

# Inductors for Power Circuits

Multilayer/STD • magnetic shielded

## MLP series

|                         |         |              |
|-------------------------|---------|--------------|
| Type:                   | MLP2012 | [0805 inch]* |
|                         | MLP2016 | [0806 inch]  |
|                         | MLP2520 | [1008 inch]  |
| * Dimensions Code [EIA] |         |              |

Issue date: September 2011

- All specifications are subject to change without notice.
- Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

# Inductors for Power Circuits

## Multilayer/STD • Magnetic Shielded

Conformity to RoHS Directive

### MLP Series MLP2012

With its internal structure optimized, the MLP2012 type has achieved DC superimposition characteristics that are comparable to those of the existing MLP2520 type.

In addition, because low-loss materials are used, the core loss of the coil can be minimized within a wide frequency range.

MLP2012's choke coils are therefore best suited to several MHz-drive switching power supplies, the use of which is especially prominent in mobile devices.

#### FEATURES

- MLP2012 has DC super imposition characteristics that are comparable to that of the existing MLP2520 type.
- Optimized ferrite materials enable the reduction of losses.
- Magnetically shielded configuration allowing for high-density mounting.
- The products contain no lead and also support lead-free soldering.
- It is a product conforming to RoHS directive.

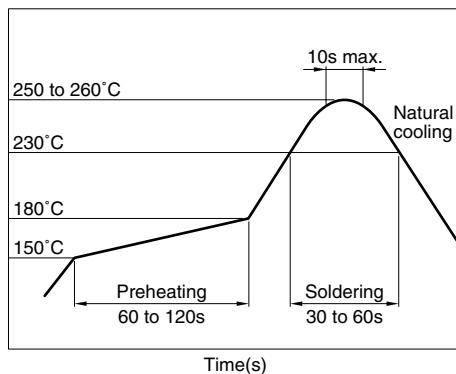
#### APPLICATIONS

Cellular phones, DSCs, DVCs, HDDs, etc.

#### SPECIFICATIONS

|                             |  |
|-----------------------------|--|
| Operating temperature range | -40 to +125°C<br>[Including self-temperature rise] |
| Storage temperature range   | -40 to +85°C                                       |

#### RECOMMENDED SOLDERING CONDITION REFLOW SOLDERING



#### PRODUCT IDENTIFICATION

| MLP | 2012 | S   | 2R2 | M   | T   |
|-----|------|-----|-----|-----|-----|
| (1) | (2)  | (3) | (4) | (5) | (6) |

(1) Series name

(2) Dimensions L×W

|      |            |
|------|------------|
| 2012 | 2.0×1.25mm |
|------|------------|

(3) Product characteristics classification code

|   |     |
|---|-----|
| S | STD |
|---|-----|

(4) Inductance value

|     |       |
|-----|-------|
| 2R2 | 2.2μH |
|-----|-------|

(5) Management number

|   |          |
|---|----------|
| T | t=0.5mm  |
| M | t=0.85mm |

(6) Packaging style

|   |               |
|---|---------------|
| T | Taping [reel] |
|---|---------------|

#### PACKAGING STYLE AND QUANTITIES

| Packaging style | Quantity         |
|-----------------|------------------|
| Taping          | 4000 pieces/reel |

#### HANDLING AND PRECAUTIONS

- Before soldering, be sure to preheat components. The preheating temperature should be set so that the temperature difference between the solder temperature and product temperature does not exceed 150°C.
- After mounting components onto the printed circuit board, do not apply stress through board bending or mishandling.
- The inductance value may change due to magnetic saturation if the current exceeds the rated maximum.
- Do not expose the inductors to stray magnetic fields.
- Avoid static electricity discharge during handling.
- When hand soldering, apply the soldering iron to the printed circuit board only. Temperature of the iron tip should not exceed 350°C. Soldering time should not exceed 3 seconds.

