

# Features

- Qualified with 65kV/ $\mu$ s @ Vcommon mode =1KV
- UL/CSA and IEC/EN safety certified
- High isolation 6.4kVDC/1s
- Optional continuous short circuit protection
- /X2 version with >9mm input/output clearance
- Suitable for IGBT applications

# Unregulated Converters

# RECOM DC/DC Converter

## RxxPxx

**1 Watt**  
**SIP7**  
**Single and Dual Output**

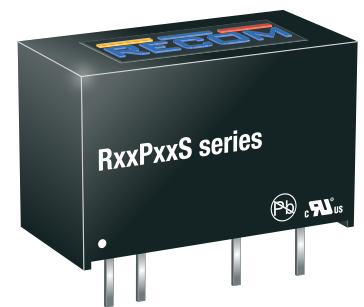


### Description

The RxxPxx\_D Series of DC/DC Converters are certified to UL/CSA60950-1 as well as EN60950-1. This makes them ideal for safety applications where approved isolation is required.

### Selection Guide

| Part Number               | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. <sup>(1)</sup> [%] | max. Capacitive Load <sup>(2)</sup> [ $\mu$ F] |
|---------------------------|--------------------------|----------------------|---------------------|------------------------------------|--|
| RxxP3.3S <sup>(3,4)</sup> | 5, 9, 12, 15, 24         | 3.3                  | 303                 | 70                                 | 2200   |
| RxxP05S <sup>(3,4)</sup>  | 5, 9, 12, 15, 24         | 5                    | 200                 | 70 - 75                            | 1000   |
| RxxP09S <sup>(3,4)</sup>  | 5, 9, 12, 15, 24         | 9                    | 111                 | 70 - 75                            | 1000   |
| RxxP12S <sup>(3,4)</sup>  | 5, 9, 12, 15, 24         | 12                   | 84                  | 70 - 75                            | 470  |
| RxxP15S <sup>(3,4)</sup>  | 5, 9, 12, 15, 24         | 15                   | 66                  | 75 - 80                            | 470  |
| RxxP3.3D <sup>(4)</sup>   | 5, 9, 12, 15, 24         | $\pm$ 3.3            | $\pm$ 151           | 70                                 | $\pm$ 1000                                     |
| RxxP05D <sup>(4)</sup>    | 5, 9, 12, 15, 24         | $\pm$ 5              | $\pm$ 100           | 70 - 75                            | $\pm$ 470                                      |
| RxxP09D <sup>(4)</sup>    | 5, 9, 12, 15, 24         | $\pm$ 9              | $\pm$ 55            | 70 - 75                            | $\pm$ 470                                      |
| RxxP12D <sup>(4)</sup>    | 5, 9, 12, 15, 24         | $\pm$ 12             | $\pm$ 41            | 70 - 75                            | $\pm$ 220                                      |
| RxxP15D <sup>(4)</sup>    | 5, 9, 12, 15, 24         | $\pm$ 15             | $\pm$ 33            | 75 - 80                            | $\pm$ 220                                      |
| RxxP1509D <sup>(4)</sup>  | 12, 24                   | +15/-9               | +33/-56             | 70 - 80                            | $\pm$ 220                                      |
| R05P1509D <sup>(4)</sup>  | 5                        | +15/-9               | $\pm$ 42            | 70 - 80                            | +68/-220                                       |

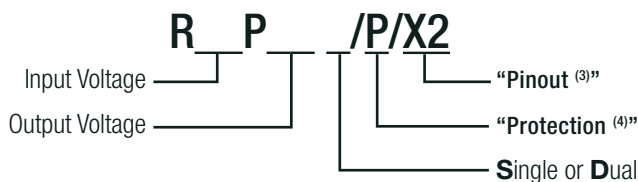


IEC/EN62368-1 certified  
UL/CSA60950-1 certified  
UL/CSA62368-1 certified  
EN55032 compliant  
CB Report

#### Notes:

- Note1: Efficiency is tested at nominal input and full load at +25°C ambient  
Note2: Max. Capacitive Load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter

### Model Numbering



#### Notes:

- Note3: add suffix „/X2“ for single output with alternative pinout  
Note4: add suffix „P“ for continuous short circuit protection

