

# Features

- Eighth brick format
- 4:1 input voltage range
- 1.5kV basic isolation
- Remote ON/OFF, sense, and trim pins
- UVLO, OTP, OVP, OCP and SCP
- 92% efficiency (typical)

# Regulated Converter



## RPA100E-W

100 Watt  
Eighth Brick  
Single Output



UL62368-1 - certified  
CAN/CSA-C22.2 No. 62368-1 - certified  
CISPR22 compliant

### Description

The RPA100E-W is a low cost 100W DC/DC converter in industry standard 1/8th brick low profile format (58.4mm x 23mm x 11mm) and pinning. The 4:1 input range covers 24V, 28V, or 48V nominal input voltages, and the trimmable output voltage options are 5V or 12V. The efficiency is particularly high (typically 92%) to permit full load operation from -40°C up to +50°C ambient temperature with only free air convection and up to 85°C with forced air cooling. The isolation voltage is 1.5kVDC/1 minute (basic insulation grade). Applications include demanding industrial power supplies, telecom, and PoE circuits.

### Selection Guide

Part Number	Input Voltage Range [VDC]	Nom. Output Voltage [VDC]	Output Current [A]	Efficiency typ. <sup>(1)</sup> [%]
RPA100E-4805SW/N	18-75	5	25	91
RPA100E-4812SW/N	18-75	12	9	92

**Notes:**

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

### Model Numbering



**Notes:**

Note2: suffix "N" = negative CTRL function, refer to "ON/OFF CTRL"

**Ordering Examples:**

RPA100E-4805SW/N	18-75Vin,	5VDC Output,	Single,	Negative control logic
RPA100E-4812SW/N	18-75Vin,	12VDC Output,	Single,	Negative control logic

**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**BASIC CHARACTERISTICS**

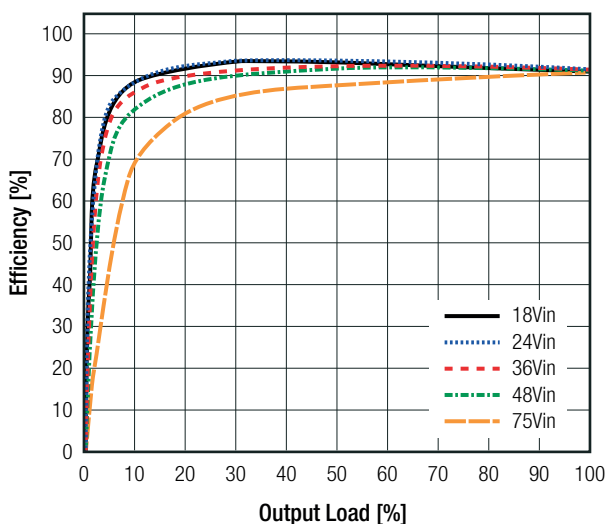
Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range	nom $V_{IN}$ = 48VDC		18VDC	48VDC	75VDC
Absolute Maximum Input Voltage	continuous		0VDC		80VDC
Input Surge Voltage	100ms max.				100VDC
Under Voltage Lockout (UVLO)	DC-DC ON		16.5VDC	17.2VDC	17.9VDC
	DC-DC OFF		15.5VDC	16.2VDC	16.9VDC
	hysteresis		0.3VDC	1VDC	1.8VDC
Input Current	$V_{IN}$ = 18VDC, full load	$V_{OUT}$ = 5VDC $V_{OUT}$ = 12VDC			8.9A 7.7A
Inrush Current					1A <sup>2</sup> s
Quiescent Current	$V_{IN}$ = 48VDC, no load	$V_{OUT}$ = 5VDC $V_{OUT}$ = 12VDC		55mA 60mA	
Standby Current	DC-DC OFF		$V_{OUT}$ = 5VDC $V_{OUT}$ = 12VDC	5mA 12mA	
Output Voltage Trimming <sup>(3)</sup>	refer to <b>"OUTPUT VOLTAGE TRIMMING"</b>		$V_{OUT}$ = 5VDC $V_{OUT}$ = 12VDC	-20% -10%	+10%
Minimum Load			0%		
Start-up Time	Power up ON/OFF CTRL			55ms 55ms	
ON/OFF CTRL <sup>(4)</sup>	Negative Logic	DC-DC ON DC-DC OFF	-0.7VDC < $V_{CTRL}$ < 0.8VDC Open or 3VDC < $V_{CTRL}$ < 5VDC		
Input Current of CTRL pin					1mA
Leakage Current of CTRL pin	logic high, $V_{CTRL}$ = 5VDC				50µA
Internal Operating Frequency	$V_{OUT}$ = 5VDC $V_{OUT}$ = 12VDC			300kHz 350kHz	
Output Ripple & Noise <sup>(5)</sup>	5-20MHz BW, 48Vin, full load		$V_{OUT}$ = 5VDC $V_{OUT}$ = 12VDC	70mVp-p 80mVp-p	
Remote Sense	$P_{OUT}$ ≤ max rated power, $I_{OUT}$ ≤ $I_{OUT}$ max				10%

