

# SMD Power Inductor

## Low Profile, High Current Type

PIW-602865

MERITEK

### FEATURE

- Magnetic Shield Construction for Power Circuit.
- Large Current and Low DC Resistance
- Low profile power inductors
- Application: DC/DC Converter, Battery Powered Devices, Low Profile High Current Power Supply, Notebook/Server



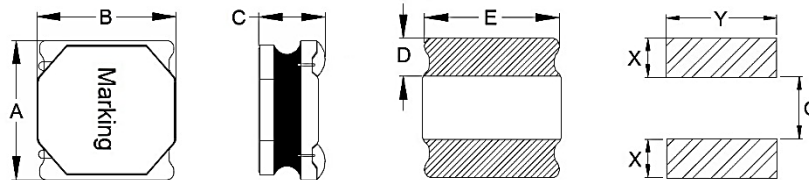
### ELECTRICAL CHARACTERISTICS

| Part Number   | Inductance (μH) | Tolerance (%) | Test Frequency (Hz) | DCR ±20% (mΩ) | I <sub>SAT</sub> (A) | I <sub>RMS</sub> (A) |
|---------------|-----------------|---------------|---------------------|---------------|----------------------|----------------------|
| PIW1R0Y602865 | 1.00            | ±30%          | 1V/100K             | 10.0          | 5.75                 | 5.20                 |
| PIW1R5Y602865 | 1.50            | ±30%          | 1V/100K             | 14.0          | 5.30                 | 4.95                 |
| PIW2R2M602865 | 2.20            | ±20%          | 1V/100K             | 18.0          | 5.00                 | 4.50                 |
| PIW3R3M602865 | 3.30            | ±20%          | 1V/100K             | 24.0          | 4.30                 | 3.60                 |
| PIW4R7M602865 | 4.70            | ±20%          | 1V/100K             | 30.0          | 3.20                 | 3.10                 |
| PIW6R8M602865 | 6.80            | ±20%          | 1V/100K             | 47.0          | 2.85                 | 2.50                 |
| PIW100M602865 | 10.0            | ±20%          | 1V/100K             | 65.0          | 2.10                 | 2.00                 |
| PIW150M602865 | 15.0            | ±20%          | 1V/100K             | 98.0          | 2.00                 | 1.80                 |
| PIW220M602865 | 22.0            | ±20%          | 1V/100K             | 138           | 1.60                 | 1.50                 |
| PIW330M602865 | 33.0            | ±20%          | 1V/100K             | 200           | 1.40                 | 1.30                 |
| PIW470M602865 | 47.0            | ±20%          | 1V/100K             | 280           | 1.15                 | 1.06                 |

Notes:

1. All test data referenced to 25°C ambient.
2. Saturation Current (I<sub>sat</sub>) based on inductance drop ( $\Delta L/L_0 \leq 30\%$ ) approximately
3. Heat Rated Current (I<sub>rms</sub>) based on temperature rise ( $\Delta T: 40^\circ\text{C}$ ) approximately
4. Operating Temperature: -40°C ~ +125°C (Including Self-temperature rise)

