

Features

Unregulated Converters

- Pot-core transformer - separated windings
- high 5.2kVDC basic isolation in compact size
- Optional continuous short circuit protection
- Efficiency up to 82%
- Pin compatible with RH and RK series
- Suitable for IGBT applications
- IEC/EN/UL/CSA 60950-1 certified



RP

1 Watt
SIP7
Single and Dual Output



Description

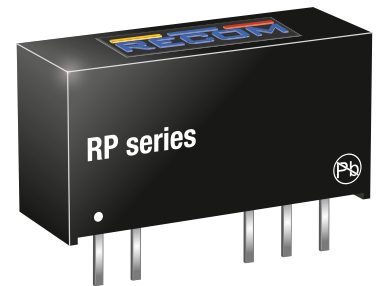
The RP series has very high isolation of 5.2kVDC in a compact size. The converters are suitable for IGBT driver applications. The /X2 version has rearranged pins to permit an input output separation of more than 9mm.

Selection Guide

| Part Number | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. ⁽¹⁾ [%] | max. Capacitive Load ⁽²⁾ [µF] |
|----------------------------|--------------------------|----------------------|---------------------|------------------------------------|--|
| RP-xx3.3S ^(3,4) | 5, 9, 12, 15, 24 | 3.3 | 303 | 70 | 2200 |
| RP-xx05S ^(3,4) | 5, 9, 12, 15, 24 | 5 | 200 | 70-72 | 1000 |
| RP-xx09S ^(3,4) | 5, 9, 12, 15, 24 | 9 | 111 | 75 | 1000 |
| RP-xx12S ^(3,4) | 5, 9, 12, 15, 24 | 12 | 84 | 75-78 | 470 |
| RP-xx15S ^(3,4) | 5, 9, 12, 15, 24 | 15 | 66 | 80 | 470 |
| RP-xx24S ^(3,4) | 5, 9, 12, 15, 24 | 24 | 42 | 80 | 220 |
| RP-xx3.3D ⁽³⁾ | 5, 9, 12, 15, 24 | ±3.3 | ±152 | 70 | ±1000 |
| RP-xx05D ⁽³⁾ | 5, 9, 12, 15, 24 | ±5 | ±100 | 74-76 | ±470 |
| RP-xx09D ⁽³⁾ | 5, 9, 12, 15, 24 | ±9 | ±56 | 75 | ±470 |
| RP-xx12D ⁽³⁾ | 5, 9, 12, 15, 24 | ±12 | ±42 | 79-82 | ±220 |
| RP-xx15D ⁽³⁾ | 5, 9, 12, 15, 24 | ±15 | ±33 | 80-82 | ±220 |
| RP-xx24D ⁽³⁾ | 5, 9, 12, 15, 24 | ±24 | ±21 | 80 | ±100 |
| RP-xx1509D ⁽³⁾ | 5,12,24 | +15/-9 | ±42 | 70-85 | ±220 |

Notes:

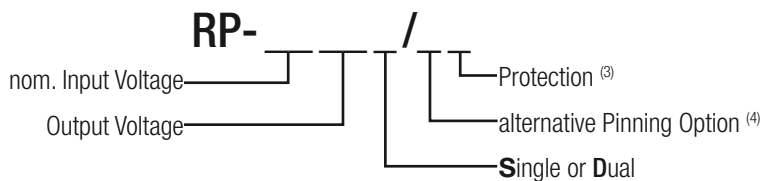
- Note1: Efficiency is tested at nominal input and full load at +25°C ambient
 Note2: Max Cap Load is tested at nominal input and full resistive load



UL60950-1 certified*
 CAN/CSA-C22.2 No 60950-1 certified*
 EN60950-1 certified
 IEC60950-1 certified
 EN55032 compliant

*+15/-9 version excluded

Model Numbering



Notes:

- Note3: standard part is without continuous short circuit protection
 add suffix „/P“ for continuous short circuit protection
 Note4: add suffix „/X2“ for alternative pinning (only available for single outputs)
 or add suffix „/P/X2“ for continuous short circuit protection and alternative pinning

