

# EPM25-2V 40 W

## 40 Watt isolated DC-DC converter



### Product features

- 40 Watt isolated DC-DC converter
- Input voltage: 9 Vdc - 36 Vdc  
18 Vdc - 75 Vdc
- 2.0" x 1.0 " package
- Efficiency up to 92%
- Isolation voltage: 1.6 kVdc
- EMI class A without external circuit
- Operating ambient temperature from -40 °C to +105 °C
- No minimum load required
- EN62368-1/ IEC62368-1 certified
- Remote On/OFF

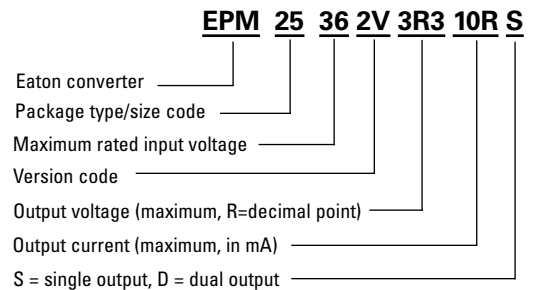
### Applications

- Computing/telecom
- Distributed power architectures
- Servers and workstations
- LAN /WAN applications
- Data processing applications
- Industrial IoT equipment, sensors
- Power supply, battery backup
- Wireless TX/RX modules
- Renewable energy products

### Environmental compliance



### Ordering part number



Powering Business Worldwide



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**Specifications**

|                                     | <b>Parameter</b>                         | <b>Conditions</b>           | <b>Minimum</b> | <b>Typical</b>         | <b>Maximum</b> | <b>Unit</b> |       |
|-------------------------------------|--|-----------------------------|----------------|------------------------|----------------|-------------|-------|
| <b>Input</b>                        | Input filter                             |                             |                | Pi type                |                |             |       |
|                                     | Input voltage range                      | Vin = 24 Vdc                | 9              |                        | 36             | Vdc         |       |
|                                     |  | Vin = 48 Vdc                | 18             |                        | 75             | Vdc         |       |
|                                     | Input current @ no load                  |                             |                |                        | 15             | mA          |       |
|                                     | Start-up time                            | 100% Load at Nominal Vin    |                |                        | 40             | ms          |       |
|                                     | Start-up voltage                         | Vin = 24 Vdc                |                |                        | 9              | Vdc         |       |
|                                     |  | Vin = 48 Vdc                |                |                        | 18             | Vdc         |       |
|                                     | UVLO                                     | Vin = 24 Vdc                |                | 8                      |                | Vdc         |       |
|                                     |  | Vin = 48 Vdc                |                | 16                     |                | Vdc         |       |
|                                     | Input surge voltage<br>(0.1 s max.)      | Vin = 24 Vdc                |                |                        |                | 50          | Vdc   |
|                                     |  | Vin = 48 Vdc                |                |                        |                | 100         | Vdc   |
| Remote ON/OFF                       | DC-DC ON                                 |                             |                | Open or 3 V - 12 Vdc   |                |             |       |
|                                     | DC-DC OFF                                |                             |                | Short or 0 V - 1.2 Vdc |                |             |       |
| <b>Output</b>                       | Efficiency                               |                             |                | Selection guide        |                |             |       |
|                                     | Minimum load                             |                             | 0              |                        |                | %           |       |
|                                     | Line regulation                          | Single output               |                | -0.2                   |                | +0.2        | %     |
|                                     |  | Dual output                 |                | -0.5                   |                | +0.5        | %     |
|                                     | Load regulation<br>(10-100% Load)        | Single output               |                | -0.5                   |                | +0.5        | %     |
|                                     |  | Dual output                 |                | -1.0                   |                | +1.0        | %     |
|                                     | Cross regulation                         |                             | -5             |                        | +5             | %           |       |
|                                     | Voltage accuracy                         |                             | -1             |                        | +1             | %           |       |
|                                     | Operating frequency                      | 100% Load at Nominal Vin    |                | 250                    |                |             | kHz   |
|                                     | Ripple & noise <sup>1</sup>              | Vout = 3.3, 5 Vdc           |                |                        |                | 100         | mVp-p |
|                                     |  | Vout = 12, 15, ±12, ±15 Vdc |                |                        |                | 125         | mVp-p |
| Voltage adjustability               |  |                             | -10            |                        | +10            | %           |       |
| Transient response<br>recovery time | 25% load step change<br>(75%-100% load)  |                             |                | 500                    |                | µs          |       |
| <b>Environment</b>                  | Operating temperature<br>(with derating) |                             | -40            |                        | +105           | °C          |       |
|                                     | Storage temperature                      |                             | -55            |                        | +125           | °C          |       |
|                                     | Max. case temperature                    |                             |                |                        | +110           | °C          |       |
|                                     | Temperature coefficient                  |                             |                | -0.05                  |                | +0.05       | %/°C  |
|                                     | Relative humidity                        |                             |                | 5                      |                | 95          | %RH   |
|                                     | Vibration                                |                             |                |                        | MIL-STD-202G   |             |       |

