

Features

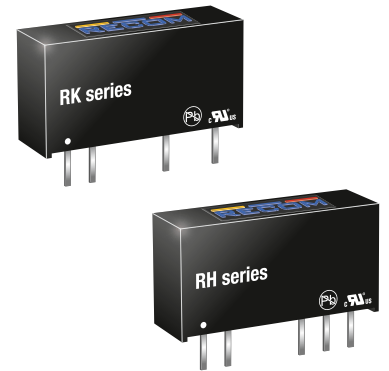
- 3kVDC or 4kVDC isolation
- Optional continuous short circuit protection
- UL94V-0 package material
- Efficiency up to 84%
- Suitable for IGBT applications

Unregulated Converters



RK_RH

1 Watt
SIP7
Single and Dual Output



UL60950-1 certified*
 CSA/CAN C22.2 No. 60950-1-07 certified*
 IEC60950-1 certified
 EN60950-1 certified

*+15/-9 version excluded

Description

The RK and RH Series DC/DC-Converter complements RECOM's industrial range of converters with very high isolations of 3kV and 4kVDC. The extended operating temperature range covering -40°C to +90°C is a standard feature. The converters are IEC/EN/UL60950-1 certified, and are suitable for IGBT driver applications.

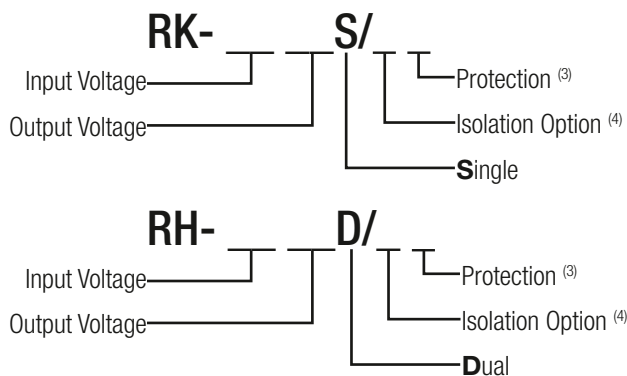
Selection Guide

Part Number	nom. Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. (1) [%]	Max. Capacitive Load (2) [µF]
RK-xx05S (3,4)	5,12, 15, 24	5	200	70-78	1000
RK-xx09S (3,4)	5,12, 15, 24	9	111	70-80	1000
RK-xx12S (3,4)	5,12, 15, 24	12	84	78-82	470
RK-xx15S (3,4)	5,12, 15, 24	15	66	80-82	470
RH-xx05D (3,4)	5,12, 15, 24	±5	±100	74-78	±470
RH-xx09D (3,4)	5,12, 15, 24	±9	±56	76-79	±470
RH-xx12D (3,4)	5,12, 15, 24	±12	±42	78-84	±220
RH-xx15D (3,4)	5,12, 15, 24	±15	±33	80-84	±220
RH-xx1509D (3,4)	5, 12, 24	+15/-9	+33/-56	70-81	+220/-470µF

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 and is defined as the capacitive load that will allow start up in under 1s without damage to the converter

Model Numbering



Notes:

- Note3: standard part is without Continuous Short Circuit Protection
 add suffix „/P“ for Continuous Short Circuit Protection
 Note4: add suffix „/H“ for 4kVDC Isolation
 or add suffix „/HP“ for Continuous Short Circuit Protection and 4kVDC Isolation

Ordering Examples:

RH-123.3D/P: 12V Input Voltage, ±3.3V Output Voltage, Dual Output with continuous short circuit protection
 RK-0509S/HP: 5V Input Voltage, 9V Output Voltage, Single Output with 4kVDC Isolation and continuous short circuit protection

