

# Features

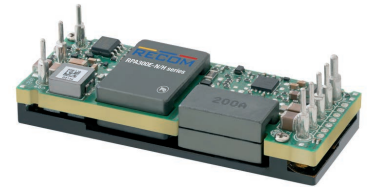
- Eighth brick format
- 36-72VDC input voltage range
- 2.25kV basic isolation
- Remote ON/OFF, sense, and trim pins
- UVLO, OTP, OVP, OCP and SCP
- 94.8% efficiency (typical)
- Integrated heat spreader

# Regulated Converter



## RPA300E

**300 Watt**  
**Eighth Brick**  
**Single Output**



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

### Description

The RPA300E is a low cost 300W DC/DC converter in industry standard 1/8th brick low profile format (58.4mm x 23mm x 12.7mm) and pinning. The input range is 36 to 72VDC, and the output voltage is trimmable from 16 to 35VDC. The efficiency is exceptionally high (typically 94.8%) to permit full load operation from -40°C up to + 85°C with forced air cooling. The isolation voltage is 2.25kVDC/1 minute (basic insulation grade). Applications include demanding industrial power supplies, telecom, and PoE circuits.

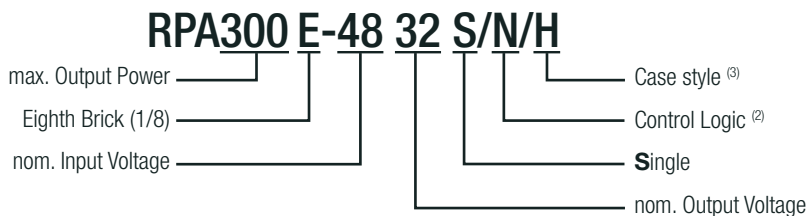
### Selection Guide

Part Number	Input Voltage Range [VDC]	Nom. Output Voltage [VDC]	Output Current [A]	Efficiency typ. <sup>(1)</sup> [%]
RPA300E-4832S/N/H	36-72	32	9.4	94.8

#### Notes:

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

### Model Numbering



#### Notes:

Note2: suffix "N" for negative CTRL function (1=OFF, 0=ON)

Note3: suffix "/H" means pre-mounted heat-spreader.

refer to "DIMENSION AND PHYSICAL CHARACTERISTICS"

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

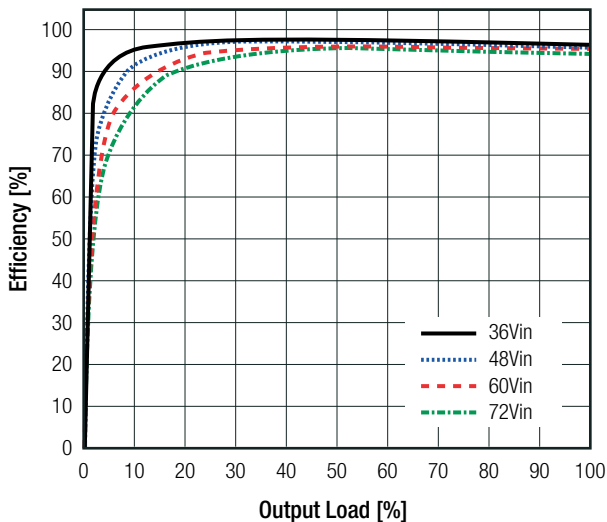
**BASIC CHARACTERISTICS**

Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom $V_{IN}$ = 48VDC	36VDC	48VDC	72VDC
Absolute Maximum Input Voltage	continuous			72VDC
Input Surge Voltage	100ms max.			80VDC
Under Voltage Lockout (UVLO)	DC-DC ON DC-DC OFF hysteresis	33VDC 31VDC	2VDC	36VDC 34VDC
Input Current	$V_{IN}$ = 36VDC, full load			9.4A
Inrush Current	with 100µF Al cap			1A <sup>2</sup> s
Quiescent Current	$V_{IN}$ = 48VDC, no load		100mA	
Standby Current	DC-DC OFF		30mA	
Output Voltage Trimming <sup>(4)</sup>	refer to <b>"OUTPUT VOLTAGE TRIMMING"</b>	16VDC		35VDC
Minimum Load		0%		
Start-up Time	Power up ON/OFF CTRL		90ms 65ms	
Rise Time			60ms	
ON/OFF CTRL <sup>(5)</sup>	Negative Logic	DC-DC ON DC-DC OFF	0VDC < $V_{CTRL}$ < 0.8VDC Open or 3.5VDC < $V_{CTRL}$ < 10VDC	
Input Current of CTRL pin				1.5mA
Leakage Current of CTRL pin	logic high, $V_{CTRL}$ = 5VDC			1mA
Internal Operating Frequency			170kHz	
Output Ripple & Noise <sup>(6)</sup>	5-20MHz BW, 48Vin, full load		150mVp-p	
Remote Sense	+Sense to +Vout -Sense to -Vout			3.5VDC 0.2VDC

