

## FEATURES

These small size chips exhibit low DC resistance and high Q at high frequency.

Minimum floating capacity and large inductance range (0.047 to 220  $\mu$ H).

Outstanding soldering heat resistance, both flow and reflow soldering methods can be used.

Perfect shape for automatic mounting, with no directionality.

Monolithic inorganic material construction for high reliability.

Closed magnetic shielding avoids crosstalk and is suitable for high density printed circuit boards.

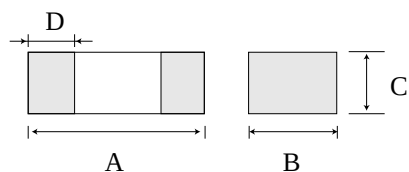
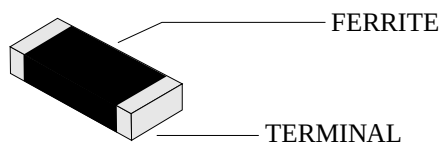
## APPLICATIONS

Can be used in CD-ROM, Hard Disk, Modem, Computers, Printers, VCRs, TVs and Portable Telephones.

## PRODUCT IDENTIFICATION

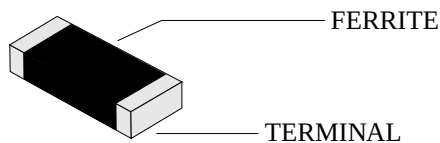
| Product Item Code | Dimension | Inductance | Tolerance: J = $\pm 5\%$ , K = $\pm 10\%$ , M = $\pm 20\%$ |
|-------------------|-----------|------------|------------------------------------------------------------|
| MLI               | 160808    | 47N        | K                                                          |

## PRODUCT DIMENSIONS

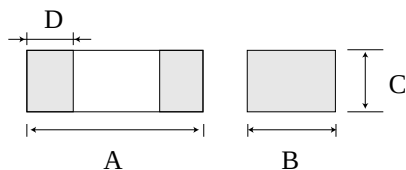


## MLI-160808 SERIES

### DIMENSION:



A:  $1.6 \pm 0.15$  ( $0.063 \pm 0.006$ )  
 B:  $0.8 \pm 0.15$  ( $0.031 \pm 0.006$ )  
 C:  $0.8 \pm 0.15$  ( $0.031 \pm 0.006$ )  
 D:  $0.3 \pm 0.20$  ( $0.012 \pm 0.008$ )  
 in mm (inch)

