

# 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**

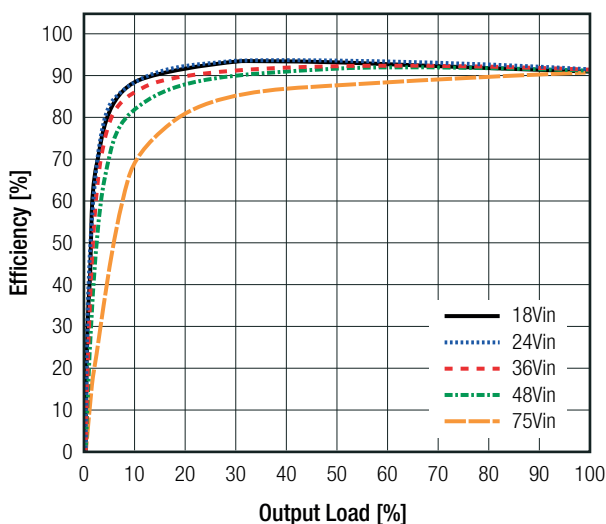
| Parameter                              | Condition  |                                       | Min.  | Typ.               | Max.              |
|--|--|---------------------------------------|---|--------------------|-------------------|
| Input Voltage Range                    | nom $V_{IN}$ = 48VDC                                   |                                       | 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<br>$V_{OUT}$ = 12VDC |   |                    | 8.9A<br>7.7A      |
| Inrush Current                         |  |                                       |   |                    | 1A <sup>2</sup> s |
| Quiescent Current                      | $V_{IN}$ = 48VDC, no load                              | $V_{OUT}$ = 5VDC<br>$V_{OUT}$ = 12VDC |   | 55mA<br>60mA       |                   |
| Standby Current                        | DC-DC OFF  |                                       | $V_{OUT}$ = 5VDC<br>$V_{OUT}$ = 12VDC                             | 5mA<br>12mA        |                   |
| Output Voltage Trimming <sup>(3)</sup> | refer to <b>"OUTPUT VOLTAGE TRIMMING"</b>              |                                       | $V_{OUT}$ = 5VDC<br>$V_{OUT}$ = 12VDC                             | -20%<br>-10%       | +10%              |
| Minimum Load                           |  |                                       | 0%  |                    |                   |
| Start-up Time                          | Power up<br>ON/OFF CTRL                                |                                       |   | 55ms<br>55ms       |                   |
| ON/OFF CTRL <sup>(4)</sup>             | Negative Logic   | DC-DC ON<br>DC-DC OFF                 | -0.7VDC < $V_{CTRL}$ < 0.8VDC<br>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<br>$V_{OUT}$ = 12VDC                  |                                       |   | 300kHz<br>350kHz   |                   |
| Output Ripple & Noise <sup>(5)</sup>   | 5-20MHz BW, 48Vin, full load                           |                                       | $V_{OUT}$ = 5VDC<br>$V_{OUT}$ = 12VDC                             | 70mVp-p<br>80mVp-p |                   |
| Remote Sense                           | $P_{OUT}$ ≤ max rated power, $I_{OUT}$ ≤ $I_{OUT}$ max |                                       |   |                    | 10%               |

**Notes:**

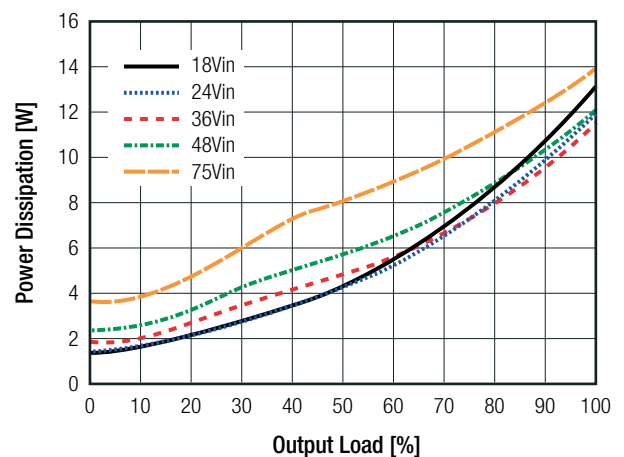
- Note3: Trim up when input voltage is greater than 20VDC only
- Note4: If CTRL function is not used, please short the CTRL pin to -Vin
- Note5: Measurements are made with a 1µF ceramic, 10µF tantalum across output

