# Features

# Regulated Converters

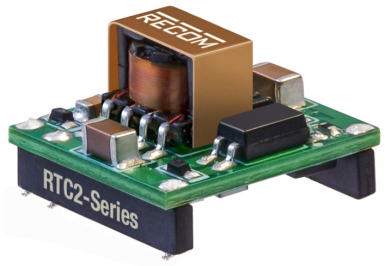
- 2:1 Wide Input Range Regulated Converter
- 2W In Compact SMD Package
- -40°C To +85°C Operating Temperature @ Full Load
- high 3kVDC/1 Second (1kVAC/1 Minute)
- Continuous Short Circuit Protection
- IEC/EN62368-1 Certified (CB Scheme)

RECOM
DC/DC Converter

# RTC2

## 2 Watt SMD Single Output

3 YEAR warranty




IEC/EN62368-1 Certified
CB Report
EN55022

## Description

The RTC2 is a 2W, open-frame, SMD, isolated DC/DC converter with 2:1 input voltage range. It is available with 5V (4.5-9V) or 24V (18-36V) inputs and offers a single 5V output which is short circuit protected. The output is tightly regulated with less than 50mV output ripple. There is no minimum load requirement. The operating temperature is -40°C up to 100°C (with derating). Isolation is 3kVDC/1kVAC (functional Isolation) and a control pin is fitted as standard. The converter is IEC/EN62368-1 certified and is 10/10 RoHS-conform. Class B EMC conformity can be reached with a simple external LC filter.

## Selection Guide

| Part Number | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. (1) [%] | max. Capacitive Load (2) [µF] |
|---|---|---|---|---|---|
| RTC2-0505SRW | 4.5 - 9 | 5 | 400 | 76 | 4700 |
| RTC2-2405SRW | 18 - 36 | 5 | 400 | 80 | 4700 |

**Notes:**

Note1: Efficiency is tested at nominal input and full load at +25°C ambient.

Note2: Max. cap. load is tested at minimum input and full resistive load.

## Model Numbering

RTC2-__ __ SRW-__

- nom. Input Voltage
- Output Voltage
- Packaging (3)
- **S**ingle

**Notes:**

Note3: without suffix, standard tray packaging
add suffix „-R“ for Tape and Reel packaging

**Ordering Examples:**

RTC2-0505SRW = nom.Vin=5VDC, nom. Vout= 5VDC, standard 3kVDC/1 second isolation, tray packaging
RTC2-2405SRW-R = nom.Vin= 24DC, nom. Vout= 5VDC, standard 3kVDC/1 second isolation, tape and reel packaging

## Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

| BASIC CHARACTERISTICS | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Condition** | | **Min.** | **Typ.** | **Max.** |
| Internal Input Filter | | | | | capacitor |
| Input Voltage Range | nom. Vin= | 5VDC<br>24VDC | 4.5VDC<br>18VDC | 5VDC<br>24VDC | 9VDC<br>36VDC |
| Input Surge Voltage | 100ms max. nom. Vin= | 5VDC<br>24VDC | | 15VDC<br>50VDC | |
| Quiescent Current | nom. Vin= | 5VDC<br>24VDC | | 40mA<br>3mA | |

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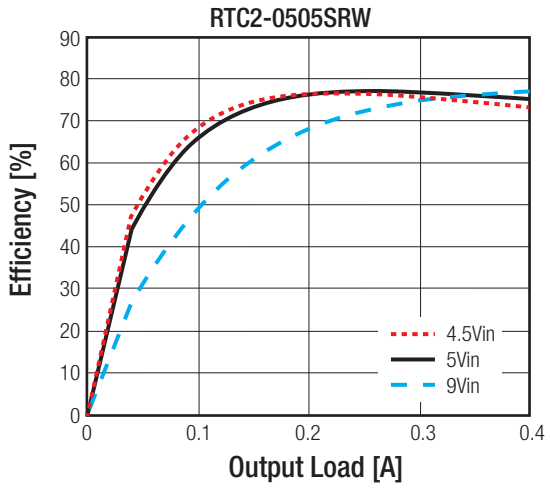
## Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

