

### APPLICATIONS



- Battery-powered devices
- High switching frequency SMPS
- IoT
- Wearable
- Portable devices
- Input filters

### FEATURES

- Size 2.0mmx1.6mmx1.0mm
- Low Profile
- Low Audible Noise
- Molded Construction
- Soft Saturation
- Stable Over High Temperatures
- Low DCR
- Max Operating Temp +125°C
- RoHS/REACH-Compliant, Halogen-Free

### ELECTRICAL CHARACTERISTICS

| Parameter                                          |                              |      | Value | Unit |
|----------------------------------------------------|------------------------------|------|-------|------|
| Inductance <sup>(1)</sup>                          | <i>L</i>                     | ±20% | 1.5   | μH   |
| Resistance                                         | <i>R<sub>DC</sub></i>        | Typ  | 85    | mΩ   |
| Resistance <sub>MAX</sub>                          | <i>R<sub>DC MAX</sub></i>    | Max  | 100   | mΩ   |
| Rated Current <sup>(2)</sup>                       | <i>I<sub>R</sub></i>         | Typ  | 2.4   | A    |
| Saturation Current <sub>25°C</sub> <sup>(3)</sup>  | <i>I<sub>SAT 25°C</sub></i>  | Typ  | 3.2   | A    |
| Saturation Current <sub>100°C</sub> <sup>(4)</sup> | <i>I<sub>SAT 100°C</sub></i> | Typ  | 3.2   | A    |
| Resonance Frequency                                | <i>f<sub>r</sub></i>         | Typ  | 58    | MHz  |

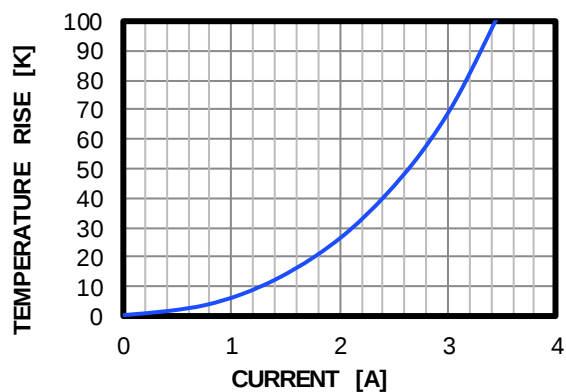
### GENERAL SPECIFICATIONS

|                                                    |                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <sup>(1)</sup> Inductance                          | Measured at 100kHz, 100mA                                                                                                                                                                                                                                                                                                           |
| <sup>(2)</sup> Rated Current                       | Rated current will cause the coil temperature rise ΔT of 40K<br><i>I<sub>R</sub> measured with the inductor soldered in a single-layer PCB. Copper layer thickness 35μm Cu / PCB size 30x50mm. Temperature behavior dependent on circuit design, PCB layout, proximity to other components, and trace dimensions and thickness.</i> |
| <sup>(3)</sup> Saturation Current <sub>25°C</sub>  | Saturation current will cause L to drop from 30% at 25°C ambient temperature                                                                                                                                                                                                                                                        |
| <sup>(4)</sup> Saturation Current <sub>100°C</sub> | Saturation current will cause L to drop from 30% at 100°C ambient temperature                                                                                                                                                                                                                                                       |
| Temperature Test Condition                         | Electrical specifications measured at 25°C, 35% RH if not given differently                                                                                                                                                                                                                                                         |
| Operating Condition                                | Operating temperature: -40°C to +125°C (including temp rise)<br>Should not exceed +125°C under worst-case operation conditions                                                                                                                                                                                                      |
| Storage Condition                                  | Tape and Reel packaging: -10°C to +40°C<br>Humidity: <50% RH                                                                                                                                                                                                                                                                        |

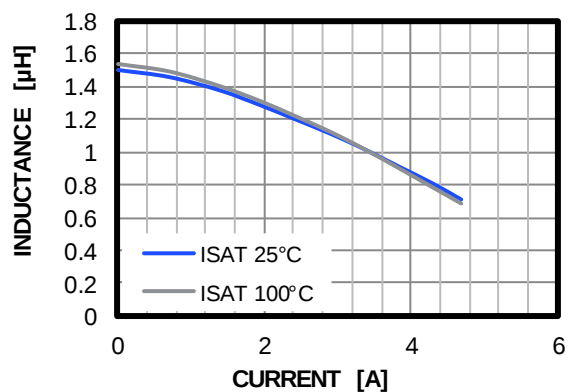
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**TYPICAL PERFORMANCE CURVES**

