

# Features

## Regulated Converter

- Wide 4:1 input voltage range
- 1.6kVDC isolation for 24Vin and 48Vin, 3kVDC isolation for 110Vin
- Efficiency up to 92%
- Six-sided continuous shield
- EN50155, UL/IEC/EN60950-1 certified

**RECOM**  
DC/DC Converter

## RP40-FR

40 Watt

2" x 1"

Single and Dual Output



**UL**  
E196683



EN50155 certified  
UL60950-1 certified  
IEC/EN60950-1 certified  
EN55032 compliant  
EN55024 compliant  
EN50121-3-2 compliant



[www.recom-power.com/eval-ref-boards](http://www.recom-power.com/eval-ref-boards)



[https://www.recom-power.com/pdf/Powerline\\_DC-DC/RSPxxx-168.pdf](https://www.recom-power.com/pdf/Powerline_DC-DC/RSPxxx-168.pdf)

## Description

The RP40-FR series wide range input DC/DC converters have been especially designed for railway applications and are EN50155 certified. They are also certified to UL60950-1 and cUL 60950-1, this makes them ideal for all high input voltage telecom and industrial applications where approved safety standards are required.

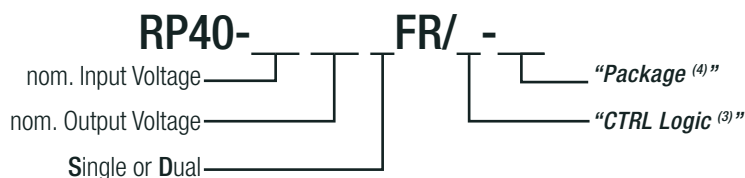
## Selection Guide

| Part Number                     | Input Voltage Range [VDC] | Output Voltage [VDC] | Output Current [mA] | Input <sup>(1)</sup> Current [mA] | Efficiency <sup>(1)</sup> typ. [%] | Max. Capacitive Load <sup>(2)</sup> [μF] |
|---------------------------------|---------------------------|----------------------|---------------------|-----------------------------------|------------------------------------|------------------------------------------|
| RP40-243.3SFR <sup>(3,4)</sup>  | 9-36                      | 3.3                  | 10000               | 1528                              | 90                                 | 26600                                    |
| RP40-2405SFR <sup>(3,4)</sup>   | 9-36                      | 5                    | 8000                | 1832                              | 91                                 | 20000                                    |
| RP40-2412SFR <sup>(3,4)</sup>   | 9-36                      | 12                   | 3333                | 1811                              | 92                                 | 3900                                     |
| RP40-2415SFR <sup>(3,4)</sup>   | 9-36                      | 15                   | 2666                | 1811                              | 92                                 | 2600                                     |
| RP40-2424SFR <sup>(3,4)</sup>   | 9-36                      | 24                   | 1666                | 1831                              | 91                                 | 1300                                     |
| RP40-483.3SFR <sup>(3,4)</sup>  | 18-75                     | 3.3                  | 10000               | 764                               | 90                                 | 26600                                    |
| RP40-4805SFR <sup>(3,4)</sup>   | 18-75                     | 5                    | 8000                | 916                               | 91                                 | 20000                                    |
| RP40-4812SFR <sup>(3,4)</sup>   | 18-75                     | 12                   | 3333                | 906                               | 92                                 | 3900                                     |
| RP40-4815SFR <sup>(3,4)</sup>   | 18-75                     | 15                   | 2666                | 906                               | 92                                 | 2600                                     |
| RP40-4824SFR <sup>(3,4)</sup>   | 18-75                     | 24                   | 1666                | 915                               | 91                                 | 1300                                     |
| RP40-1103.3SFR <sup>(3,4)</sup> | 43-160                    | 3.3                  | 10000               | 341                               | 88                                 | 26600                                    |
| RP40-11005SFR <sup>(3,4)</sup>  | 43-160                    | 5                    | 8000                | 409                               | 89                                 | 20000                                    |
| RP40-11012SFR <sup>(3,4)</sup>  | 43-160                    | 12                   | 3333                | 402                               | 90.5                               | 3900                                     |
| RP40-11015SFR <sup>(3,4)</sup>  | 43-160                    | 15                   | 2666                | 400                               | 91                                 | 2600                                     |
| RP40-11024SFR <sup>(3,4)</sup>  | 43-160                    | 24                   | 1666                | 404                               | 90                                 | 1300                                     |
| RP40-2412DFR <sup>(3,4)</sup>   | 9-36                      | ±12                  | ±1666               | 1851                              | 90                                 | ±2600                                    |
| RP40-2415DFR <sup>(3,4)</sup>   | 9-36                      | ±15                  | ±1333               | 1851                              | 90                                 | ±1600                                    |
| RP40-2424DFR <sup>(3,4)</sup>   | 9-36                      | ±24                  | ±833                | 1830                              | 91                                 | ±650                                     |
| RP40-4812DFR <sup>(3,4)</sup>   | 18-75                     | ±12                  | ±1666               | 925                               | 90                                 | ±2600                                    |
| RP40-4815DFR <sup>(3,4)</sup>   | 18-75                     | ±15                  | ±1333               | 741                               | 90                                 | ±1600                                    |
| RP40-4824DFR <sup>(3,4)</sup>   | 18-75                     | ±24                  | ±833                | 572                               | 91                                 | ±650                                     |
| RP40-11012DFR <sup>(3,4)</sup>  | 43-160                    | ±12                  | ±1666               | 408                               | 89                                 | ±2600                                    |
| RP40-11015DFR <sup>(3,4)</sup>  | 43-160                    | ±15                  | ±1333               | 408                               | 89                                 | ±1600                                    |
| RP40-11024DFR <sup>(3,4)</sup>  | 43-160                    | ±24                  | ±833                | 400                               | 91                                 | ±650                                     |

### Notes:

- Note1: Maximum values at nominal input voltage and full load at +25°C ambient  
Note2: Max. Cap load is tested at minimum input and constant resistive load

## Model Numbering



### Ordering Examples

RP40-2405SFR/P = 24V input, 5V output, single, positive Logic CTRL pin  
RP40-4812DFR/N-HC = 48V input, ±12V output, dual, negative Logic CTRL pin, Heat-sink premounted