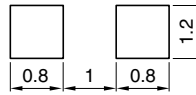
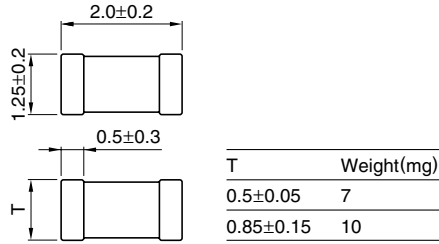
• Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

• Please contact our Sales office when your application is considered the following:

The device's failure or malfunction may directly endanger human life (e.g. application for automobile/aircraft/medical/nuclear power devices, etc.)

• All specifications are subject to change without notice.

## SHAPES AND DIMENSIONS/RECOMMENDED PC BOARD PATTERN



Dimensions in mm

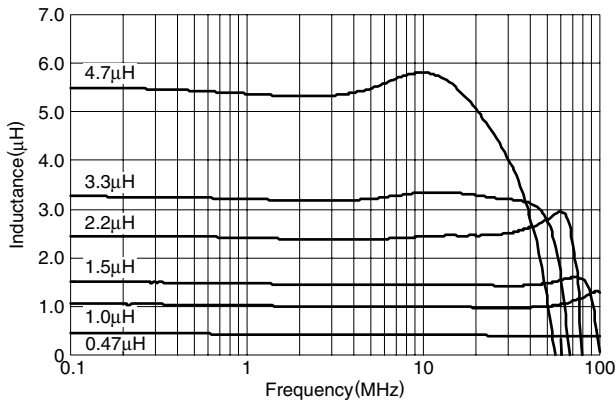
## ELECTRICAL CHARACTERISTICS

| Classification | Part No.      | Inductance (μH) | Inductance tolerance | Test frequency (MHz) | DC resistance (Ω)±30% | Rated current (mA)max. | Thickness (mm)max. |
|----------------|---------------|-----------------|----------------------|----------------------|-----------------------|------------------------|--------------------|
| STD            | MLP2012SR47MT | 0.47            | ±20%                 | 2                    | 0.09                  | 1200                   | 1                  |
|                | MLP2012S1R0MT | 1.0             | ±20%                 | 2                    | 0.16                  | 1000                   | 1                  |
|                | MLP2012S1R5MT | 1.5             | ±20%                 | 2                    | 0.16                  | 1000                   | 1                  |
|                | MLP2012S2R2MT | 2.2             | ±20%                 | 2                    | 0.23                  | 800                    | 1                  |
|                | MLP2012S3R3MT | 3.3             | ±20%                 | 2                    | 0.19                  | 900                    | 1                  |
|                | MLP2012S4R7MT | 4.7             | ±20%                 | 2                    | 0.26                  | 700                    | 1                  |
| Low profile    | MLP2012SR47TT | 0.47            | ±20%                 | 6                    | 0.13                  | 1200                   | 0.55               |
|                | MLP2012SR82TT | 0.82            | ±20%                 | 6                    | 0.13                  | 1200                   | 0.55               |
|                | MLP2012S1R0TT | 1.0             | ±20%                 | 2                    | 0.30                  | 800                    | 0.55               |
|                | MLP2012S1R5TT | 1.5             | ±20%                 | 2                    | 0.35                  | 700                    | 0.55               |
|                | MLP2012S2R2TT | 2.2             | ±20%                 | 2                    | 0.43                  | 600                    | 0.55               |

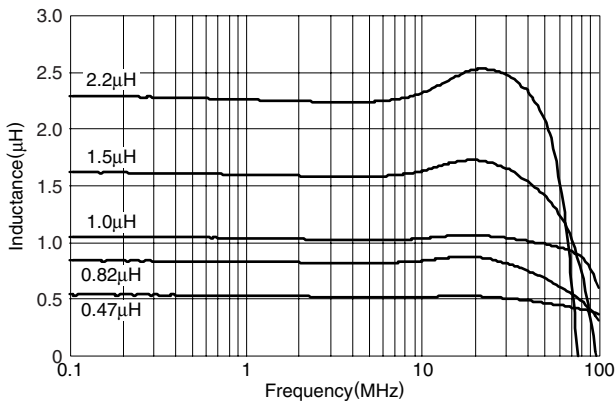
## TYPICAL ELECTRICAL CHARACTERISTICS

### INDUCTANCE vs. FREQUENCY CHARACTERISTICS

T=1.0mm max.

