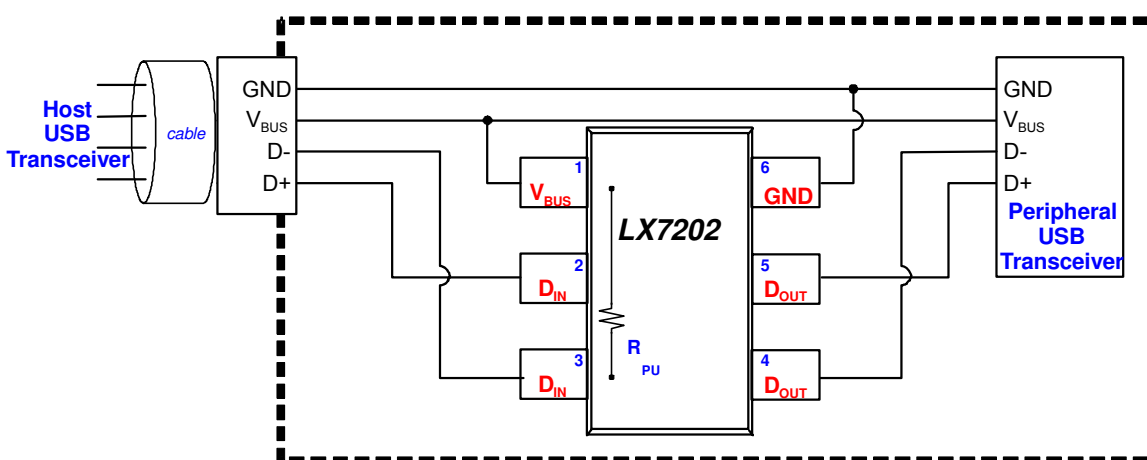


Figure 3 – Connection for Low Speed Operation

ELECTROMAGNETIC EMISSION AND SUSCEPTABILITY

FCC Part 15 sets limits for maximum allowable EM emission and susceptibility. There are two types of emissions. Conducted emissions with frequency of emission of 0.45 to 30 MHz and Radiated emissions with frequency of emission of 30 MHz to 40 GHz. All digital computing devices including the peripheral devices must comply. Examples of peripheral devices include terminals, printers, external floppy disk drives and other fixed adjustable data storage devices, video monitors, keyboards,

control cards, interface boards, external memory expansion cards and other input/output devices that may or may not contain digital circuitry. LX7202 is optimized to minimize the radiated EMI which is the primary concern in devices using USB. Refer to the typical filter response curve for the attenuation characteristics of LX7202 over the frequency range of 30KHz to 6GHz.



CHARACTERISTIC CURVES

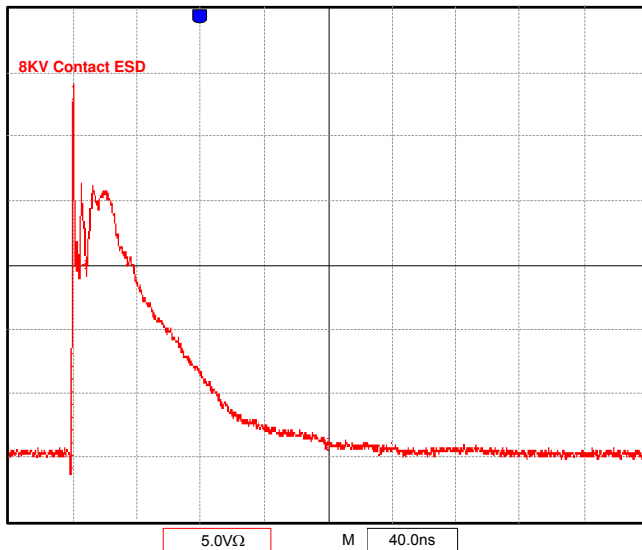


Figure 4 – 8KV ESD input pulse as per IEC61000-4-2. Vertical scale is equivalent to 5A/div.

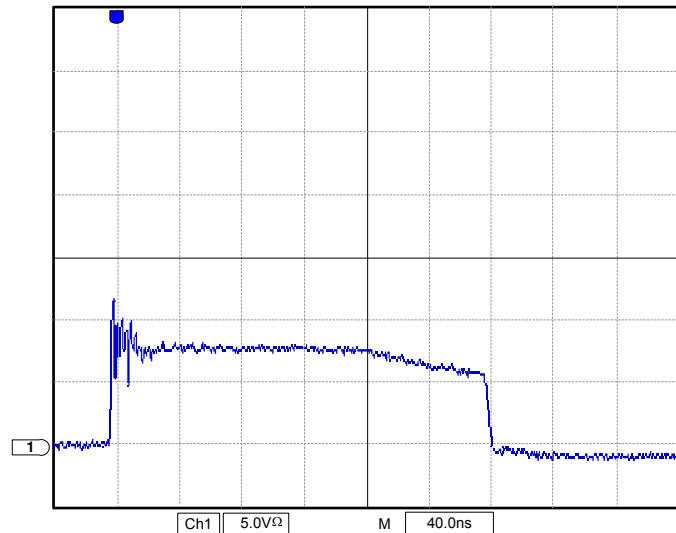


Figure 5 – Clamping Characteristics when device subjected to an 8 KV ESD pulse.