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

BASIC CHARACTERISTICS

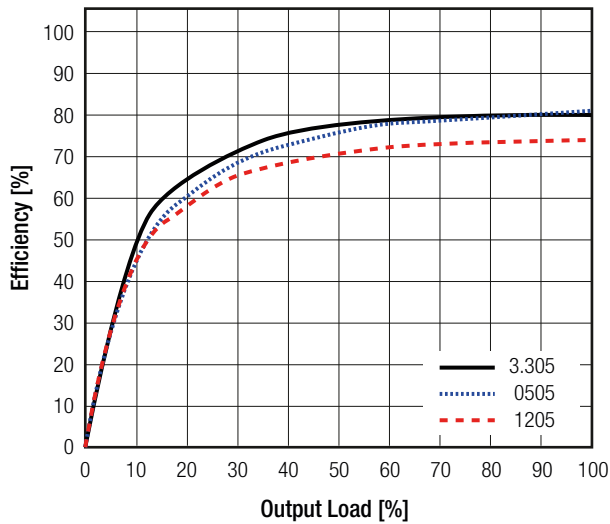
Parameter	Condition	Min.	Typ.	Max.
Internal Input Fuse				capacitors
Input Voltage Range			±10%	
Minimum Load ⁽⁵⁾			0%	
Start-up Time				250ms
Internal Operating Frequency		50kHz	100kHz	105kHz
Output Ripple and Noise	20MHz BW limited			100mVp-p

Notes:

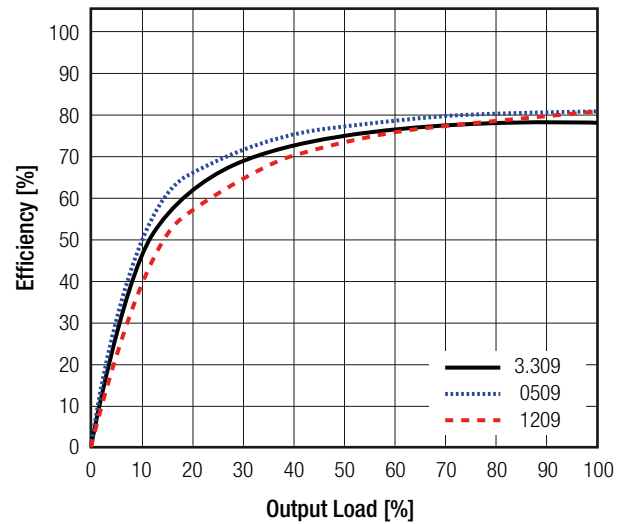
Note5: Operation below 10% load will not harm the converter, but specifications may not be met

