



# LP21 / LP24 / LP49 Series Low Profile Crystal

February 2010

- The Pletronics' LP49 Series is a low profile thru-hole crystal
- Bulk packaging
- 3 MHz to 70 MHz
- HC-49/US
- AT Cut Crystal
  - LP21 0.082 (2.10mm) high
  - LP24 0.100 (2.50mm) high
  - LP49 0.140 (3.56mm) high

**Pletronics Inc. certifies this device is in accordance with the RoHS (2002/95/EC) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following:

Cadmium, Hexavalent Chromium, Lead (<1000 ppm), Mercury, PBB's, PBDE's

Weight of the Device: 0.62 grams

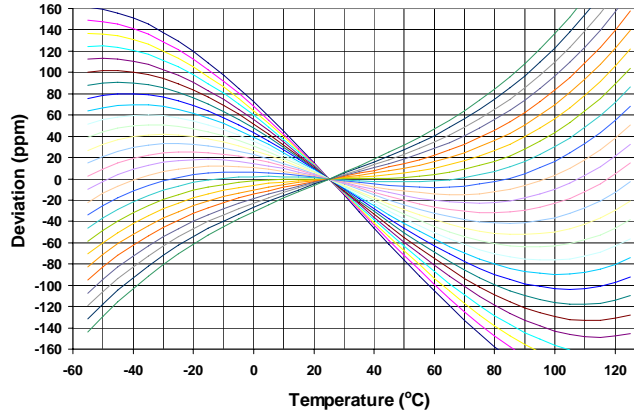
Moisture Sensitivity Level: 1 As defined in J-STD-020C

Second Level Interconnect code: e1, e2 or e3

### Electrical Specification:

Item	Min	Max	Unit	Condition		
Frequency Range	3	70	MHz	AT cut		
Calibration Frequency Tolerance	-	-	ppm	at +25°C ± 3°C	see table on page 3 for available options	
Frequency Stability over OTR	-	-	ppm			
Equivalent Series Resistance (ESR)	-	200	Ohms	3 MHz to 4 MHz	LP49	Fundamental
	-	150	Ohms	4 MHz to 5 MHz	LP49/LP24	
	-	120	Ohms	5 MHz to 6 MHz	LP49/LP24	
	-	100	Ohms	6 MHz to 7 MHz	LP49/LP24	
	-	80	Ohms	7 MHz to 9 MHz	LP49/LP24	
	-	70	Ohms	9 MHz to 10 MHz	LP49/LP24/LP21	
	-	60	Ohms	10 MHz to 13 MHz	LP49/LP24/LP21	
	-	50	Ohms	13 MHz to 15 MHz	LP49/LP24/LP21	
	-	40	Ohms	15 MHz to 27 MHz	LP49/LP24/LP21	
	-	35	Ohms	27 MHz to 30 MHz	LP49/LP24/LP21	
	-	100	Ohms	27 MHz to 32 MHz	LP49/LP24/LP21	3 <sup>rd</sup> Overtone
	-	80	Ohms	32 MHz to 50 MHz	LP49/LP24/LP21	
	-	60	Ohms	50 MHz to 70 MHz	LP49/LP24/LP21	
Drive Level	-	1	mW	use 10 µW for testing		
Shunt Capacitance (C0)	-	7	pF	Pad to Pad capacitance		
Aging per year	-5	+5	ppm	at +25°C ± 3°C		
Specified Temperature Range	-40	+85	°C	see table on page 3 for available options		
Storage Temperature Range	-55	+125	°C			

**AT Cut Crystal Frequency  
versus Temperature  
Typical Performance:**



**Part Marking:**

**2xFFFFFPymdz or L2xFFFFzywwz**

**Legend:**

- 2 = Model code for LP49
- x = Capacitance load code from below
- FFFFF = Frequency coded
- P or L = Pletronics
- ymd or yww = Date of Manufacture (year, month and day) or year, week week
- All other marking is internal factory codes

Some frequency marking examples: 3.579545M = 03579, 14.31818M = 14181, 24.0M = 24000

Specifications such as frequency tolerance and operating temperature range, etc. are not identified from the marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
pF	10	12	13	8	15	18	20	22	24	26	28	30	32	34	36	27	series	33	50	19	16	17	14

**Codes for Date Code YMD**

Code	6	7	8	9	0	1	2
Year	2006	2007	2008	2009	2010	2011	2012

Code	A	B	C	D	E	F	G	H	J	K	L	M
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Code	1	2	3	4	5	6	7	8	9	A	B	C
Day	1	2	3	4	5	6	7	8	9	10	11	12
Code	D	E	F	G	H	J	K	L	M	N	P	R
Day	13	14	15	16	17	18	19	20	21	22	23	24
Code	T	U	V	W	X	Y	Z					
Day	25	26	27	28	29	30	31					