**RPA100E-4805W/N**

**Efficiency vs. Output Current**



**Power Dissipation vs. Output Current**

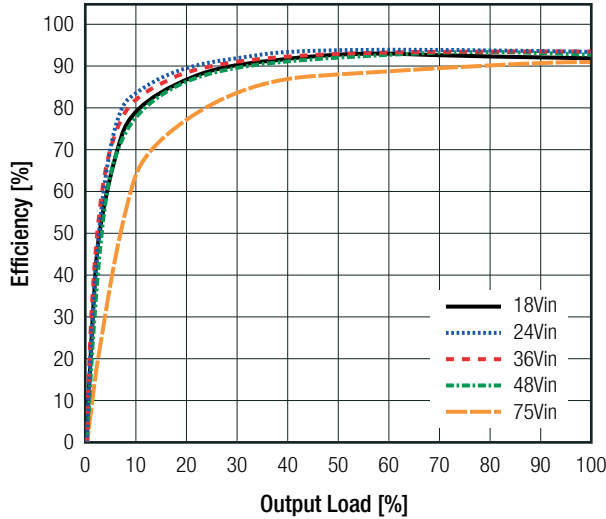


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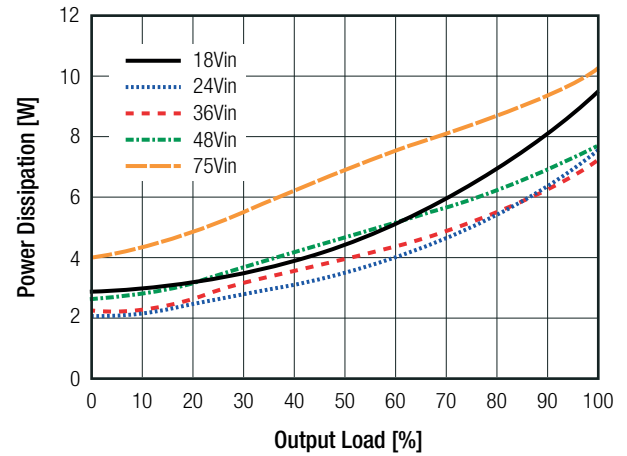
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

RPA100E-4812W/N

Efficiency vs. Output Current

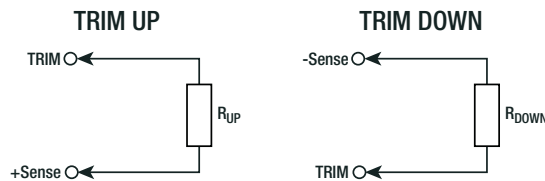


Power Dissipation vs. Output Current



**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 $\Omega$**

continued on next page

**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 | [ $\Omega$ ] |

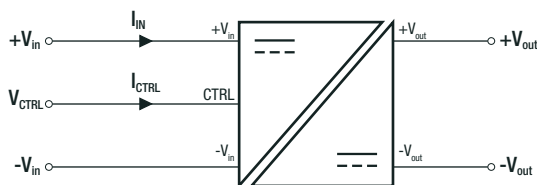
|                    |       |       |       |       |       |       |       |       |       |       |              |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|
| $\Delta V_{OUT} =$ | 11    | 12    | 13    | 14    | 15    | 16    | 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  | [ $\Omega$ ] |

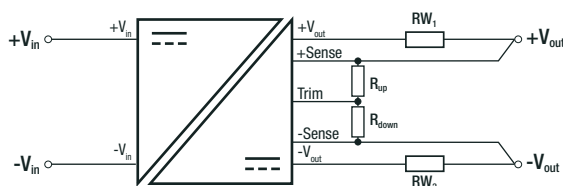
|                |       |       |       |       |       |       |       |       |       |       |              |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Trim down      | -1    | -2    | -3    | -4    | -5    | -6    | -7    | -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    -0.7VDC < V<sub>CTRL</sub> < 0.8VDC  
DC-DC OFF    Open or 3VDC < V<sub>CTRL</sub> < 5VDC

**REMOTE SENSE**



RW<sub>1</sub> ... wire losses +  
RW<sub>2</sub> ... wire losses -  
R<sub>up</sub> ... trim up resistor  
R<sub>down</sub> ... 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.