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

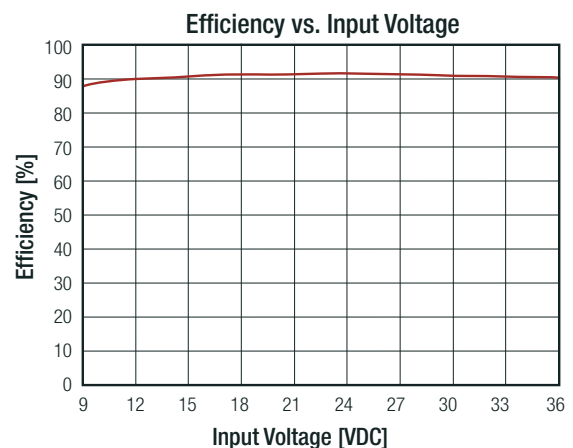
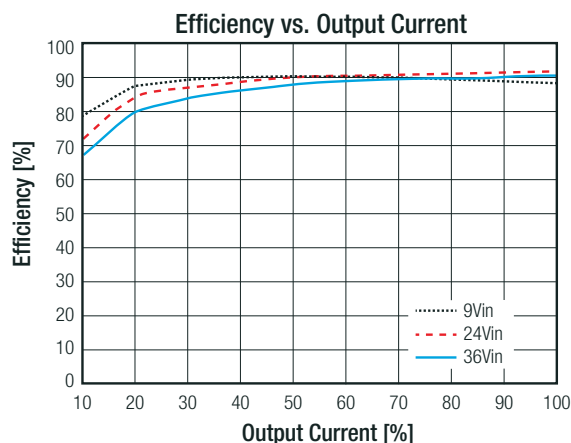
**BASIC CHARACTERISTICS**

| Parameter                      | Condition                                                 |                                                           | Min.                                                                                     | Typ.                                                                | Max.                                                                 |
|--------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------|
| Input Filter                   |                                                           |                                                           | Pi-Type                                                                                  |                                                                     |                                                                      |
| Input Voltage Range            | nom. Vin = 24VDC<br>nom. Vin = 48VDC<br>nom. Vin = 110VDC |                                                           | 9VDC<br>18VDC<br>43VDC                                                                   | 24VDC<br>48VDC<br>110VDC                                            | 36VDC<br>75VDC<br>160VDC                                             |
| Input Surge Voltage            | 1s max.                                                   | nom. Vin = 24VDC<br>nom. Vin = 48VDC<br>nom. Vin = 110VDC |                                                                                          |                                                                     | 50VDC<br>100VDC<br>170VDC                                            |
| Under Voltage Lockout (UVLO)   | nom. Vin = 24VDC                                          | DC-DC ON<br>DC-DC OFF                                     |                                                                                          | 8VDC                                                                | 9VDC                                                                 |
|                                | nom. Vin = 48VDC                                          | DC-DC ON<br>DC-DC OFF                                     |                                                                                          | 16VDC                                                               | 18VDC                                                                |
|                                | nom. Vin = 110VDC                                         | DC-DC ON<br>DC-DC OFF                                     |                                                                                          | 40VDC                                                               | 43VDC                                                                |
| Output Voltage Trimming        | refer to<br>„OUTPUT VOLTAGE TRIMMING“                     | 3.3Vout, 5Vout, 12Vout<br>15Vout, 24Vout                  | -10%<br>-10%                                                                             |                                                                     | +10%<br>+20%                                                         |
| Input Reflected Ripple Current |                                                           |                                                           |                                                                                          | 30mA <sub>p-p</sub>                                                 |                                                                      |
| Start-up Time                  | Power up<br>ON/OFF CTRL                                   |                                                           |                                                                                          | 60ms<br>60ms                                                        |                                                                      |
| ON/OFF CTRL <sup>(5)</sup>     | Positive Logic                                            | DC-DC ON<br>DC-DC OFF                                     | Open or 3.0VDC < V <sub>CTRL</sub> < 12VDC<br>Short or 0VDC < V <sub>CTRL</sub> < 1.2VDC |                                                                     |                                                                      |
|                                | Negative Logic                                            | DC-DC ON<br>DC-DC OFF                                     | Short or 0VDC < V <sub>CTRL</sub> < 1.2VDC<br>Open or 3.0VDC < V <sub>CTRL</sub> < 12VDC |                                                                     |                                                                      |
| Input Current of CTRL pin      | DC-DC ON                                                  |                                                           | -0.5mA                                                                                   |                                                                     | +0.5mA                                                               |
| Standby Current                | DC-DC OFF                                                 |                                                           |                                                                                          | 3mA                                                                 |                                                                      |
| Internal Operating Frequency   |                                                           |                                                           | 225kHz                                                                                   | 250kHz                                                              | 275kHz                                                               |
| Ripple and Noise               | measured by 20MHz bandwidth<br>with a 1µF/50V X7R MLCC    | 3.3Vout, 5Vout<br>12Vout, 15Vout<br>24Vout                |                                                                                          | 75mV <sub>p-p</sub><br>100mV <sub>p-p</sub><br>150mV <sub>p-p</sub> | 100mV <sub>p-p</sub><br>125mV <sub>p-p</sub><br>200mV <sub>p-p</sub> |

**Notes:**

Note5: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin

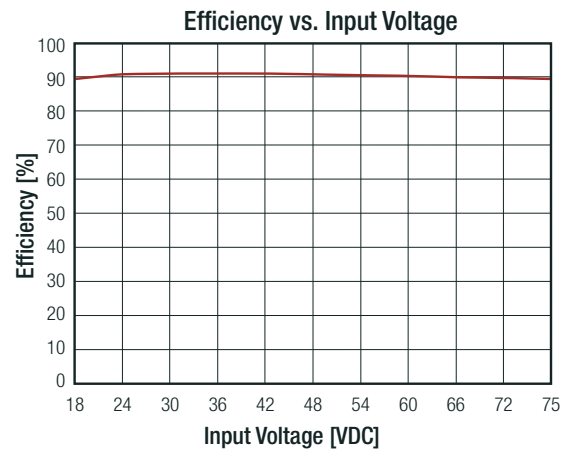
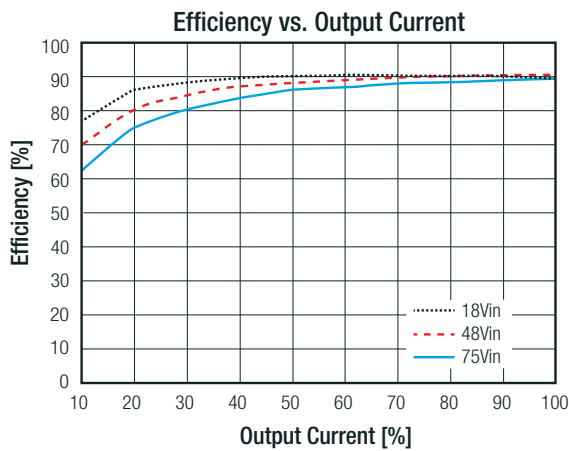
**RP40-2405SFR**