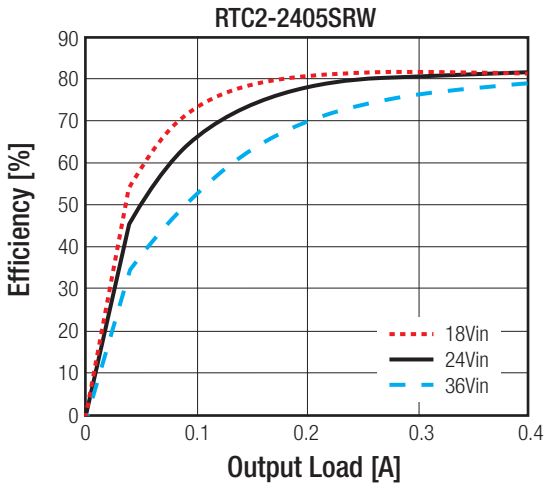
| Parameter | Condition | | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Start-up time | | | | 500µs | |
| Rise Time | | | | 450µs | |
| Hold-up Time | | | | 10µs | |
| Internal Operating Frequency | nom Vin= | 5VDC<br>24VDC | | 180kHz<br>210kHz | |
| Minimum Load | | | 0% | | |
| Output Ripple and Noise [4] | 20MHz BW | | | | 50mVp-p |
| ON/OFF CTRL | DC-DC ON<br>DC-DC OFF | | | | Open or 0.0V<Vr<0.8VDC<br>2V<Vr<6VDC |
| Input Current of CTRL Pin | nom Vin= | 5VDC<br>24VDC | | 40mA<br>16mA | |
| Standby Current | | | | 0.75mA | 1.5mA |

**Notes:**

Note4: Measurements are made with a 0.1µF MLCC across output. (low ESR)

### Efficiency vs. Load

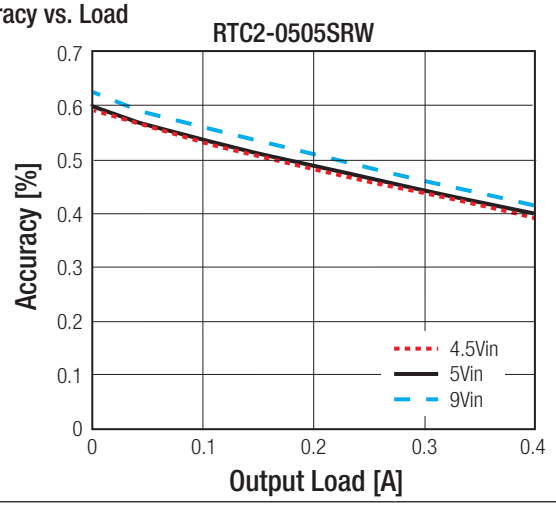


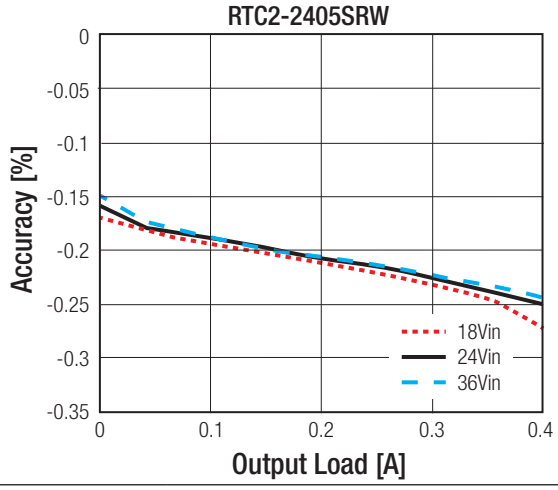




## REGULATIONS

| Parameter | Condition | Value |
|---|---|---|
| Output Accuracy | | ±2.0% typ. |
| Line Regulation | low line to high line, full load | ±0.2% max. |
| Load Regulation | 0% to 100% load | ±0.5% max. |