#### Ordering Examples:

- R05P05S/P = 5V Input, 5V Output, Single Output, Continuous Short Circuit Protection  
R05P3.3D/P = 5V Input, 3.3V Output, Dual Output, Continuous Short Circuit Protection  
R05P05S/P/X2 = 5V Input, 5V Output, Single Output, Continuous Short Circuit Protection, Alternative Pinout

**PREFERRED ALTERNATIVES**  
For new medical applications:

**REM1**

**REF DESIGN available**

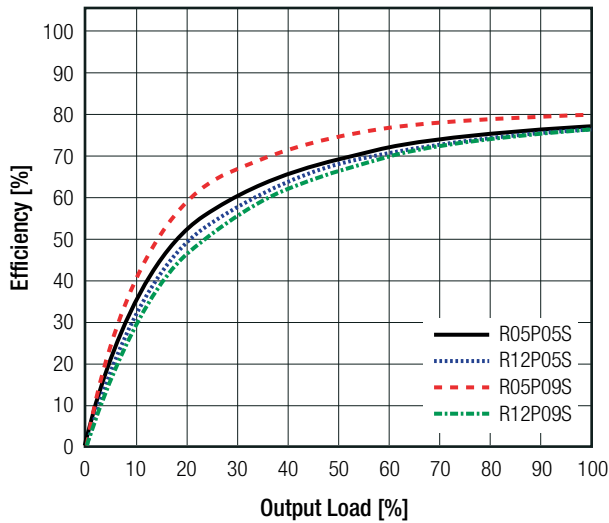
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### BASIC CHARACTERISTICS

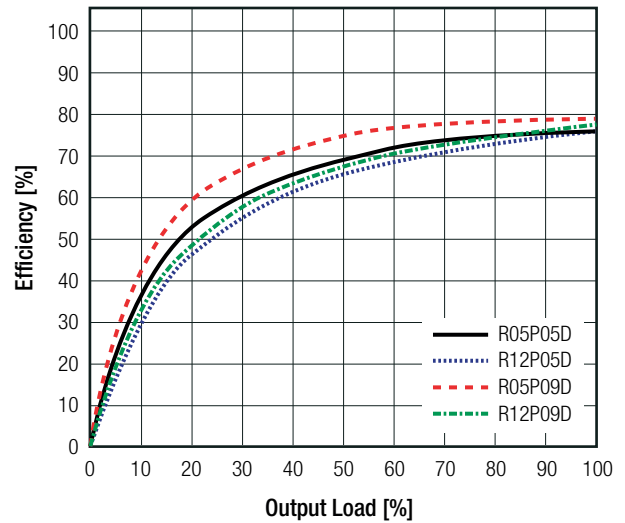
| Parameter                    | Condition              | Min.           | Typ.           | Max.     |
|------------------------------|------------------------|----------------|----------------|----------|
| Input Voltage Range          |                        |                | ±10%           |          |
| Minimum Load                 |                        | 0%             |                |          |
| Internal Operating Frequency | all types<br>PxxP1509D | 20kHz<br>20kHz | 50kHz<br>60kHz | 85kHz    |
| Output Ripple and Noise      | 20MHz BW               |                |                | 200mVp-p |