**Part Number:**

LP49	-18	-14.31818M	-50	H	1	G	G	-XX	See chart below for available options
Internal code or blank									
<b>Highest Specified Operating Temperature</b> <b>A</b> = 40°C <b>G</b> = 70°C <b>B</b> = 45°C <b>H</b> = 75°C <b>C</b> = 50°C <b>J</b> = 80°C <b>D</b> = 55°C <b>K</b> = 85°C <b>E</b> = 60°C <b>F</b> = 65°C									
<b>Lowest Specified Operating Temperature</b> <b>A</b> = +10°C <b>F</b> = -15°C <b>L</b> = -40°C <b>B</b> = +5°C <b>G</b> = -20°C <b>C</b> = 0°C <b>H</b> = -25°C <b>D</b> = -5°C <b>J</b> = -30°C <b>E</b> = -10°C <b>K</b> = -35°C									
<b>Mode:</b> 1 = Fundamental    3 = 3rd Overtone									
<b>Frequency Stability</b> See chart below									
<b>Calibration Frequency Tolerance</b> (Typ. Values shown) <b>15</b> = ± 15 ppm at 25°C ± 3°C <b>20</b> = ± 20 ppm at 25°C ± 3°C <b>30</b> = ± 30 ppm at 25°C ± 3°C (Standard)									
<b>Frequency in MHz</b>									
<b>Load in pF</b> Parallel Resonance from <b>09</b> to <b>44</b> pF or <b>SR</b> = Series Resonance									
<b>Series Model</b>									

Operating Temperature Range	CODE	Available Frequency Stability versus Temperature in ppm					
		D	E	F	G	H	J
		± 10	± 15	± 20	± 30	± 50	± 100
0 to +45°C	<b>CB</b>	•	•	•	•	•	•
0 to +50°C	<b>CC</b>	•	•	•	•	•	•
0 to +60°C	<b>CE</b>	•	•	•	•	•	•
0 to +70°C	<b>CG</b>	•	•	•	•	STD	•
-10 to +50°C	<b>EC</b>	•	•	•	•	•	•
-10 to +60°C	<b>EE</b>	•	•	•	•	•	•
-10 to +75°C	<b>EH</b>	•	•	•	•	•	•
-20 to +70°C	<b>GG</b>	•	•	•	•	•	•
-20 to +75°C	<b>GH</b>	•	•	•	•	•	•
-30 to +75°C	<b>JH</b>	•	•	•	•	•	•
-30 to +80°C	<b>JJ</b>	•	•	•	•	•	•
-30 to +85°C	<b>JK</b>	•	•	•	•	•	•
-35 to +80°C	<b>KJ</b>		•	•	•	•	•
-40 to +85°C	<b>LK</b>		•	•	•	•	•

## Legacy Part Number (not for new designs):

LP49	B	E	-18	-11.0592M	-XX	
						<b>Internal code or blank</b>
						<b>Frequency in MHz</b>
						<b>Clload in pF</b> Parallel Resonance in pF or <b>SR</b> = Series Resonance
						<b>Operating Temperature Range</b> Blank = 0 to +70°C (STD) <b>E</b> = -40 to +85°C
						<b>Calibration Tolerance / Frequency Stability</b> Blank = 30/50 (STD) <b>B</b> = 30/30 <b>C</b> = 15/30 <b>D</b> = 10/20 (not all frequencies)
						<b>Series Model</b>

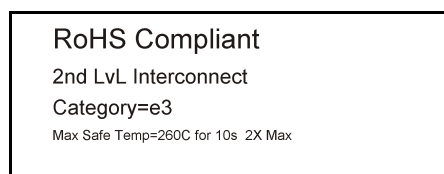
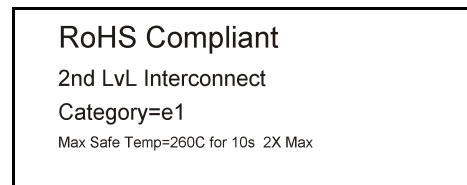
## Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002, Condition B
Vibration	MIL-STD-883 Method 2007, Condition A
Solderability	MIL-STD-883 Method 2003
Thermal Shock	MIL-STD-883 Method 1011, Condition A

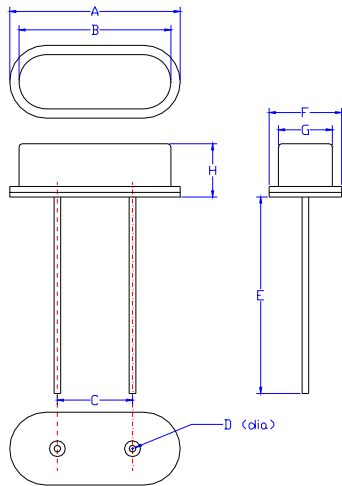
## Package Labeling

Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Arial



## Mechanical:



	Inches	mm
A	0.425 max	10.80 max
B	0.404	10.26
C	0.192	4.88
D	0.017 dia	0.43 dia
E	0.500 min	12.7 min
F	0.176 max	4.47 max
G	0.145	3.68
H LP21	0.082 max	2.10 max
H LP24	0.100 max	2.50 max
H LP49	0.140 max	3.56 max

Contacts (3 types of lead plating used):

Matte Tin (Sn)

Tin over Copper (SnCu)

SAC (SnAgCu)

**Not to Scale**

<sup>1</sup> Typical dimensions

## Layout and application information

- Trace lengths to the crystal should be kept as short as possible.
- The crystal connections are sensitive to noise.
- The package should be grounded for optimum performance.



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