### Accuracy vs. Load



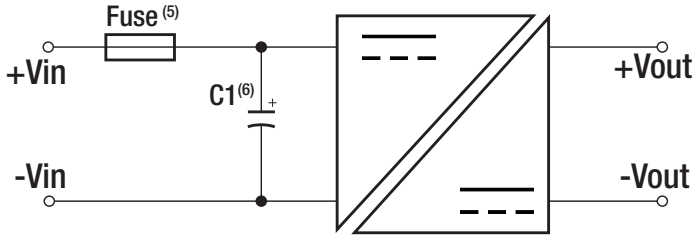



## Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

### PROTECTIONS

| Parameter | Type | | Value |
|---|---|---|---|
| Short Circuit Protection (SCP) | below 100mΩ | | continuous, auto recovery |
| Isolation Voltage [5] | I/P to O/P | tested for 1 second | 3kVDC |
| | | rated for 1 minute | 1kVAC [7] |
| Isolation Resistance | | | 1GΩ min. |
| Isolation Capacitance | | | 25pF typ. |
| Insulation Grade | | | functional |

**Protection Circuit**




**Notes:**

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note6 An input fuse is required if the main supply is not over-current protected. Recommended fuse: T2A slow blow type

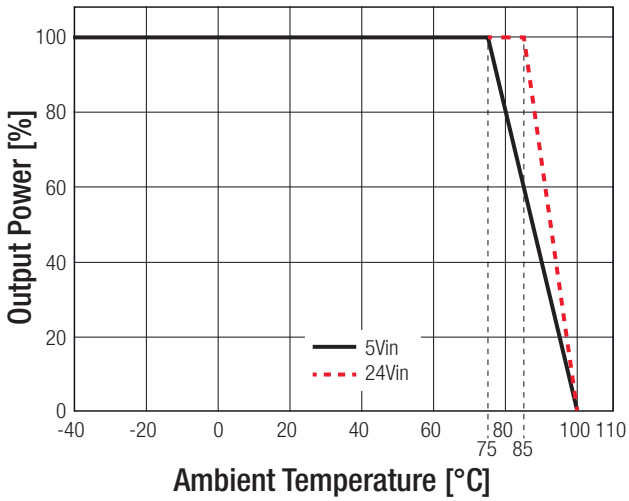
Note7: An external input filter capacitor is required if the model has to meet EN6100-4-4 and EN61000-4-5
Recom suggested: Nippon chemi-con KY Series, 220µF/100V ESR 48mΩ

Note8: Customers are allowed to test once with 1kVAC/1 minute in their production. Thereafter the test voltage and time must be reduced for any repeat testing

### ENVIRONMENTAL

| Parameter | Condition | Value |
|---|---|---|
| Operating Temperature Range | with derating (see graph) | -40°C to +100°C |
| Temperature Coefficient | | ±0.05%/°C |
| Operating Altitude | | 5000m |
| Operating Humidity | non-condensing | 5% - 95% RH max. |
| Pollution Degree | | PD2 |
| Vibration | | according to MIL-STD-202G |
| MTBF | according to MIL-HDBK-217F, G.B. +25°C | 2145 x 10³ hours |