Efficiency vs. Load

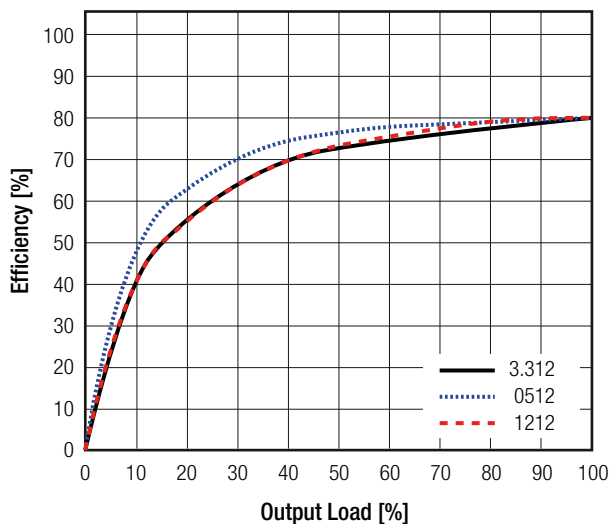
RK-xx05S



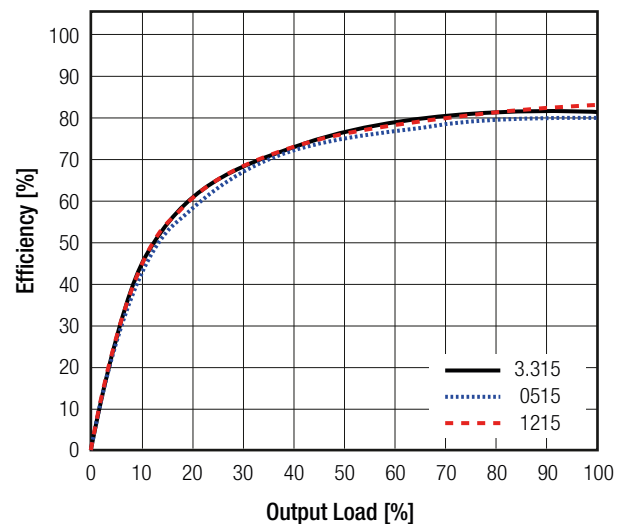
RK-xx09S



RK-xx12S



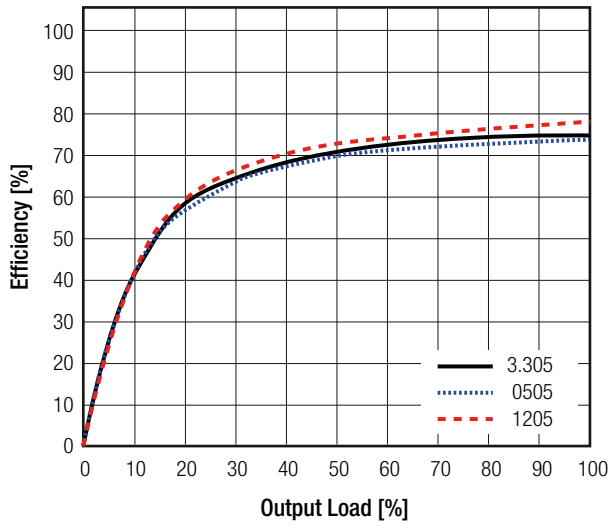
RK-xx15S



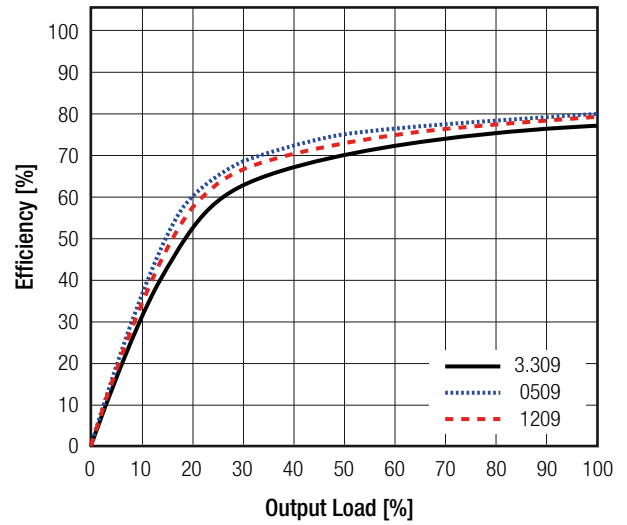
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