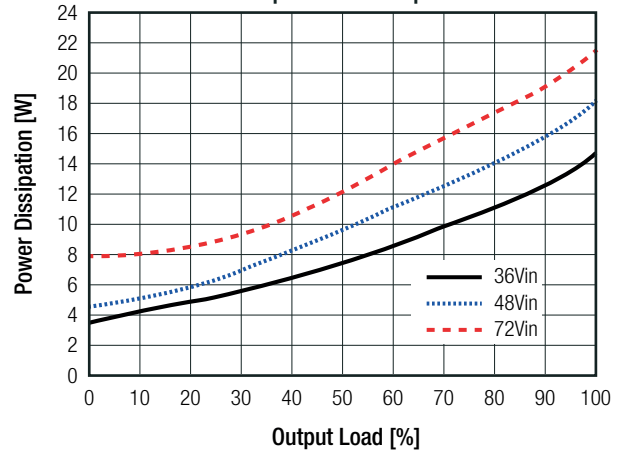
**Notes:**

- Note4: Trim up when input voltage is greater than 40VDC only
- Note5: If CTRL function is not used, please short the CTRL pin to -Vin
- Note6: Measurements are made with 470µF and a 1µF ceramic, 10µF tantalum across output

**Efficiency vs. Output Current**



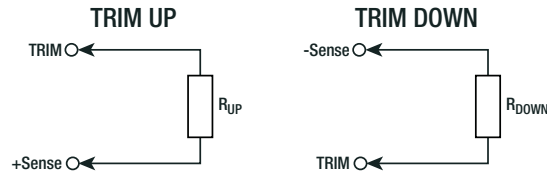
**Power Dissipation vs. Output Current**



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

### OUTPUT VOLTAGE TRIMMING

RPA300E 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:

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

$$R_{DOWN} = \frac{511}{\Delta V_{OUT}} - 10.2$$

#### Practical Example RPA300E-4832S/N trim up +5%

$V_{OUTnom} = 32VDC$ ,  $\Delta V_{OUT} = +5\%$  (33.6VDC)

$$R_{UP} = \left[ \frac{5.11 \times 32 \times (100 + 5)}{1.225 \times 5} \right] - \frac{511}{5} - 10.22 = 2690.78k\Omega$$

$R_{UP}$  according to E96  $\approx$  **2M67 $\Omega$**

#### Practical Example RPA300E-4832S/N trim down -20%

$V_{OUTnom} = 32VDC$ ,  $\Delta V_{OUT} = -20\%$  (25.6VDC)

$$R_{DOWN} = \left[ \frac{511}{20} \right] - 10.22 = 15.33k\Omega$$

$R_{DOWN}$  according to E96  $\approx$  **15k4 $\Omega$**

$\Delta V_{OUT} =$	1	2	3	4	5	6	7	8	9	10	[%]
$V_{OUTset} =$	32.32	32.64	32.96	33.28	33.60	33.92	34.24	34.56	34.88	35.00	[VDC]
$R_{UP} =$	13M0	6M49	4M42	3M32	2M67	2M26	1M96	1M74	1M54	1M50	[ $\Omega$ ]

$\Delta V_{OUT} =$	-1	-2	-3	-4	-5	-6	-7	-8	9	10	[%]
$V_{OUTset} =$	31.68	31.36	31.04	30.40	30.08	29.76	29.44	29.12	28.80	28.48	[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	[ $\Omega$ ]

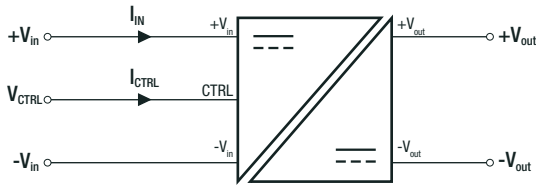
$\Delta V_{OUT} =$	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30	[%]
$V_{OUTset} =$	25.28	24.96	24.64	24.32	24.00	23.68	23.36	23.04	22.72	22.40	[VDC]
$R_{DOWN} =$	14k3	13k	12k1	11k	10k2	9k53	8k66	8k06	7k32	6k81	[ $\Omega$ ]