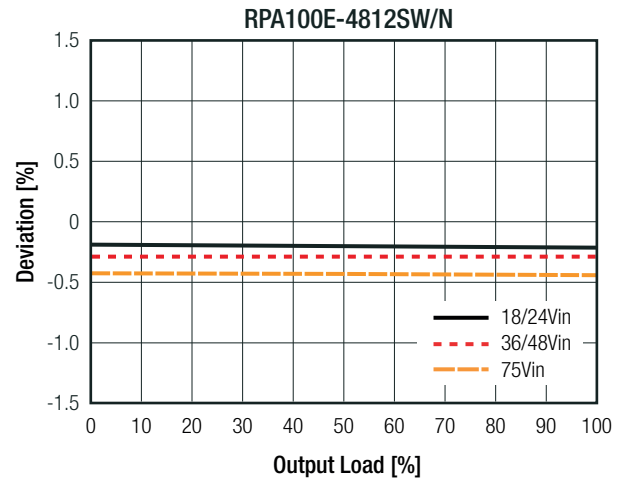
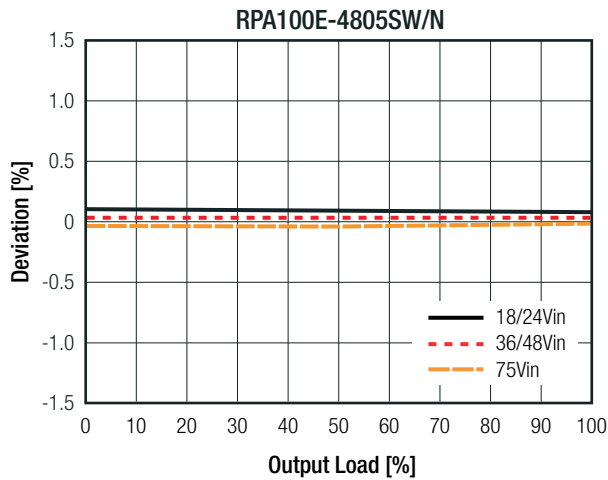
**REGULATIONS**

| Parameter          | Condition             | Value   |
|--------------------|-----------------------|---|
| Output Accuracy    |                       | ±1.5% max.  |
| Line Regulation    | low line to high line | ±0.05 typ. / ±0.2% max.                             |
| Load Regulation    | 0% to 100% load       | 0.05 typ. / 0.2% max.                               |
| Transient Response | 25% load change       | V <sub>OUT</sub> = 5VDC<br>V <sub>OUT</sub> = 12VDC |
|                    | recovery time         | 200mV typ.<br>400mV typ.<br>200µs typ.              |

continued on next page

**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<br>(refer to "Airflow direction") | measured on "HOTSPOT1"<br>$V_{OUT}= 5VDC$ +132°C typ.<br>$V_{OUT}= 12VDC$ +130°C typ. |
|  | measured on "NTC RESISTOR"                                    | $V_{OUT}= 5VDC$ +130°C typ.<br>$V_{OUT}= 12VDC$ +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**

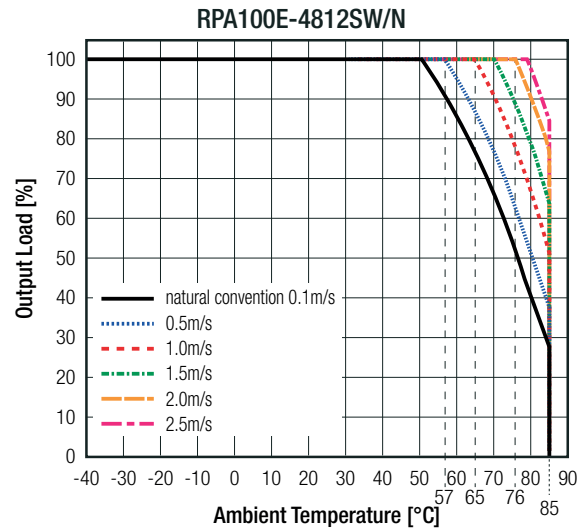
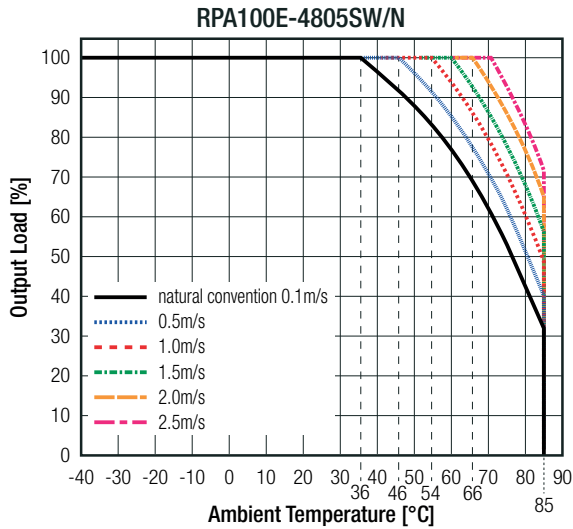
| Parameter                    | Condition                                      | Value  |
|------------------------------|--|--|
| Operating Temperature Range  | refer to "Derating Graph"                      | -40°C to +85°C                                 |
| Maximum Hotspot1 Temperature | $V_{OUT}= 5VDC$                                | +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<br>airflow | $V_{OUT}= 5VDC$ 7300 x 10 <sup>3</sup> hours   |
|                              |  | $V_{OUT}= 12VDC$ 4500 x 10 <sup>3</sup> hours  |