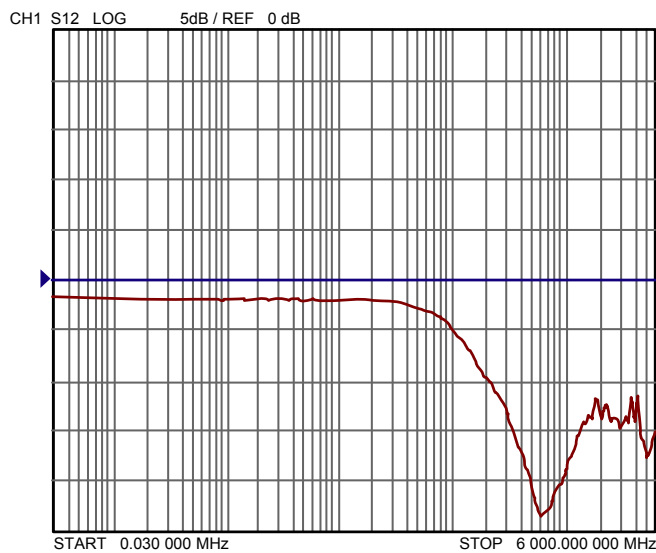


Figure 6 – Frequency response curve. Low insertion loss in the pass band and -20dB attenuation at 800-900 MHz. Better than -10dB attenuation at the WLAN frequencies of 2.4 and 5.0-6.0 GHz.

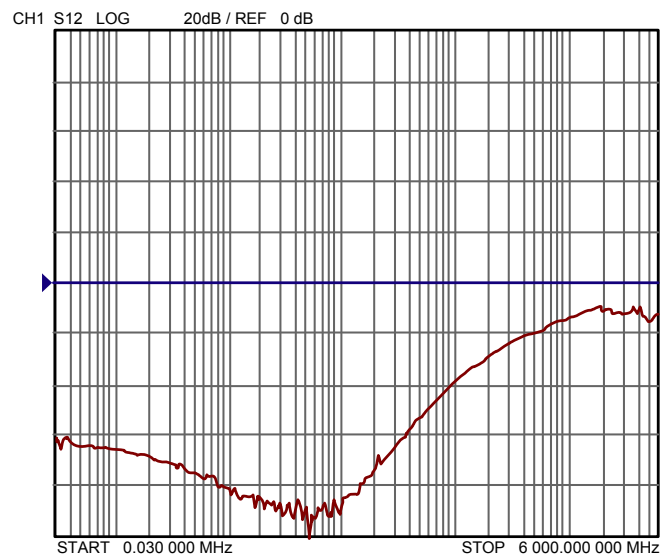
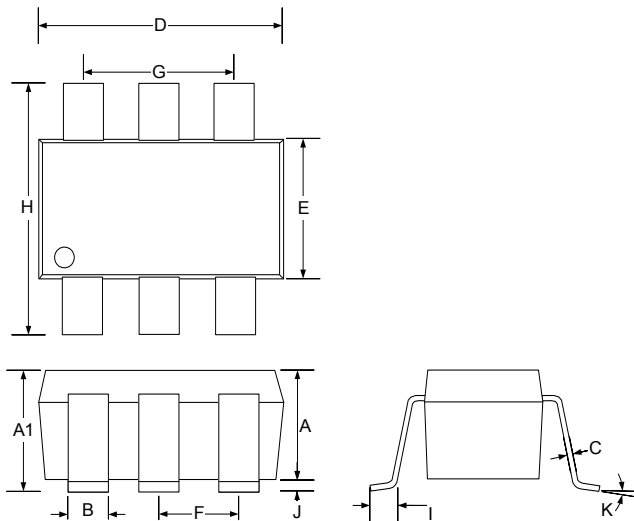


Figure 7 – Analog Crosstalk between the two datalines D- and D+



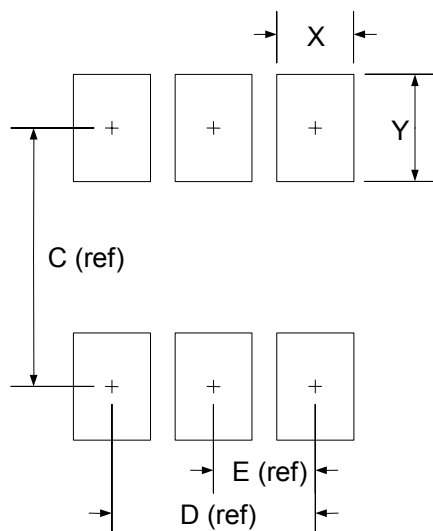
Microsemi®

LX7202-xx
**EMI Filter & ESD Protection for Up Stream USB
Ports**
PRODUCTION DATA SHEET
PACKAGE DIMENSIONS
SF 6 Pin Plastic SOT-23


Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.30	0.035	0.051
A1	0.90	1.45	0.035	0.057
B	0.25	0.50	0.010	0.020
C	0.09	0.20	0.004	0.008
D	2.80	3.10	0.110	0.122
E	1.50	1.75	0.059	0.069
F	0.95 BSC		0.038 BSC	
G	1.90 BSC		0.075 BSC	
H	2.60	3.00	0.102	0.118
I	0.35	0.55	0.014	0.022
J	0.00	0.15	0.000	0.006
K	10° MAX		10° MAX	

Note:

1. Dimensions do not include mold flash or protrusions; these shall not exceed 0.155mm(.006") on any side. Lead dimension shall not include solder coverage.

Recommended Footprint


Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
C	-	2.40	-	0.094
D	-	1.90	-	0.074
E	-	0.95	-	0.037
X	-	0.70	-	0.028
Y	-	1.00	-	0.039



Microsemi[®]

LX7202-xx

**EMI Filter & ESD Protection for Up Stream USB
Ports**

PRODUCTION DATA SHEET

NOTES

PRODUCTION DATA – Information contained in this document is proprietary to Microsemi and is current as of publication date. This document may not be modified in any way without the express written consent of Microsemi. Product processing does not necessarily include testing of all parameters. Microsemi reserves the right to change the configuration and performance of the product and to discontinue product at any time.