Efficiency vs. Load

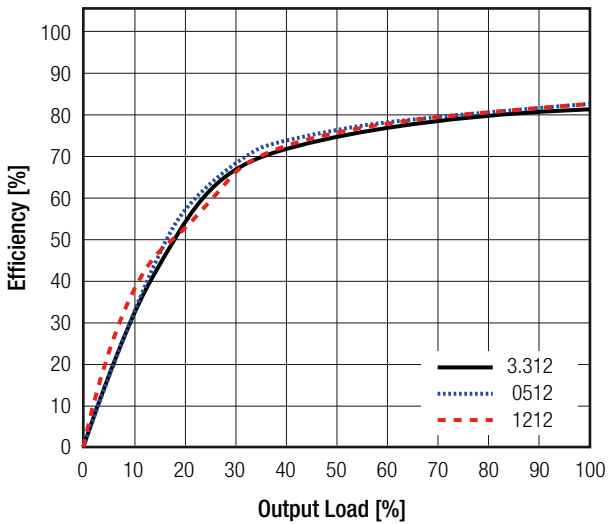
RH-xx05D



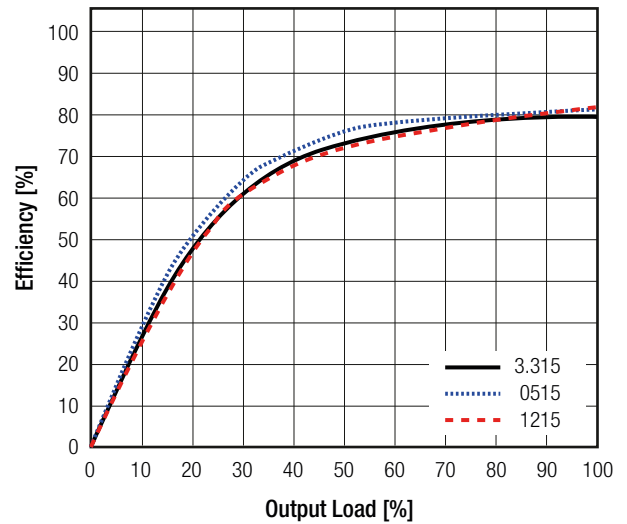
RH-xx09D



RH-xx12D



RH-xx15D



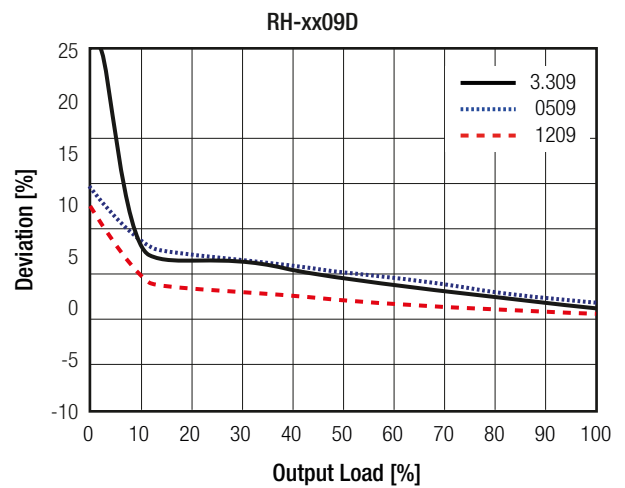
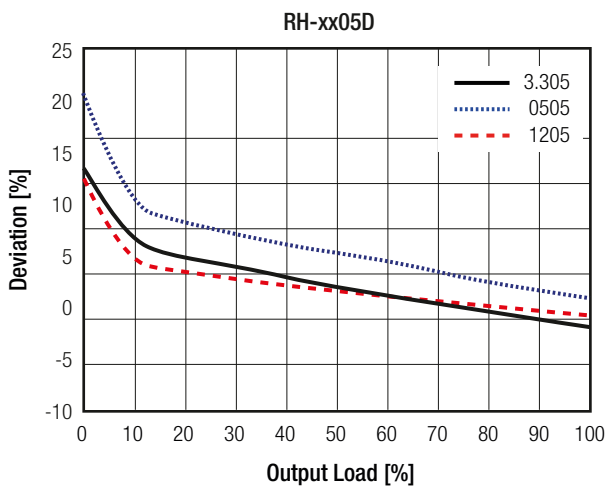
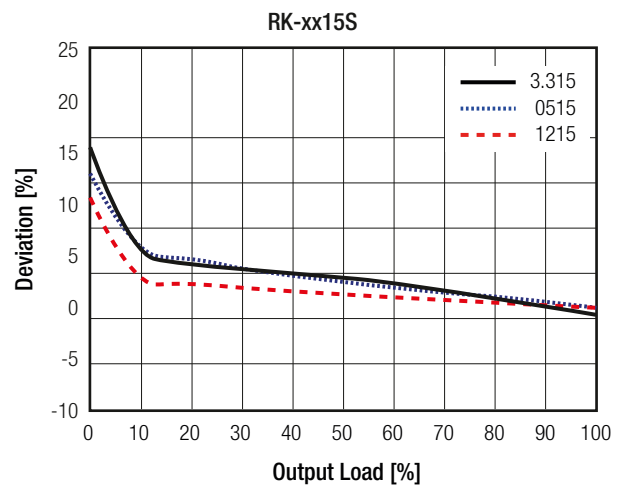