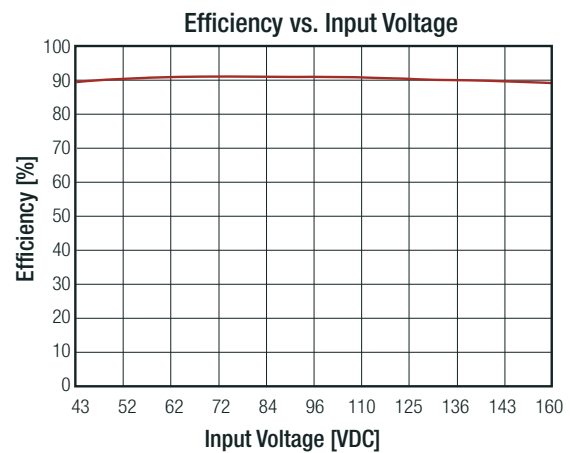
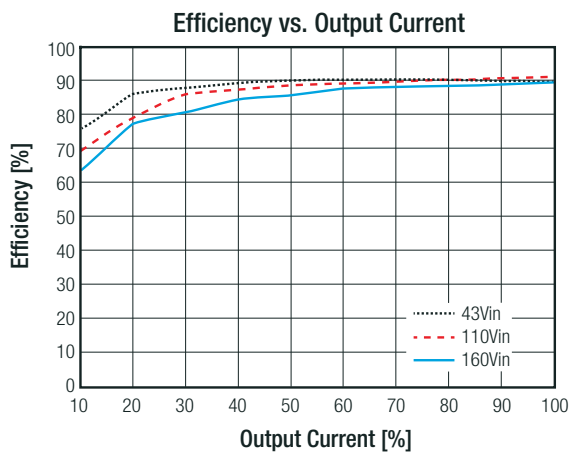
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**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom. Vin, full load unless otherwise stated)

### RP40-4805SFR



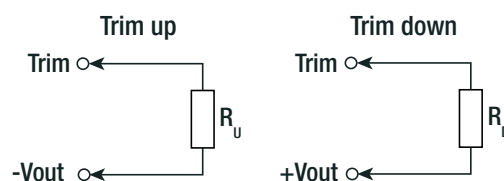
### RP40-11005SFR



## OUTPUT VOLTAGE TRIMMING

### Output Voltage Trimming

Single output Powerline converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. No general equation can be given for calculating the trim resistors, but the following trimtables give typical values for choosing these trimming resistors. If voltages between the given trim points are required, extrapolate between the two nearest given values to work out the resistor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.



continued on next page

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

**RP40-xx3.3SFR**

|                  |       |       |       |       |       |       |       |       |       |      |       |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Trim up          | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10   | [%]   |
| Vout =           | 3.333 | 3.366 | 3.399 | 3.432 | 3.465 | 3.498 | 3.531 | 3.564 | 3.597 | 3.63 | [VDC] |
| R <sub>u</sub> = | 57.93 | 26.16 | 15.58 | 10.28 | 7.11  | 4.99  | 3.48  | 2.34  | 1.46  | 0.75 | [kΩ]  |
| Trim down        | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10   | [%]   |
| Vout =           | 3.267 | 3.234 | 3.201 | 3.168 | 3.135 | 3.102 | 3.069 | 3.036 | 3.003 | 2.97 | [VDC] |
| R <sub>d</sub> = | 69.47 | 31.23 | 18.49 | 12.12 | 8.29  | 5.74  | 3.92  | 2.56  | 1.50  | 0.65 | [kΩ]  |

**RP40-xx05SFR**

|                  |        |        |        |       |      |       |       |       |      |       |       |
|------------------|--------|--------|--------|-------|------|-------|-------|-------|------|-------|-------|
| Trim up          | 1      | 2      | 3      | 4     | 5    | 6     | 7     | 8     | 9    | 10    | [%]   |
| Vout =           | 5.05   | 5.10   | 5.15   | 5.20  | 5.25 | 5.30  | 5.35  | 5.4   | 5.45 | 5.50  | [VDC] |
| R <sub>u</sub> = | 36.57  | 16.58  | 9.92   | 6.89  | 4.59 | 3.25  | 2.30  | 1.59  | 1.03 | 0.59  | [kΩ]  |
| Trim down        | 1      | 2      | 3      | 4     | 5    | 6     | 7     | 8     | 9    | 10    | [%]   |
| Vout =           | 4.95   | 4.90   | 4.85   | 4.80  | 4.75 | 4.70  | 4.65  | 4.60  | 4.55 | 4.50  | [VDC] |
| R <sub>d</sub> = | 45.533 | 20.612 | 12.306 | 8.152 | 5.66 | 3.999 | 2.812 | 1.922 | 1.23 | 0.676 | [kΩ]  |

**RP40-xx12SFR**

|                  |        |        |        |        |        |        |        |        |        |       |       |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| Trim up          | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10    | [%]   |
| Vout =           | 12.12  | 12.24  | 12.36  | 12.48  | 12.60  | 12.72  | 12.84  | 12.96  | 13.08  | 13.20 | [VDC] |
| R <sub>u</sub> = | 367.91 | 165.95 | 98.636 | 64.977 | 44.782 | 31.318 | 21.701 | 14.488 | 8.879  | 4.391 | [kΩ]  |
| Trim down        | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10    | [%]   |
| Vout =           | 11.88  | 11.76  | 11.64  | 11.52  | 11.40  | 11.28  | 11.16  | 11.04  | 10.92  | 10.8  | [VDC] |
| R <sub>d</sub> = | 460.99 | 207.95 | 123.6  | 81.423 | 56.118 | 39.249 | 27.199 | 18.162 | 11.132 | 5.509 | [kΩ]  |

**RP40-xx15SFR**

|                  |        |        |        |        |        |        |        |        |        |        |       |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| Trim up          | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | [%]   |
| Vout =           | 15.15  | 15.3   | 15.45  | 15.60  | 15.75  | 15.90  | 16.05  | 16.20  | 16.35  | 16.50  | [VDC] |
| R <sub>u</sub> = | 419.81 | 199.91 | 126.60 | 89.95  | 67.96  | 53.30  | 42.83  | 34.98  | 28.87  | 23.98  | [kΩ]  |
| Trim up          | 11     | 12     | 13     | 14     | 15     | 16     | 17     | 18     | 19     | 20     | [%]   |
| Vout =           | 16.650 | 16.800 | 16.950 | 17.100 | 17.250 | 17.400 | 17.550 | 17.700 | 17.850 | 18.000 | [VDC] |
| R <sub>u</sub> = | 19.98  | 16.65  | 13.83  | 11.42  | 9.32   | 7.49   | 5.87   | 4.43   | 3.15   | 1.99   | [kΩ]  |
| Trim down        | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | [%]   |
| Vout =           | 14.85  | 14.70  | 14.55  | 14.40  | 14.25  | 14.1   | 13.95  | 13.8   | 13.65  | 13.5   | [VDC] |
| R <sub>d</sub> = | 284.89 | 128.68 | 76.61  | 50.58  | 34.96  | 24.55  | 17.11  | 11.53  | 7.19   | 3.72   | [kΩ]  |