**Notes:**

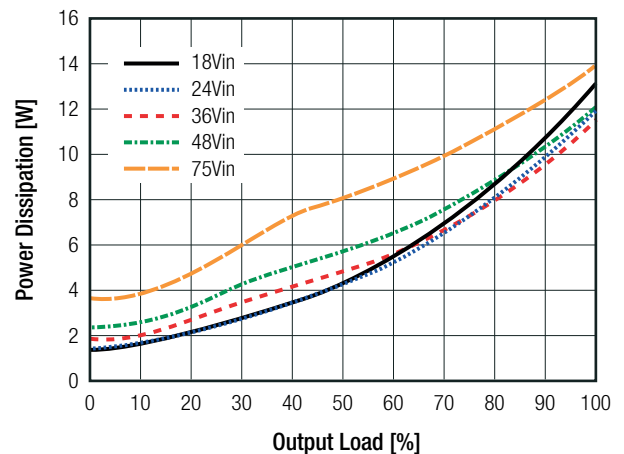
- Note3: Trim up when input voltage is greater than 20VDC only
- Note4: If CTRL function is not used, please short the CTRL pin to -Vin
- Note5: Measurements are made with a 1µF ceramic, 10µF tantalum across output

**RPA100E-4805W/N**

**Efficiency vs. Output Current**



**Power Dissipation vs. Output Current**

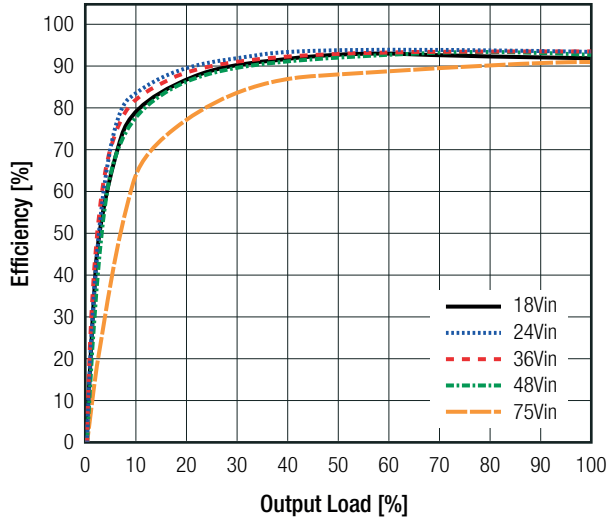


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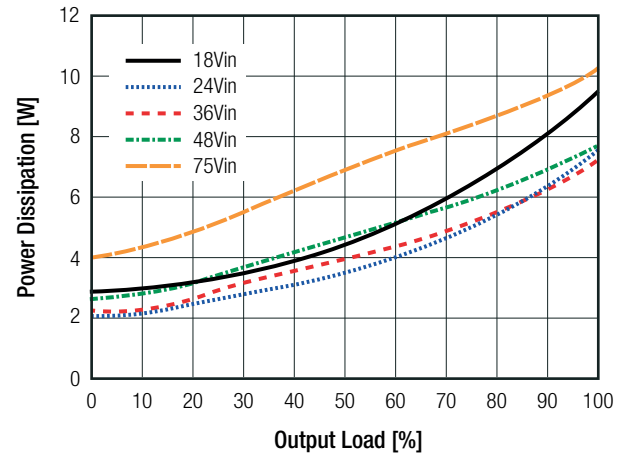
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