## Specifications

|                 | Parameter                                    | Conditions                                  | Minimum  | Typical | Maximum | Unit   |     |
|-----------------|--|---|--|---------|---------|--------|-----|
| <b>Function</b> | Isolation voltage<br>1 min., Input to Output |   | 1.6  |         |         | kVdc   |     |
|                 | Isolation resistance                         |   | 1000   |         |         | MΩ     |     |
|                 | Isolation capacitance                        |   |  | 1500    |         | pF     |     |
|                 | MTBF<br>(MIL-HDBK-217F)                      | 25 °C                                       |  | 779     |         | khours |     |
|                 | Short circuit protection                     |   | Continuous, automatic recovery                                     |         |         |        |     |
|                 | Overload protection                          |   |  | 175     |         | %      |     |
|                 | Over voltage protection<br>Zener diode clamp | Vout = 3.3 Vdc                              |  | 3.7     |         | 5.3    | Vdc |
|                 |  | Vout = 5 Vdc                                |  | 5.6     |         | 8.0    | Vdc |
|                 |  | Vout = 12 Vdc                               |  | 13.4    |         | 19.2   | Vdc |
|                 |  | Vout = 15 Vdc                               |  | 16.8    |         | 24.0   | Vdc |
|                 |  | Vout = ±12 Vdc                              |  | ±13.4   |         | ±19.2  | Vdc |
|                 |  | Vout = ±15 Vdc                              |  | ±16.8   |         | ±24.0  | Vdc |
|                 | Over temperature protection                  |   |  | +115    |         | °C     |     |
| Certification   |  |   | EN62368-1/ IEC62368-1  |         |         |        |     |
| <b>Physical</b> | Dimension                                    |   | 2.00 x 1.00 x 0.413 inch   |         |         |        |     |
|                 | Weight                                       |   | 37.6 g   |         |         |        |     |
|                 | Case material                                |   | metal case   |         |         |        |     |
|                 | Base material                                |   | FR4 PCB  |         |         |        |     |
|                 | Potting material                             |   | Silicone   |         |         |        |     |
| <b>EMC</b>      | EMI  | EN 55032                                    | Class A without external circuit,<br>Class B with external circuit |         |         |        |     |
|                 | ESD  | IEC 61000-4-2<br>Air ± 8 kV; Contact ± 6 kV | Criteria A   |         |         |        |     |
|                 | RS <sup>2</sup>                              | IEC 61000-4-3, 20 V/m                       | Criteria A   |         |         |        |     |
|                 | EFT <sup>2</sup>                             | IEC 61000-4-4, ± 2 kV                       | Criteria A   |         |         |        |     |
|                 | Surge <sup>2</sup>                           | IEC 61000-4-5, ± 2 kV                       | Criteria A   |         |         |        |     |
|                 | CS <sup>2</sup>                              | IEC 61000-4-6, 10 Vrms                      | Criteria A   |         |         |        |     |
|                 | PFMF   | IEC 61000-4-8, 10 A/m                       | Criteria A   |         |         |        |     |

1. The ripple & noise are measured with 1 μF capacitor at 20 MHz BW.
2. Test with E-CAP 680 μF/100 V at input terminal.
3. All specifications valid at nominal input, full load and +25 °C after warm-up time unless otherwise stated.
4. The product information and specifications are subject to change without prior notice.