### DIMENSIONS

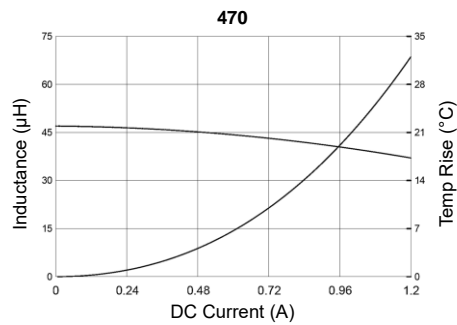
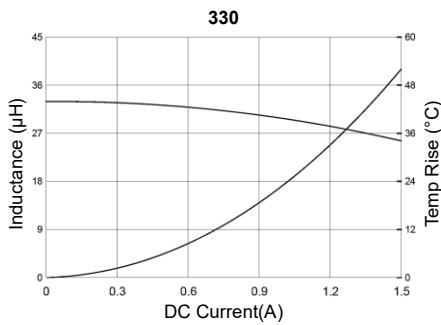
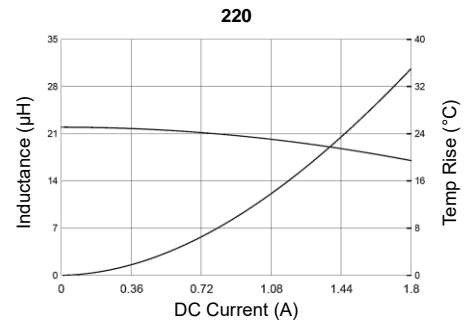
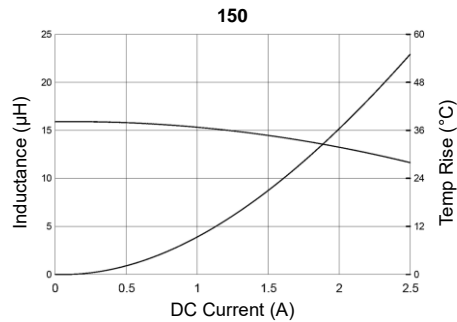
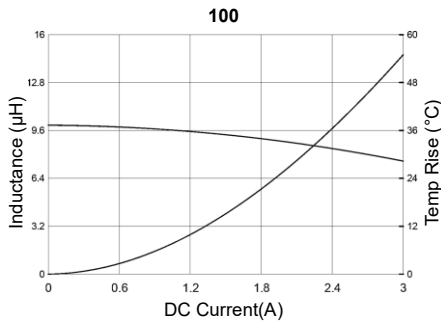
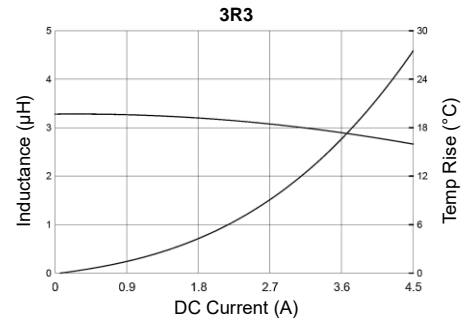
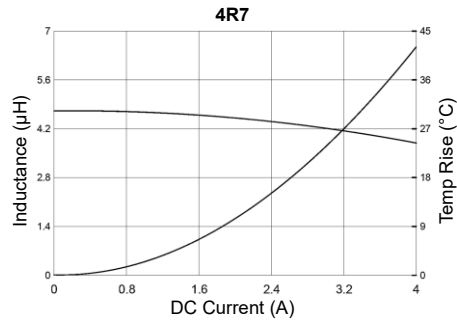
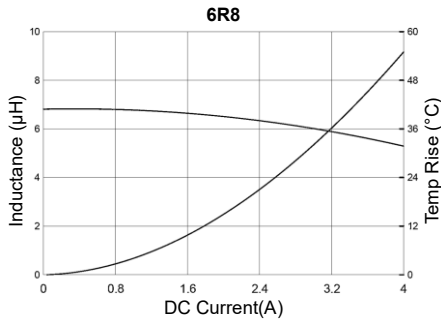
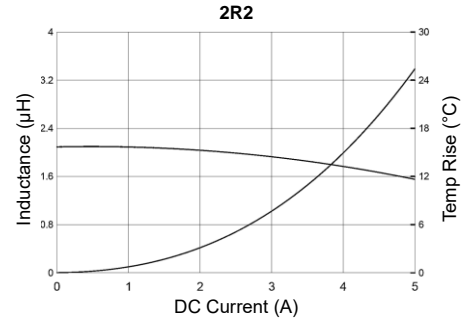
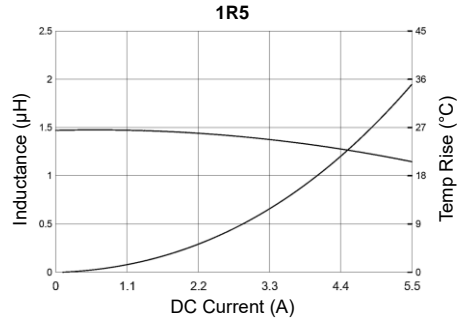
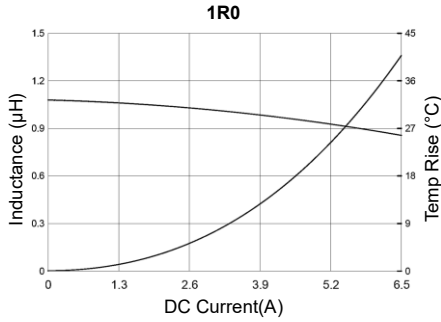


(Unit: mm)

| Size Code | A         | B         | C         | D         | E         | X   | Y   | G   |
|-----------|-----------|-----------|-----------|-----------|-----------|-----|-----|-----|
| 6028      | 6.0 ± 0.2 | 6.0 ± 0.2 | 2.6 ± 0.2 | 1.6 ± 0.3 | 5.8 ± 0.3 | 1.8 | 5.8 | 2.5 |

Notes: 1. The above PCB layout reference only. 2. Recommend solder paste thickness at 0.15mm and above.