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### Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

| RP40-xx24SFR     |        |        |        |        |        |        |        |        |        |        |       |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| Trim up          | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | [%]   |
| Vout =           | 24.240 | 24.480 | 24.720 | 24.960 | 25.200 | 25.440 | 25.680 | 25.920 | 26.160 | 26.400 | [VDC] |
| R <sub>u</sub> = | 1275.2 | 606.60 | 383.73 | 272.30 | 205.44 | 160.87 | 129.03 | 105.15 | 86.58  | 71.72  | [kΩ]  |
|                  |        |        |        |        |        |        |        |        |        |        |       |
| Trim up          | 11     | 12     | 13     | 14     | 15     | 16     | 17     | 18     | 19     | 20     | [%]   |
| Vout =           | 26.640 | 26.880 | 27.120 | 27.360 | 27.600 | 27.840 | 28.080 | 28.320 | 28.560 | 28.800 | [VDC] |
| R <sub>u</sub> = | 59.56  | 49.43  | 40.86  | 33.51  | 27.15  | 21.57  | 16.66  | 12.29  | 8.38   | 4.86   | [kΩ]  |
|                  |        |        |        |        |        |        |        |        |        |        |       |
| Trim down        | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | [%]   |
| Vout =           | 23.760 | 23.520 | 23.280 | 23.040 | 22.800 | 22.560 | 22.320 | 22.080 | 21.840 | 21.600 | [VDC] |
| R <sub>d</sub> = | 838.15 | 376.78 | 222.98 | 146.09 | 99.95  | 69.19  | 47.22  | 30.74  | 17.93  | 7.68   | [kΩ]  |

| REGULATIONS                      |                                  |        |            |
|----------------------------------|----------------------------------|--------|------------|
| Parameter                        | Condition                        |        | Value      |
| Output Accuracy                  |                                  |        | ±1.0%      |
| Line Regulation                  | low line to high line, full load |        | ±0.2%      |
| Load Regulation                  | 0% to 100% load                  | Single | ±0.5%      |
|                                  |                                  | Dual   | ±1.0%      |
| Cross Regulation                 | asymmetrical 25%<>100% load      |        | ±5.0%      |
| Transient Response Recovery Time | 25% load step change             |        | 250µs typ. |

| PROTECTIONS                                                                                                                  |                      |                                  |                                |
|------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------|--------------------------------|
| Parameter                                                                                                                    | Condition            |                                  | Value                          |
| Short Circuit Protection (SCP)                                                                                               |                      |                                  | continuous, automatic recovery |
| Over Voltage Protection (OVP)                                                                                                | zener diode clamp    | 3.3Vout                          | 3.9VDC                         |
|                                                                                                                              |                      | 5Vout                            | 6.2VDC                         |
|                                                                                                                              |                      | 12Vout                           | 15VDC                          |
|                                                                                                                              |                      | 15Vout                           | 20VDC                          |
|                                                                                                                              |                      | 24Vout                           | 30VDC                          |
| Over Load Protection (OLP)                                                                                                   | % Iout rated         |                                  | 150% typ., Hiccup mode         |
| Over Temperature Protection (OTP)                                                                                            |                      |                                  | 115°C typ.                     |
| Isolation Voltage <sup>⑥</sup>                                                                                               | nom. Vin = 24, 48VDC | I/P to O/P<br>I/P to O/P to Case | 1.6kVDC/1min.<br>1.6kVDC/1min. |
|                                                                                                                              | nom. Vin = 110VDC    | I/P to O/P<br>I/P to O/P to Case | 3kVDC/1min.<br>1.6kVDC/1min.   |
| Isolation Resistance                                                                                                         | Viso= 500VDC         |                                  | 1GΩ min.                       |
| Isolation Capacitance                                                                                                        |                      |                                  | 1500pF max.                    |
| <b>Notes:</b>                                                                                                                |                      |                                  |                                |
| Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage                                                    |                      |                                  |                                |
| Note7: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type |                      |                                  |                                |

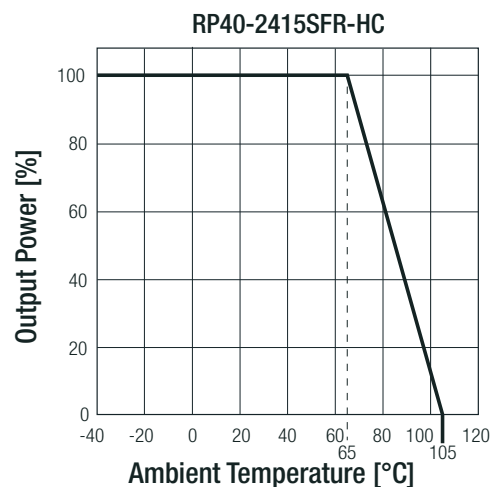
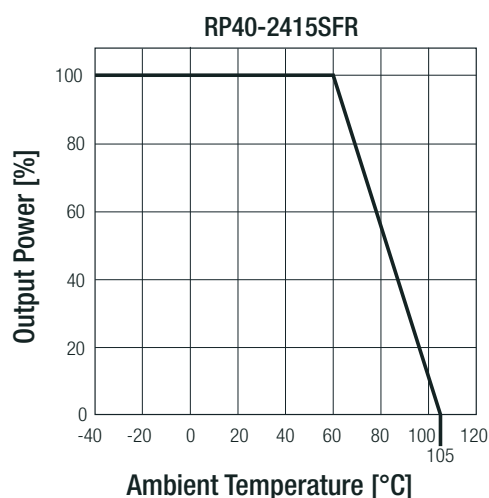
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

