

**DESCRIPTION**

LX7207 has 10 lines of integrated low pass filters with ESD protection and that filter out EMI as well as protecting the equipment from ESD surge voltages. The device is a 5x5 array flip chip and measures 2.5 x 2.5 x 0.65 mm.

The absence of leadframe and bondwires minimizes inductance and optimizes the high frequency filter performance. LX7207 exceeds the requirements of IEC61000-4-2 (15KV air discharge and 8KV contact discharge).

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

**KEY FEATURES**

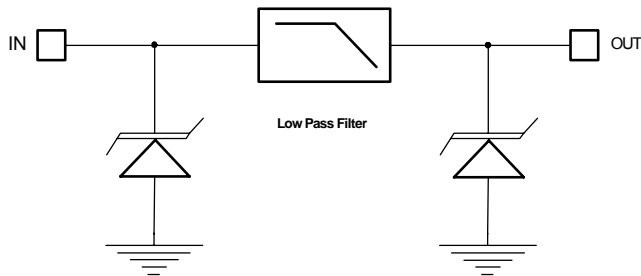
- Flip Chip construction
- EMI/RFI low-pass filter with integrated ESD protection
- 50 Ω line termination resistors ensure signal integrity
- Low TVS operating voltage (5V)
- Low leakage current
- 0.5mm Pitch Chip Scale Package designed for direct assembly on FR4 PCB using conventional assembly techniques

**BENEFITS**

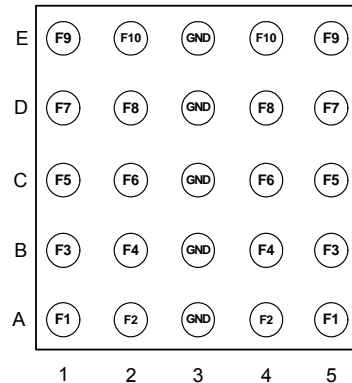
- Filter response characterized up to 6 GHz
- 3.5dB insertion loss in the pass band
- >30dB attenuation in the 800-1000 MHz range
- >20dB attenuation in the WLAN frequencies of 2.4GHz and 5.0-6.0 GHz

**APPLICATIONS**

- LCD displays
- Wireless handsets
- PDA's
- Portable Information Terminals
- Notebook Computers
- Point of Sale Terminals
- Fingerprint Sensors

**PRODUCT HIGHLIGHT**


Circuit Diagram For Each of 10 EMI Filters



Pinout of CSP EMI Filter With ESD Protection  
F1 is Filter #1 etc.  
Bottom View (Bumps up)

**PACKAGE ORDER INFO**

T <sub>J</sub> (°C)	SP	0.5mm Pitch Chip Scale Package (CSP)	Marking	Quantity per Reel	Reel Diameter
-40 to 125		LX7207ISP	LX7207 Date Code	3000	7 in. (177.8mm)

Note: Available in Tape & Reel  
Append the letters "TR" to the part number (i.e. LX7207ISPTR)

**ABSOLUTE MAXIMUM RATINGS**

Steady State Power .....	100mW
ESD Air Discharge per IEC61000-4-2 .....	±16KV
ESD Contact Discharge per IEC61000-4-2 .....	±11KV
Reflow Temperature (10 Seconds) .....	240°C
Operating Temperature .....	-40° to +125°C
Storage Temperature Range.....	-55° 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.

**CSP- TOP VIEW**

**FUNCTIONAL PIN DESCRIPTION**

Name	Description
A1, B1, C1, D1, E1	Filter Inputs 1, 3, 5, 7, 9
A2, B2, C2, D2, E2	Filter Inputs 2, 4, 6, 8, 10
A3, B3, C3, D3, E3	Ground
A4, B4, C4, D4, E4	Filter Outputs 2, 4, 6, 8, 10
A5, B5, C5, D5, E5	Filter Outputs 1, 3, 5, 7, 9