### CHARACTERISTIC CURVES- PIW-602865 series



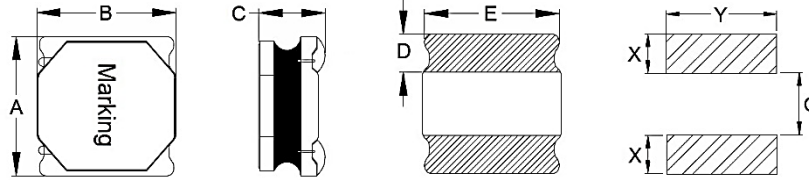
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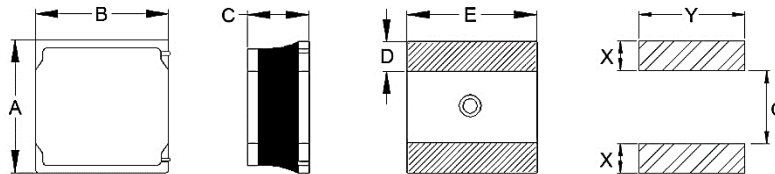
### DIMENSIONS- PIW-65 SERIES



(Unit: mm)

| Size Code       | A          | B          | C         | D         | E         | X    | Y   | G   |
|-----------------|------------|------------|-----------|-----------|-----------|------|-----|-----|
| 4018            | 4.0 ± 0.2  | 4.0 ± 0.2  | 1.8 max   | 1.2 ref   | --        | 1.2  | 3.7 | 1.6 |
| 4018B           | 4.0 ± 0.2  | 4.0 ± 0.2  | 1.8 max   | 1.1 ± 0.2 | --        | 1.2  | 3.7 | 1.6 |
| 5020            | 5.0 ± 0.2  | 5.0 ± 0.2  | 1.8 ± 0.2 | 1.3 ± 0.2 | 4.7 ± 0.2 | 1.5  | 4.7 | 2.1 |
| 5040 (≤10μH)    | 4.95 ± 0.2 | 4.95 ± 0.2 | 3.9 ± 0.2 | 1.3 ± 0.3 | 4.2 ± 0.2 | 1.5  | 4.2 | 2.1 |
| 5040 (>10μH)    | 4.95 ± 0.2 | 4.95 ± 0.2 | 3.8 ± 0.2 | 1.3 ± 0.3 | 4.2 ± 0.2 | 1.5  | 4.2 | 2.1 |
| 6020            | 6.0 ± 0.2  | 6.0 ± 0.2  | 1.8 ± 0.2 | 1.6 ± 0.3 | 5.8 ± 0.3 | 1.8  | 5.8 | 2.5 |
| 6028            | 6.0 ± 0.2  | 6.0 ± 0.2  | 2.6 ± 0.2 | 1.6 ± 0.3 | 5.8 ± 0.3 | 1.8  | 5.8 | 2.5 |
| 6045            | 6.0 ± 0.3  | 6.0 ± 0.3  | 4.2 ± 0.3 | 1.9 ± 0.3 | 4.8 ± 0.3 | 2.15 | 6.5 | 2.2 |
| 8040 (< 1.0 μH) | 8.0 ± 0.3  | 8.0 ± 0.3  | 4.2 Max   | 2.4 ± 0.3 | 6.3 ± 0.3 | 2.85 | 6.6 | 2.8 |
| 8040 (≥ 1.0 μH) | 8.0 ± 0.3  | 8.0 ± 0.3  | 3.7 ± 0.3 | 2.4 ± 0.3 | 6.3 ± 0.3 | 2.85 | 6.6 | 2.8 |

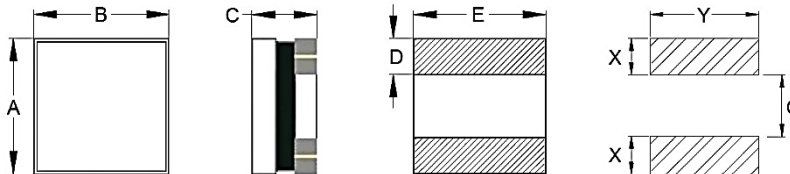
Notes: 1. The above PCB layout reference only. 2. Recommend solder paste thickness at 0.15mm and above.