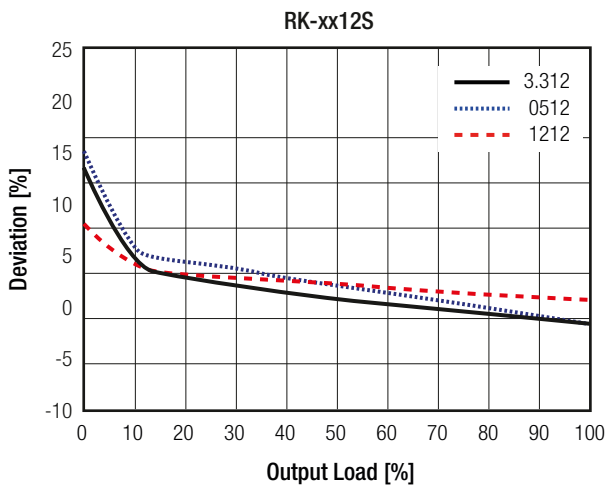
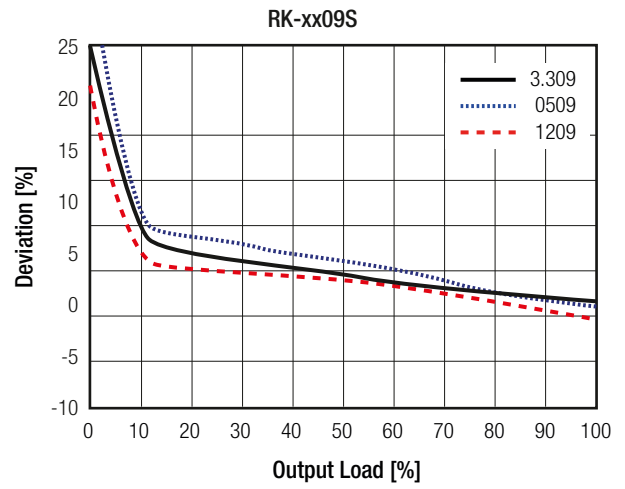
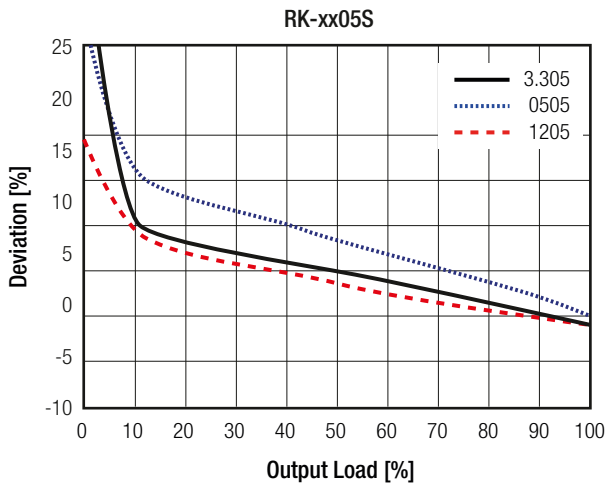
REGULATIONS

Parameter	Condition		Values
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	5Vout	15.0% max.
		12, 15, 24Vout	10.0% max.