**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.

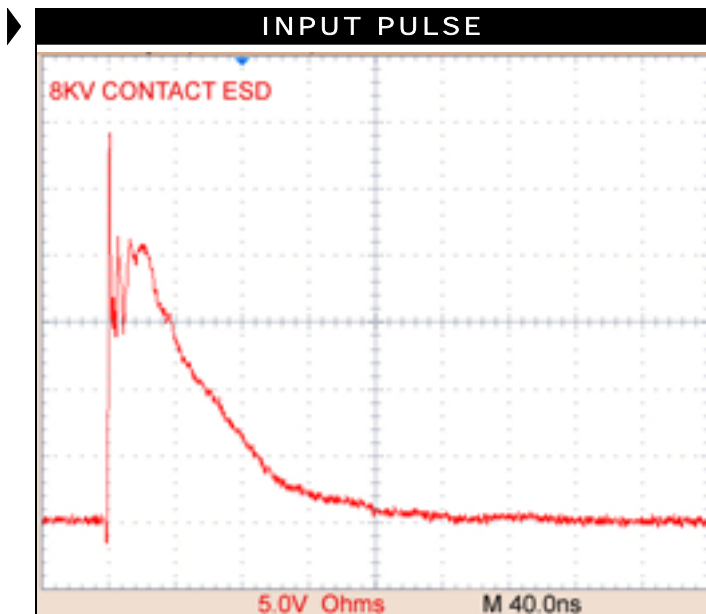
Parameter	Symbol	Test Conditions	LX7207			Units
			Min	Typ	Max	
Stand-Off Voltage	$V_{RWM}$				5.25	V
Breakdown Voltage	$V_{BR}$	IR = 1mA	6			V
Leakage Current	$I_R$	VRWM = 5.0V, T = 25°C			1	µA
Series Resistance	$R_S$	Each Line	45	50	55	Ω
Temperature Co-Efficient of $R_S$	$T_{coeff}$	Each Line		200		ppm
Total Capacitance	C	Each Line, 0V, 1MHz	80	100	120	pF
Attenuation in the Pass Band	$\alpha$	50 Ω Environment, DC Bias = 0V, T = 25°C		3.5		dB
Cut-off Frequency	$f_c$	50 Ω Environment, DC Bias = 0V, T = 25°C		52		MHz

**APPLICATION INFORMATION**

Majority of Color LCD displays are made with Thin Film Transistors (TFT) and as such are very vulnerable to ESD damage. If an ESD stress hits the TFT display, it will produce a black pixel/line. ESD events can also create Electromagnetic Interference (EMI). EMI radiated from an ESD event can couple into a display through cables or I/O ports and become a voltage or current spike. This spike can

then corrupt the operation of the sensitive TFT's and affect the display operation and quality.

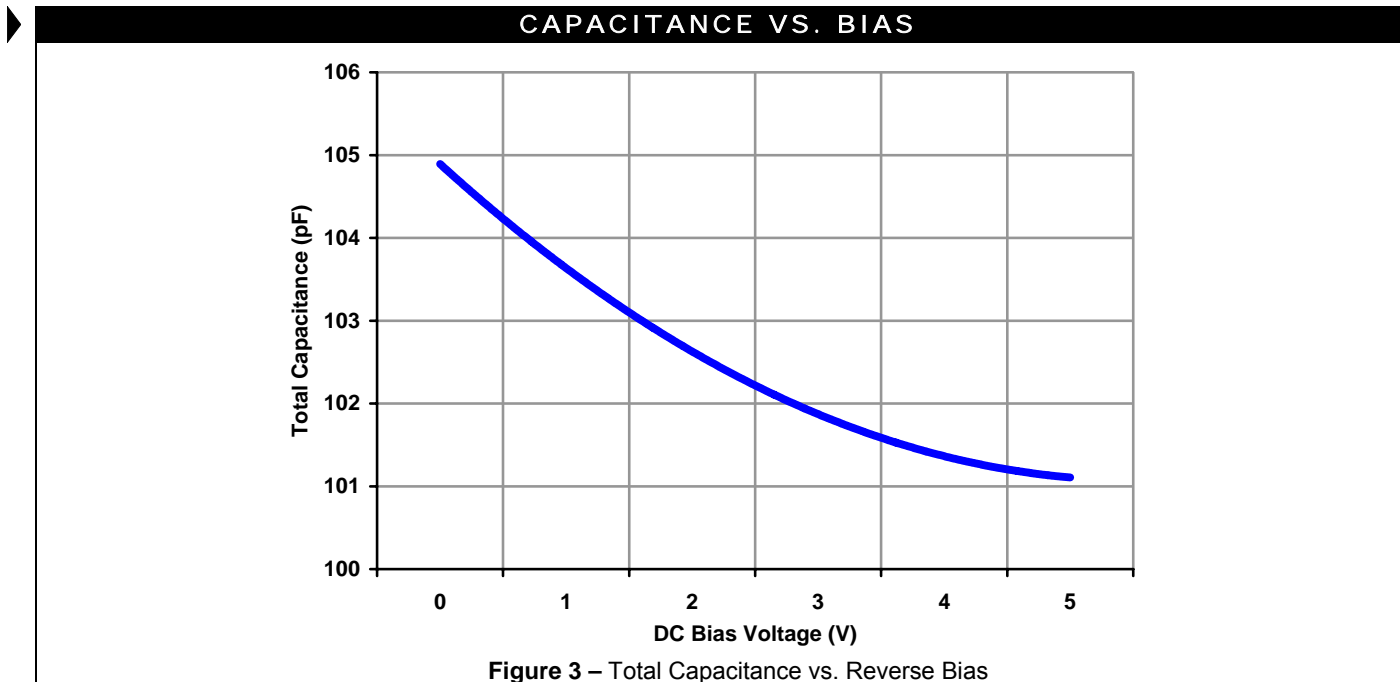
Figure 6 shows a typical application of LX7207 is suppressing ESD and EMI in color LCD displays. Exact number of lines to be protected will depend on the controller and LCD specifications such as number of bits per pixel (bpp).



