

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)

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



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= 24VDC, nom. Vout= 5VDC, standard 3kVDC/1 second isolation, tape and reel packaging

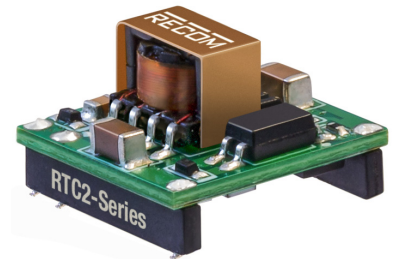
Specifications (measured @ ta= 25°C, nominal Vin, full load and after warm up unless otherwise specified)

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

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RTC2

2 Watt
SMD
Single Output



IEC/EN62368-1 Certified
CB Report
EN55022

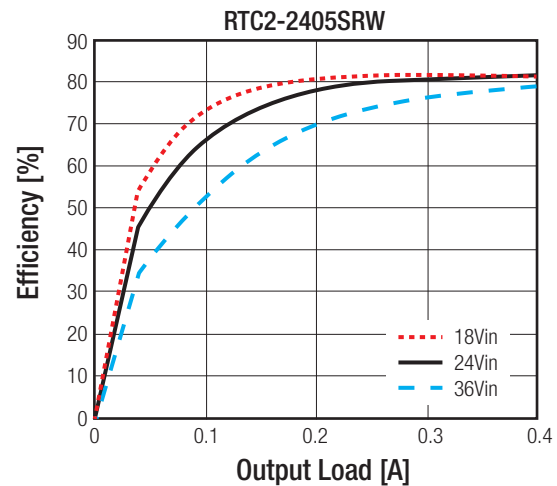
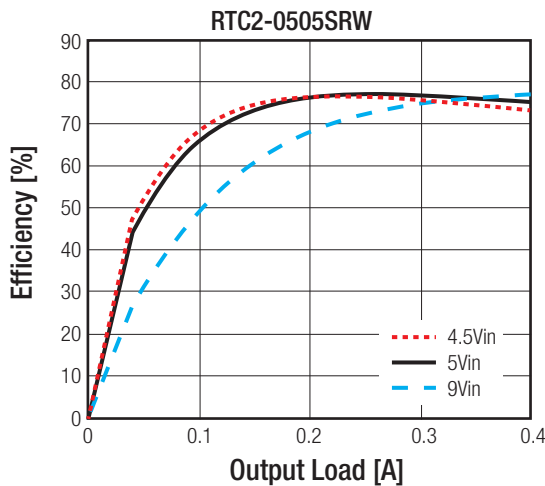
Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal V_{in} , full load and after warm up unless otherwise specified)

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

Notes:

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

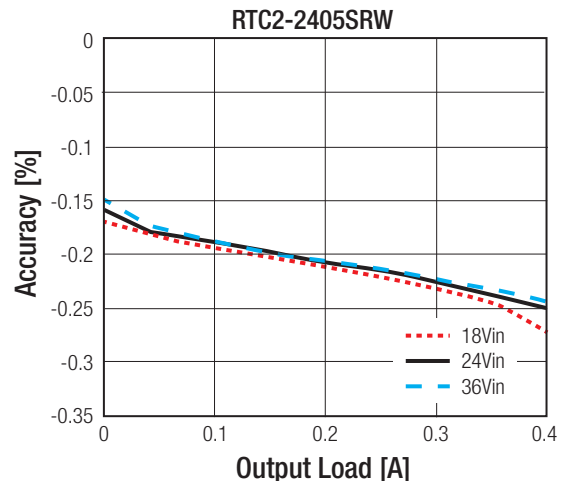
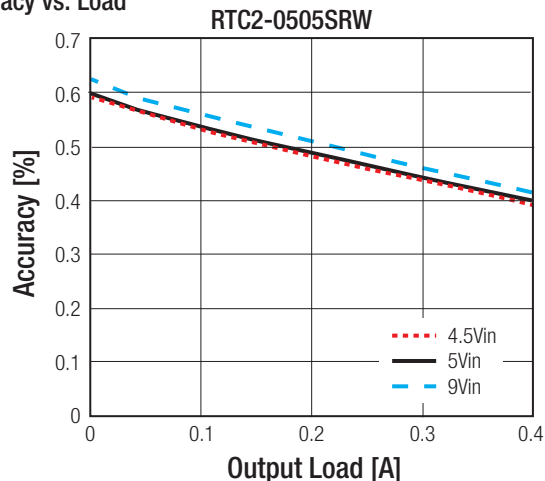
Efficiency vs. Load