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

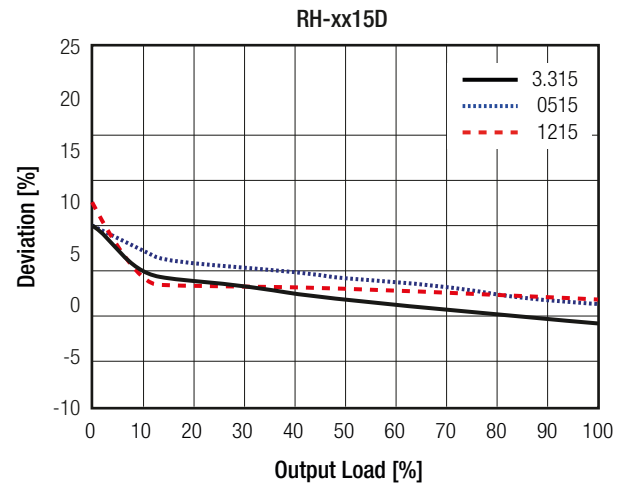
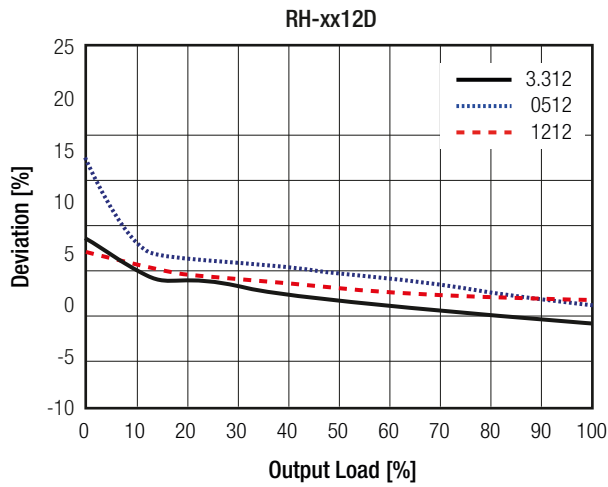
Accuracy vs. Load



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

Accuracy vs. Load



PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)	without suffix with suffix "/P"		1 second continuous
Isolation Voltage ⁽⁶⁾	I/P to O/P	without suffix tested for 1 second rated for 1 minute	3kVDC 1.5kVAC
		with suffix "/H" tested for 1 second rated for 1 minute	4kVDC 2kVAC
Isolation Capacitance	RK types RH types		20pF min. / 75pF max. 20pF min. / 65pF max.
Isolation Resistance			15GΩ min.
Insulation Grade			functional
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			

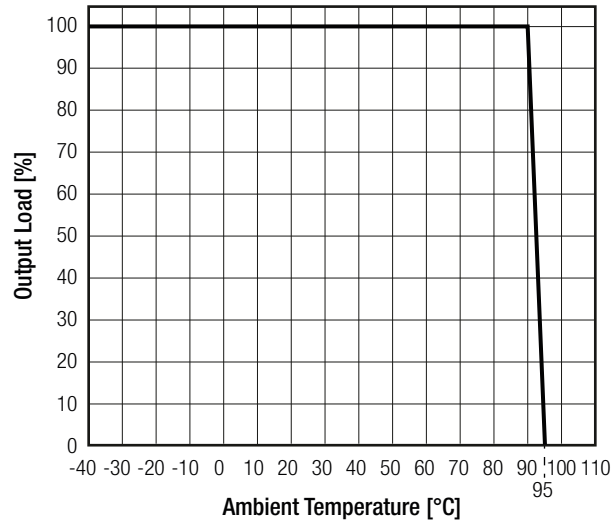
ENVIRONMENTAL

Parameter	Condition		Value	
Operating Temperature Range	full load @ free air convection (see graph)		-40°C to +90°C	
Operating Altitude			2000m	
Operating Humidity	non-condensing		5% - 95% RH max.%	
Pollution Degree			PD2	
MTBF	according to MIL-HDBK-217F; G.B.	RK type	+25°C	992 x 10 ³ hours
			+85°C	145 x 10 ³ hours
		RH type	+25°C	1012 x 10 ³ hours
			+85°C	151 x 10 ³ hours

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

Derating Graph
(@ free air convection)