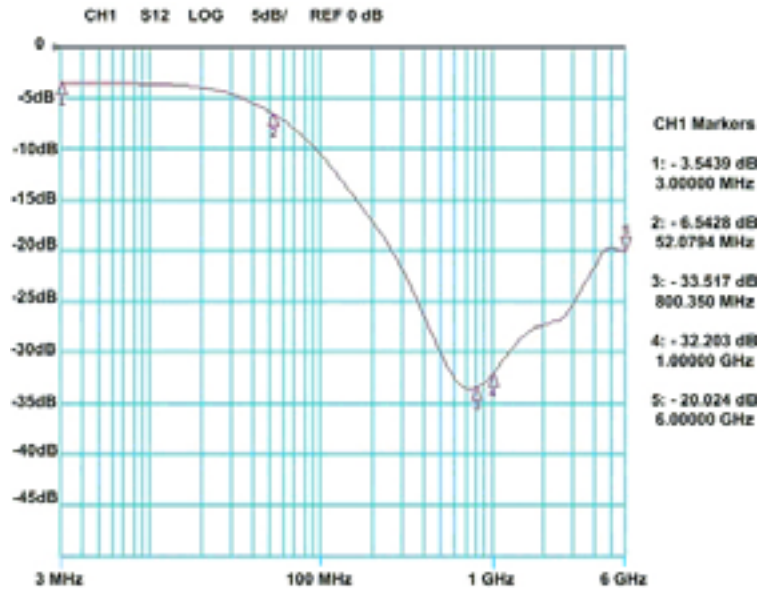
**Figure 1** – 8KV ESD Input Pulse as per IEC61000-4-2.  
Vertical Scale is equivalent to 5A/div



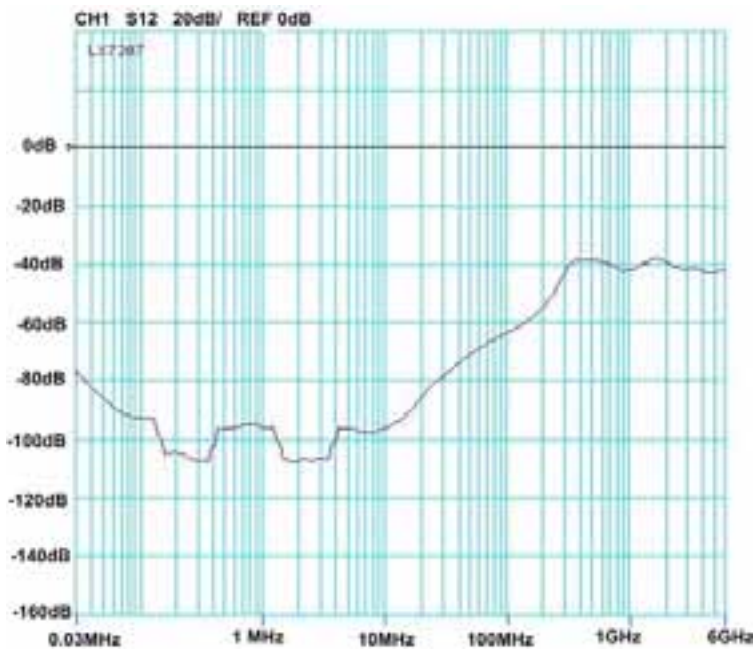
**Figure 2** – Clamping Characteristics when device subjected to an 8 KV ESD pulse.