### Efficiency vs. Load

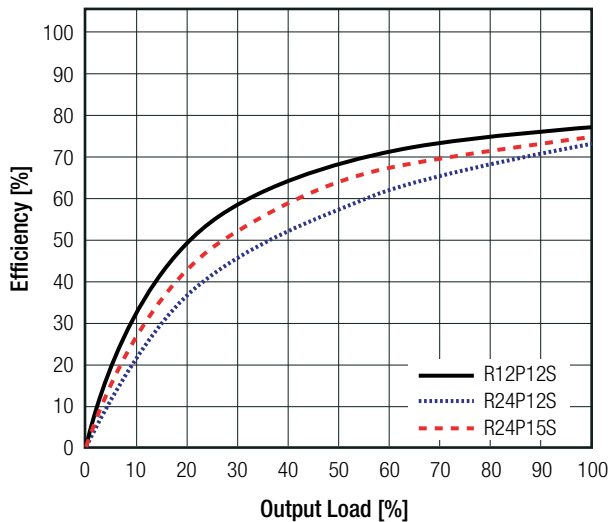
RxxP05S and RxxP09S



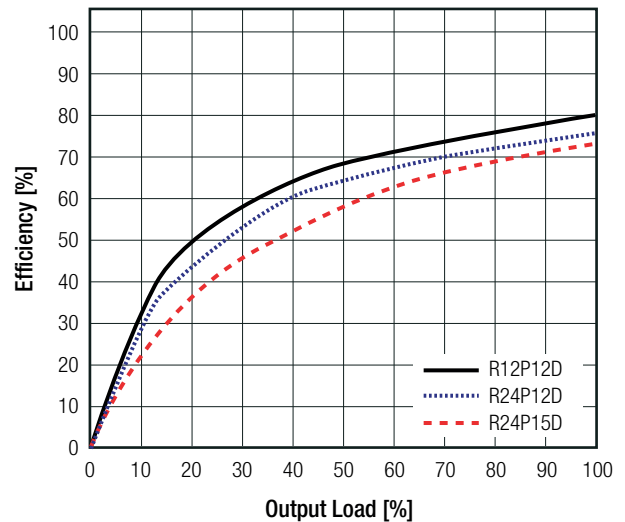
RxxP05D and RxxP09D



RxxP12S and RxxP15S



RxxP12D and RxxP15D



### REGULATIONS

| Parameter                      | Condition                        |                           | Value                  |
|--------------------------------|----------------------------------|---------------------------|------------------------|
| Output Accuracy                |                                  |                           | ±5.0% max.             |
| Line Regulation                | low line to high line, full load |                           | ±1.2% of 1.0% Vin typ. |
| Load Regulation <sup>(5)</sup> | 10% to 100% load                 | 3.3, 5VDC<br>9, 12, 15VDC | 15% typ.<br>10% typ.   |

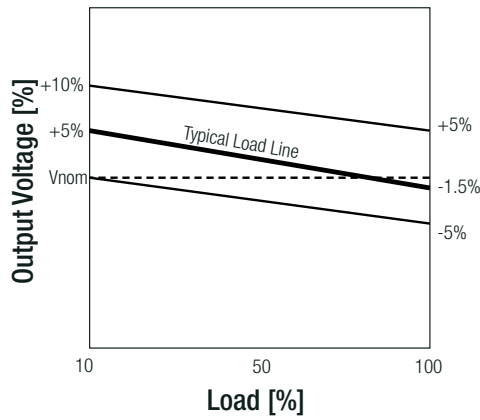
**Notes:**

Note5: Operation below 10% load will not harm the converter, but specifications may not be met

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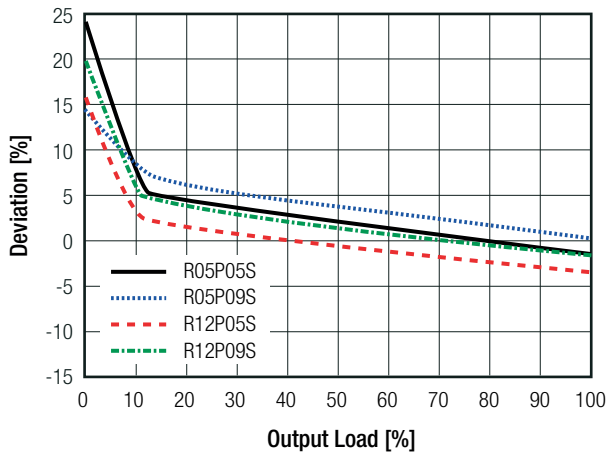
Specifications (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load and after warm-up unless otherwise stated)