### Selection guide

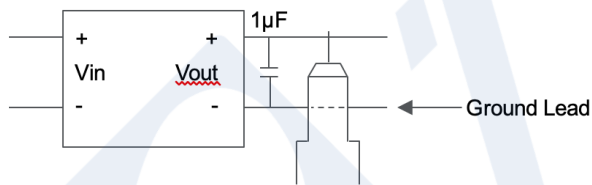
| Part number        | Input voltage (Vdc) | Output voltage (Vdc) | Output current @ full load (mA) | Efficiency <sup>1</sup> minimum | Efficiency <sup>1</sup> typical | Capacitive load <sup>2</sup> maximum (μF) |
|--------------------|---------------------|----------------------|---------------------------------|---------------------------------|---------------------------------|---|
| EPM25362V-3R3-10RS | 9-36<br>Nominal 24  | 3.3                  | 10000                           | 88%                             | 89%                             | 26600                                     |
| EPM25362V-05R-8R0S | 9-36<br>Nominal 24  | 5                    | 8000                            | 89%                             | 90%                             | 20000                                     |
| EPM25362V-12R-3R3S | 9-36<br>Nominal 24  | 12                   | 3333                            | 91%                             | 92%                             | 3900                                      |
| EPM25362V-15R-2R6S | 9-36<br>Nominal 24  | 15                   | 2666                            | 91%                             | 92%                             | 2600                                      |
| EPM25362V-12R-1R6D | 9-36<br>Nominal 24  | ±12                  | ±1666                           | 89%                             | 90%                             | ±2600                                     |
| EPM25362V-15R-1R3D | 9-36<br>Nominal 24  | ±15                  | ±1333                           | 89%                             | 90%                             | ±1600                                     |
| EPM25752V-3R3-10RS | 18-75<br>Nominal 48 | 3.3                  | 10000                           | 88%                             | 89%                             | 26600                                     |
| EPM25752V-05R-8R0S | 18-75<br>Nominal 48 | 5                    | 8000                            | 89%                             | 90%                             | 20000                                     |
| EPM25752V-12R-3R3S | 18-75<br>Nominal 48 | 12                   | 3333                            | 91%                             | 92%                             | 3900                                      |
| EPM25752V-15R-2R6S | 18-75<br>Nominal 48 | 15                   | 2666                            | 91%                             | 92%                             | 2600                                      |
| EPM25752V-12R-1R6D | 18-75<br>Nominal 48 | ±12                  | ±1666                           | 89%                             | 90%                             | ±2600                                     |
| EPM25752V-15R-1R3D | 18-75<br>Nominal 48 | ±15                  | ±1333                           | 89%                             | 90%                             | ±1600                                     |

1. Efficiency is nominal input voltage and full load @ +25 °C.

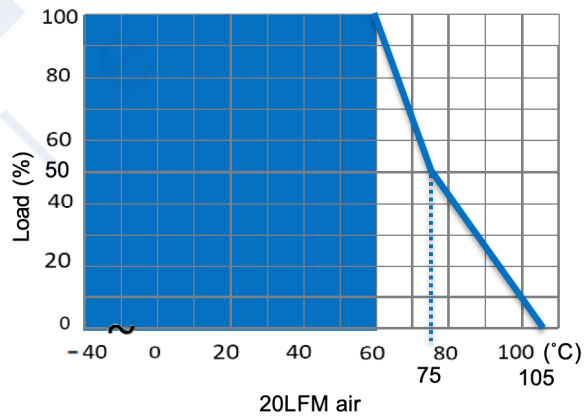
2. Capacitive load is tested at minimum input voltage and a constant resistive load.

3. All specifications valid at nominal input voltage, full load and +25 °C after warm-up time unless otherwise stated.

### Measure method

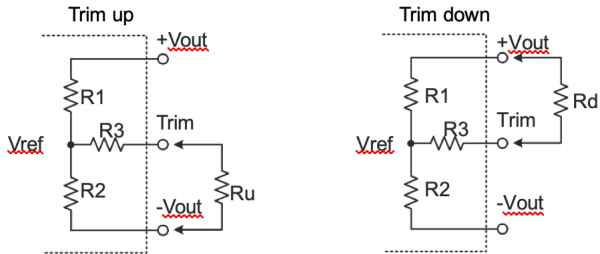


### Derating curve



## Application information

### Single external output voltage trimming



Formula for trim resistor:

$$\text{UP: } R_u = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_0' - V_{ref}} \cdot R_1$$

$$\text{DOWN: } R_d = \frac{bR_1}{R_1 - b} - R_3 \quad b = \frac{V_0' - V_{ref}}{V_{ref}} \cdot R_2$$