**Derating Graph**
(@ Chamber and natural convection 0.1m/s)

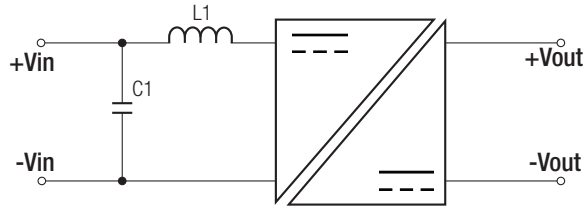


## Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

| SAFETY AND CERTIFICATIONS | | |
|---|---|---|
| **Certificate Type (Safety)** | **Report / File Number** | **Standard** |
| Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme) | L0339m43-CB-1-B1 | IEC62368-1, 2nd Edition, 2014<br>EN62368-1, 2014 |
| RoHS2 | | RoHS-2011/65/EU + AM2 (10/10) |

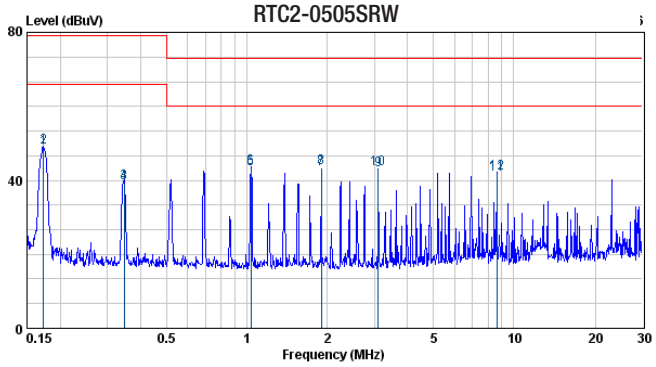
| **EMC Compliance** | **Condition** | **Standard / Criterion** |
|---|---|---|
| Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement | with external filter<br>(see filter suggestion below) | EN55022, Class A<br>EN55022, Class B |
| Electromagnetic compatibility of multimedia equipment - Emission requirements | | EN55032, Class B |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement | | EN55024 |
| ESD Electrostatic discharge immunity test | Air: ±8kV; Contact: ±4kV | EN61000-4-2, Criteria A |
| Radiated, radio-frequency, electromagnetic field immunity test | 3V/m | EN61000-4-3, Criteria A |
| Fast Transient and Burst Immunity | DC Port: ±0.5kV | EN61000-4-4, Criteria A |
| Surge Immunity | DC Port: ±1kV | EN61000-4-5, Criteria B |
| Immunity to conducted disturbances, induced by radio-frequency fields | DC Port: 3V | EN61000-4-6, Criteria A |
| Power Magnetic Field Immunity | 50Hz 1A/m | EN61000-4-8, Criteria A |

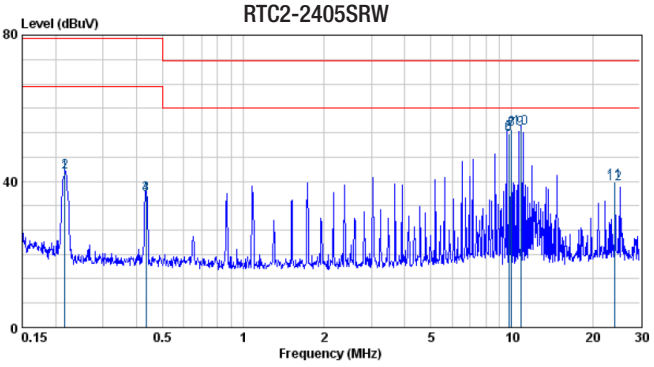
### EMC Filtering Suggestions according to EN55022 Class A




| nom. Vin | C1 | L1 |
|---|---|---|
| 5VDC | 22µF/16V MLCC | 12µH SMD Inductor |
| 24VDC | 22µF/50V MLCC | 22µH SMD Inductor |

### EN55022 Class A Conducted Emmisions

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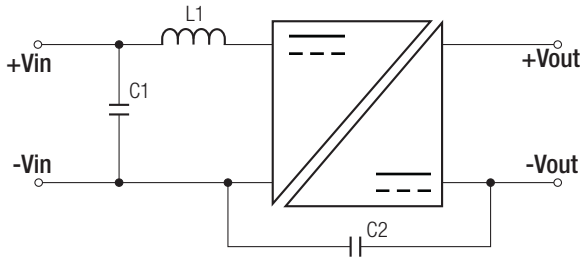
## Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