REGULATIONS

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

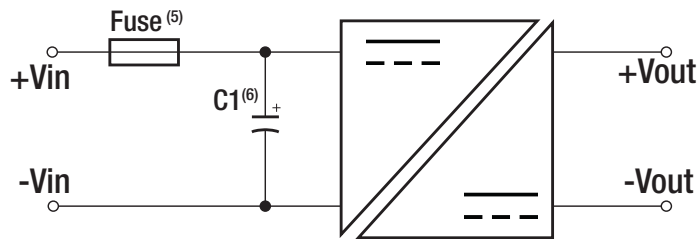
Accuracy vs. Load



Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal V_{in} , full load and after warm up unless otherwise specified)

PROTECTIONS			
Parameter	Type	Value	
Short Circuit Protection (SCP)	below $100\text{m}\Omega$	continuous, auto recovery	
Isolation Voltage ⁽⁵⁾	I/P to O/P	tested for 1 second	3kVDC
		rated for 1 minute	1kVAC ⁽⁷⁾
Isolation Resistance		$1\text{G}\Omega$ min.	
Isolation Capacitance		25pF typ.	
Insulation Grade		functional	

Protection Circuit



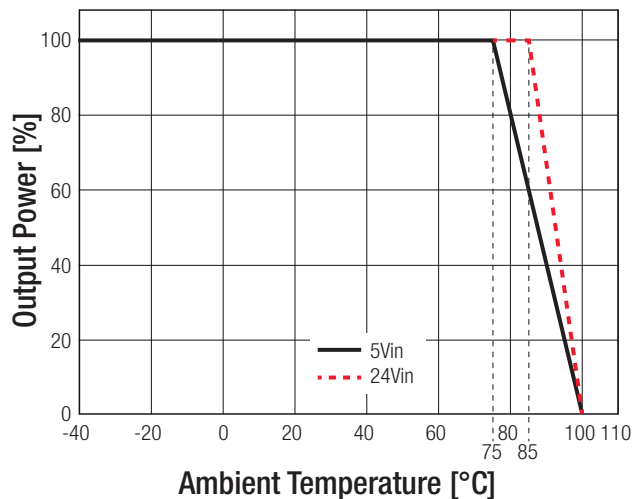
Notes:

- 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, $220\mu\text{F}/100\text{V}$ ESR $48\text{m}\Omega$
- 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 $+100^\circ\text{C}$
Temperature Coefficient		$\pm 0.05\%/^\circ\text{C}$
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. $+25^\circ\text{C}$	2145×10^3 hours

Derating Graph

(@ Chamber and natural convection 0.1m/s)



Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal V_{in} , full load and after warm up unless otherwise specified)

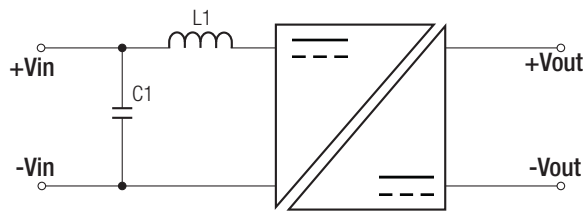
SAFETY AND CERTIFICATIONS

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 EN62368-1, 2014
RoHS2		RoHS-2011/65/EU + AM2 (10/10)