### Tolerance Envelope

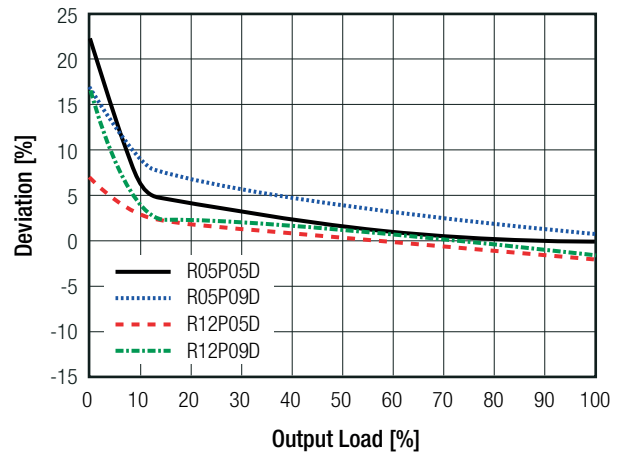


### Deviation vs. Load

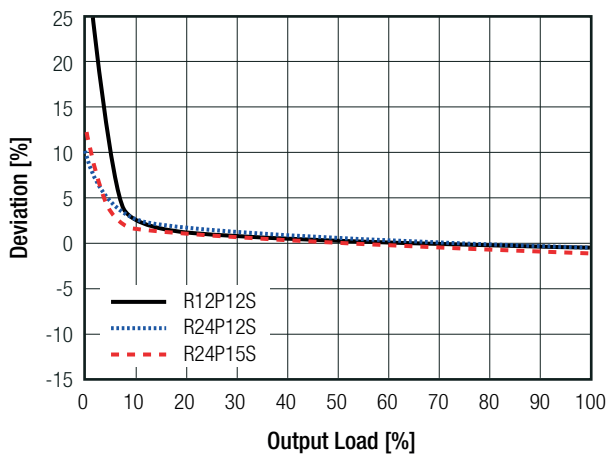
RxxP05S and RxxP09S



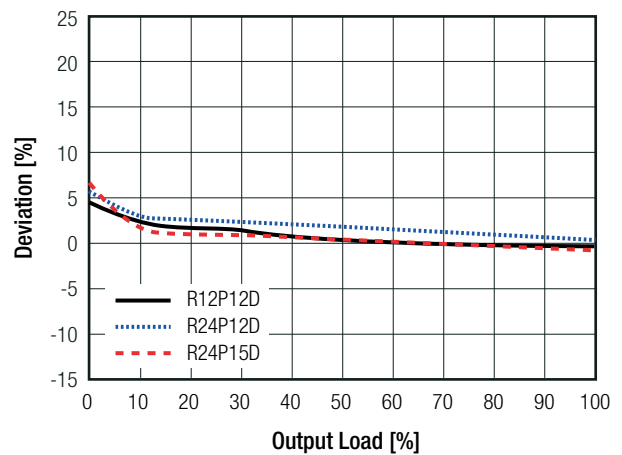
RxxP05D and RxxP09D



RxxP12S and RxxP15S



RxxP12D and RxxP15D



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

**PROTECTIONS**

| Parameter                        | Type                               | Value                  |              |
|----------------------------------|------------------------------------|------------------------|--------------|
| Short Circuit Protection (SCP)   | without suffix<br>with suffix "/P" | 1 second<br>continuous |              |
| Isolation Voltage <sup>(6)</sup> | I/P to O/P                         | tested for 1 second    | 6.4kVDC      |
|                                  |                                    | rated for 1 minute     | 3.2kVAC/60Hz |
|                                  |                                    | working voltage        | 250VACrms    |
| Isolation Resistance             |                                    | 15GΩ min.              |              |
| Isolation Capacitance            |                                    | 4.0pF min. / 10pF max. |              |
| Insulation Grade                 | according to 62368-1               | basic                  |              |

**Notes:**

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

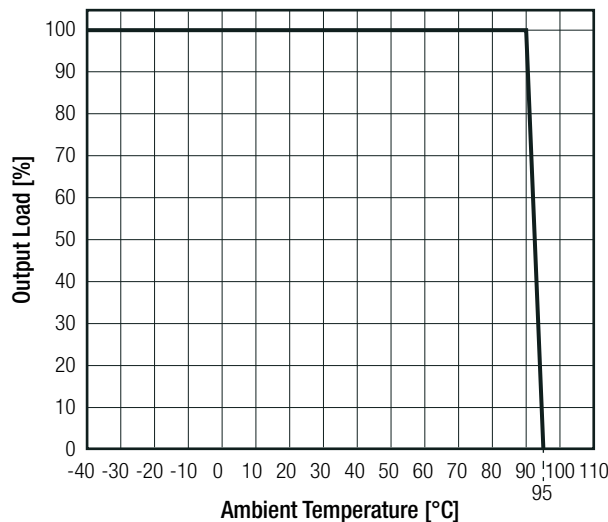
Note7: Refer to local safety regulations if input over-current protection is required. Recommended fuse: slow blow type