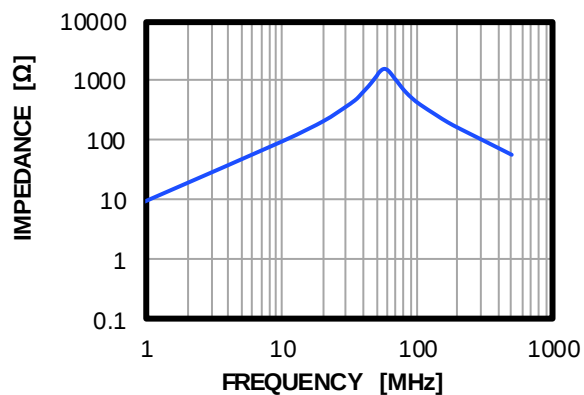
**Temperature Rise vs. Current**



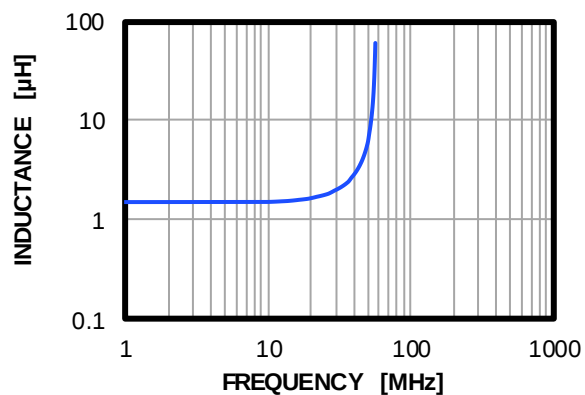
**Inductance vs. Current**



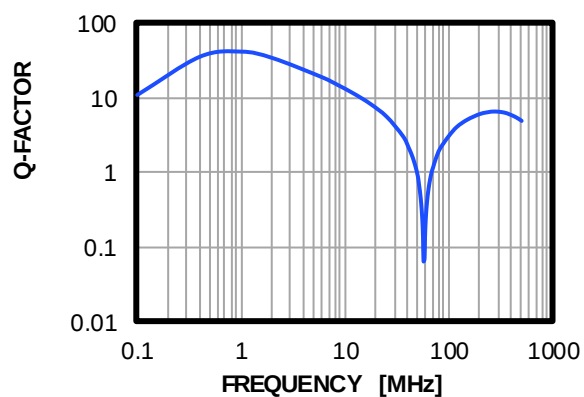
**Impedance vs. Frequency**



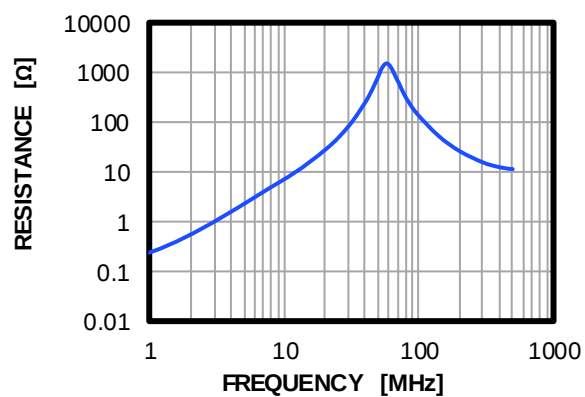
**Inductance vs. Frequency**



**Quality Factor vs. Frequency**

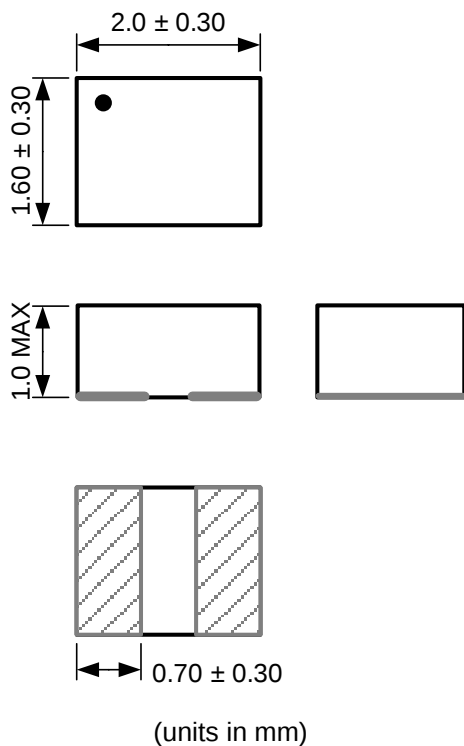


**AC Resistance vs. Frequency**

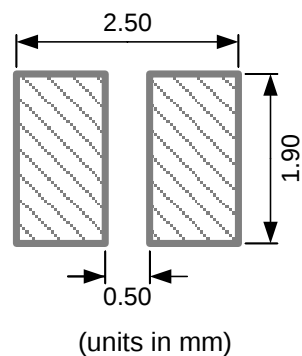


## DIMENSIONS

### PRODUCT PACKAGE



### RECOMMENDED LAND PATTERN



## TOP MARKING

### Marking

Start of Winding . (dot)