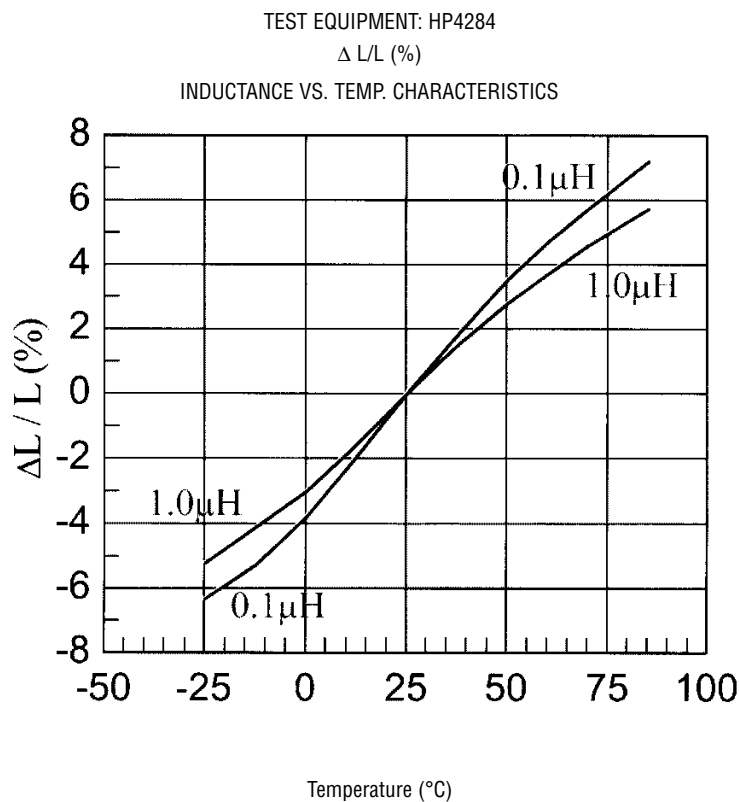
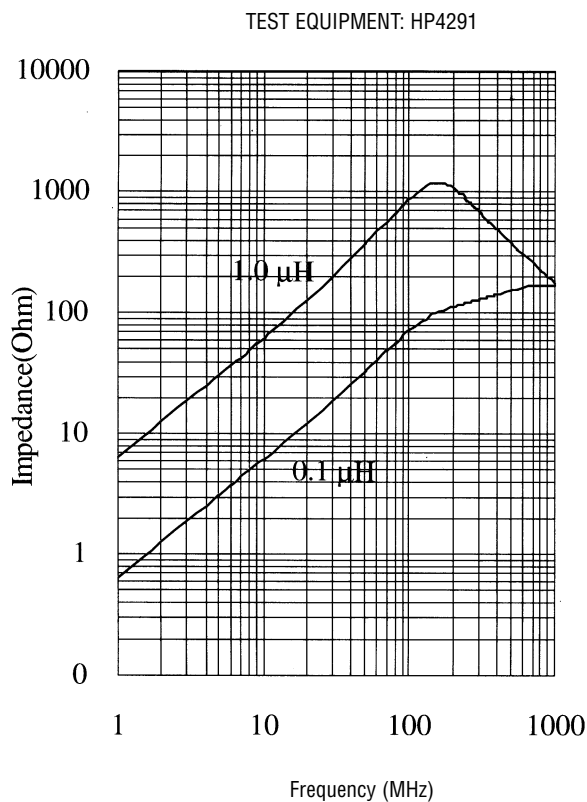
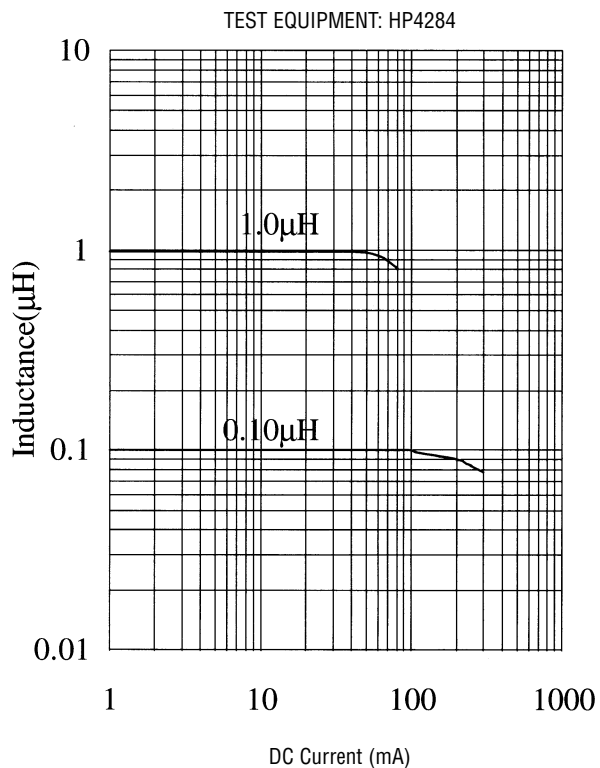
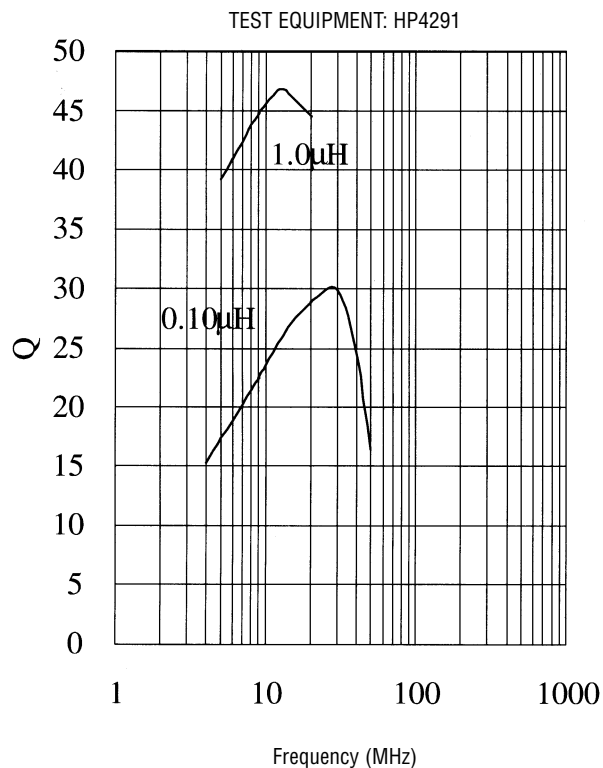