RPA100E-4812W/N

Efficiency vs. Output Current

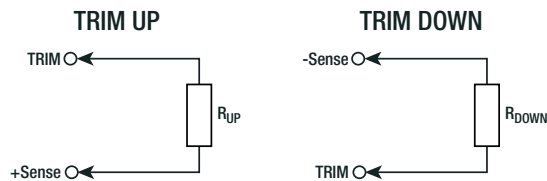


Power Dissipation vs. Output Current



### OUTPUT VOLTAGE TRIMMING

RPA100E-W converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. The values for trim resistors shown in trim tables below are according to standard E96 values; therefore, the specified voltage may slightly vary; they can also be calculated with below shown equation.



$V_{OUTnom}$  = nom. output voltage [VDC]  
 $V_{OUTset}$  = trimmed output voltage [VDC]  
 $\Delta V_{OUT}$  = output voltage change [%]  
 $R_{up}$  = trim up resistor [ $\Omega$ ]  
 $R_{down}$  = trim down resistor [ $\Omega$ ]

**Calculation:**

$$R_{UP} = \frac{5.11 \times V_{OUTnom} \times (100 + \Delta V_{OUT})}{1.225 \times \Delta V_{OUT}} - \frac{511}{\Delta V_{OUT}} - 10.22$$

$$R_{DOWN} = \frac{511}{\Delta V_{OUT}} - 10.22$$

**Practical Example RPA100E-4812SW/N trim up +10%**

$V_{OUTnom} = 12V, \Delta V_{OUT} = +10\%$  (13.2VDC)

$$R_{UP} = \left[ \frac{5.11 \times 12 \times (100 + 10)}{1.225 \times 10} \right] - \frac{511}{10} - 10.22 = 489.3k\Omega$$

$R_{UP}$  according to E96  $\approx$  **487k $\Omega$**

**Practical Example RPA100E-4812SW/N trim down -10%**

$V_{OUTnom} = 12V, \Delta V_{OUT} = -10\%$  (10.8VDC)

$$R_{DOWN} = \left[ \frac{511}{10} \right] - 10.22 = 40.88k\Omega$$

$R_{DOWN}$  according to E96  $\approx$  **41k $\Omega$**

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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**RPA100E-4805SW/N**

$\Delta V_{OUT} =$	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	[%]
$V_{OUTset} =$	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50	[VDC]
$R_{UP} =$	1M58	806k	536k	402k	324k	274k	237k	205k	187k	169k	[ $\Omega$ ]

$\Delta V_{OUT} =$	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
$V_{OUTset} =$	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	[VDC]
$R_{DOWN} =$	499k	243k	162k	118k	90k9	75k	63k4	53k6	46k4	41k2	[ $\Omega$ ]

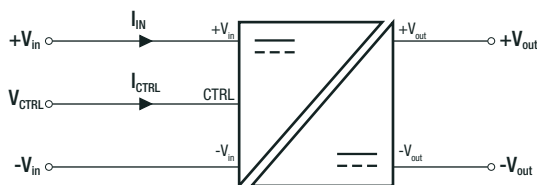
$\Delta V_{OUT} =$	11	12	13	14	15	16	17	18	19	20	[%]
$V_{OUTset} =$	28.48	28.16	27.84	27.52	27.20	26.88	26.56	26.24	25.92	25.60	[VDC]
$R_{DOWN} =$	36k5	32k4	29k4	26k1	23k7	21k5	20k	18k2	16k5	15k4	[ $\Omega$ ]

**RPA100E-4812SW/N**

Trim up	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	[%]
$V_{OUTset} =$	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20	[VDC]
$R_{UP} =$	4M53	2M26	1M58	1M15	931k	787k	681k	604k	536k	487k	[ $\Omega$ ]