EMC Compliance

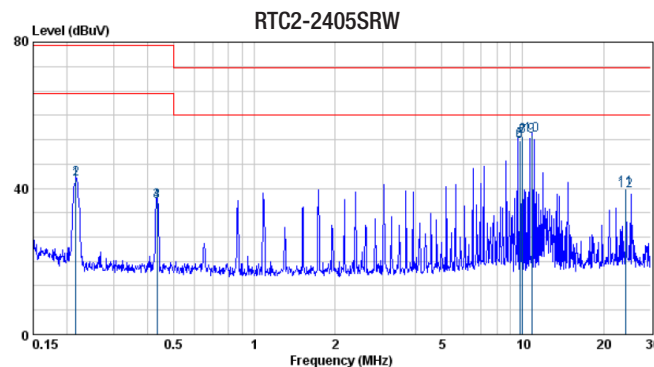
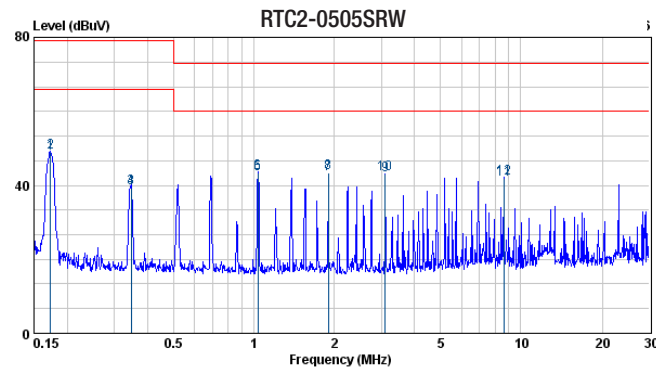
EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external filter (see filter suggestion below)	EN55022, Class A EN55022, Class B
Electromagnetic compatibility of multimedia equipment - Emission requirements		EN55032, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024
ESD Electrostatic discharge immunity test	Air: $\pm 8\text{kV}$; Contact: $\pm 4\text{kV}$	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: $\pm 0.5\text{kV}$	EN61000-4-4, Criteria A
Surge Immunity	DC Port: $\pm 1\text{kV}$	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. V_{in}	C1	L1
5VDC	22 μF /16V MLCC	12 μH SMD Inductor
24VDC	22 μF /50V MLCC	22 μH SMD Inductor

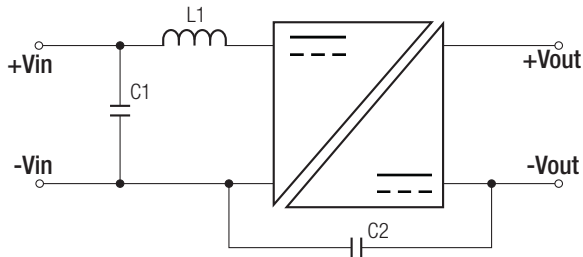
EN55022 Class A Conducted Emissions



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Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal V_{in} , full load and after warm up unless otherwise specified)

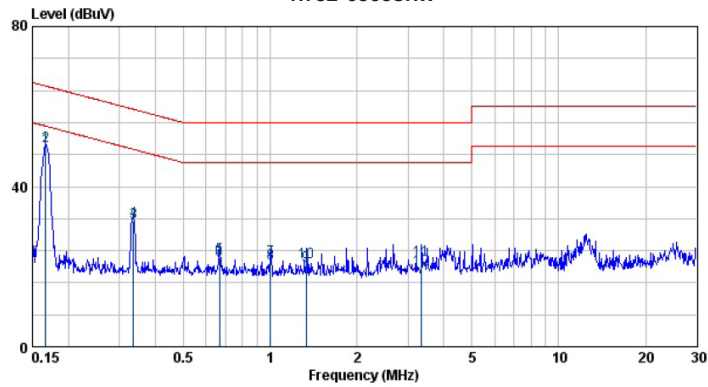
EMC Filtering Suggestions according to EN55022 Class B



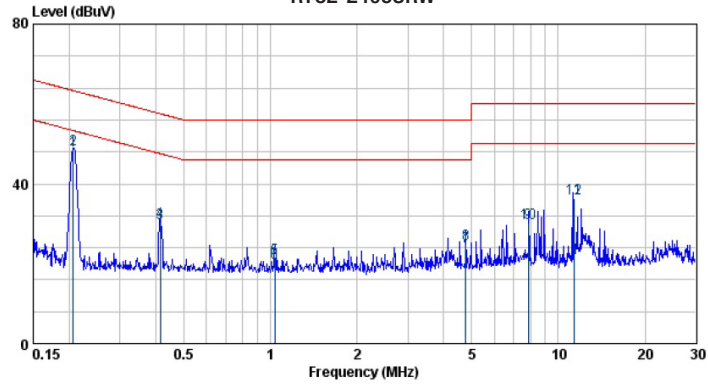
nom. V_{in}	C1	C2	L1
5VDC	22 μF /16V MLCC	220pF/4kV	12 μH SMD
24VDC	22 μF /50V MLCC	Disc ceramic	Inductor