**ENVIRONMENTAL**

| Parameter                                                                                                                      | Condition                                                                                                                        |                                     | Value                             |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------|
| Operating Temperature Range                                                                                                    | without derating<br>with derating                                                                                                |                                     | -40°C to +60°C<br>-40°C to +105°C |
| Maximum Case Temperature                                                                                                       |                                                                                                                                  |                                     | +105°C                            |
| Temperature Coefficient                                                                                                        |                                                                                                                                  |                                     | ±0.02%/K max.                     |
| Thermal Impedance                                                                                                              | @ natural convection 0.1m/s                                                                                                      | without heat-sink<br>with heat-sink | 10.8K/W<br>10.3K/W                |
| Operating Humidity                                                                                                             | non-condensing                                                                                                                   |                                     | 5% - 95% RH                       |
| Environmental testing Part 2-1: Tests<br>Test A: Cold                                                                          | Storage temperature -40°C, 16 hours<br>Operating temperature -40°C, 2 hours                                                      |                                     | according to EN60068-2-1:2007     |
| Environmental testing Part 2-2: Tests<br>Test B: Dry heat                                                                      | Temperature +85°C, 6 hours                                                                                                       |                                     | according to EN60068-2-2:2007     |
| Environmental testing Part 2-30: Tests<br>Test Db: Damp heat, cyclic (12 h + 12 h cycle)                                       | Temperature: +25 to +55°C<br>Humidity: 90%+/-5% RH<br>Test Duration: 48 hours                                                    |                                     | according to EN60068-2-30:2005    |
| Railway applications – Rolling stock equipment –<br>Shock and vibration tests                                                  | Random vibration test 5Hz to 150Hz, Z-Axis<br>1.01m/s² (0.103Grms), Y-Axis, X-Axis 0.70m/s²<br>(0.0714Grms), Duration 10min/Axis |                                     | according to EN61373:2010         |
| Fire protection on railway vehicles                                                                                            |                                                                                                                                  |                                     | according to EN45545-2:2013       |
| Fire hazard testing Part 2-11: Glowing/hot-wire<br>based test methods – Glow-wire flammability test<br>method for end-products | Oxygen index test                                                                                                                |                                     | according to EN ISO 4589-2 OI     |
| Fire hazard testing Part 11-10: Test flames – 50 W<br>horizontal and vertical flame test methods                               | Glow-wire test                                                                                                                   |                                     | according to EN60695-2-11         |
| Shock                                                                                                                          |                                                                                                                                  |                                     | according to MIL-STD-810F         |
| Thermal Shock                                                                                                                  |                                                                                                                                  |                                     | according to MIL-STD-810F         |
| Vibration                                                                                                                      |                                                                                                                                  |                                     | according to MIL-STD-810F         |
| MTBF                                                                                                                           | according to MIL-HDBK-217F, G.B                                                                                                  |                                     | 907.3 x 10³ hours                 |

**Derating Graph <sup>(8)</sup>**

(@ Chamber and natural convection 0.1m/s)



**Notes:**

Note8: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a part-number not shown here please contact RECOM Techsupport for detailed information

### Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

#### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety)                                               | Condition      | Standard                                                                        |
|-------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------|
| Information Technology Equipment, General Requirements for Safety       | E196683        | UL60950-1, 2nd Edition, 2014<br>CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2014 |
| Information Technology Equipment, General Requirements for Safety (LVD) | TW1708011-001  | IEC60950-1:2005, 2nd Edition + A2:2013<br>EN60950-1:2006 + A2:2013              |
| Railway Applications - Electrical Equipment used on rolling stock       | 15A100702E-C   | EN50155:2007                                                                    |
| EAC                                                                     | RU-AT.49.09571 | TP TC 004/2011                                                                  |
| RoHS2                                                                   |                | RoHS-2011/65/EU + AM-2015/863                                                   |

#### EMC Compliance (Railway)

| Condition                                                                                                                      | Standard / Criterion                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Railway Applications - Electromagnetic Compatibility                                                                           | <i>"refer to EMC filtering"</i><br>EN50121-3-2:2006                                                                |
| Industrial, Scientific and Medical Equipment – Radio Frequency Disturbance Characteristics – Limits and Methods of Measurement | EN55011                                                                                                            |
| ESD Electrostatic Discharge Immunity Test                                                                                      | Air $\pm 2, \pm 4, \pm 8\text{kV}$<br>Contact $\pm 2, \pm 4, \pm 6\text{kV}$<br>EN61000-4-2, Criteria A            |
| Radiated, Radio-Frequency, Electromagnetic Field Immunity Test                                                                 | 20V/m (80-1000MHz)<br>EN61000-4-3, Criteria A                                                                      |
| Fast Transient and Burst Immunity <sup>(9)</sup>                                                                               | DC Power Port: $\pm 2\text{kV}$<br>EN61000-4-4, Criteria A                                                         |
| Surge Immunity <sup>(9)</sup>                                                                                                  | DC Power Port: L-L $\pm 0.5, 1\text{kV}$<br>DC Power Port: L-E $\pm 0.5, 1, 2\text{kV}$<br>EN61000-4-5, Criteria A |
| Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields                                                          | DC Power Port: 10V<br>EN61000-4-6, Criteria A                                                                      |

#### EMC Compliance (Multimedia)

| Condition                                                                                       | Standard / Criterion                                                                                          |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements                   | with external filter<br><i>"refer to EMC filtering"</i><br>EN55032, Class A and B                             |
| Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement | EN55024:2010 + A1:2015                                                                                        |
| ESD Electrostatic Discharge Immunity Test                                                       | Air $\pm 2, \pm 4, \pm 8\text{kV}$<br>Contact $\pm 2, \pm 4, \pm 6\text{kV}$<br>IEC61000-4-2:2008, Criteria A |
| Radiated, Radio-Frequency, Electromagnetic Field Immunity Test                                  | 20V/m (80-1000MHz)<br>IEC61000-4-3:2006 + A2:2010, Criteria A                                                 |
| Fast Transient and Burst Immunity                                                               | DC Power Port: $\pm 2\text{kV}$<br>IEC61000-4-4:2012, Criteria A                                              |
| Surge Immunity                                                                                  | DC Power Port: $\pm 0.5, \pm 1, \pm 2\text{kV}$<br>IEC61000-4-5:2014, Criteria A                              |
| Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields                           | DC Power Port: 10V<br>IEC61000-4-6:2013, Criteria A                                                           |
| Power Magnetic Field Immunity                                                                   | 50Hz 100A/m, 1000A/m<br>IEC61000-4-8:2009, Criteria A                                                         |

#### Notes:

Note9: An external input filter capacitor is required if the module has to meet EN61000-4-4 and -4-5.

**The RP40-24xxFR** requires an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}$ /100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) connected in parallel.

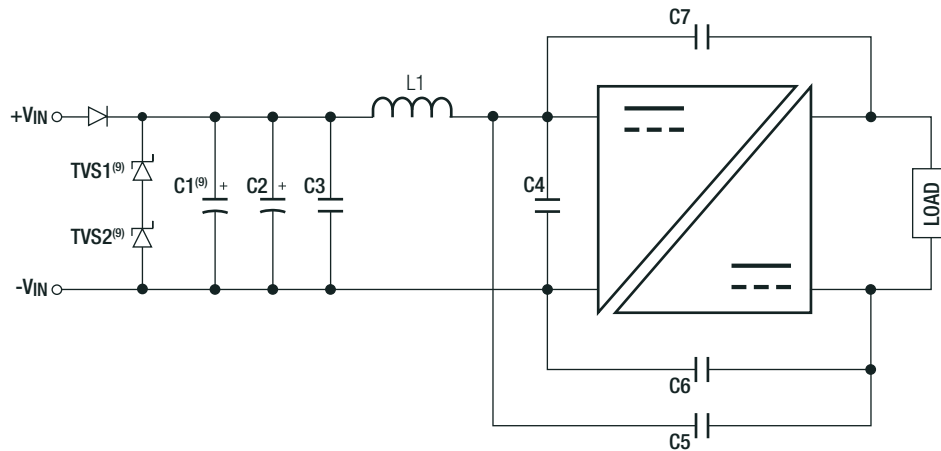
**The RP40-48xxFR** requires an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}$ /100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) connected in parallel.