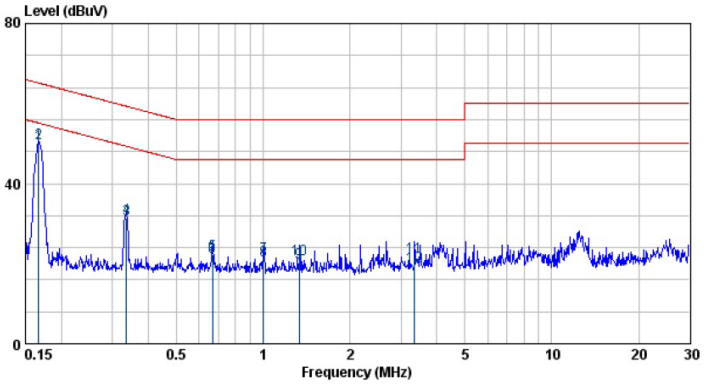
### EMC Filtering Suggestions according to EN55022 Class B



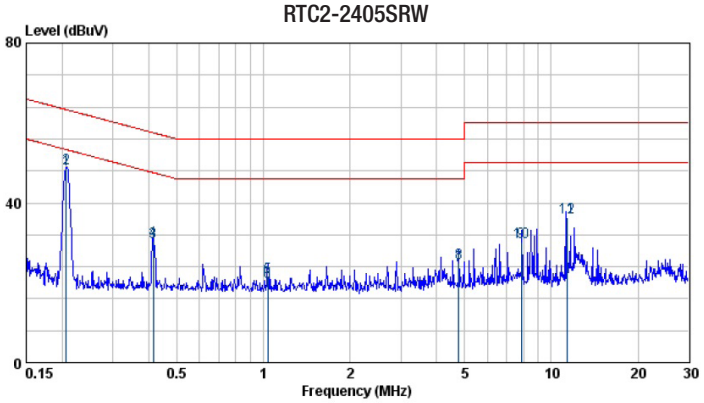

| nom. Vin | C1 | C2 | L1 |
|---|---|---|---|
| 5VDC | 22µF/16V MLCC | 220pF/4kV Disc ceramic | 12µH SMD Inductor |
| 24VDC | 22µF/50V MLCC | | |

### EN55022 Class B Conducted Emmisions

RTC2-0505SRW




RTC2-2405SRW




| DIMENSION and PHYSICAL CHARACTERISTICS | | |
|---|---|---|
| **Parameter** | **Type** | **Value** |
| Material | Case (spacers)<br>PCB | plastic (UL94 V-0)<br>FR4 (UL94 V-0) |
| Package Dimension (LxWxH) | | 14.99 x 14.22 x 9.6mm |
| Package Weight | | 2.0g typ. |

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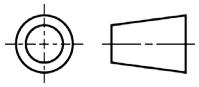
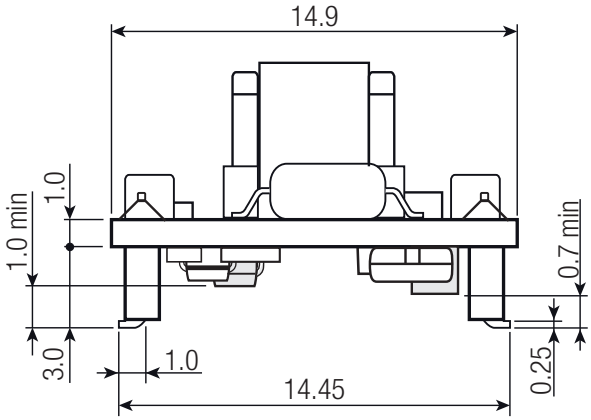
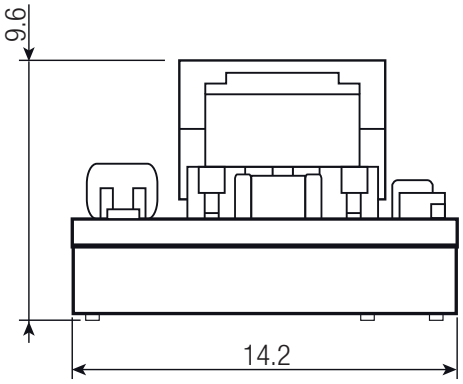
## Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