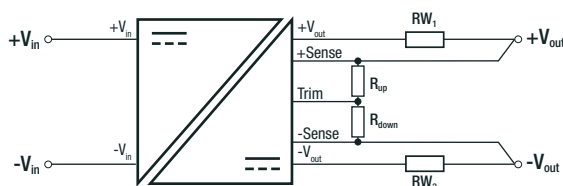
Trim down	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	[%]
$V_{OUTset} =$	11.88	11.76	11.64	11.52	11.40	11.28	11.16	11.04	10.92	10.80	[VDC]
$R_{DOWN} =$	499k	243k	162k	118k	90k9	75k	63k4	53k6	46k4	41k2	[ $\Omega$ ]

**ON/OFF CTRL**



Negative Logic DC-DC ON  
DC-DC OFF  $-0.7VDC < V_{CTRL} < 0.8VDC$   
Open or  $3VDC < V_{CTRL} < 5VDC$

**REMOTE SENSE**



$RW_1$  ... wire losses +  
 $RW_2$  ... wire losses -  
 $R_{up}$  ... trim up resistor  
 $R_{down}$  ... trim down resistor

The output voltage can be adjusted by both trim and remote sense. De-rate the maximum output power if using the trim or sense function to increase the output voltage.

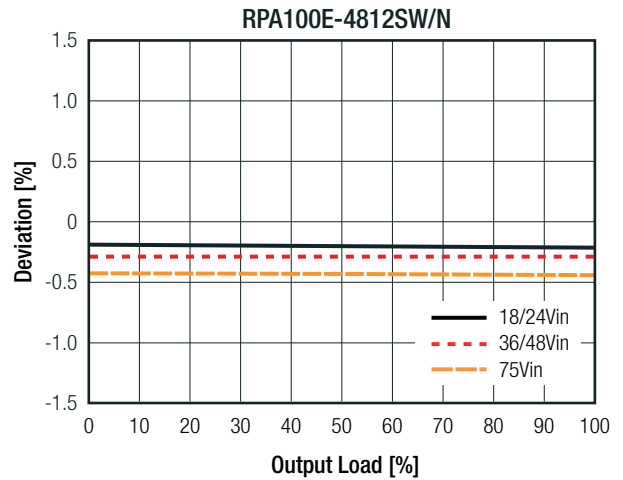
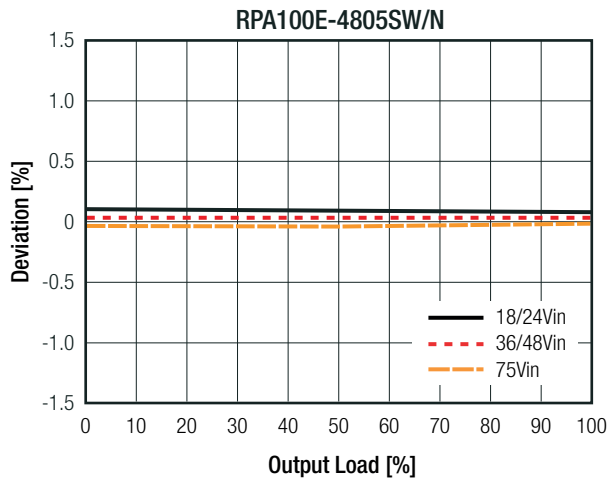
**REGULATIONS**

Parameter	Condition	Value
Output Accuracy		$\pm 1.5\%$ max.
Line Regulation	low line to high line	$\pm 0.05$ typ. / $\pm 0.2\%$ max.
Load Regulation	0% to 100% load	0.05 typ. / 0.2% max.
Transient Response	25% load change	$V_{OUT} = 5VDC$ $V_{OUT} = 12VDC$ 200mV typ. 400mV typ.
	recovery time	200 $\mu s$ typ.