## ELECTRICAL CHARACTERISTICS

| PART NO.         | INDUCTANCE ( $\mu$ H)     | Q<br>MIN. | LQ TEST<br>FREQUENCY<br>(MHz) MIN. | SELF RESONANT<br>$R_{DC}$<br>( $\Omega$ ) MAX. | DC RESISTANCE<br>CURRENT<br>$I_{DC}$ (mA) MAX. | RATED |
|------------------|---------------------------|-----------|------------------------------------|------------------------------------------------|------------------------------------------------|-------|
| MLI-160808-47N □ | $0.047 \pm 20\%$          | 10        | 50                                 | 260                                            | 0.3                                            | 50    |
| MLI-160808-68N □ | $0.068 \pm 20\%$          | 10        | 50                                 | 250                                            | 0.3                                            | 50    |
| MLI-160808-82N □ | $0.082 \pm 20\%$          | 10        | 50                                 | 245                                            | 0.3                                            | 50    |
| MLI-160808-R10 □ | $0.10 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 240                                            | 0.5                                            | 50    |
| MLI-160808-R12 □ | $0.12 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 205                                            | 0.5                                            | 50    |
| MLI-160808-R15 □ | $0.15 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 180                                            | 0.6                                            | 50    |
| MLI-160808-R18 □ | $0.18 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 165                                            | 0.6                                            | 50    |
| MLI-160808-R22 □ | $0.22 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 150                                            | 0.8                                            | 50    |
| MLI-160808-R27 □ | $0.27 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 136                                            | 0.8                                            | 50    |
| MLI-160808-R33 □ | $0.33 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 125                                            | 0.85                                           | 35    |
| MLI-160808-R39 □ | $0.39 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 110                                            | 1                                              | 35    |
| MLI-160808-R47 □ | $0.47 \pm 20\% \pm 10\%$  | 15        | 25                                 | 105                                            | 1.35                                           | 35    |
| MLI-160808-R56 □ | $0.56 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 95                                             | 1.55                                           | 35    |
| MLI-160808-R68 □ | $0.68 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 90                                             | 1.7                                            | 35    |
| MLI-160808-R82 □ | $0.82 \pm 20\%, \pm 10\%$ | 15        | 25                                 | 85                                             | 2.1                                            | 35    |
| MLI-160808-1R0 □ | $1.00 \pm 20\%, \pm 10\%$ | 35        | 10                                 | 75                                             | 0.6                                            | 25    |
| MLI-160808-1R2 □ | $1.20 \pm 20\%, \pm 10\%$ | 35        | 10                                 | 65                                             | 0.8                                            | 25    |
| MLI-160808-1R5 □ | $1.50 \pm 20\%, \pm 10\%$ | 35        | 10                                 | 60                                             | 0.8                                            | 25    |
| MLI-160808-1R8 □ | $1.80 \pm 20\%, \pm 10\%$ | 35        | 10                                 | 55                                             | 0.95                                           | 25    |
| MLI-160808-2R2 □ | $2.20 \pm 20\%, \pm 10\%$ | 35        | 10                                 | 50                                             | 1.15                                           | 15    |
| MLI-160808-2R7 □ | $2.70 \pm 20\%, \pm 10\%$ | 35        | 10                                 | 45                                             | 1.35                                           | 15    |

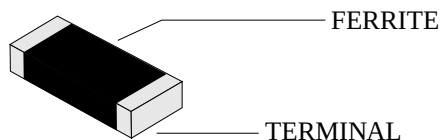
TOLERANCE: J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

## TYPICAL ELECTRICAL CHARACTERISTIC CURVES

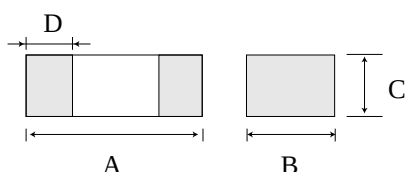


## MLI-201209 SERIES

### DIMENSION:



A:  $2.0 \pm 0.20$  ( $0.079 \pm 0.008$ )  
 B:  $1.2 \pm 0.20$  ( $0.047 \pm 0.008$ )  
 C:  $0.9 \pm 0.20$  ( $0.035 \pm 0.008$ )  
 D:  $0.5 \pm 0.30$  ( $0.020 \pm 0.012$ )  
 in mm (inch)