### Derating Graph
(@ Chamber and natural convection 0.1m/s)



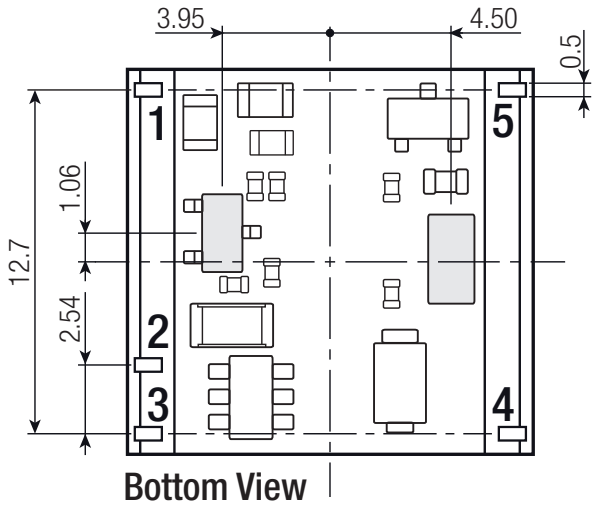


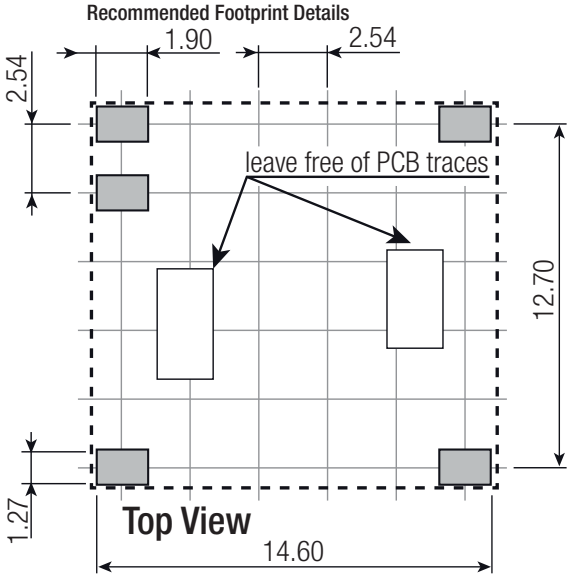

**Pin Connection**

| Pin # | Function |
|---|---|
| 1 | +Vin |
| 2 | -Vin |
| 3 | CTRL |
| 4 | +Vout |
| 5 | -Vout |