1.  $R_u$ ,  $R_d$  is mean trim resistor, please check the formula.
2.  $a$  &  $b$ : user define parameter, no actual meanings.
3.  $V_0'$  is mean trim up/down voltage.
4. Value for  $R_1$ ,  $R_2$ ,  $R_3$  and  $V_{ref}$  Refer to the table below.

| Output voltage | R1       | R2     | R3    | Vref   |
|----------------|----------|--------|-------|--------|
| 3.3 V          | 8.5 kΩ   | 5.1 kΩ | 27 kΩ | 1.24 V |
| 5 V            | 15.47 kΩ | 5.1 kΩ | 33 kΩ | 1.24 V |
| 12 V           | 12.62 kΩ | 3.3 kΩ | 22 kΩ | 2.5 V  |
| 15 V           | 15.1 kΩ  | 3 kΩ   | 22 kΩ | 2.5 V  |

### Trim up

#### 3R3-10RS

| trim (%) | 1      | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10   |
|----------|--------|--------|-------|-------|-------|-------|-------|-------|-------|------|
| Vout (V) | 3.333  | 3.366  | 3.399 | 3.432 | 3.465 | 3.498 | 3.531 | 3.564 | 3.597 | 3.63 |
| Ru (kΩ)  | 373.25 | 150.64 | 87.15 | 57.1  | 39.57 | 28.09 | 19.98 | 13.96 | 9.3   | 5.6  |

#### 05R-8R0S

| trim (%) | 1      | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9    | 10   |
|----------|--------|--------|-------|-------|-------|-------|-------|-------|------|------|
| Vout (V) | 5.05   | 5.1    | 5.15  | 5.2   | 5.25  | 5.3   | 5.35  | 5.4   | 5.45 | 5.5  |
| Ru (kΩ)  | 361.17 | 161.42 | 96.03 | 63.56 | 44.14 | 31.23 | 22.02 | 15.12 | 9.76 | 5.47 |

#### 12R-3R3S

| trim (%) | 1     | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10   |
|----------|-------|--------|-------|-------|-------|-------|-------|-------|-------|------|
| Vout (V) | 12.12 | 12.24  | 12.36 | 12.48 | 12.6  | 12.72 | 12.84 | 12.96 | 13.08 | 13.2 |
| Ru (kΩ)  | 509.2 | 153.87 | 83.38 | 53.23 | 36.49 | 25.85 | 18.48 | 13.08 | 8.95  | 5.69 |

#### 15R-2R6S

| trim (%) | 1      | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10   |
|----------|--------|--------|-------|-------|-------|-------|-------|-------|-------|------|
| Vout (V) | 15.15  | 15.3   | 15.45 | 15.6  | 15.75 | 15.9  | 16.05 | 16.2  | 16.35 | 16.5 |
| Ru (kΩ)  | 544.25 | 152.23 | 80.95 | 51.06 | 34.63 | 24.22 | 17.05 | 11.81 | 7.8   | 4.65 |

### Trim down

#### 3R3-10RS

| trim (%) | 1      | 2      | 3      | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
|----------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|
| Vout (V) | 3.267  | 3.234  | 3.201  | 3.168 | 3.135 | 3.102 | 3.069 | 3.036 | 3.003 | 2.97  |
| Rd (kΩ)  | 407.36 | 206.24 | 130.75 | 91.18 | 66.83 | 50.33 | 38.41 | 29.4  | 22.35 | 16.68 |

#### 05R-8R0S

| trim (%) | 1       | 2      | 3      | 4      | 5      | 6      | 7      | 8     | 9     | 10   |
|----------|---------|--------|--------|--------|--------|--------|--------|-------|-------|------|
| Vout (V) | 4.95    | 4.9    | 4.85   | 4.8    | 4.75   | 4.7    | 4.65   | 4.6   | 4.55  | 4.5  |
| Rd (kΩ)  | 1085.06 | 525.75 | 336.03 | 240.54 | 183.05 | 144.63 | 117.15 | 96.52 | 80.45 | 67.6 |