## ELECTRICAL CHARACTERISTICS

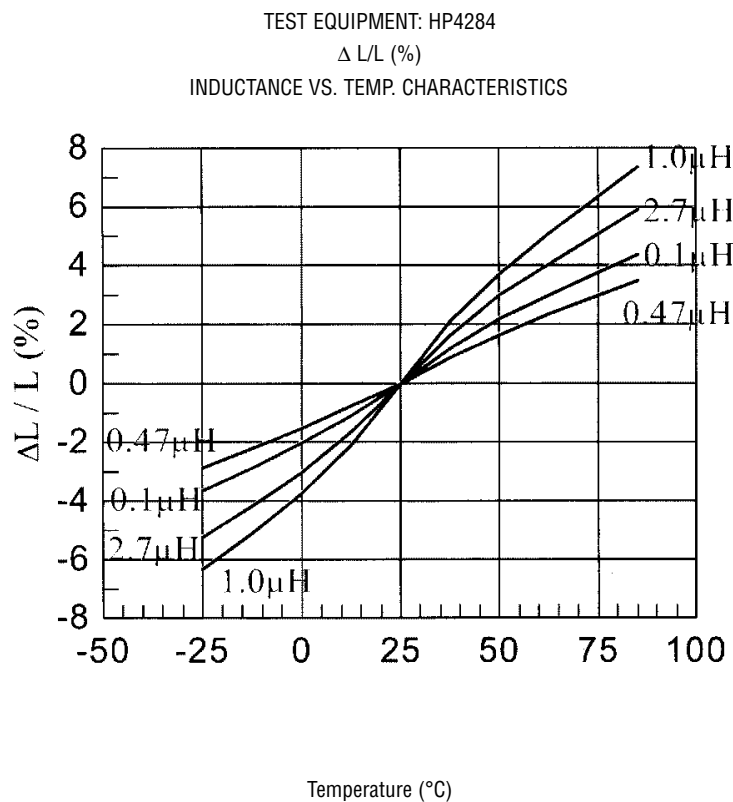
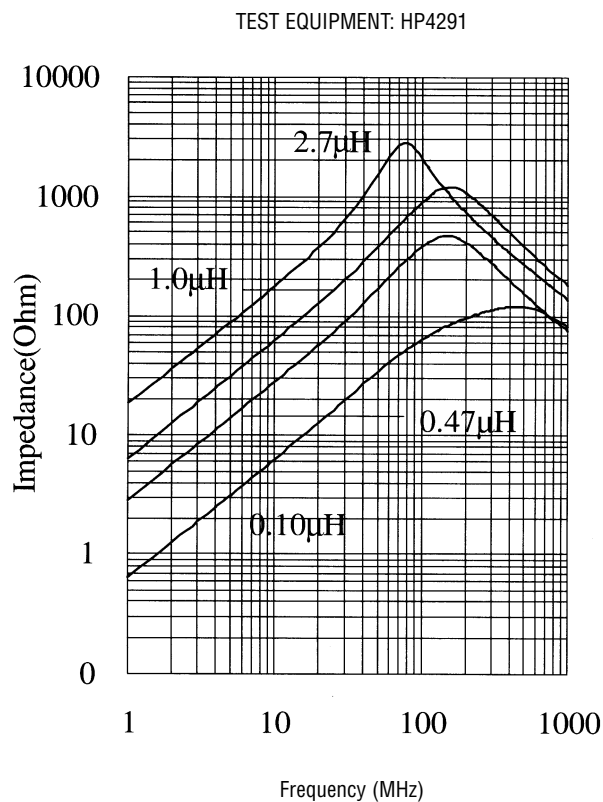
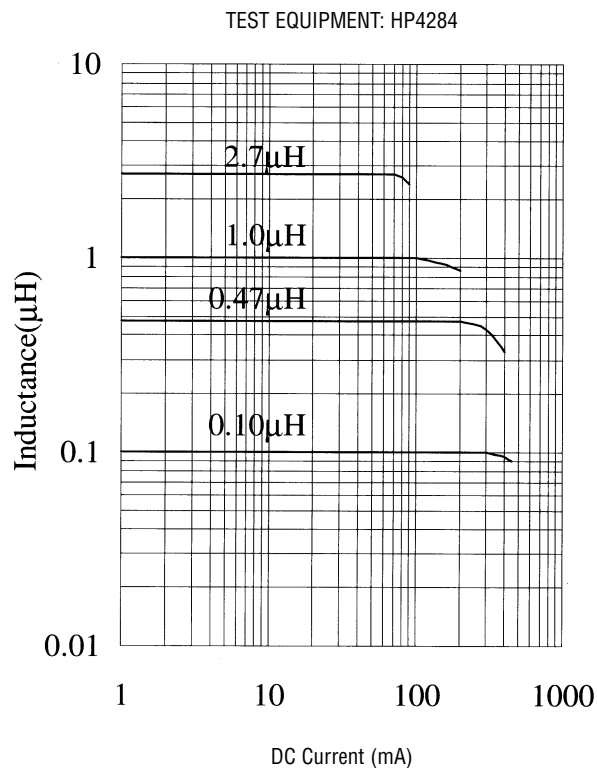
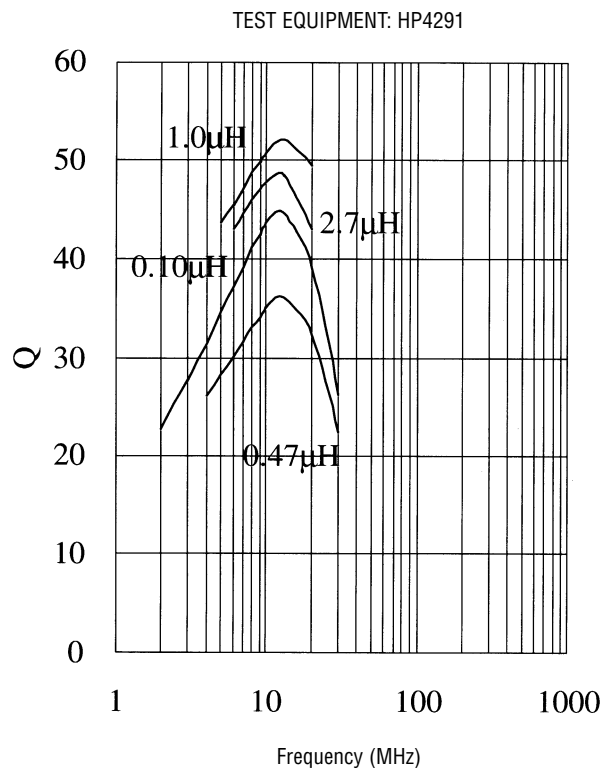
| PART NO.       | INDUCTANCE ( $\mu$ H)     | Q<br>MIN. | LQ TEST<br>FREQUENCY<br>(MHz) MIN. | SELF RESONANT<br>$R_{DC}$<br>( $\Omega$ ) MAX. | DC RESISTANCE<br>CURRENT<br>$I_{DC}$ (mA) MAX. | RATED |
|----------------|---------------------------|-----------|------------------------------------|------------------------------------------------|------------------------------------------------|-------|
| MLI-201209-47N | $0.047 \pm 20\%$          | 15        | 50                                 | 320                                            | 0.20                                           | 300   |
| MLI-201209-68N | $0.068 \pm 20\%$          | 15        | 50                                 | 280                                            | 0.20                                           | 300   |
| MLI-201209-82N | $0.082 \pm 20\%$          | 15        | 50                                 | 255                                            | 0.20                                           | 300   |
| MLI-201209-R10 | $0.10 \pm 20\%, \pm 10\%$ | 20        | 25                                 | 235                                            | 0.30                                           | 250   |
| MLI-201209-R12 | $0.12 \pm 20\%, \pm 10\%$ | 20        | 25                                 | 220                                            | 0.30                                           | 250   |
| MLI-201209-R15 | $0.15 \pm 20\%, \pm 10\%$ | 20        | 25                                 | 200                                            | 0.40                                           | 250   |
| MLI-201209-R18 | $0.18 \pm 20\%, \pm 10\%$ | 20        | 25                                 | 185                                            | 0.40                                           | 250   |
| MLI-201209-R22 | $0.22 \pm 20\%, \pm 10\%$ | 20        | 25                                 | 170                                            | 0.50                                           | 250   |
| MLI-201209-R27 | $0.27 \pm 20\%, \pm 10\%$ | 20        | 25                                 | 150                                            | 0.50                                           | 250   |
| MLI-201209-R33 | $0.33 \pm 20\%, \pm 10\%$ | 20        | 25                                 | 145                                            | 0.55                                           | 250   |
| MLI-201209-R39 | $0.39 \pm 20\%, \pm 10\%$ | 25        | 25                                 | 135                                            | 0.65                                           | 200   |
| MLI-201209-R47 | $0.47 \pm 20\%, \pm 10\%$ | 25        | 25                                 | 125                                            | 0.65                                           | 200   |
| MLI-201209-R56 | $0.56 \pm 20\%, \pm 10\%$ | 25        | 25                                 | 115                                            | 0.75                                           | 150   |
| MLI-201209-R68 | $0.68 \pm 20\%, \pm 10\%$ | 25        | 25                                 | 105                                            | 0.80                                           | 150   |
| MLI-201209-R82 | $0.82 \pm 20\%, \pm 10\%$ | 25        | 25                                 | 100                                            | 1.00                                           | 150   |
| MLI-201209-1R0 | $1.00 \pm 20\%, \pm 10\%$ | 45        | 10                                 | 75                                             | 0.40                                           | 50    |
| MLI-201209-1R2 | $1.20 \pm 20\%, \pm 10\%$ | 45        | 10                                 | 65                                             | 0.50                                           | 50    |
| MLI-201209-1R5 | $1.50 \pm 20\%, \pm 10\%$ | 45        | 10                                 | 60                                             | 0.50                                           | 50    |
| MLI-201209-1R8 | $1.80 \pm 20\%, \pm 10\%$ | 45        | 10                                 | 55                                             | 0.60                                           | 50    |
| MLI-201209-2R2 | $2.20 \pm 20\%, \pm 10\%$ | 45        | 10                                 | 50                                             | 0.65                                           | 30    |