EN55022 Class B Conducted Emissions

RTC2-0505SRW



RTC2-2405SRW



DIMENSION and PHYSICAL CHARACTERISTICS

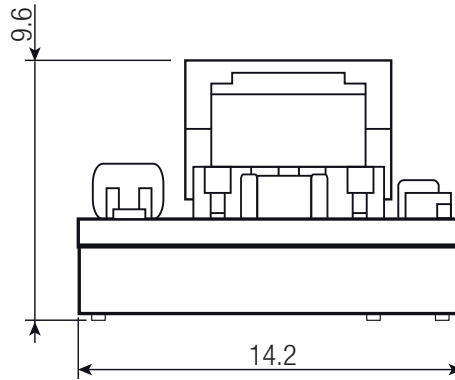
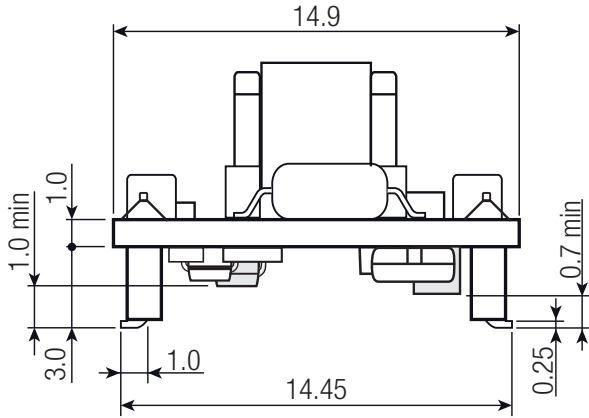
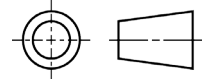
Parameter	Type	Value
Material	Case (spacers) PCB	plastic (UL94 V-0) FR4 (UL94 V-0)
Package Dimension (LxWxH)		14.99 x 14.22 x 9.6mm
Package Weight		2.0g typ.

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Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal V_{in} , full load and after warm up unless otherwise specified)

Derating Graph

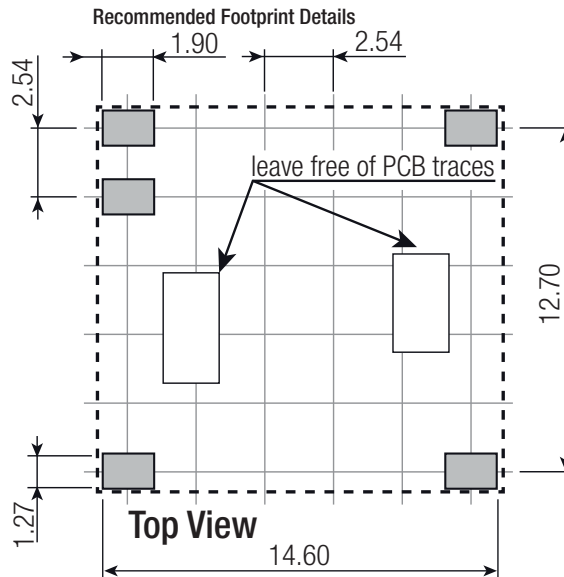
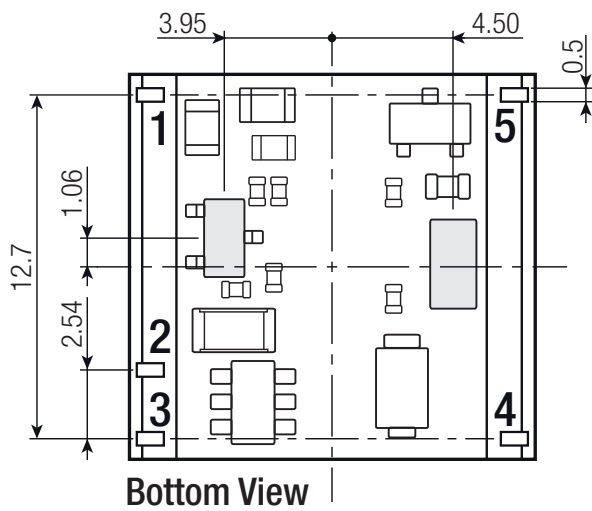
(@ Chamber and natural convection 0.1 m/s)