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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Deviation vs. Load



**PROTECTIONS**

Parameter	Type	Value
Short Circuit Protection (SCP)		hiccup mode, auto recovery
Over Voltage Protection (OVP)	over full temperature range; % of $V_{OUTnom}$	115% - 140%, hiccup mode
Over Current Protection (OCP)	% of rated $I_{OUT}$	110% - 140%, hiccup mode
Over Temperature Protection (OTP) <sup>(7)</sup>	48Vin, 80% $I_{OUT}$ , 1m/s (refer to "Airflow direction")	measured on "HOTSPOT1" $V_{OUT}= 5VDC$ +132°C typ. $V_{OUT}= 12VDC$ +130°C typ.
	measured on "NTC RESISTOR"	$V_{OUT}= 5VDC$ +130°C typ. $V_{OUT}= 12VDC$ +125°C typ.
Isolation Voltage <sup>(8)</sup>		1.5kVDC
Isolation Resistance		10MΩ min.
Isolation Capacitance		1000pF typ.
Insulation Grade		basic

**Notes:**

- Note7: Automatic restart after temperature is within specification. A thermocouple should be placed on NTC for best OTP function. Hotspot1 temperature is just for reference only.
- Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage
- Note9: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: 20A normal blow type

**ENVIRONMENTAL**

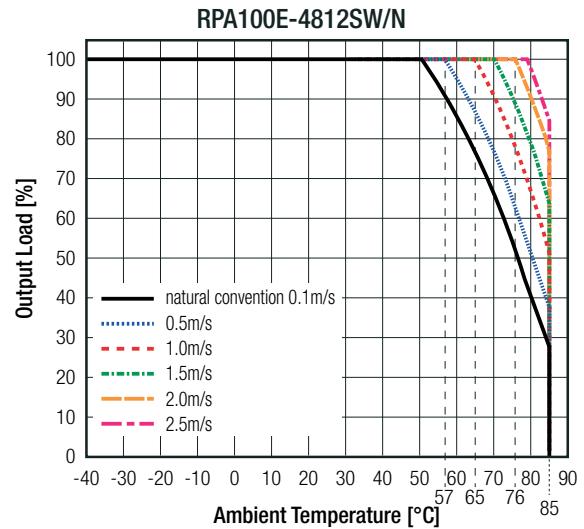
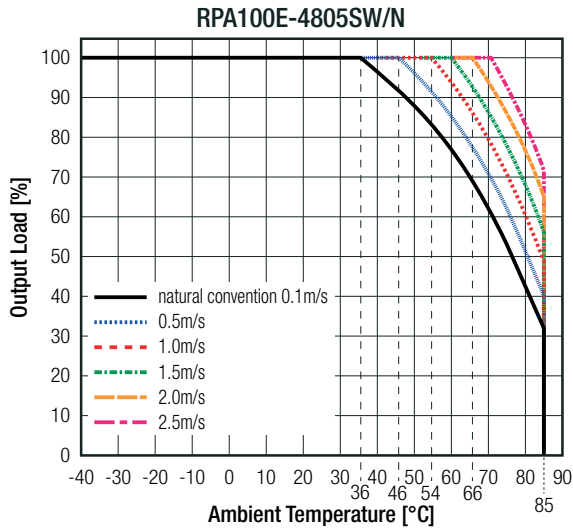
Parameter	Condition	Value
Operating Temperature Range	refer to "Derating Graph"	-40°C to +85°C
Maximum Hotspot1 Temperature	$V_{OUT}= 5VDC$	+116°C
	$V_{OUT}= 12VDC$	+115°C
Temperature Coefficient		±0.01%/K
Operating Altitude		4000m
Operating Humidity	non-condensing	95% RH max.
Pollution Degree		PD2
Mechanical Shock		30G, 11ms, 3 times, half sine
Vibration		2.4Grms, 10-500Hz, 30min along x, y and z axis
MTBF	80% load, $T_{AMB}= +25°C$ , 1.5m/s airflow	$V_{OUT}= 5VDC$ 7300 x 10 <sup>3</sup> hours
		$V_{OUT}= 12VDC$ 4500 x 10 <sup>3</sup> hours

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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**Derating Graph**

(Module vertical mounted and at VIN= 24VDC, refer to "APPLICATION and INSTALLATION")