## ELECTRICAL CHARACTERISTICS

| PART NO.       | INDUCTANCE ( $\mu$ H)     | Q<br>MIN. | LQ TEST<br>FREQUENCY<br>(MHz) MIN. | SELF RESONANT<br>$R_{DC}$<br>( $\Omega$ ) MAX. | DC RESISTANCE<br>CURRENT<br>$I_{DC}$ (mA) MAX. | RATED |
|----------------|---------------------------|-----------|------------------------------------|------------------------------------------------|------------------------------------------------|-------|
| MLI-201209-2R7 | 2.70 $\pm$ 20%, $\pm$ 10% | 45        | 10                                 | 45                                             | 0.75                                           | 30    |
| MLI-201209-3R3 | 3.30 $\pm$ 20%, $\pm$ 10% | 45        | 10                                 | 41                                             | 0.80                                           | 30    |
| MLI-201209-3R9 | 3.90 $\pm$ 20%, $\pm$ 10% | 45        | 10                                 | 38                                             | 0.90                                           | 15    |
| MLI-201209-4R7 | 4.70 $\pm$ 20%, $\pm$ 10% | 45        | 10                                 | 35                                             | 1.00                                           | 15    |
| MLI-201209-5R6 | 5.60 $\pm$ 20%, $\pm$ 10% | 50        | 4                                  | 32                                             | 0.90                                           | 15    |
| MLI-201209-6R8 | 6.80 $\pm$ 20%, $\pm$ 10% | 50        | 4                                  | 29                                             | 1.00                                           | 15    |
| MLI-201209-8R2 | 8.20 $\pm$ 20%, $\pm$ 10% | 50        | 4                                  | 26                                             | 1.10                                           | 15    |
| MLI-201209-100 | 10.0 $\pm$ 20%, $\pm$ 10% | 50        | 2                                  | 24                                             | 1.15                                           | 15    |