## ORDERING INFORMATION

| Part Number    | $L^{(1)}$<br>±20% (μH) | $R_{DC}$<br>Typ (mΩ) | $I_R^{(2)}$<br>Typ (A) | $I_{SAT\ 25^\circ C}^{(3)}$<br>Typ (A) | $I_{SAT\ 100^\circ C}^{(4)}$<br>Typ (A) |
|----------------|------------------------|----------------------|------------------------|----------------------------------------|-----------------------------------------|
| MPL-AT2010-R47 | 0.47                   | 27                   | 4.5                    | 5.7                                    | 5.7                                     |
| MPL-AT2010-R68 | 0.68                   | 41                   | 3.6                    | 4.9                                    | 4.9                                     |
| MPL-AT2010-1R0 | 1.0                    | 50                   | 3.3                    | 4.2                                    | 4.2                                     |
| MPL-AT2010-1R5 | 1.5                    | 85                   | 2.4                    | 3.2                                    | 3.2                                     |
| MPL-AT2010-2R2 | 2.2                    | 125                  | 2.0                    | 2.6                                    | 2.6                                     |
| MPL-AT2010-4R7 | 4.7                    | 215                  | 1.5                    | 1.9                                    | 1.9                                     |

## GENERAL SPECIFICATIONS

|                                                           |                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(1) Inductance</b>                                     | Measured at 100kHz, 100mA                                                                                                                                                                                                                                                                                                                      |
| <b>(2) Rated Current</b>                                  | Rated current will cause the coil temperature rise $\Delta T$ of 40K<br><i><math>I_R</math> measured with the inductor soldered in a single-layer PCB. Copper layer thickness 35μm Cu / PCB size 30x50mm. Temperature behavior dependent on circuit design, PCB layout, proximity to other components, and trace dimensions and thickness.</i> |
| <b>(3) Saturation Current <math>_{25^\circ C}</math></b>  | Saturation current will cause L to drop from 30% at 25°C ambient temperature                                                                                                                                                                                                                                                                   |
| <b>(4) Saturation Current <math>_{100^\circ C}</math></b> | Saturation current will cause L to drop from 30% at 100°C ambient temperature                                                                                                                                                                                                                                                                  |
| <b>Temperature Test Condition</b>                         | Electrical specifications measured at 25°C, 35% RH if not given differently                                                                                                                                                                                                                                                                    |
| <b>Operating Condition</b>                                | Operating temperature: -40°C to +125°C (including temp rise)<br>Should not exceed +125°C under worst-case operation conditions                                                                                                                                                                                                                 |
| <b>Storage Condition</b>                                  | Tape and Reel packaging: -10°C to +40°C<br>Humidity: <50% RH                                                                                                                                                                                                                                                                                   |

## REVISION HISTORY

| Revision # | Revision Date | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Pages Updated |
|------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1.0        | 7/11/2019     | Initial Release                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -             |
| 1.1        | 7/29/2019     | Updated Impedance vs. Frequency Curve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2             |
| 1.2        | 7/7/2023      | Updated the $R_{DC}$ (Typ), $R_{DC\ MAX}$ , and $f_r$ (Typ) values, and made minor formatting edits in the Electrical Characteristics section                                                                                                                                                                                                                                                                                                                                                                                        | 1             |
|            |               | Updated all the Typical Performance Curves                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2             |
|            |               | Reordered the Dimensions section; updated the Product Package and Recommended Land Pattern images                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3             |
|            |               | Updated the following values in the Ordering Information section:<br><ul style="list-style-type: none"> <li>• MPL-AT2010-R47: Updated <math>I_R</math> (Typ)</li> <li>• MPL-AT2010-R68: Updated <math>I_R</math> (Typ)</li> <li>• MPL-AT2010-1R0: Updated <math>I_R</math> (Typ)</li> <li>• MPL-AT2010-1R5: Updated <math>R_{DC}</math> (Typ)</li> <li>• MPL-AT2010-2R2: Updated <math>R_{DC}</math> (Typ), <math>I_R</math> (Typ), <math>I_{SAT\ 25^{\circ}C}</math> (Typ), and <math>I_{SAT\ 100^{\circ}C}</math> (Typ)</li> </ul> | 4             |

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