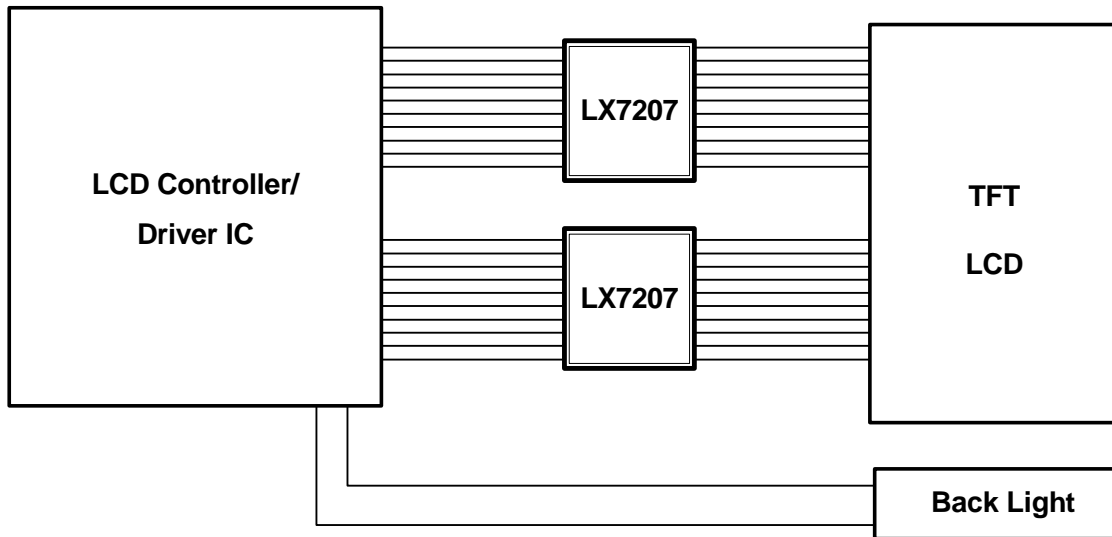
**Figure 3** – Total Capacitance vs. Reverse Bias