**The RP40-110xxFR** requires 3pcs aluminum electrolytic capacitor in parallel (Ruby-con BXF series, 68 $\mu\text{F}$ /200V) and two TVS (SMDJ90A, 90V, 3000Watt peak pulse power) in series, connected in parallel.

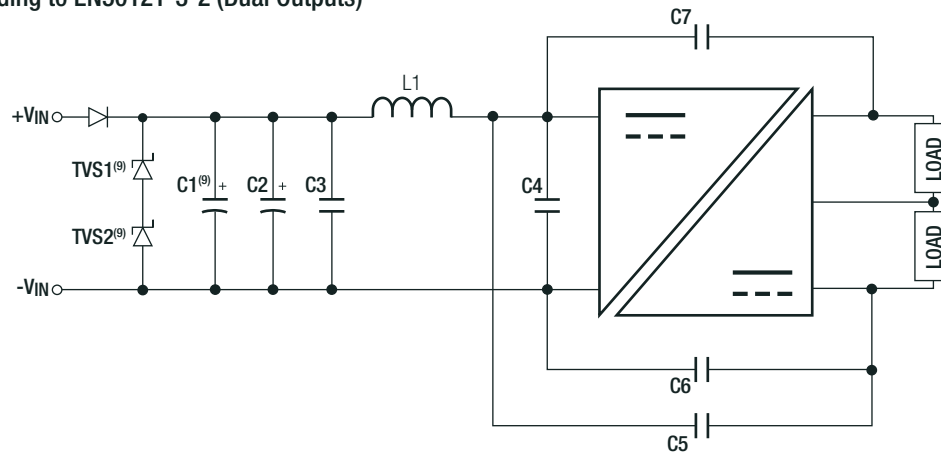
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**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load unless otherwise stated)

### EMC Filtering according to EN50121-3-2 (Single Outputs)



### EMC Filtering according to EN50121-3-2 (Dual Outputs)



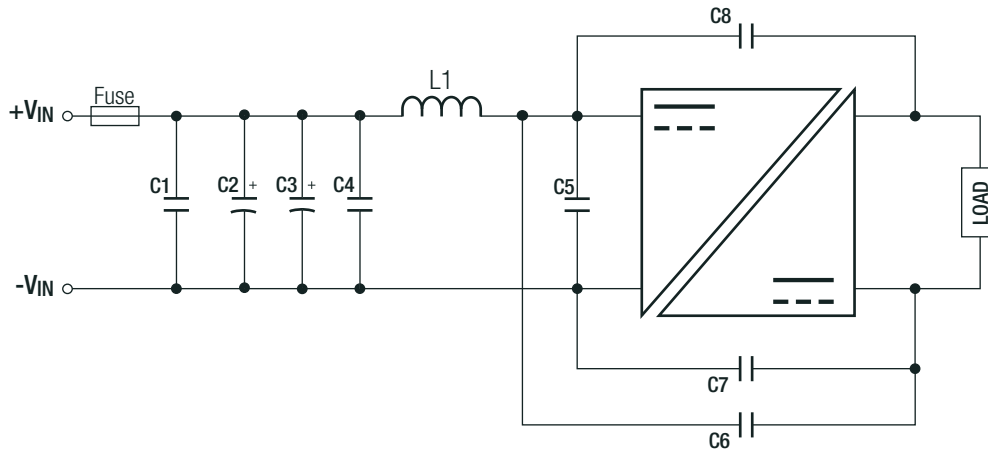
### Component List

| MODEL           | TVS1                                        | TVS2                                      | C1 <sup>(9)</sup>          | C2                                               | C3                    | C4                      | C5, C6, C7                    | L1                        |
|-----------------|---------------------------------------------|-------------------------------------------|----------------------------|--------------------------------------------------|-----------------------|-------------------------|-------------------------------|---------------------------|
| RP40-24xxS_DFR  | SMDJ58A<br>58V, 3000W<br>peak pulse power   | N/A                                       | 220μF/100V                 | N/A                                              | N/A                   | 10μF/50V<br>1210 MLCC   | 680pF/3kV<br>1808 MLCC        | 2.2μH 11A<br>SMD-Inductor |
| RP40-48xxS_DFR  | SMDJ120A<br>120V, 3000W<br>peak pulse power |                                           |                            |                                                  |                       | 4.7μF/100V<br>1210 MLCC |                               | 12μH 4A<br>SMD-Inductor   |
| RP40-110xxS_DFR | SMDJ90A<br>90V, 3000W<br>peak pulse power   | SMDJ90A<br>90V, 3000W<br>peak pulse power | 68μF/200V<br>3 in parallel | 33μF/250V<br>Al Cap. (lie down)<br>Chemi-con KXJ | 1μF/250V<br>1812 MLCC | 1μF/250V<br>1812 MLCC   | 1000pF<br>TDK CD series<br>Y1 | 22μH 1.5A<br>SMD-Inductor |

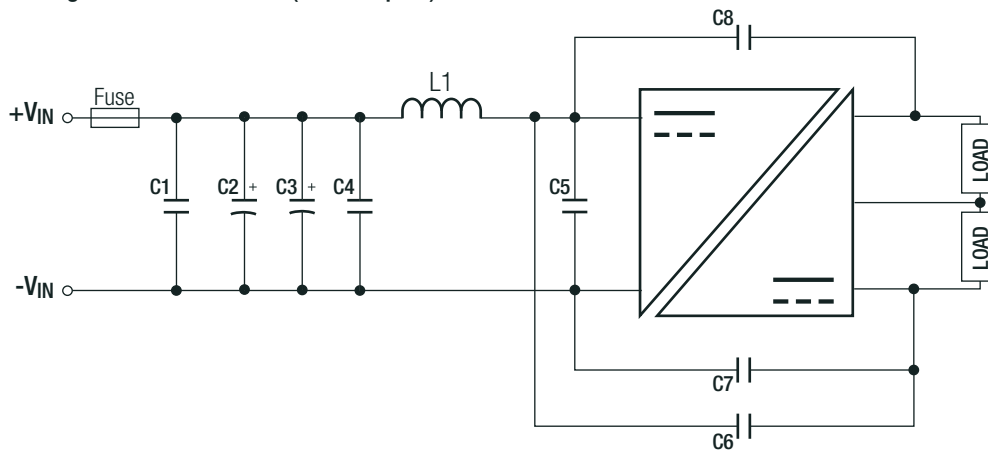
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**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load unless otherwise stated)

