



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

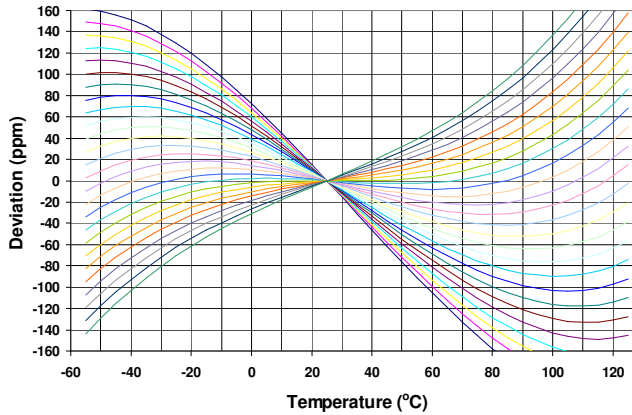
Moisture Sensitivity Level: 1 As defined in J-STD-020C

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

| 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 | CB | • | • | • | • | • | • |
| 0 to +50°C | CC | • | • | • | • | • | • |
| 0 to +60°C | CE | • | • | • | • | • | • |
| 0 to +70°C | CG | • | • | • | • | STD | • |
| -10 to +50°C | EC | • | • | • | • | • | • |
| -10 to +60°C | EE | • | • | • | • | • | • |
| -10 to +75°C | EH | • | • | • | • | • | • |
| -20 to +70°C | GG | • | • | • | • | • | • |
| -20 to +75°C | GH | • | • | • | • | • | • |
| -30 to +75°C | JH | • | • | • | • | • | • |
| -30 to +80°C | JJ | • | • | • | • | • | • |
| -30 to +85°C | JK | • | • | • | • | • | • |
| -35 to +80°C | KJ | | • | • | • | • | • |
| -40 to +85°C | LK | | • | • | • | • | • |

Legacy Part Number (not for new designs):

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

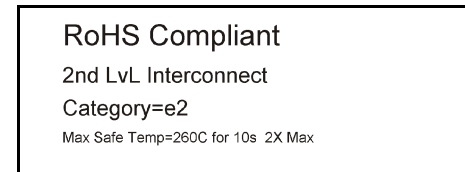
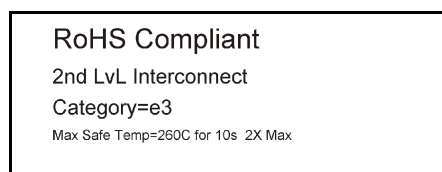
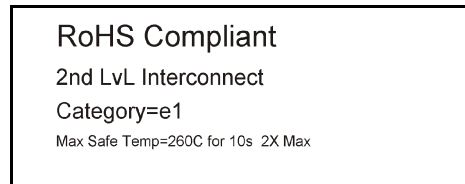
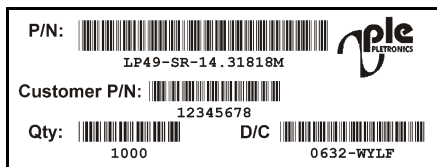
Reliability: Environmental Compliance

| 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 |

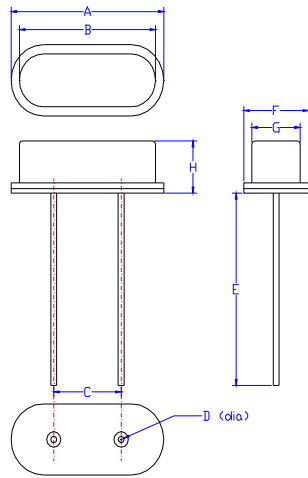
Package Labeling

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

¹ 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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