Ordering Examples:

- RP-123.3S/P: 12V Input Voltage, 3.3V Output Voltage, Single Output with continuous short circuit protection
 RP-0509S/X2: 5V Input Voltage, ±9V Output Voltage, Single Output with alternative pinning
 RP-0505S/P/X2: 5V Input Voltage, 5V Output Voltage, Single Output with continuous short circuit protection and alternative pinning

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

BASIC CHARACTERISTICS

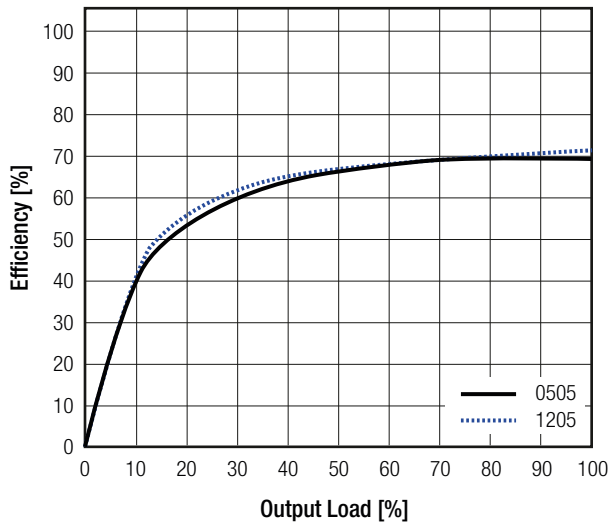
| Parameter | Condition | Min. | Typ. | Max. |
|------------------------------|-----------|-------|--------|-----------|
| Internal Input Filter | | | | capacitor |
| Input Voltage Range | | | ±10% | |
| Minimum Load ⁽⁵⁾ | | 0% | | |
| Start-up time | | | | 250ms |
| Internal Operating Frequency | | 50kHz | 100kHz | 120kHz |
| Output Ripple and Noise | 20MHz BW | | | 100mVp-p |

Notes:

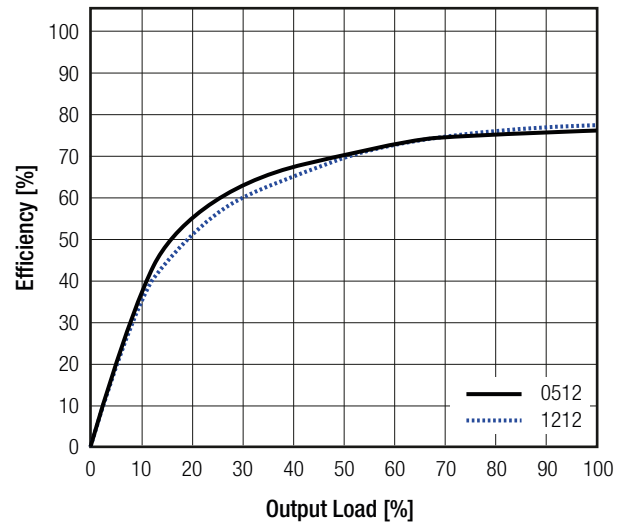
Note5: Operation below 10% load will not harm the converter, but specifications may not be met