**EMC Filtering according to EN55032 Class A (Single Outputs)**



**EMC Filtering according to EN55032 Class A (Dual Outputs)**



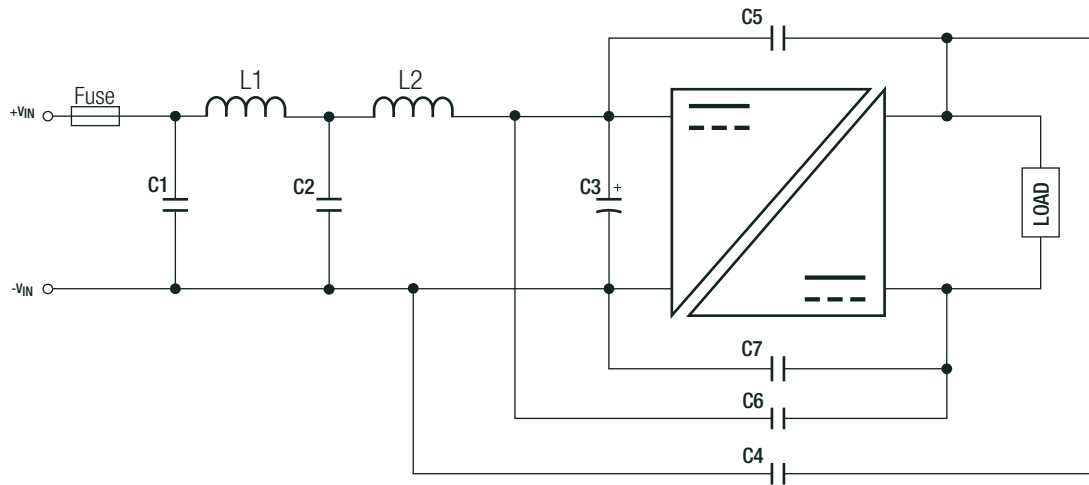
**Component List**

| MODEL           | C1                      | C2                                               | C3  | C4                    | C5                      | C6                            | C7 | C8 | L1                        |
|-----------------|-------------------------|--------------------------------------------------|-----|-----------------------|-------------------------|-------------------------------|----|----|---------------------------|
| RP40-24xxS_DFR  | 10μF/50V<br>1210 MLCC   | N/A                                              | N/A | N/A                   | 10μF/50V<br>1210 MLCC   | 680pF/3kV<br>1808 MLCC        |    |    | 2.2μH 11A<br>SMD Inductor |
| RP40-48xxS_DFR  | 4.7μF/100V<br>1210 MLCC |                                                  |     |                       | 4.7μF/100V<br>1210 MLCC |                               |    |    | 12μH 4A<br>SMD Inductor   |
| RP40-110xxS_DFR | N/A                     | 33μF/250V<br>Al Cap. (lie down)<br>Chemi-con KXJ |     | 1μF/250V<br>1812 MLCC |                         | 1000pF<br>TDK CD series<br>Y1 |    |    | 22μH 1.5A<br>SMD Inductor |

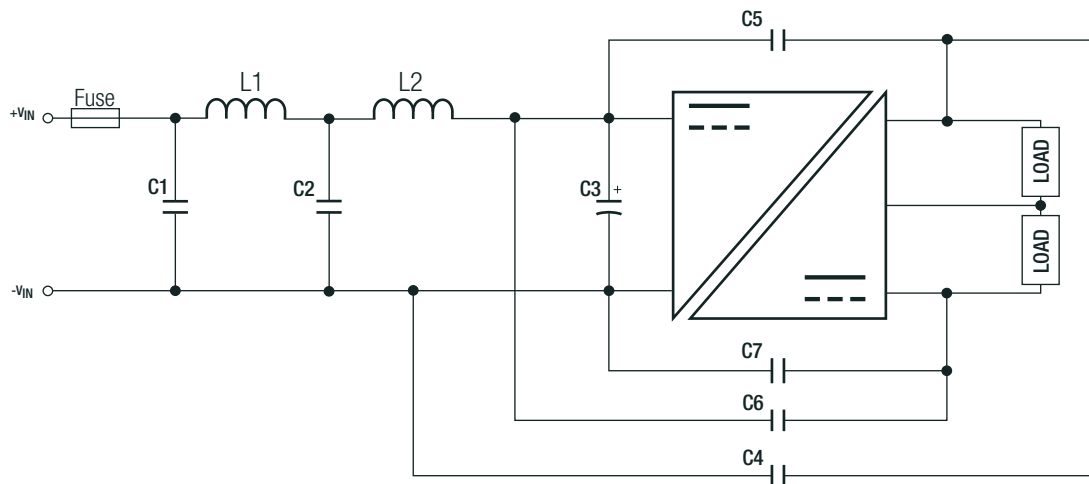
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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

EMC Filtering according to EN55032 Class B (24Vin and 48Vin, Single Outputs)



EMC Filtering according to EN55032 Class B (24Vin and 48Vin, Dual Outputs)



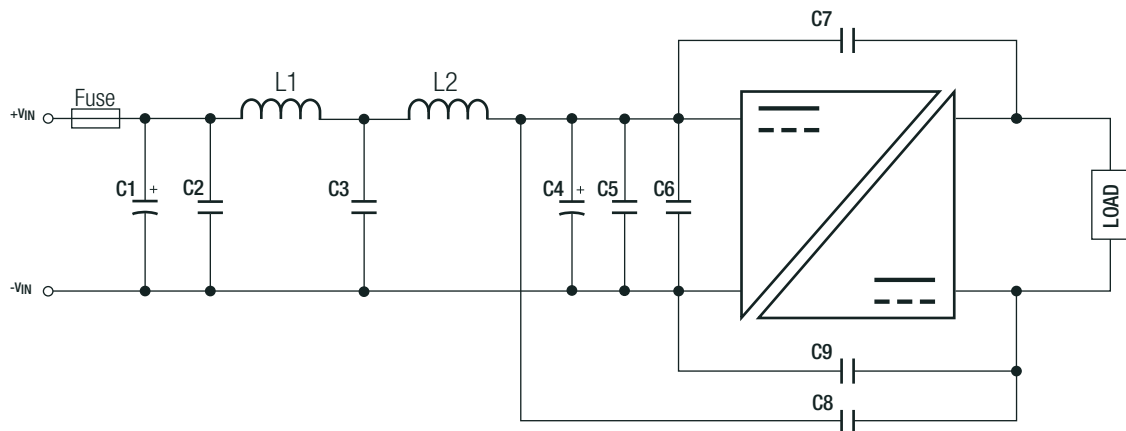
**Component List**

| MODEL          | C1/C2                   | C3                                              | C4/C6                   | C5/C7                   | L1/L2                     |
|----------------|-------------------------|-------------------------------------------------|-------------------------|-------------------------|---------------------------|
| RP40-24xxS_DFR | 10μF/50V<br>1210 MLCC   | 82μF/100V<br>Al Cap. (lie down)<br>Chemi-con KJ | 1000pf/3kV<br>1808 MLCC | 2200pf/3kV<br>1808 MLCC | 3.3μH 10A<br>SMD Inductor |
| RP40-48xxS_DFR | 4.7μF/100V<br>1210 MLCC |                                                 |                         |                         | 12μH 4A<br>SMD Inductor   |