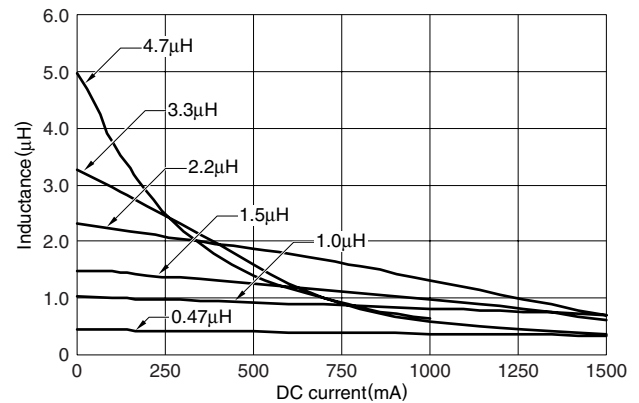


T=0.55mm max.

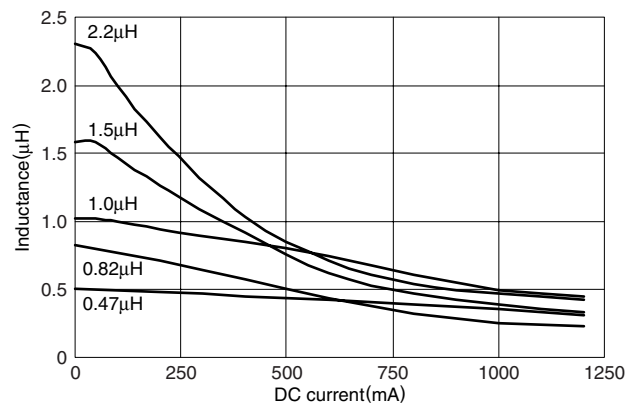


### INDUCTANCE CHANGE vs. DC SUPERPOSITION CHARACTERISTICS

T=1.0mm max.

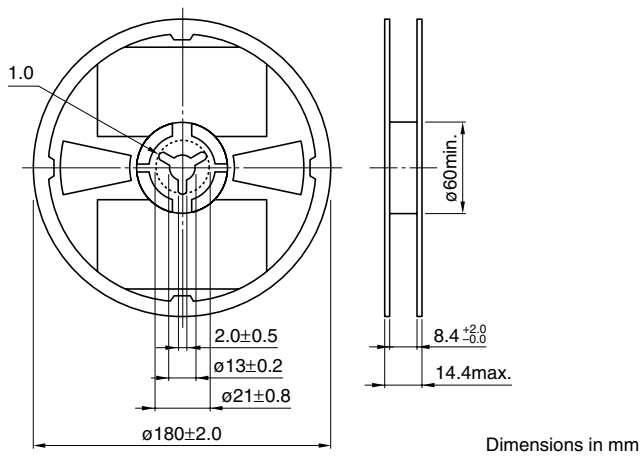


T=0.55mm max.