Efficiency vs. Load

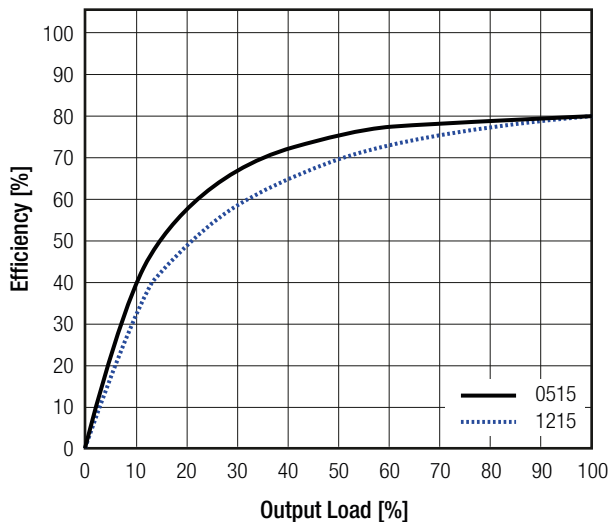
RP-xx05S



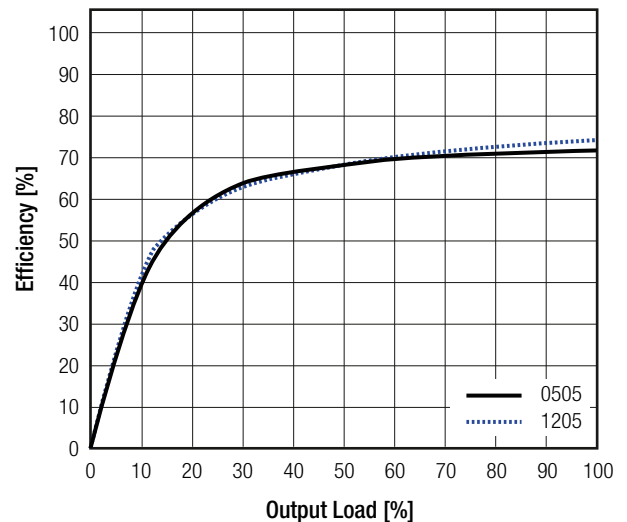
RP-xx12S



RP-xx15S



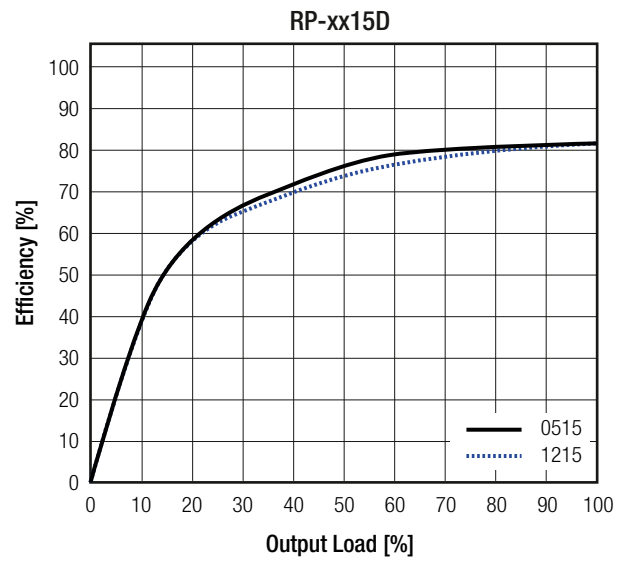
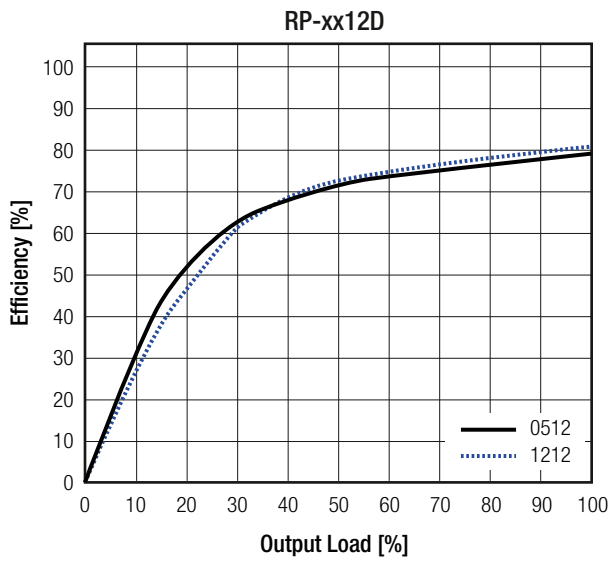
RP-xx05D