Tolerance: xx.x±0.5mm
xx.xx ±0.25mm
Pin dimension: ±0.1mm

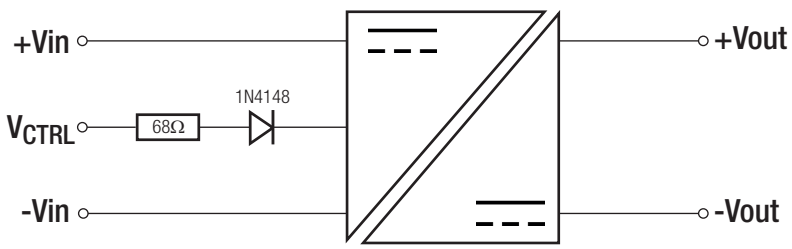



Recommended Footprint Details




## INSTALLATION and APPLICATION

### ON/OFF CTRL Circuit




DC-DC ON: Open or 0V<Vr<0.8VDC
DC-DC OFF: 2V<Vr<6VDC

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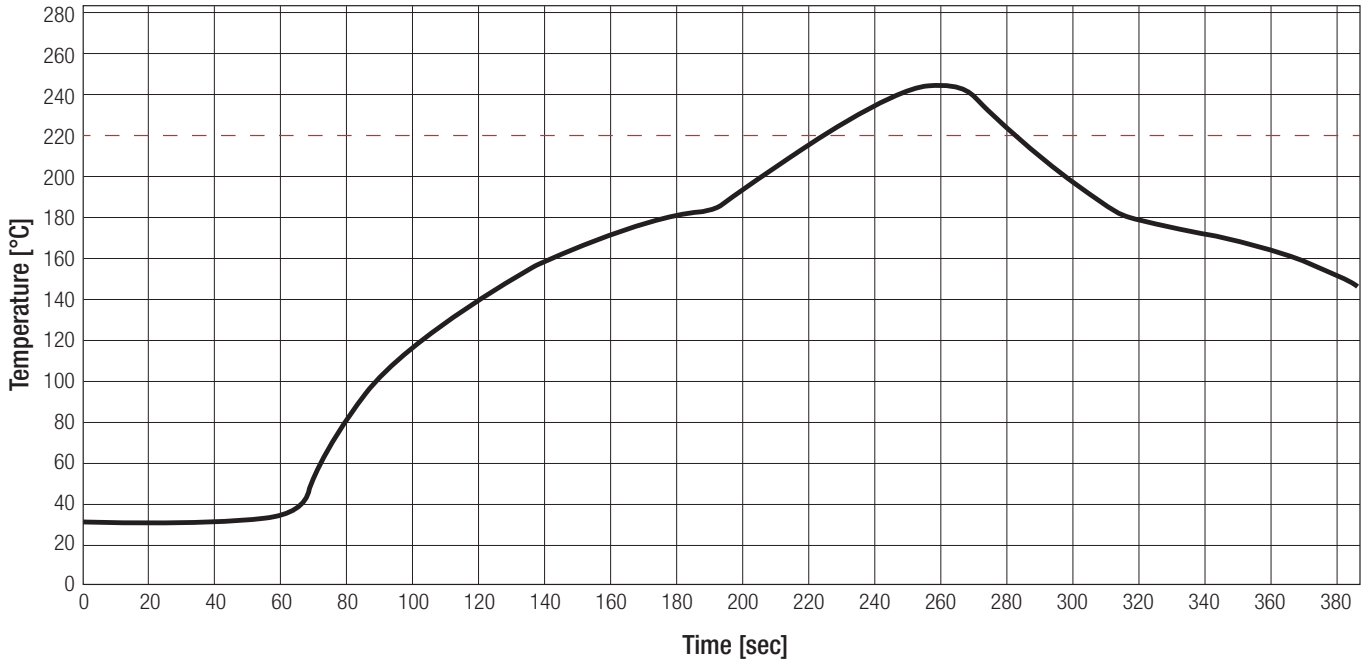
## Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

### Lead-free Recommended Solder Profile according to JEDEC STD-020D-01




| PACKAGING INFORMATION | | |
|---|---|---|
| Packaging Dimension (LxWxH) | tray carton<br>tray | 260.0 x 205.0 x 25.0mm<br>240.0 x 200.0 x 20.0mm |
| | tape and reel (-R) carton<br>reel | 385.0 x 375.0 x 70.0mm<br>330.0 x 50.0 x 330.0mm |
| Packaging Quantity | tray<br>tape and reel (-R) | 30pcs<br>200pcs |
| Tape Width | | 44mm |
| Storage Temperature Range | | -55°C to +125°C |
| Storage Humidity | | 95% RH max. |