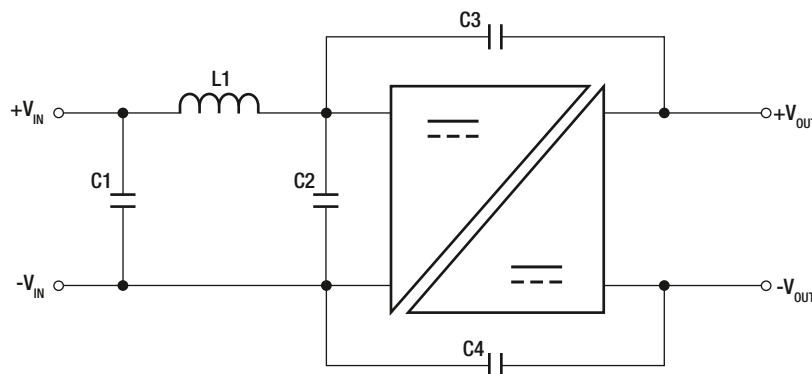
SAFETY AND CERTIFICATIONS

Certificate Type	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E224736-A25 (7)	UL60950-1, 2nd Edition, 2014
		CSA/CAN C22.2 No. 60950-1-07, 2nd Edition, 2014
Information Technology Equipment, General Requirements for Safety	1602031	IEC60950-1:2005, 2nd Edition + A2:2013 EN60950-1:2006 + A2:2013
EAC	RU-AT.49.09571	TP TC 004/2011
RoHs 2+		RoHS-2011/65/EU + AM-2015/863

EMI Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter (see suggestions)	EN55032, Class A EN55032, Class B

Notes:
Note7: +15/-9 version excluded

EMC Filtering Suggestions according to EN55032



Component List Class A

MODEL	L1	C1	C2	C4
RK-xxxxS	-	-	4.7µF MLCC, 50V	-

Component List Class B

MODEL	L1	C1	C3	C4
RK-xxxxS	22µH choke RP4532Z-220K	10µF MLCC, 100V	1nF 5kV, Johanson	2.2nF 5kV, Johanson

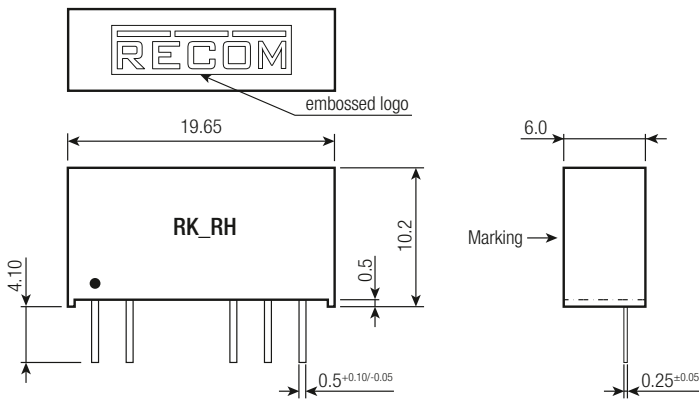
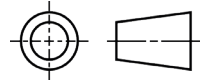
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case potting	non-conductive black plastic, (UL94 V-0) epoxy, (UL94 V-0)
Dimension (LxWxH)	RK/RH	19.6 x 10.2 x 7.0mm
Weight	with suffix "/H"	2.6g typ. 2.8g typ.

Dimension Drawing (mm)