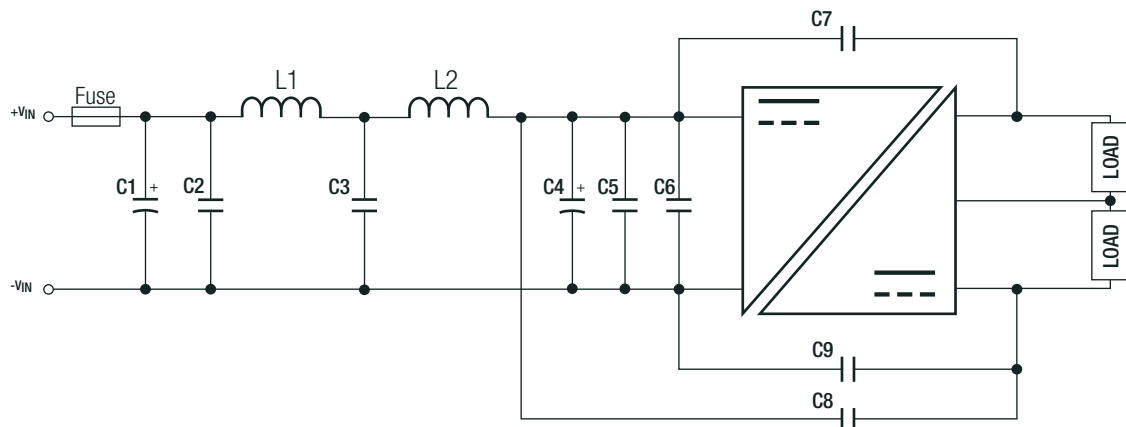
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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

EMC Filtering according to EN55032 Class B (110Vin Single Outputs)



EMC Filtering according to EN55032 Class B (110Vin Dual Outputs)



#### Component List

| MODEL           | C1                                               | C2/C3                 | C4                                               | C5/C6                 | C7/C8/C9                   | L1/L2                     |
|-----------------|--------------------------------------------------|-----------------------|--------------------------------------------------|-----------------------|----------------------------|---------------------------|
| RP40-110xxS_DFR | 33μF/250V<br>Al Cap. (lie down)<br>Chemicon -KXJ | 1μF/250V<br>1812 MLCC | 33μF/250V<br>Al Cap. (lie down)<br>Chemicon -KXJ | 1μF/250V<br>1812 MLCC | 2200pF<br>TDK CD series Y1 | 22μH 1.5A<br>SMD Inductor |

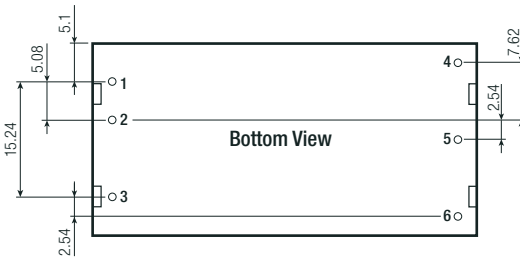
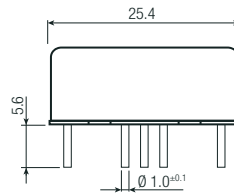
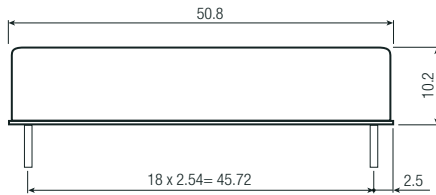
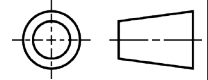
#### DIMENSIONS and PHYSICAL CHARACTERISTICS

| Parameter          | Type              | Value                 |
|--------------------|-------------------|-----------------------|
| Material           | case              | copper alloy (CuZn33) |
|                    | base              | FR4 PCB               |
|                    | potting           | silicone (UL94 V-0)   |
| Dimensions (LxWxH) | without Heat-sink | 50.8 x 25.4 x 10.2mm  |
|                    | with Heat-sink    | 56.8 x 25.4 x 16.8mm  |
| Weight             | without Heat-sink | 32g                   |
|                    | with Heat-sink    | 43g                   |

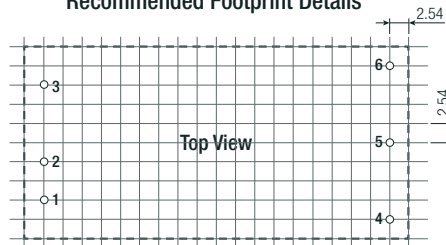
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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

Dimension Drawing (mm)



Recommended Footprint Details

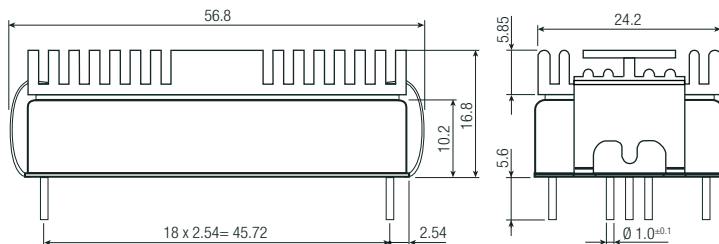
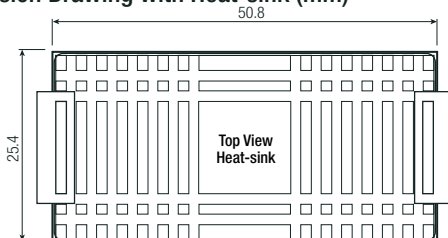


Pinning Information

| Pin # | Single              | Dual                |
|-------|---------------------|---------------------|
| 1     | +Vin                | +Vin                |
| 2     | -Vin                | -Vin                |
| 3     | CTRL <sup>(3)</sup> | CTRL <sup>(3)</sup> |
| 4     | +Vout               | +Vout               |
| 5     | -Vout               | Com                 |
| 6     | Trim                | -Vout               |

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

Dimension Drawing with Heat-sink (mm)



### PACKAGING INFORMATION

| Parameter                   | Type           |                   | Value                  |
|-----------------------------|----------------|-------------------|------------------------|
| Packaging Dimension (LxWxH) | tube           | without heat-sink | 255.0 x 54.0 x 22.0mm  |
|                             | tray           | with heat-sink    | 302.5 x 222.0 x 20.0mm |
| Packaging Quantity          | tube           | without heat-sink | 9pcs                   |
|                             | tray           | with heat-sink    | 20pcs                  |
| Storage Temperature Range   |                |                   | -55°C to +125°C        |
| Storage Humidity            | non-condensing |                   | 5% - 95% RH            |

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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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