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

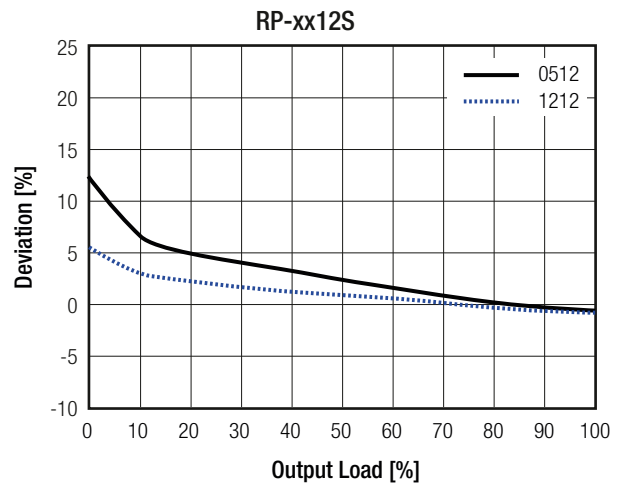
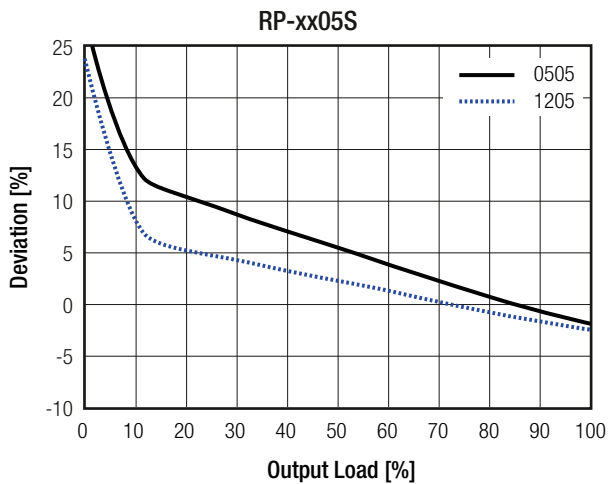
Efficiency vs. Load



REGULATIONS

| Parameter | Condition | | Value |
|-----------------|-----------------------|----------------------------------|------------------------|
| Output Accuracy | | | ±5.0% max. |
| Line Regulation | low line to high line | | ±1.2% of 1.0% Vin typ. |
| Load Regulation | 10% to 100% load | 3.3Vout | 20.0% max. |
| | | 5Vout | 15.0% max. |
| | | 9, 12, 15, 24Vout and RP-xx1509D | 10.0% max. |