#### 12R-3R3S

| trim (%) | 1      | 2      | 3      | 4      | 5      | 6      | 7     | 8     | 9     | 10    |
|----------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|
| Vout (V) | 11.88  | 11.76  | 11.64  | 11.52  | 11.4   | 11.28  | 11.16 | 11.04 | 10.92 | 10.8  |
| Rd (kΩ)  | 633.44 | 366.75 | 252.24 | 188.56 | 148.02 | 119.95 | 99.35 | 83.6  | 71.16 | 61.09 |

#### 15R-2R6S

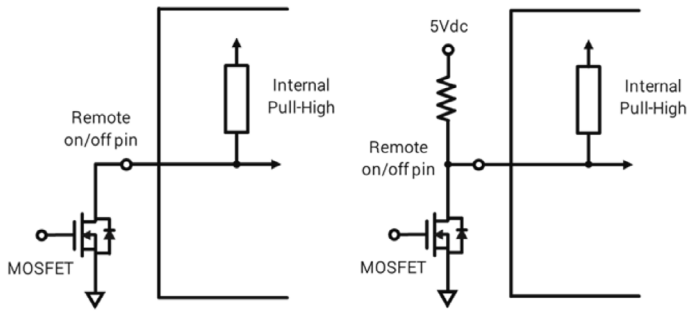
| trim (%) | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9     | 10    |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| Vout (V) | 14.85  | 14.7   | 14.55  | 14.4   | 14.25  | 14.1   | 13.95  | 13.8   | 13.65 | 13.5  |
| Rd (kΩ)  | 777.22 | 458.57 | 319.17 | 240.96 | 190.91 | 156.13 | 130.55 | 110.96 | 95.46 | 82.91 |

**CTRL pin setting**

|               |           |                      |
|---------------|-----------|----------------------|
| Remote ON/OFF | DC-DC ON  | Open or 3 - 12 Vdc   |
|               | DC-DC OFF | Short or 0 - 1.2 Vdc |

If not using CTRL function, leave CTRL pin floating.

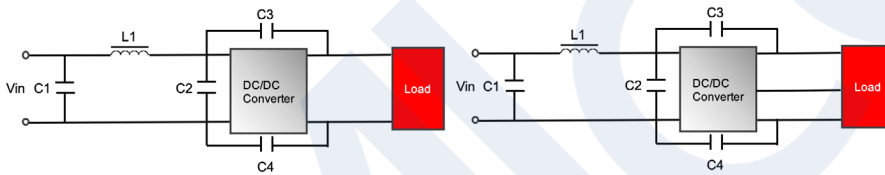
If using CTRL pin to control module to turn on and off; use either external circuit as shown below.



**EMC filtering circuit**

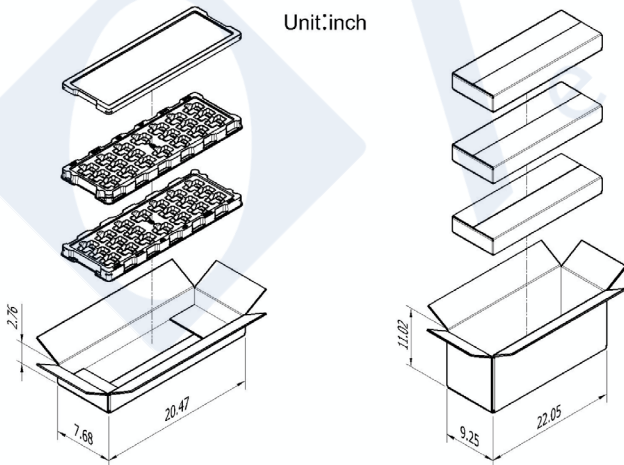
■ Single

■ Dual



| Class B            | C1     | L1     | C2     | C3      | C4      |
|--------------------|--------|--------|--------|---------|---------|
| 24 V <sub>in</sub> | 10 μF  | 1.5 μH | 10 μF  | 2200 pF | 2200 pF |
| 48 V <sub>in</sub> | 4.7 μF | 3.3 μH | 4.7 μF | 2200 pF | 2200 pF |