Pin Connection

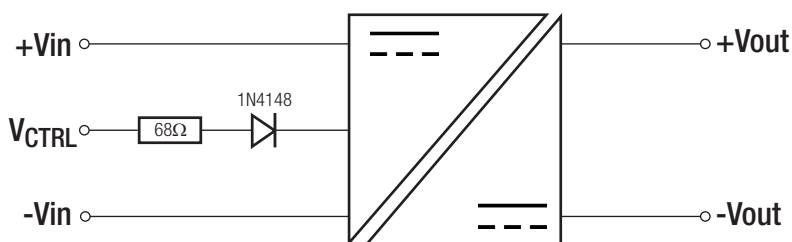
Pin #	Function
1	+Vin
2	-Vin
3	CTRL
4	+Vout
5	-Vout

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



INSTALLATION and APPLICATION

ON/OFF CTRL Circuit

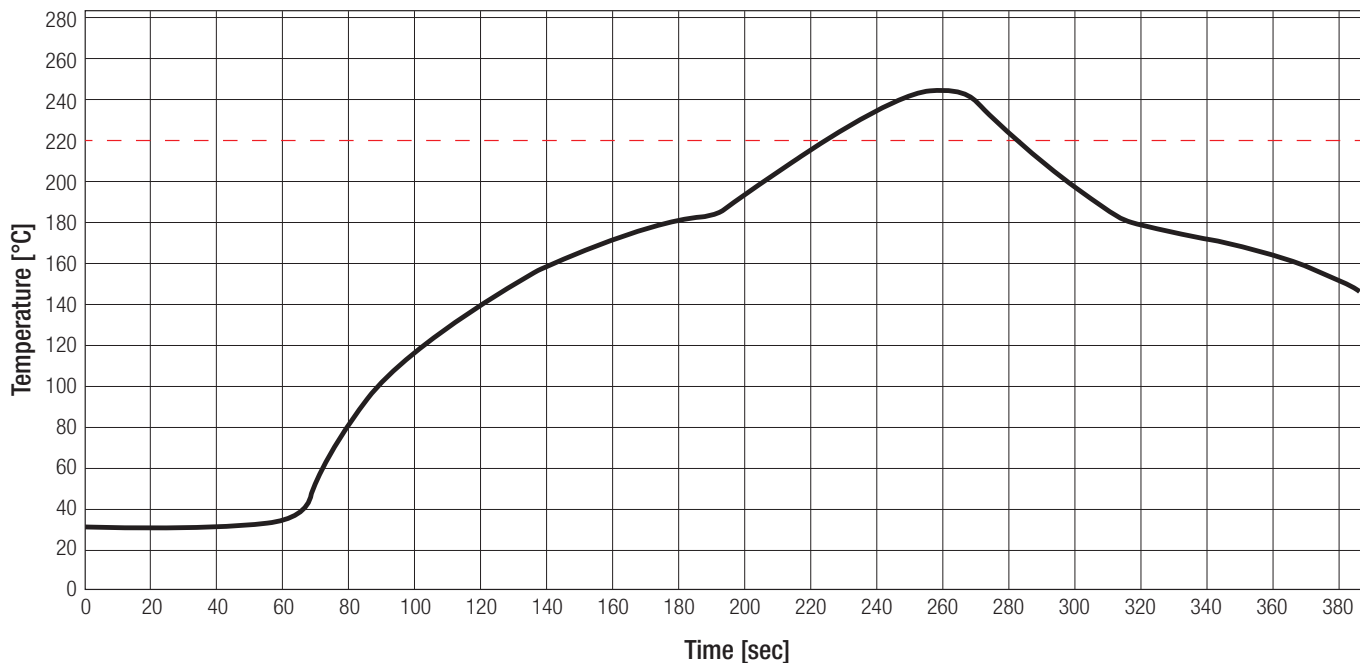


DC-DC ON: Open or $0V < V_r < 0.8V_{DC}$
DC-DC OFF: $2V < V_r < 6V_{DC}$

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Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal V_{in} , 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	260.0 x 205.0 x 25.0mm
	tray	240.0 x 200.0 x 20.0mm
Packaging Quantity	tape and reel (-R) carton	385.0 x 375.0 x 70.0mm
	reel	330.0 x 50.0 x 330.0mm
Tape Width	tray	30pcs
Storage Temperature Range	tape and reel (-R)	200pcs
Storage Humidity		44mm
		-55°C to +125°C
		95% RH max.

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