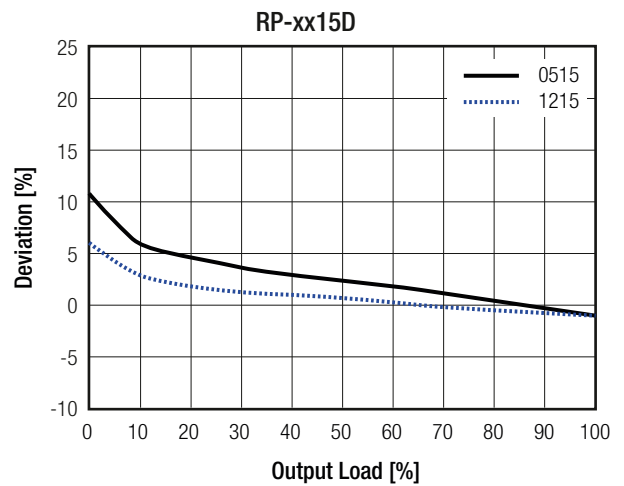
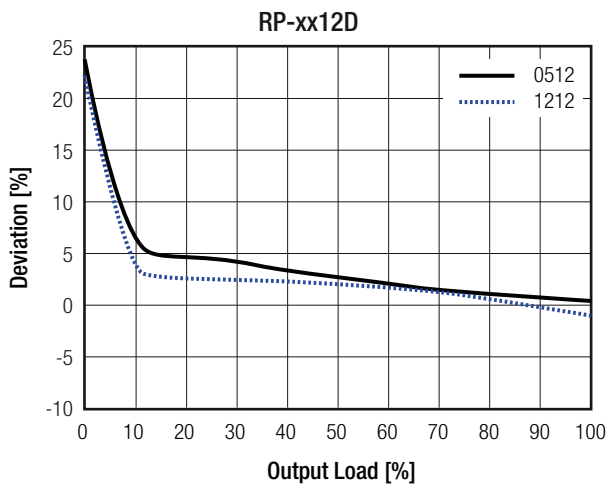
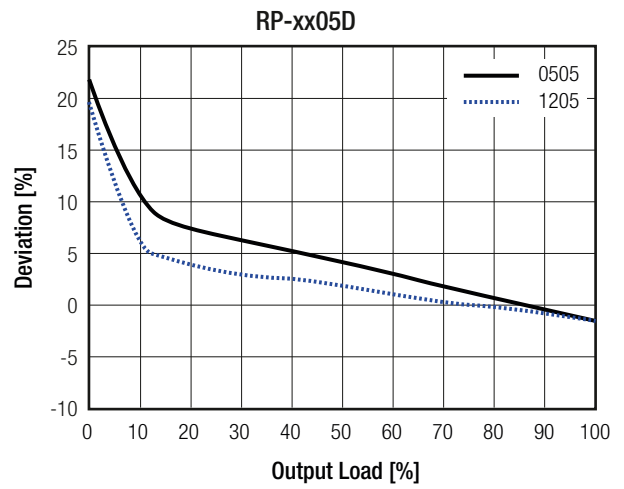
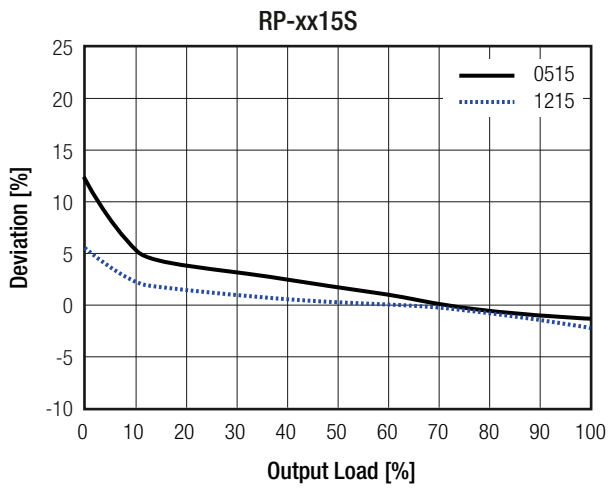
Deviation vs. Load



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

Deviation vs. Load



PROTECTIONS

| Parameter | Type | | Value |
|----------------------------------|------------------------------------|---|------------------------|
| Short Circuit Protection (SCP) | without suffix with suffix "/P" | | 1 second continuous |
| Isolation Voltage ⁽⁶⁾ | I/P to O/P | tested for 1 second rated for 1 minute | 5.2kVDC 2kVAC/60Hz |
| Isolation Resistance | | | 20GΩ min. |
| Isolation Capacitance | | | 4pF min. / 10pF max. |
| Insulation Grade | | | basic |

Notes:

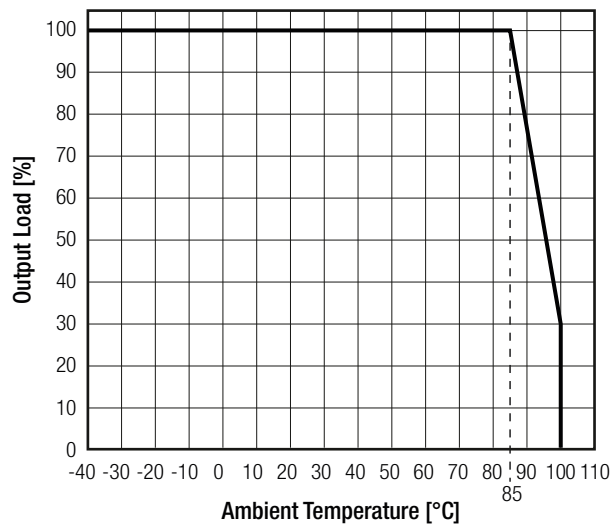
Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note7: Refer to local wiring regulations if input over-current protection is also required. Recommended fuse: T1A slow blow type