**ENVIRONMENTAL**

| Parameter                   | Condition                              | Value          |                              |
|-----------------------------|--|----------------|------------------------------|
| Operating Temperature Range | without derating @ free air convection | -40°C to +90°C |                              |
| Operating Altitude          | according to 62368-1                   | 2000m          |                              |
|                             | according to 60601-1                   | 3000m          |                              |
| Operating Humidity          | non-condensing                         | 95% RH max.    |                              |
| Pollution Degree            |  | PD2            |                              |
| MTBF                        | according to MIL-HDBK-217F, G.B.       | +25°C          | 2974 x 10 <sup>3</sup> hours |
|                             |  | +85°C          | 728 x 10 <sup>3</sup> hours  |

**Derating Graph**

(@ Chamber and free air convection)



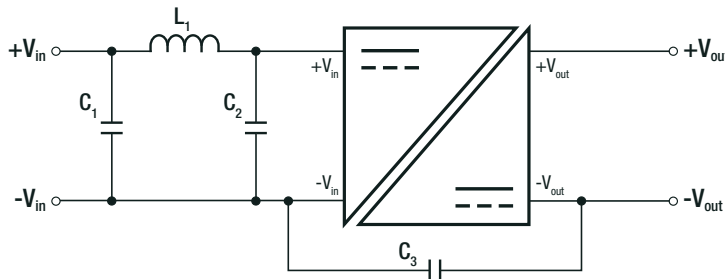
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety)  | Report / File Number | Standard   |
|--|----------------------|--|
| Information Technology Equipment, General Requirements for Safety  | E224736-A56-UL       | UL60950-1, 2nd Edition, 2014<br>CAN/CSA C22.2 No. 60950-1, 2nd Edition, 2014 |
| Information Technology Equipment, General Requirements for Safety  | LVD1602031           | EN60950-1:2006 + A2:2013<br>IEC60950-1:2005 2nd Edition + A2:2013            |
| Audio/Video, information and communication technology equipment. Safety requirements                     | E224736-A56-UL       | UL62368-1, 2nd Edition, 2014<br>CAN/CSA C22.2 No. 62368-1, 2nd Edition, 2014 |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements             | ATTCB106076          | EN62368-1: 2014 + A11:2017   |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB Scheme) |                      | IEC62368-1:2014, 2nd Edition   |
| Medical electrical equipment Part 1: General requirements for basic safety and essential performance     | SPC1007090           | IEC 60601-1:1988 + A2:1995<br>EN 60601-1:1990 + A13 :1996                    |
| EAC  | RU-AT.49.09571       | TP TC 004/2011   |
| RoHS2  |                      | RoHS-2011/65/EU + AM2015/863   |

| EMC Compliance  | Condition   | Standard / Criterion   |
|---|---|------------------------|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | with external filter<br>(see filter suggestion below) | EN55032, Class A and B |

#### EMC Filtering Suggestions according to EN55032



#### Component List Class A

| MODEL   | C1   | L1  | C2    | C3 (safety) |
|---------|------|-----|-------|-------------|
| R05P05S | 22µF | N/A | N/A   | N/A         |
| R05P12S | MLCC |     | N/A   |             |
| R12P05S | 10µF |     | 4.7µF |             |
| R24P05S | MLCC |     | MLCC  |             |

| MODEL   | C1           | L1  | C2  | C3 (safety) |
|---------|--------------|---|-----|-------------|
| R05P05S | 10µF<br>MLCC | <a href="#">22µH choke</a><br><a href="#">RLS-226</a> | N/A | 1nF         |
| R05P12S |              |   |     |             |
| R12P05S |              |   |     |             |
| R24P05S |              |   |     |             |

**Notes:**

Note8: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact RECOM tech support for advice