**FREQUENCY RESPOSNE**


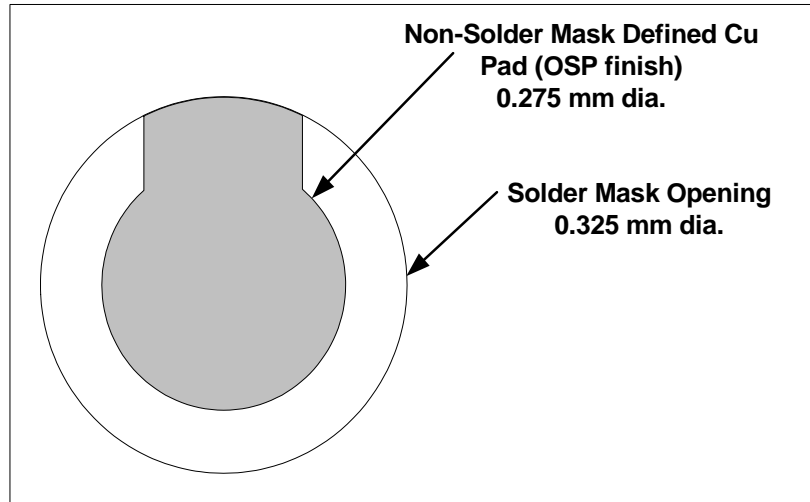
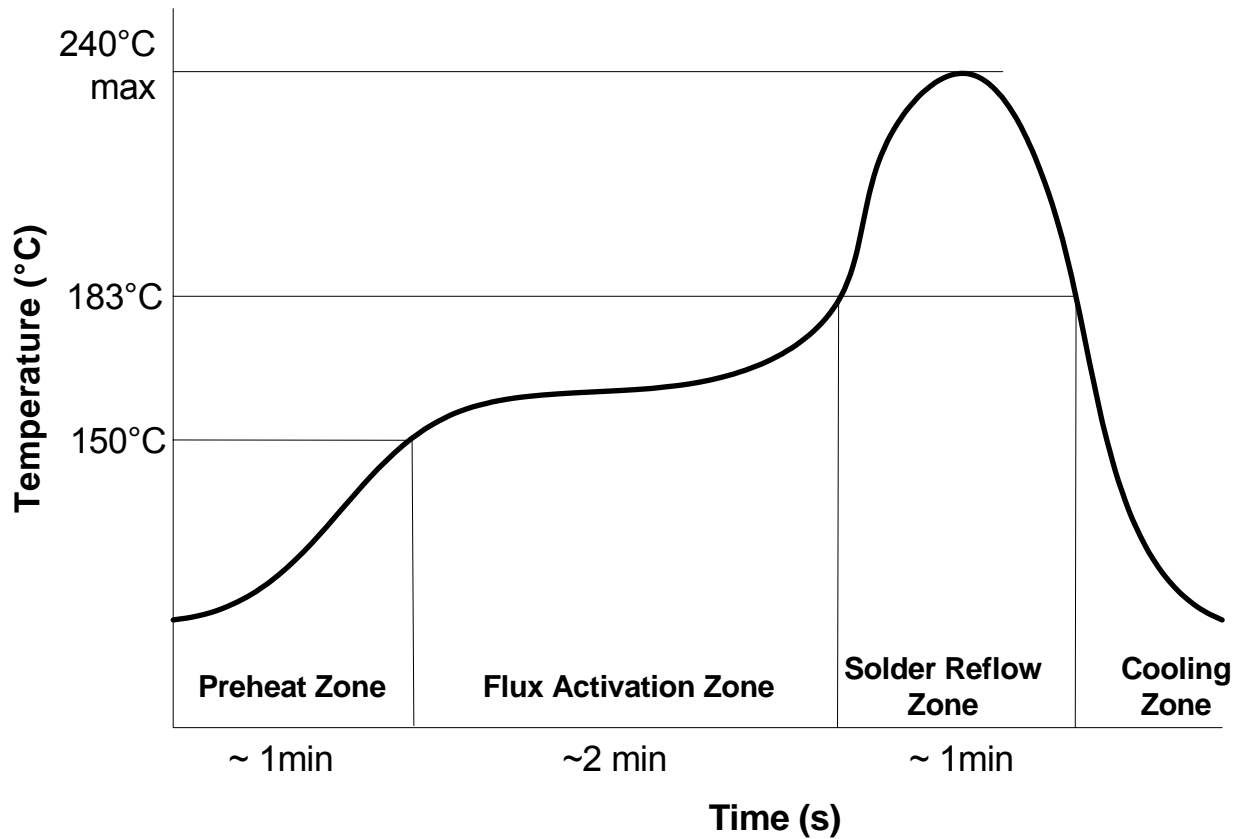
**Figure 4** – Typical frequency response curve. Low insertion loss in the pass band and >-30dB attenuation at 800-1000 MHz. Better than -20dB attenuation at the WLAN frequencies of 2.4 GHz and 5.0-6.0 GHz.

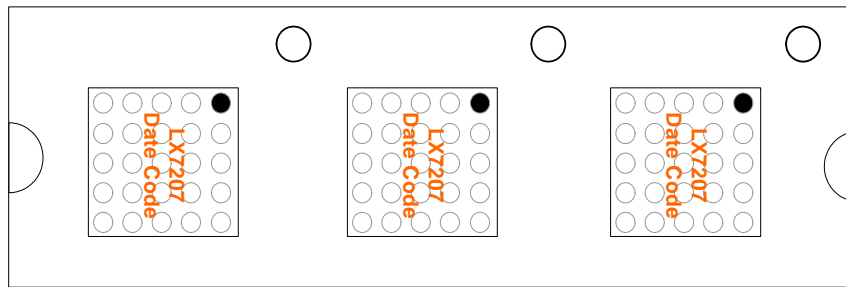
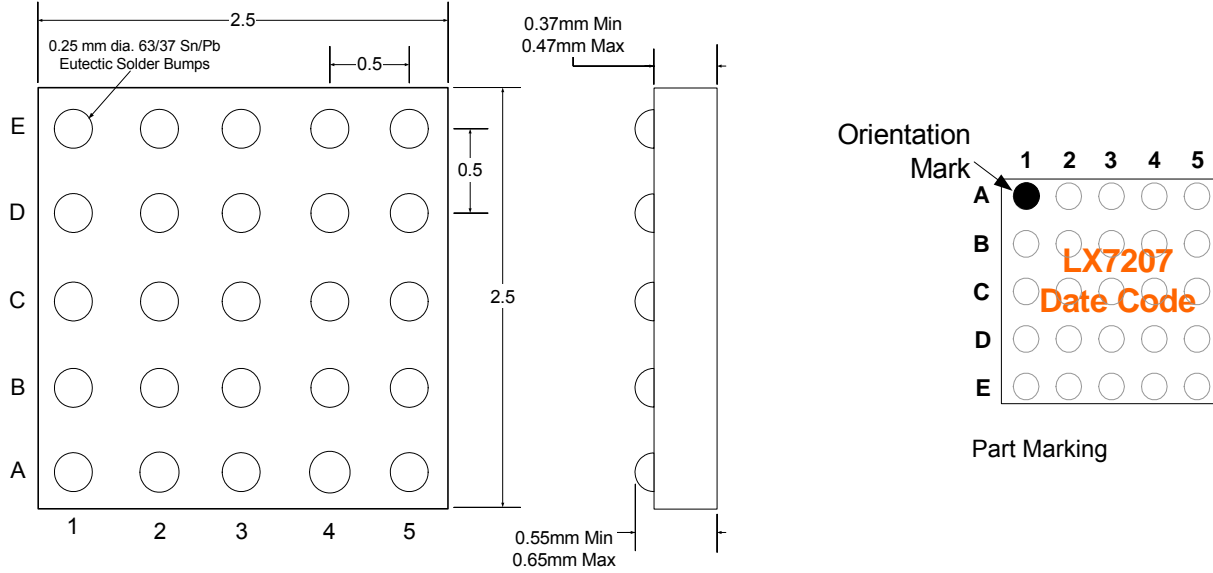
**ANALOG CROSSTALK**


