



## LP21 / LP24 / LP49 Series Low Profile Crystal

February 2015

- 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 (2011/65/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

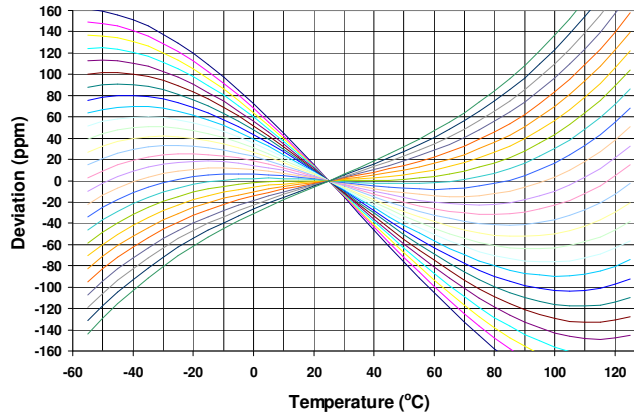
Moisture Sensitivity Level: 1 As defined in J-STD-020C

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:**

**2xFFFFPymdz or L2xFFFFzywwz**

**Legend:**

- 2 = Model code for LP49
- x = Capacitance load code from below
- FFFF = 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	2	3	4	5	6	7	8
Year	2012	2013	2014	2015	2016	2017	2018

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> <b>1</b> = Fundamental <b>3</b> =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	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>Load 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>

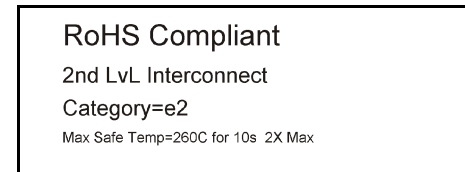
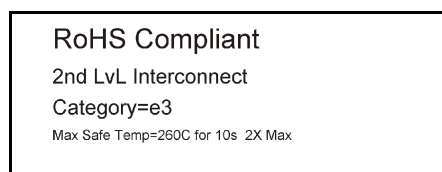
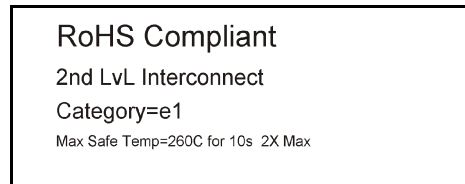
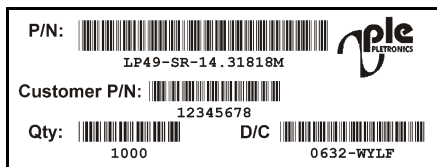
### Reliability: Environmental Compliance

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

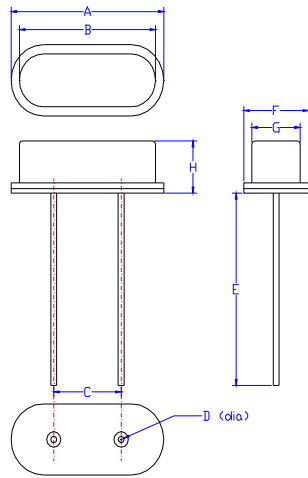
### Package Labeling

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.

### IMPORTANT NOTICE

Pletronics Incorporated (PLE) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. PLE reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to PLE's terms and conditions of sale supplied at the time of order acknowledgment.

PLE warrants performance of this product to the specifications applicable at the time of sale in accordance with PLE's limited warranty. Testing and other quality control techniques are used to the extent PLE deems necessary to support this warranty. Except where mandated by specific contractual documents, testing of all parameters of each product is not necessarily performed.

PLE assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using PLE components. To minimize the risks associated with the customer products and applications, customers should provide adequate design and operating safeguards.

PLE products are not designed, intended, authorized or warranted to be suitable for use in life support applications, devices or systems or other critical applications that may involve potential risks of death, personal injury or severe property or environmental damage. Inclusion of PLE products in such applications is understood to be fully at the risk of the customer. Use of PLE products in such applications requires the written approval of an appropriate PLE officer. Questions concerning potential risk applications should be directed to PLE.

PLE does not warrant or represent that any license, either express or implied, is granted under any PLE patent right, copyright, artwork or other intellectual property right relating to any combination, machine or process which PLE product or services are used. Information published by PLE regarding third-party products or services does not constitute a license from PLE to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from PLE under the patents or other intellectual property of PLE.

Reproduction of information in PLE data sheets or web site is permissible only if the reproduction is without alteration and is accompanied by associated warranties, conditions, limitations and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. PLE is not responsible or liable for such altered documents.

Resale of PLE products or services with statements different from or beyond the parameters stated by PLE for that product or service voids all express and implied warranties for the associated PLE product or service and is an unfair or deceptive business practice. PLE is not responsible for any such statements.

### Contacting Pletronics Inc.

Pletronics Inc.  
19013 36<sup>th</sup> Ave. West  
Lynnwood, WA 98036-5761 USA

Tel: 425-776-1880  
Fax: 425-776-2760  
E-mail: [ple-sales@pletronics.com](mailto:ple-sales@pletronics.com)  
URL: [www.pletronics.com](http://www.pletronics.com)

Copyright © 2009, 2010, Pletronics Inc.