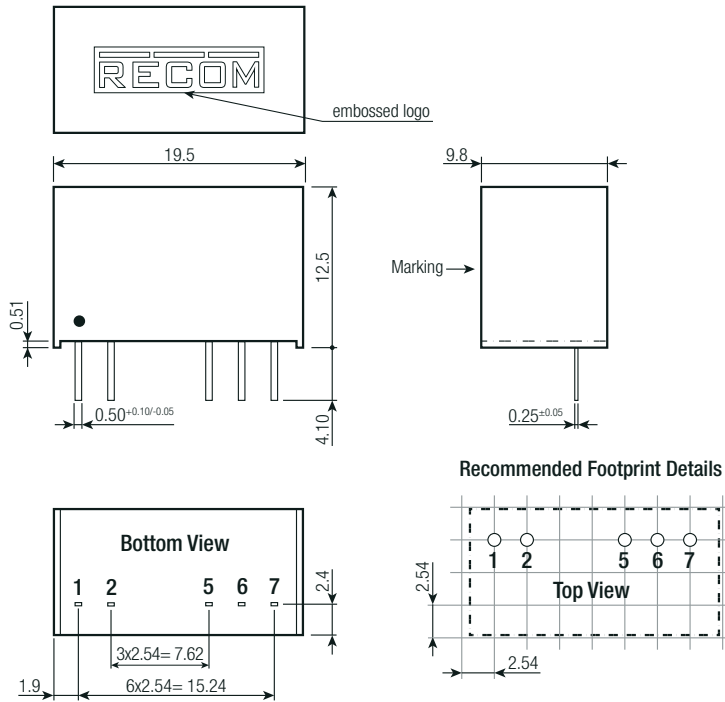
### DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter         | Type                   | Value  |
|-------------------|------------------------|--|
| Material          | case<br>potting<br>PCB | non-conductive black plastic, (UL94 V-0)<br>epoxy, (UL94 V-0)<br>FR4, (UL94 V-0) |
| Dimension (LxWxH) |                        | 19.5 x 9.8 x 12.5mm  |
| Weight            |                        | 4.3g typ.  |

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

### Dimension Drawing (mm)



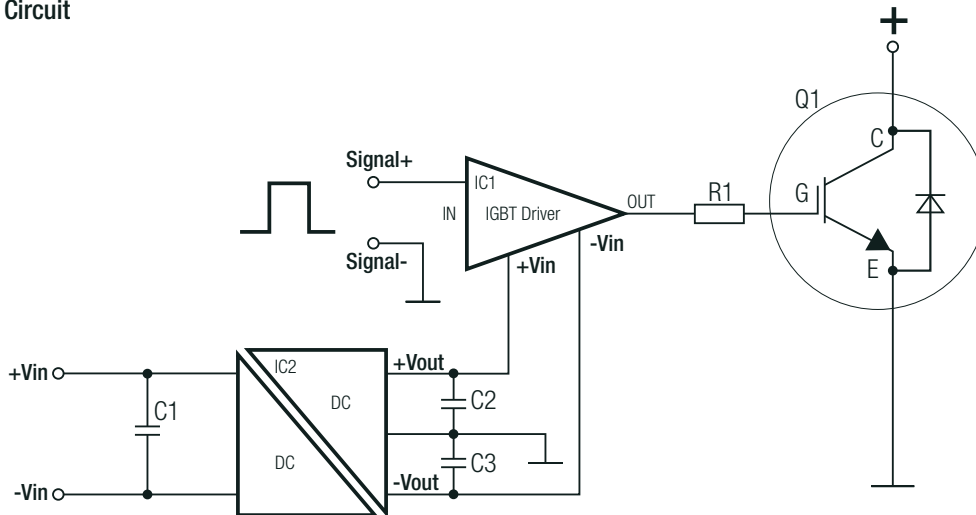
### Pin Connection

| Pin # | Single | Dual  | /X2    |
|-------|--------|-------|--------|
| 1     | +Vin   | +Vin  | +Vin   |
| 2     | -Vin   | -Vin  | -Vin   |
| 5     | -Vout  | -Vout | No Pin |
| 6     | No Pin | Com   | -Vout  |
| 7     | +Vout  | +Vout | +Vout  |

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

### INSTALLATION AND APPLICATION

#### IGBT Application Circuit



### PACKAGING INFORMATION

| Parameter                   | Type | Value                 |
|-----------------------------|------|-----------------------|
| Packaging Dimension (LxWxH) | tube | 520.0 x 22.3 x 12.0mm |
| Packaging Quantity          |      | 25pcs                 |
| Storage Temperature Range   |      | -55°C to +125°C       |
| Storage Humidity            |      | 95% RH max.           |

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.