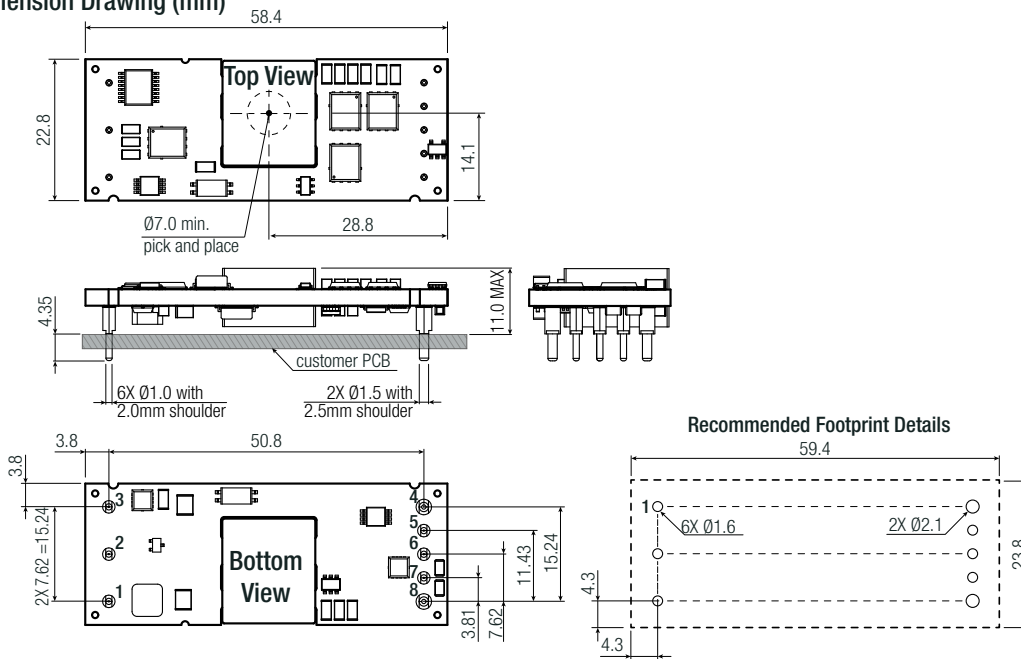
**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
Audio/Video, information and communication technology equipment - Safety requirements	E224736	UL62368-1:2014 2nd Edition CSA C22.2 No. 62368-1-14, 2nd Edition
RoHS2		RoHS 2011/65/EU + AM2015/863
EMC Compliance	Condition	Standard / Criterion
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	with external filter	CISPR22, Class B

**DIMENSION AND PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Material	PCB	FR4, UL94 V-0
Dimension (LxWxH)		58.8 x 22.8 x 11.0mm
Weight		24.6g typ.

**Dimension Drawing (mm)**



**Pinning Information**

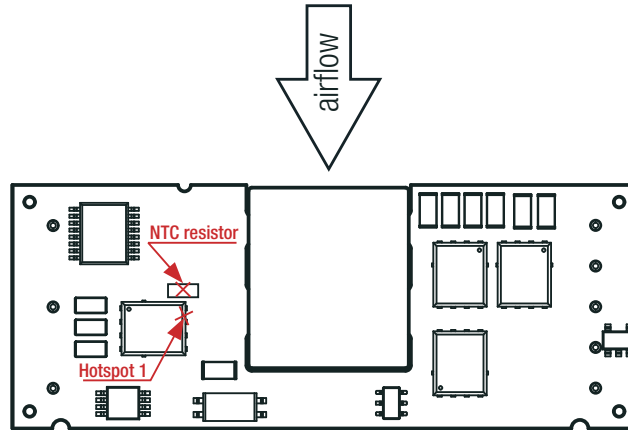
Pin #	Single
1	+Vin
2	CTRL
3	-Vin
4	-Vout
5	-Sense
6	Trim
7	+Sense
8	+Vout

Tolerance:  
 xx.x = ±0.5mm  
 xx.xx = ±0.25mm

**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**APPLICATION AND INSTALLATION**

**Airflow direction**  
(vertically mounted)



**PACKAGING INFORMATION**

Parameter	Type	Value
Packaging Dimension (LxWxH)	box	221.0 x 128.0 x 33.0mm
Packaging Quantity		6pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	95% RH max.

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