(Unit: mm)

| Size Code | A         | B         | C       | D       | E         | X    | Y   | G   |
|-----------|-----------|-----------|---------|---------|-----------|------|-----|-----|
| 3010      | 3.0 ± 0.2 | 3.0 ± 0.2 | 1.0 max | 1.0 ref | 3.0 ± 0.2 | 1.25 | 3.5 | 0.9 |
| 3012      | 3.0 ± 0.2 | 3.0 ± 0.2 | 1.2 max | 1.0 ref | 3.0 ± 0.2 | 1.25 | 3.5 | 0.9 |
| 3015      | 3.0 ± 0.2 | 3.0 ± 0.2 | 1.5 max | 1.0 ref | 3.0 ± 0.2 | 1.25 | 3.5 | 0.9 |
| 4010      | 4.0 ± 0.2 | 4.0 ± 0.2 | 1.0 max | 1.2 ref | 4.0 ± 0.2 | 1.5  | 4.5 | 1.5 |
| 4012      | 4.0 ± 0.2 | 4.0 ± 0.2 | 1.2 max | 1.2 ref | 4.0 ± 0.2 | 1.5  | 4.5 | 1.5 |
| 4015      | 4.0 ± 0.2 | 4.0 ± 0.2 | 1.5 max | 1.2 ref | 4.0 ± 0.2 | 1.5  | 4.5 | 1.5 |

Notes: 1. The above PCB layout reference only. 2. Recommend solder paste thickness at 0.15mm and above.



(Unit: mm)

| Size Code | A              | B               | C         | D         | E           | X    | Y    | G   |
|-----------|----------------|-----------------|-----------|-----------|-------------|------|------|-----|
| 1608B     | 1.60 ± 0.15    | 0.90 ± 0.15     | 0.95 Max. | 0.50 ref. | 0.90 ± 0.15 | 0.75 | 1.15 | 0.6 |
| 2016B     | 2.0 -0.1/+0.2  | 1.6 -0.1/+0.2   | 1.0 max   | 0.60      | 1.6         | 1.0  | 2.1  | 0.5 |
| 2520A     | 2.50 -0.1/+0.3 | 2.0 -0.05/+0.35 | 0.80 max. | 0.85      | 2.0         | 1.15 | 2.5  | 0.7 |
| 2520C     | 2.5 ± 0.2      | 2.0 ± 0.2       | 1.2Max    | 0.85      | 2.0         | 1.15 | 2.5  | 0.7 |

Notes: 1. The above PCB layout reference only. 2. Recommend solder paste thickness at 0.15mm and above.

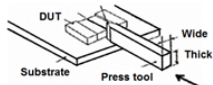
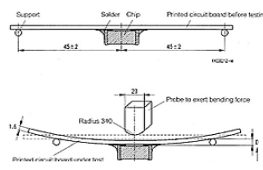
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### RELIABILITY TEST CONDITON AND REQUIREMENT