Standard Version

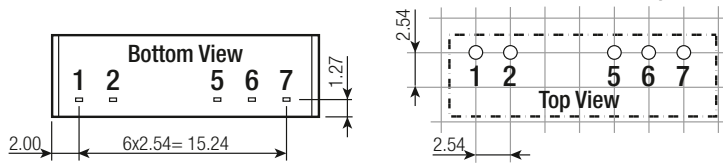


Pin Connections

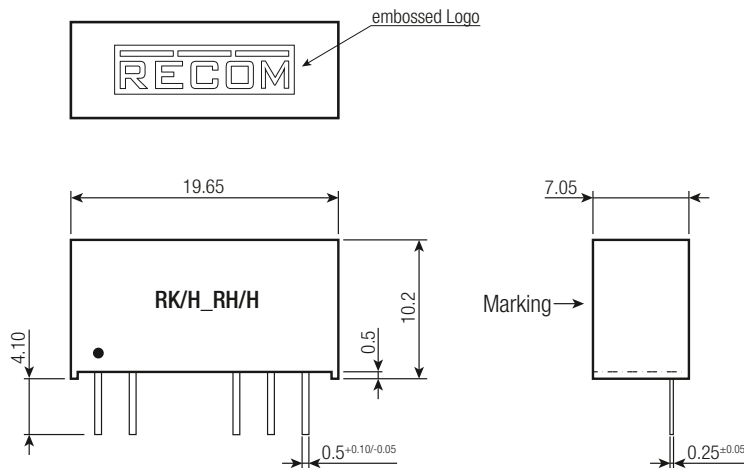
Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
5	-Vout	-Vout
6	No Pin	Com
7	+Vout	+Vout

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

Recommended Footprint



„H“ - Version

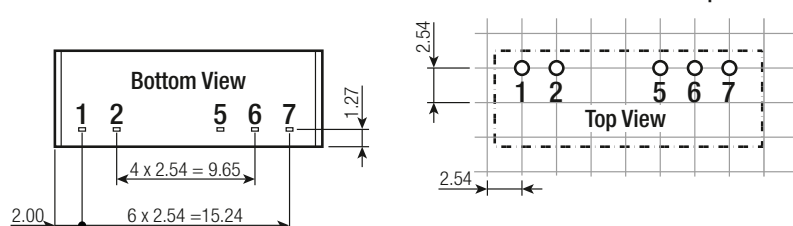


Pin Connections

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5	-Vout	-Vout
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7	+Vout	+Vout

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

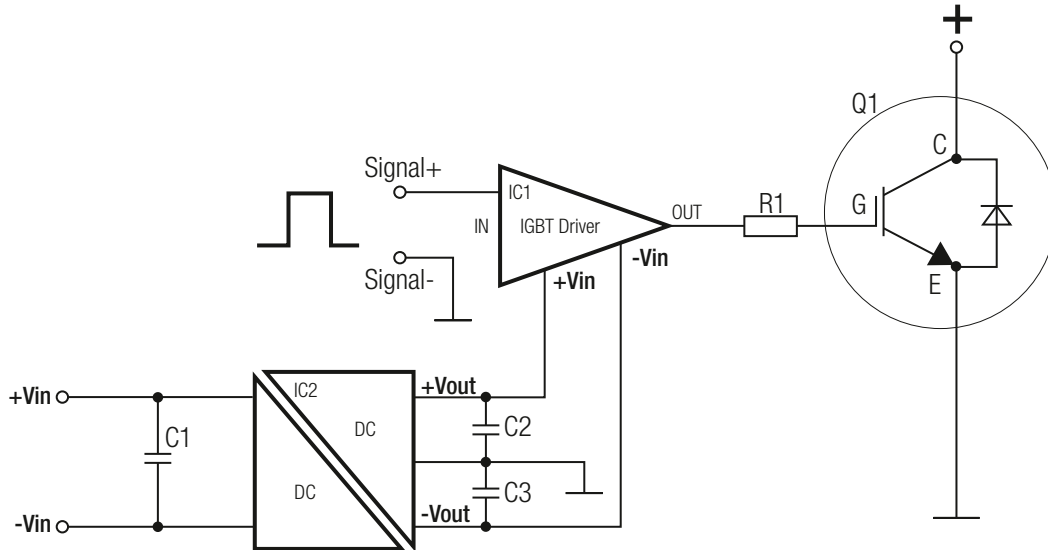
Recommended Footprint



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

INSTALLATION AND APPLICATION

IGBT Application Circuit



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 9.3 x 16.5mm
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.

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