$\Delta V_{OUT} =$	-31	-32	-33	-34	-35	-36	-37	-38	-39	-40	[%]
$V_{OUTset} =$	22.08	21.76	21.44	21.12	20.80	20.48	20.16	19.84	19.52	19.20	[VDC]
$R_{DOWN} =$	6k19	5k76	5k23	4k81	4k42	4k02	3k57	18k2	3k24	2k87	[ $\Omega$ ]

$\Delta V_{OUT} =$	-41	-42	-43	-44	-45	-46	-47	-48	-49	-50	[%]
$V_{OUTset} =$	18.88	18.56	18.24	17.92	17.60	17.28	16.96	16.64	16.32	16.00	[VDC]
$R_{DOWN} =$	2k26	1k96	1k66	1k4	1k13	887	649	432	210	0	[ $\Omega$ ]

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

**ON/OFF CTRL**

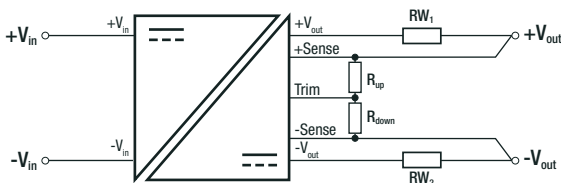


Negative Logic

DC-DC ON  
DC-DC OFF

$0VDC < V_{CTRL} < 0.8VDC$   
Open or  $3.5VDC < V_{CTRL} < 10VDC$

**REMOTE SENSE**



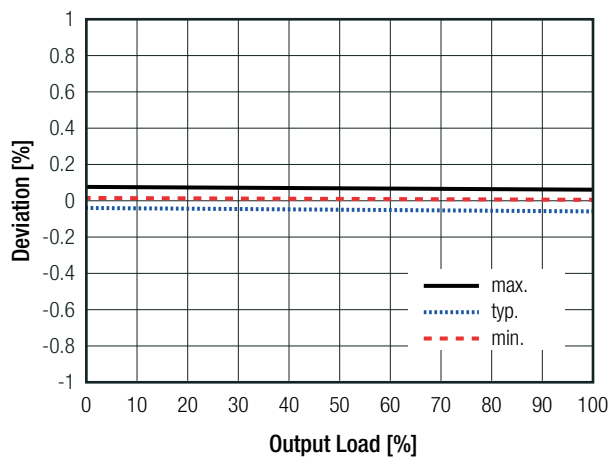
$RW_1$  ... wire losses +  
 $RW_2$  ... wire losses -  
 $R_{up}$  ... trim up resistor  
 $R_{down}$  ... trim down resistor

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		±1.5% max.
Line Regulation	low line to high line	±0.3% max.
Load Regulation	0% to 100% load	0.5% max.
Transient Response	25% load change	600mV
	recovery time	500µS

**Deviation vs. Load**



**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load and after warm-up unless otherwise stated)

PROTECTIONS		
Parameter	Type	Value
Short Circuit Protection (SCP)		hiccup mode
Over Voltage Protection (OVP)	over full temp range; % of $V_{OUTnom}$	39VDC, hiccup mode
Over Current Protection (OCP)		10.4A - 13.5A, hiccup mode
Over Temperature Protection (OTP) <sup>(7)</sup>	48Vin, 80% $I_{OUT}$ , 1m/s (refer to "Airflow direction") with heat-spreader ("H"), measured on "HOTSPOT"	+125°C typ.
Isolation Voltage <sup>(8)</sup>		2.25kVDC
Isolation Capacitance		4.7nF typ.
Insulation Grade		basic

**Notes:**

Note7: Automatic restart after temperature is within specification. Hotspot temperature is just for references only.