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

| ENVIRONMENTAL | | | |
|-----------------------------|----------------------------------|-------|-------------------------------|
| Parameter | Condition | | Value |
| Operating Temperature Range | full load (see graph) | | -40°C to +85°C |
| Maximum Case Temperature | | | +105°C |
| Operating Altitude | | | 2000m |
| Operating Humidity | non-condensing | | 95% RH max. |
| Pollution Degree | | | PD2 |
| MTBF | according to MIL-HDBK-217F, G.B. | +25°C | 18400 x 10 ³ hours |
| | | +85°C | 6900 x 10 ³ hours |

Derating Graph

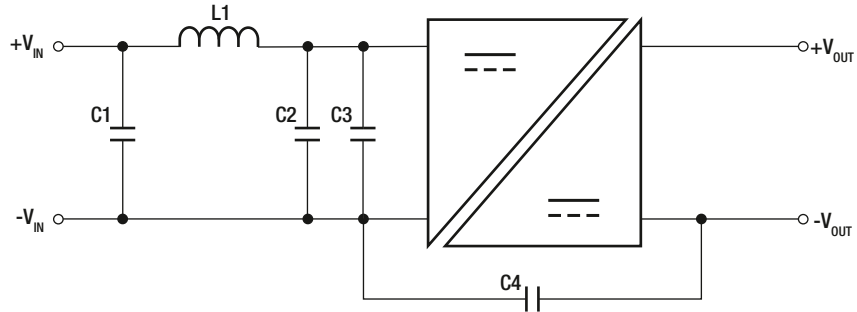


| SAFETY AND CERTIFICATIONS | | |
|--|----------------------|---|
| Certificate Type (Safety) | Report / File Number | Standard |
| Information Technology Equipment, General Requirements for Safety ⁽⁸⁾ | 1602031 | IEC60950-1:2005, 2nd Edition + A2:2013 EN60950-1:2006 + A2:2013 |
| Information Technology Equipment, General Requirements for Safety ⁽⁸⁾ | E358085-A6-UL | UL60950-1, 1st Edition:2007 CAN/CSA C22.2 No. 60950-1-03, 1st Edition:2006 |
| EAC | RU-AT.49.09571 | TP TC 004/2011 |
| RoHs 2+ | | RoHS-2011/65/EU + AM-2015/863 |
| EMC Compliance | Condition | Standard / Criterion |
| Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement | with external filter | EN55032, Class B EN55032, Class A |
| <p>Notes: Note8: excluded +15/-9 version and suffix „/X2“</p> | | |

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

EMC Filtering Suggestions according to EN55032



Component List Class A

| C1 | L1 | C2 | C3 | C4 (safety) |
|-----|-----|--------------------|--------------------|-------------|
| N/A | N/A | 10µF 100V, MLCC | 4.7µF 50V, MLCC | N/A |

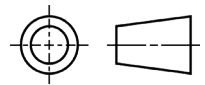
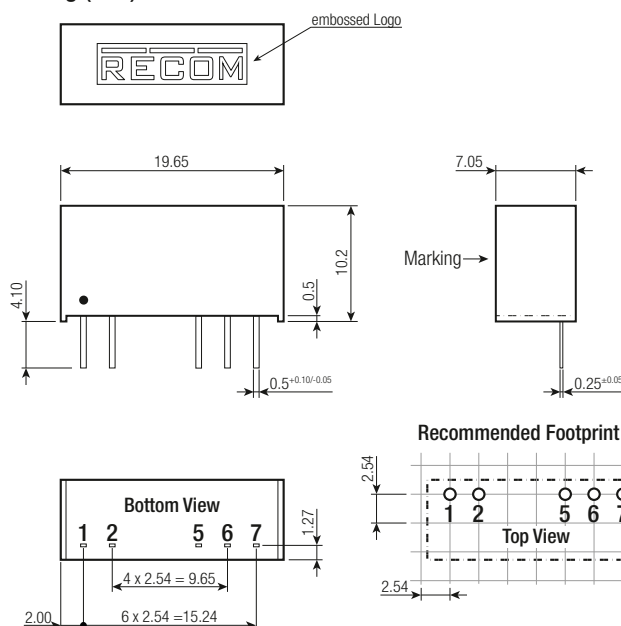
Component List Class B

| C1 | L1 | C2 | C3 | C4 (safety) |
|--------------------|----------------------|-----|-----|----------------|
| 10µF 100V, MLCC | 22µH PR4532Z-220K | N/A | N/A | 2.2nF 5.2kV |

DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter | Type | Value |
|-------------------|------------------------|---|
| Material | case potting PCB | non-conductive black plastic (UL94 V-0) epoxy, (UL94 V-0) FR4, (UL94 V-0) |
| Dimension (LxWxH) | | 19.65 x 7.05 x 10.2mm |
| Weight | | 2.4g typ. |

Dimension Drawing (mm)



Pin Connections

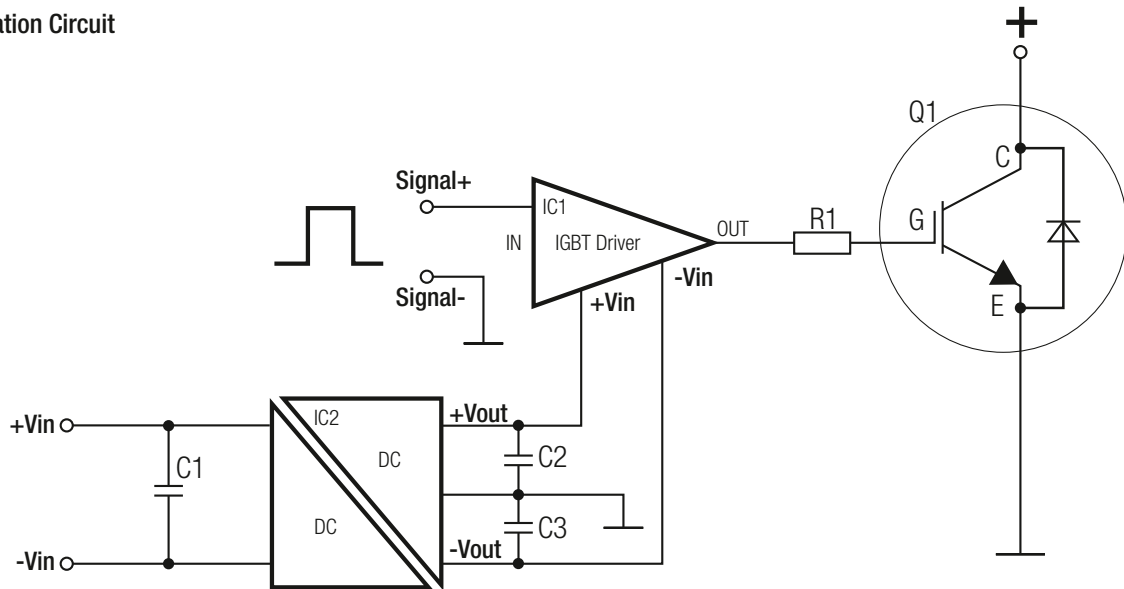
| Pin # | Single | Dual | /X2 |
|-------|--------|-------|--------|
| 1 | +Vin | +Vin | +Vin |
| 2 | -Vin | -Vin | -Vin |
| 5 | -Vout | -Vout | No Pin |
| 6 | No Pin | Com | -Vout |
| 7 | +Vout | +Vout | +Vout |

Tolerance: xx.x= ±0.50mm
xx.xx= ±0.25mm

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

INSTALLATION AND APPLICATION

IGBT Application Circuit



PACKAGING INFORMATION

| Parameter | Type | Value |
|-----------------------------|------|----------------------|
| Packaging Dimension (LxWxH) | tube | 520.0 x 16.0 x 9.0mm |
| Packaging Quantity | tube | 25pcs |
| Storage Temperature Range | | -55°C to + 125°C |
| Storage Humidity | | 95% RH max. |

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