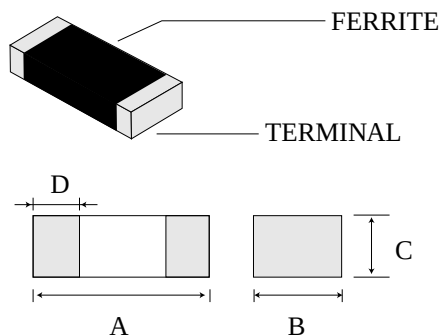
TOLERANCE: J =  $\pm$ 5%, K =  $\pm$ 10%, M =  $\pm$ 20%

## TYPICAL ELECTRICAL CHARACTERISTIC CURVES



## MLI-321611 SERIES

### DIMENSION:



Dimensions in mm (inch)

| PART NO.   | A                         | B                         | C                         | D                         |
|------------|---------------------------|---------------------------|---------------------------|---------------------------|
| MLI-321611 | 3.2±0.20<br>(0.126±0.008) | 1.6±0.20<br>(0.063±0.008) | 1.1±0.20<br>(0.043±0.008) | 0.5±0.30<br>(0.020±0.012) |

### ELECTRICAL CHARACTERISTICS

| PART NO.       | INDUCTANCE (μH) | Q<br>MIN. | LQ TEST<br>FREQUENCY<br>(MHz) MIN. | SELF RESONANT<br>R <sub>DC</sub><br>(Ω) MAX. | DC RESISTANCE<br>CURRENT<br>I <sub>DC</sub> (mA) MAX. | RATED |
|----------------|-----------------|-----------|------------------------------------|----------------------------------------------|-------------------------------------------------------|-------|
| MLI-321611-47N | 0.047±20%       | 20        | 50                                 | 320                                          | 0.15                                                  | 300   |
| MLI-321611-68N | 0.068±20%       | 20        | 50                                 | 280                                          | 0.25                                                  | 300   |
| MLI-321611-R10 | 0.10±20%,±10%   | 20        | 25                                 | 235                                          | 0.25                                                  | 250   |
| MLI-321611-R12 | 0.12±20%,±10%   | 20        | 25                                 | 250                                          | 0.30                                                  | 250   |
| MLI-321611-R15 | 0.15±20%,±10%   | 20        | 25                                 | 200                                          | 0.30                                                  | 250   |
| MLI-321611-R18 | 0.18±20%,±10%   | 20        | 25                                 | 185                                          | 0.40                                                  | 250   |
| MLI-321611-R22 | 0.22±20%,±10%   | 20        | 25                                 | 170                                          | 0.50                                                  | 250   |
| MLI-321611-R27 | 0.27±20%,±10%   | 20        | 25                                 | 150                                          | 0.50                                                  | 250   |
| MLI-321611-R33 | 0.33±20%,±10%   | 20        | 25                                 | 145                                          | 0.60                                                  | 250   |
| MLI-321611-R39 | 0.39±20%,±10%   | 25        | 25                                 | 135                                          | 0.50                                                  | 200   |
| MLI-321611-R47 | 0.47±20%±10%    | 25        | 25                                 | 125                                          | 0.60                                                  | 200   |
| MLI-321611-R56 | 0.56±20%,±10%   | 25        | 25                                 | 115                                          | 0.70                                                  | 150   |
| MLI-321611-R68 | 0.68±20%,±10%   | 25        | 25                                 | 105                                          | 0.80                                                  | 150   |
| MLI-321611-R82 | 0.82±20%,±10%   | 25        | 25                                 | 100                                          | 0.90                                                  | 150   |