| Item                         | Test Standards / Conditions / Equipment  | Requirement  |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
|------------------------------|--|--|---------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|-----------|----------------|----------------|----------------|--|-----------|------|--|
| Inductance                   | HP4284A, CH11025, CH3302, CH1320, CH1320S, LCR Meter   | Refer to specification   |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| DC Resistance                | CH16502, Agilent33420A Micro-Ohm Meter   | Refer to specification   |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Mechanical Shock             | <table border="1"> <thead> <tr> <th>Type</th> <th>Peak value (g's)</th> <th>Normal duration (D) (ms)</th> <th>Wave form</th> <th>Velocity change (Vi) ft/sec</th> </tr> </thead> <tbody> <tr> <td>SMD</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> <tr> <td>Lead</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> </tbody> </table>  | Type   | Peak value (g's)          | Normal duration (D) (ms) | Wave form                   | Velocity change (Vi) ft/sec | SMD                       | 50                        | 11                        | Half-sine | 11.3           | Lead           | 50             | 11   | Half-sine | 11.3 | Appearance: No damage<br>Inductance: within $\pm 10\%$ of initial value<br>Q: Shall not exceed the specification value<br>RDC: within $\pm 15\%$ of initial value and shall not exceed the specification value |
|                              | Type   | Peak value (g's)   | Normal duration (D) (ms)  | Wave form                | Velocity change (Vi) ft/sec |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
|                              | SMD  | 50   | 11                        | Half-sine                | 11.3                        |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Lead                         | 50   | 11   | Half-sine                 | 11.3                     |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Solderability                | Method B1, 4 Hrs at 155°C dry heat at 255°C $\pm 5^\circ\text{C}$<br>Test Time: 5 +0/-0.5 seconds.<br>Method D category 3. (steam aging 8 hours $\pm 15\text{min}$ ) at 260°C $\pm 5^\circ\text{C}$<br>Test Time: 30+0/-0.5 seconds.   | More than 95% of the terminal electrode should be covered with solder.   |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Resistance to Soldering Heat | Solder temperature: 260 $\pm 5^\circ\text{C}$ for 10 seconds<br>Temperature ramp/immersion and emersion rate 25mm/s $\pm 6$ mm/s.<br>Completely cover the termination.   |  |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Vibration                    | Oscillation Frequency: 10~2K~10 Hz for 20 minutes<br>Equipment : Vibration checker<br>Total Amplitude: 10g<br>Testing Time: 12 hours (20 minutes, 12 cycles each of 3 orientations)  | Appearance: No damage<br>Inductance: within $\pm 10\%$ of initial value<br>Q: Shall not exceed the specification value<br>RDC: within $\pm 15\%$ of initial value and shall not exceed the specification value |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Load Humidity                | Humidity: 85 $\pm 3\%$ R.H. Temperature: 85°C $\pm 2^\circ\text{C}$<br>Duration: 1000Hrs Min at 100% rated current<br>Measured at Room Temperature after placing for 24 $\pm 2$ hrs  |  |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Life Test                    | Temperature: 125 $\pm 2^\circ\text{C}$<br>Duration: 1000Hrs Min. with 100% rated current<br>Measured at Room Temperature after placing for 24 $\pm 2$ Hrs  |  |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Thermal Shock                | Condition for 1 cycle <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>Temperature</td> <td>-40 <math>\pm 2^\circ\text{C}</math></td> <td>125 <math>\pm 2^\circ\text{C}</math></td> <td>125 <math>\pm 2^\circ\text{C}</math></td> </tr> <tr> <td>Duration</td> <td>30<math>\pm 5</math>min</td> <td><math>\leq 0.5</math>min</td> <td>30<math>\pm 5</math>min</td> </tr> </tbody> </table>   | Step   | 1                         | 2                        | 3                           | Temperature                 | -40 $\pm 2^\circ\text{C}$ | 125 $\pm 2^\circ\text{C}$ | 125 $\pm 2^\circ\text{C}$ | Duration  | 30 $\pm 5$ min | $\leq 0.5$ min | 30 $\pm 5$ min | Appearance: No damage<br>Inductance: within $\pm 10\%$ of initial value<br>Q: Shall not exceed the specification value<br>RDC: within $\pm 15\%$ of initial value and shall not exceed the specification value |           |      |  |
|                              | Step   | 1  | 2                         | 3                        |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Temperature                  | -40 $\pm 2^\circ\text{C}$  | 125 $\pm 2^\circ\text{C}$  | 125 $\pm 2^\circ\text{C}$ |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Duration                     | 30 $\pm 5$ min   | $\leq 0.5$ min   | 30 $\pm 5$ min            |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
|                              | Number of cycles : 300<br>Measured at room temperature after placing for 24 $\pm 2$ hrs.   |  |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Terminal Strength            | Component mounted on a PCB apply a force 1.8kg to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to shock the component being tested.    | Appearance : No damage   |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Board Flex                   | Place the 100x40mm board into a fixture with the component facing down.<br>Apply a force which will bend the board:<br>$\geq 0.805\text{in}$ (2012mm):1.2mm<br>$< 0.805\text{in}$ (2012mm):0.8mm.<br>Duration: 10 seconds. The Force is to be applied only once to the board   | Appearance : No damage   |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |
| Moisture Resistance          | <ol style="list-style-type: none"> <li>Baked at 50°C for 25hrs, measured at room temperature after placing for 4hrs.</li> <li>Raise temperature to 65<math>\pm 2^\circ\text{C}</math> 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25°C in 2.5hrs.</li> <li>Raise temperature to 65<math>\pm 2^\circ\text{C}</math> 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25°C in 2.5hrs, keep at 25°C for 2hrs then keep at -10°C for 3hrs</li> <li>Keep at 25°C 80-100%RH for 15min and vibrate at the frequency of 10 to 55 Hz to 10 Hz, measure at room temperature after placing for 1~2 hrs.</li> </ol> | Appearance: No damage<br>Inductance: within $\pm 10\%$ of initial value<br>Q: Shall not exceed the specification value<br>RDC: within $\pm 15\%$ of initial value and shall not exceed the specification value |                           |                          |                             |                             |                           |                           |                           |           |                |                |                |  |           |      |  |