**Figure 5** – Typical analog crosstalk

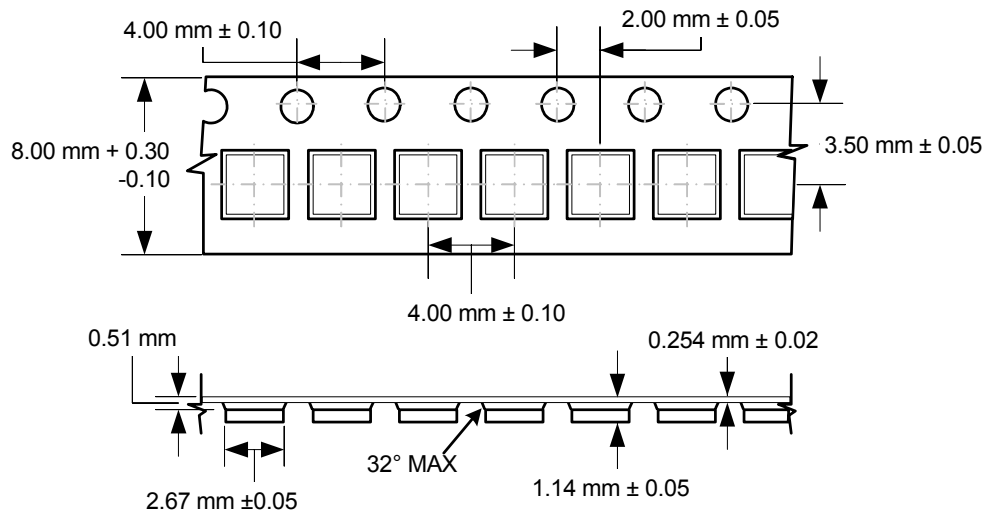
**APPLICATION CIRCUITS**

**Figure 6 – System Block Diagram of LCD Controller and Display**
**RECOMMENDED PCB PARAMETERS**

Parameter	Value
Cu pad size	0.275 +0.0/-0.025 mm
Pad Pitch	0.5mm
Pad Definition	Non-Solder Mask Defined
Solder Mask Opening	0.375 ± 0.025 mm
Solder Stencil	0.25 x 0.25 mm square, 0.125 mm thick, laser cut, electro-polished
Pad Protective Finish	OSP (Organic Surface Preservative)

**RECOMMENDED PCB PARAMETERS- CONTINUED**

**Figure 7 – Recommended Non-Solder Mask Defined Pad**

**Figure 8 – Solder Reflow Profile. Max Temp is 240°C and max time above liquidous (183°C) is 60 seconds.**

**PACKAGE DIMENSIONS**
**SP 0.5mm Chip Scale Package**


Part Orientation in Tape



Tape Dimensions



**Microsemi**<sup>®</sup>

**LX7207**

**Integrated EMI Filter & ESD Protection  
For Color LCD Displays**

**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.