## ELECTRICAL CHARACTERISTICS

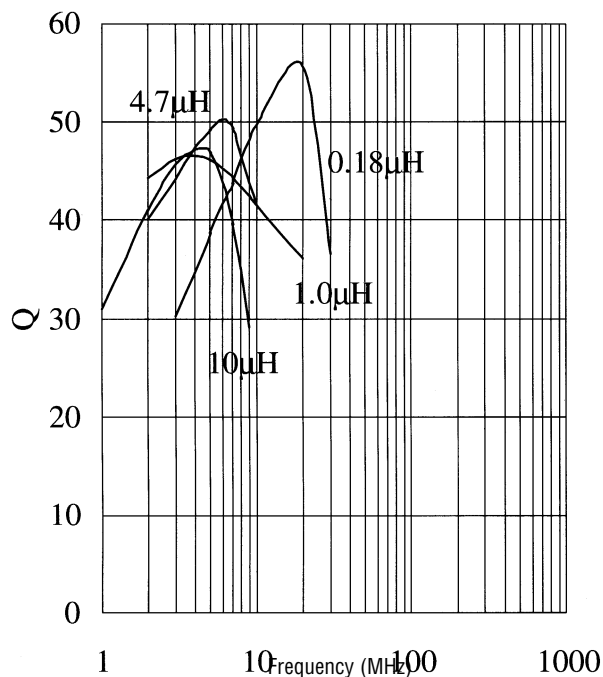
| PART NO.       | INDUCTANCE (μH) | Q<br>MIN. | LQ TEST<br>FREQUENCY<br>(MHz) MIN. | SELF RESONANT<br>R <sub>DC</sub><br>(Ω) MAX. | DC RESISTANCE<br>CURRENT<br>I <sub>DC</sub> (mA) MAX. | RATED |
|----------------|-----------------|-----------|------------------------------------|----------------------------------------------|-------------------------------------------------------|-------|
| MLI-321611-1R0 | 1.00±20%,±10%   | 30        | 10                                 | 75                                           | 0.40                                                  | 100   |
| MLI-321611-1R2 | 1.20±20%,±10%   | 30        | 10                                 | 65                                           | 0.50                                                  | 100   |
| MLI-321611-1R5 | 1.50±20%,±10%   | 30        | 10                                 | 60                                           | 0.50                                                  | 50    |
| MLI-321611-1R8 | 1.80±20%,±10%   | 30        | 10                                 | 55                                           | 0.50                                                  | 50    |
| MLI-321611-2R2 | 2.20±20%,±10%   | 30        | 10                                 | 50                                           | 0.60                                                  | 50    |
| MLI-321611-2R7 | 2.70±20%,±10%   | 30        | 10                                 | 45                                           | 0.60                                                  | 50    |
| MLI-321611-3R3 | 3.30±20%,±10%   | 30        | 10                                 | 41                                           | 0.70                                                  | 50    |
| MLI-321611-3R9 | 3.90±20%,±10%   | 30        | 10                                 | 38                                           | 0.80                                                  | 50    |
| MLI-321611-4R7 | 4.70±20%,±10%   | 30        | 10                                 | 35                                           | 0.90                                                  | 50    |
| MLI-321611-5R6 | 5.60±20%,±10%   | 35        | 4                                  | 32                                           | 0.70                                                  | 25    |
| MLI-321611-6R8 | 6.80±20%,±10%   | 35        | 4                                  | 29                                           | 0.90                                                  | 25    |
| MLI-321611-8R2 | 8.20±20%,±10%   | 35        | 4                                  | 26                                           | 0.90                                                  | 25    |
| MLI-321611-100 | 10.0±20%,±10%   | 35        | 2                                  | 24                                           | 1.00                                                  | 25    |
| MLI-321611-120 | 12.0±20%,±10%   | 35        | 2                                  | 22                                           | 1.05                                                  | 15    |
| MLI-321611-150 | 15.0±20%,±10%   | 30        | 1                                  | 19                                           | 0.70                                                  | 5     |
| MLI-321611-180 | 18.0±20%,±10%   | 30        | 1                                  | 18                                           | 0.70                                                  | 5     |
| MLI-321611-220 | 22.0±20%,±10%   | 30        | 1                                  | 16                                           | 0.90                                                  | 5     |
| MLI-321611-270 | 27.0±20%,±10%   | 30        | 1                                  | 14                                           | 0.90                                                  | 5     |
| MLI-321611-330 | 33.0±20%,±10%   | 30        | 0.4                                | 13                                           | 1.05                                                  | 5     |