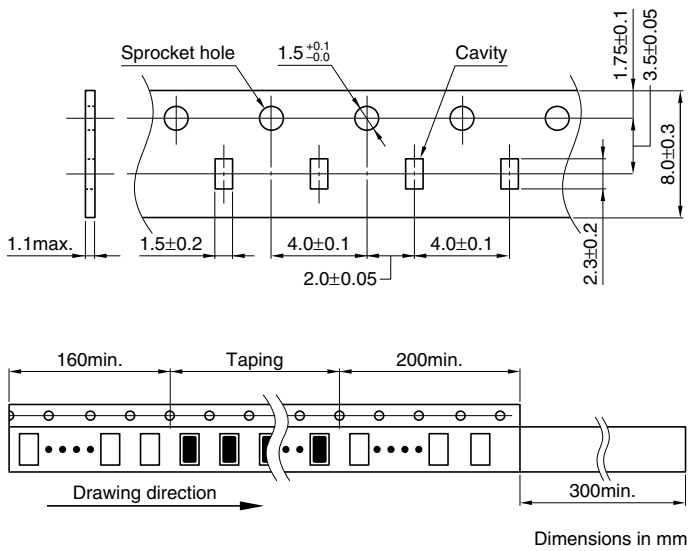


## PACKAGING STYLES

### REEL DIMENSIONS



### TAPE DIMENSIONS



# Inductors for Power Circuits

## Multilayer/STD • Magnetic Shielded

Conformity to RoHS Directive

### MLP Series MLP2016

With its internal structure optimized, the MLP2016 type has achieved DC superimposition characteristics that are comparable to those of the existing MLP2520 type.

In addition, because low-loss materials are used, the core loss of the coil can be minimized within a wide frequency range.

MLP2016's choke coils are therefore best suited to several MHz-drive switching power supplies, the use of which is especially prominent in mobile devices.

#### FEATURES

- MLP2016 has DC super imposition characteristics that are comparable to that of the existing MLP2520 type.
- Optimized ferrite materials enable the reduction of losses.
- Magnetically shielded configuration allowing for high-density mounting.
- The products contain no lead and also support lead-free soldering.
- It is a product conforming to RoHS directive.

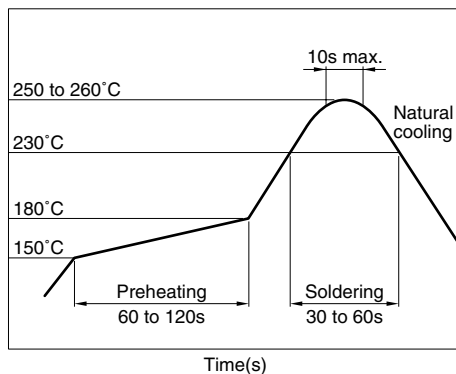
#### APPLICATIONS

Cellular phones, DSCs, DVCs, HDDs, etc.

#### SPECIFICATIONS

|                             |  |
|-----------------------------|--|
| Operating temperature range | -40 to +125°C<br>[Including self-temperature rise] |
| Storage temperature range   | -40 to +85°C                                       |

#### RECOMMENDED SOLDERING CONDITION REFLOW SOLDERING



#### PRODUCT IDENTIFICATION

| MLP | 2016 | S   | 2R2 | M   | T   |
|-----|------|-----|-----|-----|-----|
| (1) | (2)  | (3) | (4) | (5) | (6) |

(1) Series name

(2) Dimensions L×W

|      |           |
|------|-----------|
| 2016 | 2.0×1.6mm |
|------|-----------|

(3) Product characteristics classification code

|   |     |
|---|-----|
| S | STD |
|---|-----|

(4) Inductance value

|     |       |
|-----|-------|
| 2R2 | 2.2μH |
|-----|-------|

(5) Management number

|   |          |
|---|----------|
| M | t=0.85mm |
|---|----------|

(6) Packaging style

|   |               |
|---|---------------|
| T | Taping [reel] |
|---|---------------|

#### PACKAGING STYLE AND QUANTITIES

|                 |                  |
|-----------------|------------------|
| Packaging style | Quantity         |
| Taping          | 3000 pieces/reel |

#### HANDLING AND PRECAUTIONS

- Before soldering, be sure to preheat components. The preheating temperature should be set so that the temperature difference between the solder temperature and product temperature does not exceed 150°C.
- After mounting components onto the printed circuit board, do not apply stress through board bending or mishandling.
- The inductance value may change due to magnetic saturation if the current exceeds the rated maximum.
- Do not expose the inductors to stray magnetic fields.
- Avoid static electricity discharge during handling.
- When hand soldering, apply the soldering iron to the printed circuit board only. Temperature of the iron tip should not exceed 350°C. Soldering time should not exceed 3 seconds.