continued on next page

**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")



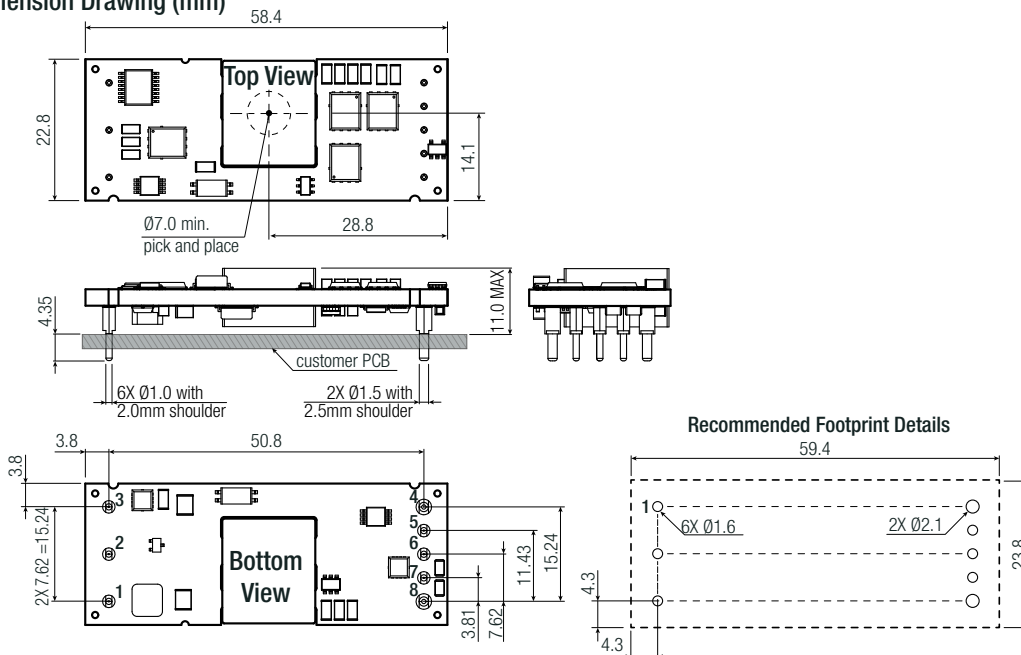
**SAFETY AND CERTIFICATIONS**

| Certificate Type (Safety)   | Report / File Number | Standard  |
|---|----------------------|---|
| Audio/Video, information and communication technology equipment - Safety requirements | E224736              | UL62368-1:2014 2nd Edition<br>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**

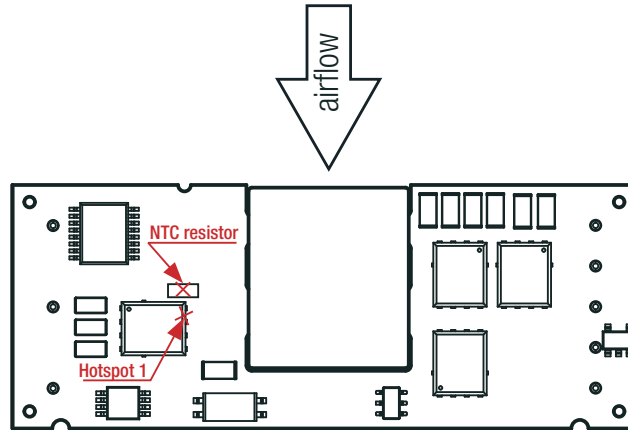
| Pin # | Single |
|-------|--------|
| 1     | +Vin   |
| 2     | CTRL   |
| 3     | -Vin   |
| 4     | -Vout  |
| 5     | -Sense |
| 6     | Trim   |
| 7     | +Sense |
| 8     | +Vout  |

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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