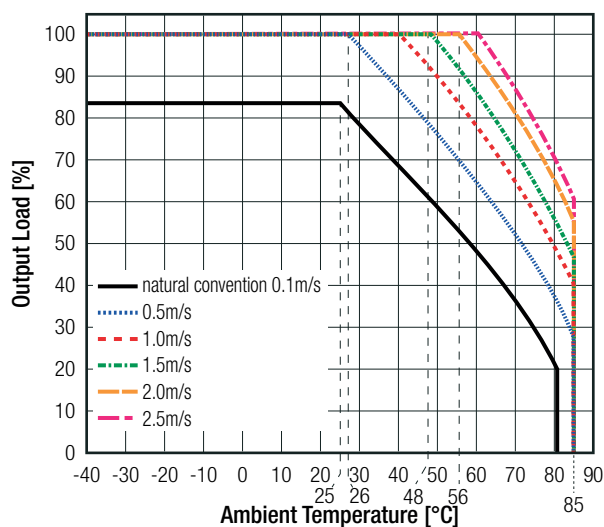
Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage

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		-40°C to +85°C
Maximum Hotspot Temperatures	with heat-spreader ("H")	+110°C
Temperature Coefficient		$\pm 0.01\%/K$
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	$I_{OUT} = 80\%$ of $I_{OUT\ max}$ ; $T_{AMB} = +25^\circ\text{C}$	$5900 \times 10^3$ hours

### Derating Graph

(Module vertical mounted and at  $V_{IN} = 48\text{VDC}$ , refer to "APPLICATION and INSTALLATION")



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

**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

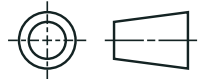
  

EMC Compliance	Condition	Standard / Criterion
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	with external filter	CISPR22, Class B

**DIMENSION AND PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Material	PCB	FR4, UL94 V-0
Dimension (LxWxH)		58.8 x 22.8 x 11.0mm
Weight	with heat-spreader ("H")	40g typ.

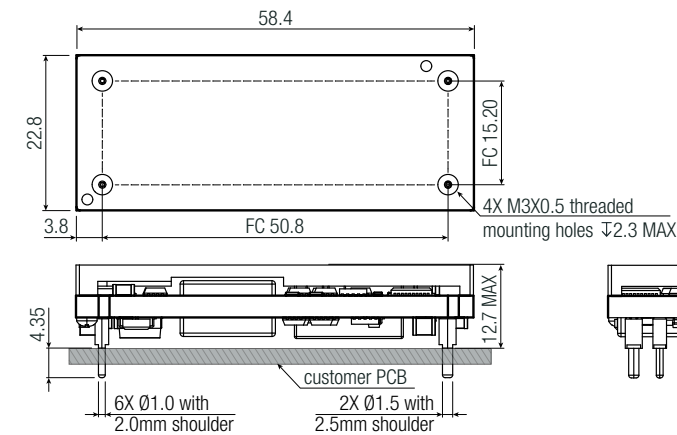
**Dimension Drawing (mm)**



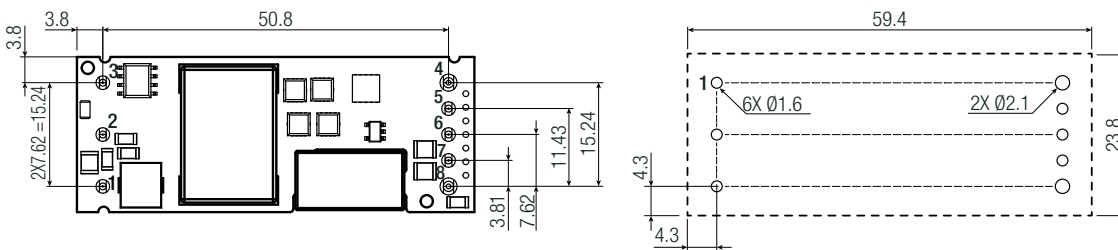
**Pinning Information**

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

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

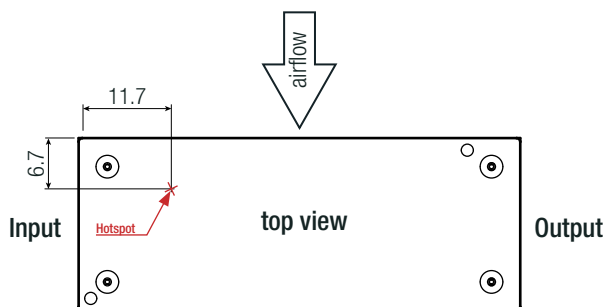


**Recommended Footprint Details**



**APPLICATION AND INSTALLATION**

**Airflow direction**  
(vertically mounted)



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

PACKAGING INFORMATION		
Parameter	Type	Value
Packaging Dimension (LxWxH)		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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