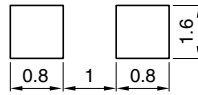
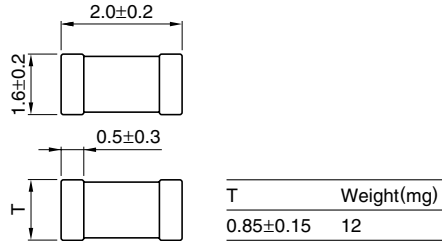
• Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

• Please contact our Sales office when your application is considered the following:

The device's failure or malfunction may directly endanger human life (e.g. application for automobile/aircraft/medical/nuclear power devices, etc.)

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## SHAPES AND DIMENSIONS/RECOMMENDED PC BOARD PATTERN



Dimensions in mm



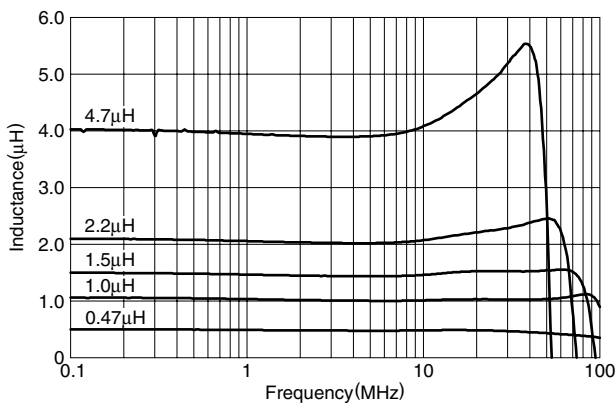
## ELECTRICAL CHARACTERISTICS

| Classification | Part No.      | Inductance (μH) | Inductance tolerance | Test frequency (MHz) | DC resistance (Ω)±30% | Rated current (mA)max. | Thickness (mm)max. |
|----------------|---------------|-----------------|----------------------|----------------------|-----------------------|------------------------|--------------------|
| STD            | MLP2016SR47MT | 0.47            | ±20%                 | 2                    | 0.05                  | 1600                   | 1                  |
|                | MLP2016S1R0MT | 1.0             | ±20%                 | 2                    | 0.09                  | 1400                   | 1                  |
|                | MLP2016S1R5MT | 1.5             | ±20%                 | 2                    | 0.09                  | 1200                   | 1                  |
|                | MLP2016S2R2MT | 2.2             | ±20%                 | 2                    | 0.11                  | 1200                   | 1                  |
|                | MLP2016S4R7MT | 4.7             | ±20%                 | 2                    | 0.27                  | 800                    | 1                  |

## TYPICAL ELECTRICAL CHARACTERISTICS

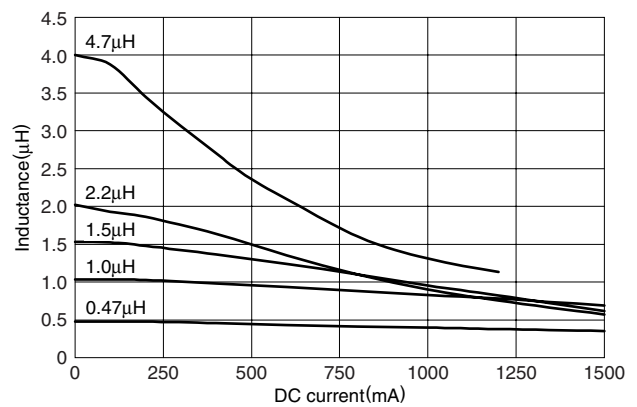
### INDUCTANCE vs. FREQUENCY CHARACTERISTICS

T=1.0mm max.



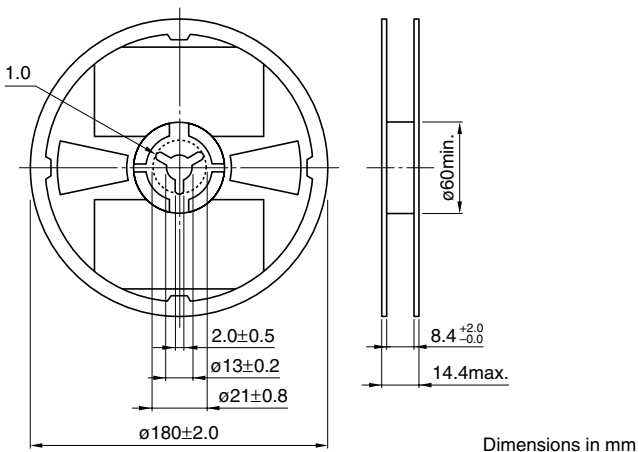
### INDUCTANCE CHANGE vs. DC SUPERPOSITION CHARACTERISTICS

T=1.0mm max.