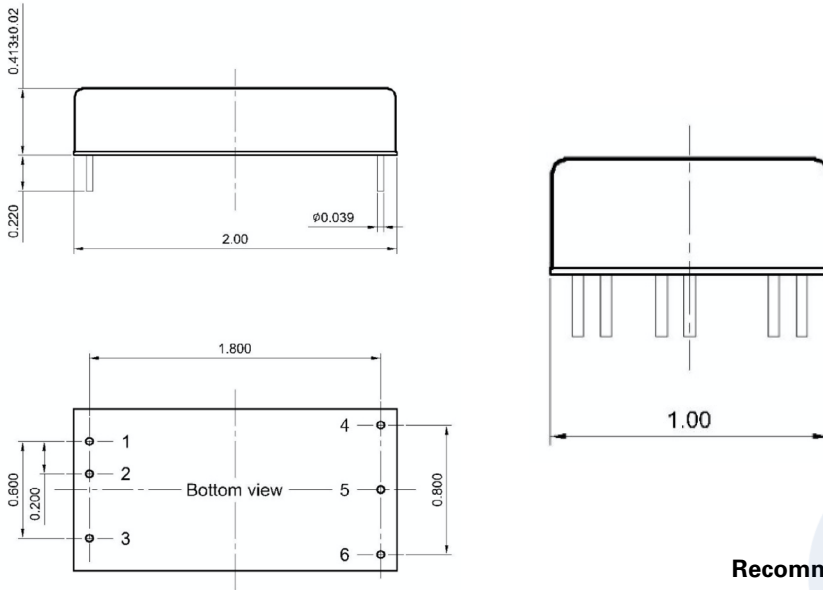
**Packaging- Inches**



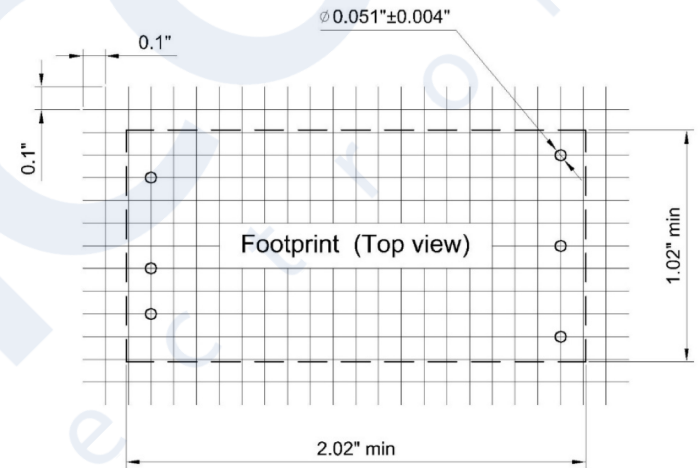
Box accommodates  
2 tray 40 converters per box

Carton accommodates  
3 boxes 120 converters per carton

**Dimensions - inches**



**Recommended PCB layout**



| Pin | Single | Dual   |
|-----|--------|--------|
| 1   | +Vin   | +Vin   |
| 2   | -Vin   | -Vin   |
| 3   | CTRL   | CTRL   |
| 4   | +Vout  | +Vout  |
| 5   | -Vout  | Common |
| 6   | Trim   | -Vout  |

Unit: inch  
PIN tolerance:  $\pm 0.004$   
Tolerance: X.XX  $\pm 0.02$  X.XXX  $\pm 0.015$

**Marking**



WLY = lot code



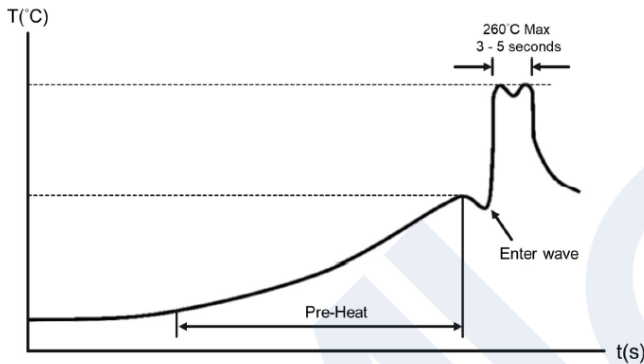
## General information

### Storage and handling

The shelf life will be a minimum of 36 months, when stored at the following conditions: < +40 °C, < 90% RH.

### Wave solder profile

The wave solder profile is measured based on lead temperature. The recommended PCB pre-heat temperature is +80 °C to +100 °C, and the preheat rate of 1.5 to 2.5 °C/sec. The underside PCB temperature at the last pre-heat zone should be approximately +150 °C. The internal temperature of the solder parts should not exceed +210 °C. The duration of solder dwell time should be between 3 to 5 seconds, and not to exceed 10 seconds at a temperature of +260 °C maximum.



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