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### PART NUMBERING SYSTEM

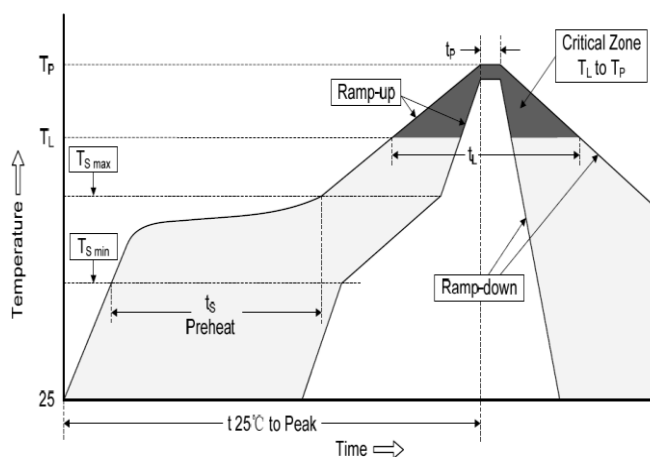
**PIW**    **470M**    **6028**    **65**  
 (1)        (2)        (3)        (4)

| No  | Item         | Code | Description  |
|-----|--------------|------|--|
| (1) | Product Code | PIW  | Power Inductor series, Wire wound type                               |
| (2) | Inductance   | 470M | 47.0μH ±20%(M)      First two digits: significant, Third: multiplier |
| (3) | Size Code    | 6028 | 6.0x6.0x2.6mm      Length x Width x Thickness (mm)                   |
| (4) | Series Code  | 65   | Surface Mount Shielded, Low Profile, High Current series             |

### RECOMMENDED SOLDERING PROFILES

| Reflow Condition  |                               |                  |
|---|-------------------------------|------------------|
| Pre Heat  | Temp. Min $T_{s(min)}$        | 150°C            |
|   | Temp. Max $T_{s(max)}$        | 200°C            |
|   | Time (min. to max.) ( $t_s$ ) | 60 ~ 120 seconds |
| Average ramp up rate (Liquidus Temperature) ( $T_L$ ) to peak |                               | 3°C/second max   |
| $T_{s(max)}$ to $T_L$ (Ramp-up rate)                          |                               | 3°C/second max   |
| Reflow  | Temp. ( $T_L$ )               | 217°C            |
|   | Time (min. to max.) ( $t_L$ ) | 60 ~ 150 seconds |
| Peak Temperature ( $T_P$ )                                    |                               | See table below  |
| Time within 5°C of actual peak Temperature ( $t_p$ )          |                               | 10 seconds max   |
| Ramp-down Rate  |                               | 6°C/second max   |
| Reflow Times  |                               | 3 times max      |

| Volume              | Peak Temperature ( $T_P$ ) |                         |                       |
|---------------------|----------------------------|-------------------------|-----------------------|
|                     | < 350mm <sup>3</sup>       | 350-2000mm <sup>3</sup> | > 2000mm <sup>3</sup> |
| Thickness < 1.6mm   | 260°C                      | 260°C                   | 260°C                 |
| Thickness 1.6-2.5mm | 260°C                      | 250°C                   | 245°C                 |
| Thickness ≥ 2.5mm   | 250°C                      | 245°C                   | 245°C                 |



\*Specifications subject to change without notice