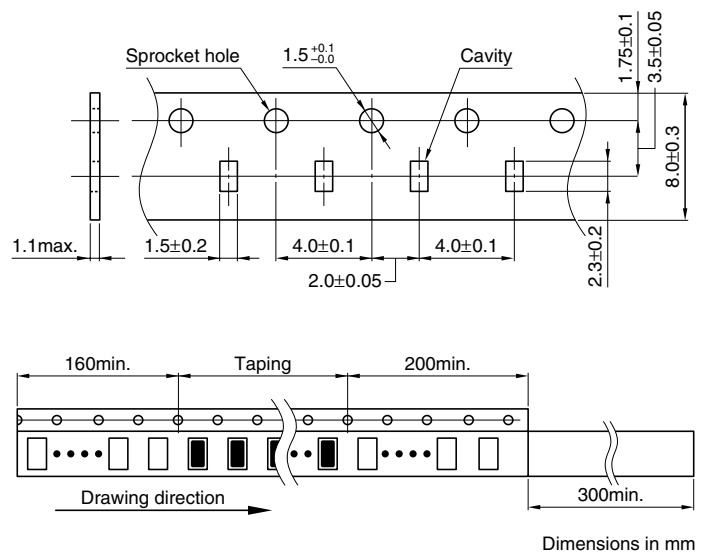
## PACKAGING STYLES

### REEL DIMENSIONS



Dimensions in mm

### TAPE DIMENSIONS



Dimensions in mm

# Inductors for Power Circuits

## Multilayer/STD • Magnetic Shielded

Conformity to RoHS Directive

### MLP Series MLP2520

In response to market demands for smaller mobile devices with a longer lasting life, mounted switching supply circuits with even higher frequencies are now being developed.

With optimized materials the MLP2520 type contributes to the improved efficiency of power sources, and reduces the losses caused by ferrite, even if the products are used for supply circuits with high drive frequencies.

#### FEATURES

- Optimized ferrite materials enable the reduction of losses.
- Compared to the existing MLP2520 type, DC superposition characteristics have been substantially improved.
- The products contain no lead and also support lead-free soldering.
- It is a product conforming to RoHS directive.

#### APPLICATIONS

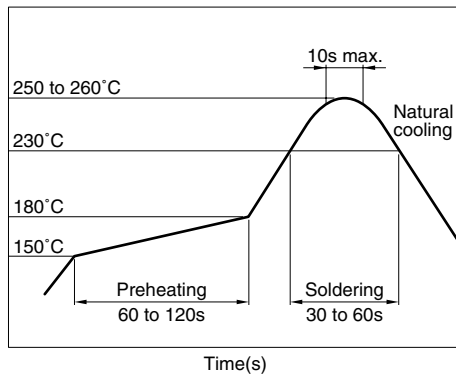
Cellular phones, DSCs, DVCs, HDs, etc.

#### SPECIFICATIONS

|                             |  |
|-----------------------------|--|
| Operating temperature range | −40 to +125°C<br>[Including self-temperature rise] |
| Storage temperature range   | −40 to +85°C                                       |

#### RECOMMENDED SOLDERING CONDITION

##### REFLOW SOLDERING



#### PRODUCT IDENTIFICATION

|     |      |     |     |     |     |
|-----|------|-----|-----|-----|-----|
| MLP | 2520 | S   | 1R0 | M   | T   |
| (1) | (2)  | (3) | (4) | (5) | (6) |

(1) Series name

(2) Dimensions L×W

|      |           |
|------|-----------|
| 2520 | 2.5×2.0mm |
|------|-----------|