TOLERANCE: J = ±5%, K = ±10%, M = ±20%

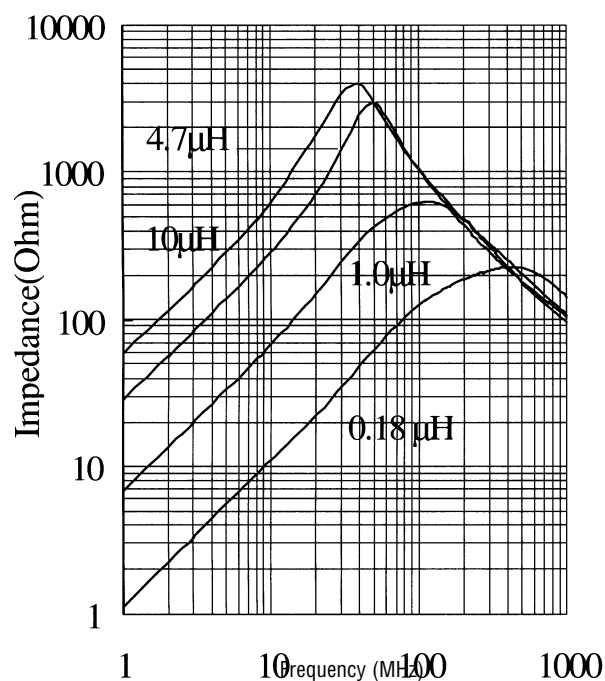


## TYPICAL ELECTRICAL CHARACTERISTIC CURVES

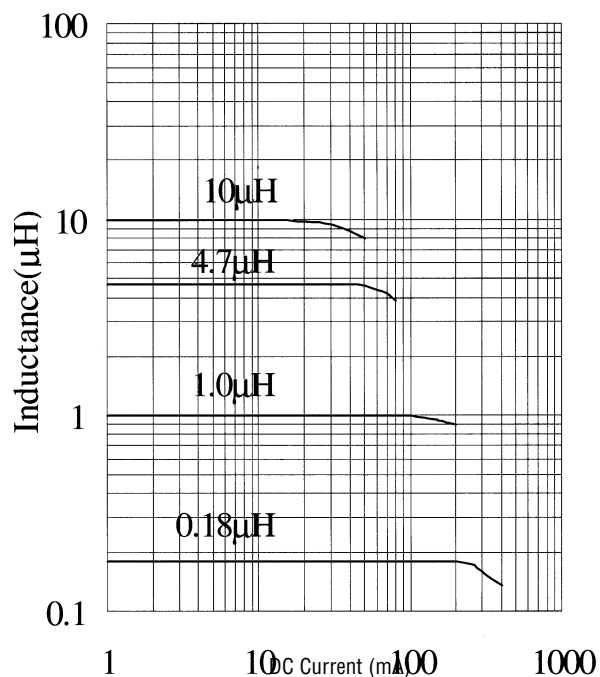
TEST EQUIPMENT: HP4291



TEST EQUIPMENT: HP4291



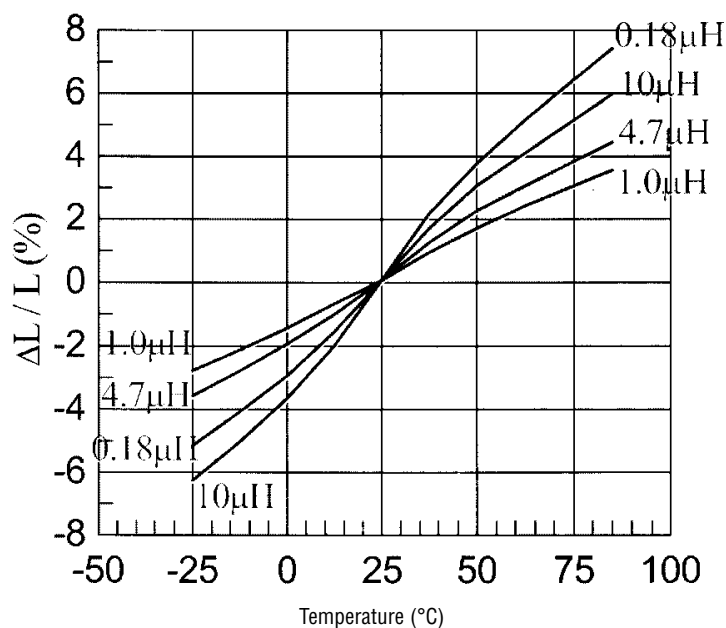
TEST EQUIPMENT: HP4284



TEST EQUIPMENT: HP4284

$\Delta L/L$  (%)

INDUCTANCE VS. TEMP. CHARACTERISTICS



## RELIABILITY TEST

### MECHANICAL PERFORMANCE TEST

| ITEM                      | SPECIFICATION                                                                                  | TEST CONDITION                                                                                         |       |     |
|---------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------|-----|
| Solderability             | More than 90% of the terminal electrode shall be covered with fresh solder.                    | Solder: H63A (Eutectic Solder)<br>Solder Temperature: 230±5°C<br>Flux: Rosin<br>Dip Time: 3±1 seconds  |       |     |
| Soldering Heat Resistance | The chip shall not crack. more then 75% of the terminal electrode shall be covered with solder | Solder: H63A (Eutectic Solder)<br>Solder Temperature: 260±5°C<br>Flux: Rosin<br>Dip Time: 10±1 seconds |       |     |
| Bending Strength          | The Ferrite shall not be damaged by forces applied on the right.                               | TYPE                                                                                                   | A(MM) | KGF |
|                           |                                                                                                | MLI-160808                                                                                             | 1.0   | 0.6 |
|                           |                                                                                                | MLI-201209                                                                                             | 1.4   | 1.0 |
|                           |                                                                                                | MLB-321611                                                                                             | 2.0   | 2.0 |
|                           |                                                                                                | MLB-322513                                                                                             | 2.0   | 2.0 |

### CLIMATIC TEST

| ITEM                                 | SPECIFICATION                                                                                                                    | TEST CONDITION                                               |  |  |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--|--|
| Thermal Shock<br>(Temperature Cycle) | No mechanical damage.<br>Inductance shall be within ±5% of the initial value, and Q (shall be) within ±30% of the initial value. | Temperature: -40°C, 85°C for 30 minutes each, 100 cycles.    |  |  |
| Humidity Resistance                  |                                                                                                                                  | Temperature: 40°C<br>Humidity: 95% RH<br>Time: 1000±12 Hours |  |  |
| High Temperature Resistance          |                                                                                                                                  | Temperature: 85°C±2°C<br>Time: 1000±12 Hours                 |  |  |
| Low Temperature Resistance           |                                                                                                                                  | Temperature: -40°C±2°C<br>Time: 1000±12 Hours                |  |  |

Operating temperature range -25°C to +85°C. Storage temperature range -40°C to +85°C.