(3) Product characteristics classification code

|   |     |
|---|-----|
| S | STD |
|---|-----|

(4) Inductance value

|     |       |
|-----|-------|
| 1R0 | 1.0μH |
| 1R5 | 1.5μH |
| 2R2 | 2.2μH |
| 3R3 | 3.3μH |
| 4R7 | 4.7μH |

• S1R0S: 1.2μH, S2R2S: 2.5μH

(5) Management number

|   |              |
|---|--------------|
| M | t=1.0mm max. |
| S | t=1.2mm max. |

(6) Packaging style

|   |               |
|---|---------------|
| T | Taping [reel] |
|---|---------------|

#### PACKAGING STYLE AND QUANTITIES

| Packaging style | Thickness T(mm) | Quantity         |
|-----------------|-----------------|------------------|
| Taping          | 1.0mm max.      | 3000 pieces/reel |
|                 | 1.2mm max.      | 3000 pieces/reel |

#### HANDLING AND PRECAUTIONS

- Before soldering, be sure to preheat components. The preheating temperature should be set so that the temperature difference between the solder temperature and product temperature does not exceed 150°C.
- After mounting components onto the printed circuit board, do not apply stress through board bending or mishandling.
- The inductance value may change due to magnetic saturation if the current exceeds the rated maximum.
- Do not expose the inductors to stray magnetic fields.
- Avoid static electricity discharge during handling.
- When hand soldering, apply the soldering iron to the printed circuit board only. Temperature of the iron tip should not exceed 350°C. Soldering time should not exceed 3 seconds.

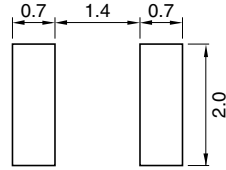
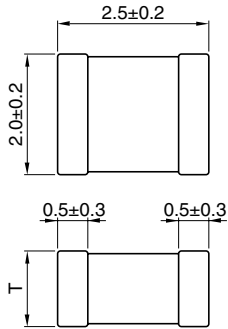
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• Please contact our Sales office when your application is considered the following:

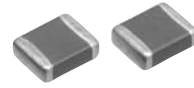
The device's failure or malfunction may directly endanger human life (e.g. application for automobile/aircraft/medical/nuclear power devices, etc.)

• All specifications are subject to change without notice.

## SHAPES AND DIMENSIONS/RECOMMENDED PC BOARD PATTERN



Dimensions in mm



| T(Thickness) | Weight(mg) |
|--------------|------------|
| 1.0max.      | 15         |
| 1.2max.      | 25         |

## ELECTRICAL CHARACTERISTICS

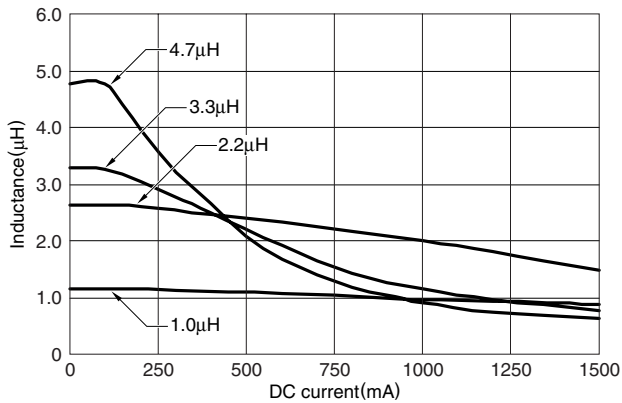
| Type    | Part No.     | Inductance (μH) | Inductance tolerance | Test frequency (MHz) | DC resistance (Ω)±30% | Rated current (mA) | Thickness (mm)max. |
|---------|--------------|-----------------|----------------------|----------------------|-----------------------|--------------------|--------------------|
| General | MLP2520S1R0M | 1.0             | ±20%                 | 2                    | 0.085                 | 1500               | 1.0                |
|         | MLP2520S1R5M | 1.5             | ±20%                 | 2                    | 0.09                  | 1200               | 1.0                |
|         | MLP2520S2R2M | 2.2             | ±20%                 | 2                    | 0.09                  | 1200               | 1.0                |
|         | MLP2520S3R3M | 3.3             | ±20%                 | 2                    | 0.13                  | 1000               | 1.0                |
|         | MLP2520S4R7M | 4.7             | ±20%                 | 2                    | 0.13                  | 1000               | 1.0                |
|         | MLP2520S1R0S | 1.2             | ±20%                 | 2                    | 0.08                  | 1500               | 1.2                |
|         | MLP2520S2R2S | 2.5             | ±20%                 | 2                    | 0.11                  | 1200               | 1.2                |
|         | MLP2520S3R3S | 3.3             | ±20%                 | 2                    | 0.11                  | 1000               | 1.2                |
|         | MLP2520S4R7S | 4.7             | ±20%                 | 2                    | 0.11                  | 1000               | 1.2                |

## TYPICAL ELECTRICAL CHARACTERISTICS

### INDUCTANCE CHANGE vs. DC SUPERPOSITION CHARACTERISTICS

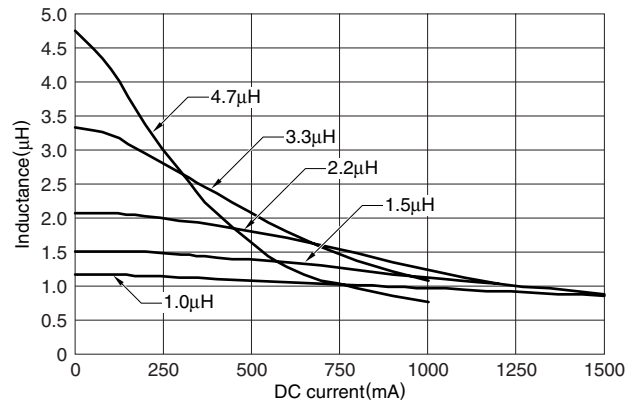
T=1.2mm max.

MLP2520S-S series



T=1.0mm max.

MLP2520S-M series





1.0

$2.0 \pm 0.5$

$\phi 13 \pm 0.2$

$\phi 21 \pm 0.8$

$\phi 180 \pm 2.0$

$\phi 60 \text{ min.}$

$8.4^{+2.0}_{-6.0}$

14.4 max.

Dimensions in mm

The drawing shows a mechanical part with the following dimensions and tolerances:

- Top View (Cross-section):**
  - Overall width:  $8.0 \pm 0.3$
  - Top flange thickness:  $1.75 \pm 0.1$
  - Bottom flange thickness:  $3.5 \pm 0.05$
  - Distance between sprocket holes:  $4.0 \pm 0.1$
  - Distance between cavities:  $4.0 \pm 0.1$
  - Distance from last cavity to right edge:  $2.3 \pm 0.1$
  - Distance from left edge to first sprocket hole:  $2.7 \pm 0.1$
  - Radius of sprocket hole:  $1.5^{+0.1}_{-0.0}$
  - Radius of cavity:  $1.5^{+0.1}_{-0.0}$
  - Distance from left edge to first cavity:  $2.0 \pm 0.05$
  - Distance from last cavity to right edge:  $2.0 \pm 0.05$
  - Distance from left edge to first sprocket hole:  $2.0 \pm 0.05$
  - Distance from last sprocket hole to right edge:  $2.0 \pm 0.05$
  - Distance from left edge to first sprocket hole:  $2.0 \pm 0.05$
  - Distance from last sprocket hole to right edge:  $2.0 \pm 0.05$
- Side View:**
  - Overall length:  $300 \text{ min.}$
  - Distance from left edge to first sprocket hole:  $160 \text{ min.}$
  - Distance from first sprocket hole to first cavity:  $200 \text{ min.}$
  - Distance from first cavity to last cavity:  $200 \text{ min.}$
  - Distance from last cavity to right edge:  $300 \text{ min.}$
  - Drawing direction: Indicated by an arrow pointing right.