

# Features

## Unregulated Converters

- Fully RoHS 6/6 Conform
- Full Power at 100°C Ambient Temperature
- 1kVDC or 3kVDC Isolation Options
- UL /CSA Certified, CB Report
- Suitable for Fully Automated Assembly (including Vapour Phase Soldering)
- Optional Continuous Short Circuit Protection
- Efficiency to 84%

### Selection Guide

Part Number	SMD	(3kV)	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Efficiency (%)	Capacitive Load (max.)
R1S**	-xx3.3	(H)	3.3, 5, 12, 15, 24	3.3	303	75	33µF
R1S**	-xx05	(H)	3.3, 5, 12, 15, 24	5	200	72-78	33µF
R1S**	-xx09	(H)	3.3, 5, 12, 15, 24	9	111	74-78	22µF
R1S**	-xx12	(H)	3.3, 5, 12, 15, 24	12	84	75-80	22µF
R1S**	-xx15	(H)	3.3, 5, 12, 15, 24	15	66	75-82	10µF
R1S**	-xx24	(H)	3.3, 5, 12, 15, 24	24	42	74-84	10µF
R1D**	-xx3.3	(H)	3.3, 5, 12, 15, 24	±3.3	±152	75	±10µF
R1D**	-xx05	(H)	3.3, 5, 12, 15, 24	±5	±100	72-78	±10µF
R1D**	-xx09	(H)	3.3, 5, 12, 15, 24	±9	±56	74-78	±6.8µF
R1D**	-xx12	(H)	3.3, 5, 12, 15, 24	±12	±42	75-80	±6.8µF
R1D**	-xx15	(H)	3.3, 5, 12, 15, 24	±15	±33	75-82	±4.7µF
R1D**	-xx24	(H)	3.3, 5, 12, 15, 24	±24	±21	74-84	±4.7µF

xx = Input Voltage (other input and output voltage combinations available on request)

\* add Suffix "H" for 3kV Isolation, e.g. R1S-0505/H, R1D-0505/H, R1S12-0505/H, R1D12-0505/H

\* add Suffix "P" for Continuous Short Circuit Protection, e.g. R1S8-0505/P, R1S-0505/HP, R1D12-0505/HP

\* add suffix -R for tape & reel packing e.g. R1S-0505-R. For more details see Application Notes.

### Case and Pinning Options (note restrictions on /H option)

- R1S\*\* : \*\* without marking denotes 5 pins out of 8 fitted (includes /H option)  
 \*\* with marking **8** denotes 8 pins out of 8 fitted (/H option not available)  
 \*\* with marking **12** denotes 10 pins out of 12 fitted (includes /H option)
- R1D\*\* : \*\* without marking denotes 6 pins out of 10 fitted (includes /H option)  
 \*\* with marking **10** denotes with 10 pins out of 10 fitted (/H option not available)  
 \*\* with marking **12** denotes 10 pins out of 12 fitted (includes /H option)

### Specifications (measured at $T_A = 25^\circ\text{C}$ , nominal input voltage, full load and after warm-up)

Input Voltage Range			±10%
Output Voltage Accuracy			±2% typ., ±5% max.
Line Voltage Regulation	All Variants	1.2%/1% of $V_{in}$ typ.	
Load Voltage Regulation (10% to 100% full load)	3.3V output types	15% typ., 20% max.	
	5V output type	12% typ., 15% max.	
	9V output type	7% typ., 10% max.	
	12V, 15V, 24V output types	6% typ., 10% max.	
Output Ripple and Noise (20MHz BW limited)			50mVp-p typ., 100mVp-p max.
Operating Frequency			20kHz min. / 60kHz typ. / 100kHz max.
Efficiency at Full Load			See Selection Guide
No Load Power Consumption	R1S** types	101mW min. / 126mW typ. / 220mW max.	
	R1D** types	87mW min. / 130mW typ. / 230mW max.	
Isolation Voltage		(tested for 1 second)	1000VDC min.
	H-Suffix	(tested for 1 second)	3000VDC min.
Rated Working Voltage	(long term isolation)		see Application Notes
Isolation Capacitance	R1S, R1S8, R1D, R1D10	15pF min. / 70pF max.	
	R1S12, R1D12	10pF min. / 75pF max.	
Isolation Resistance			10 GΩ min.
Short Circuit Protection			1 Second
P-Suffix			Continuous

# ECONOLINE

## DC/DC-Converter

# RECOM

## 1 Watt SMD Single & Dual Output



UL-60950-1 Certified

# R1S\_R1D

### Description

The R1S and R1D converters are of the enclosed open frame type, i.e. they are not potted.

The converters are typically used in general purpose and industrial low power isolation and voltage matching applications where an SMD converter is required.

The converter series feature an extended ambient temperature operating range of  $-40^\circ\text{C} \sim +100^\circ\text{C}$  without derating and optional continuous short circuit protection.

In addition to two isolation options and three different case formats, the converters are also available prepacked as tape and reel for use with automatic insertion machines.

Refer to Application Notes

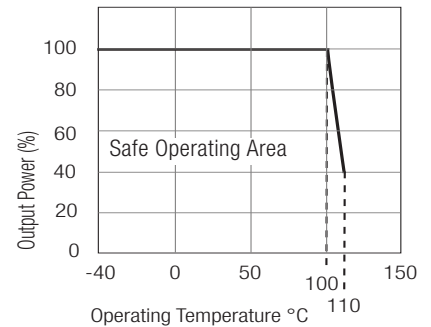
[www.recom-electronic.com](http://www.recom-electronic.com)

## Specifications - continued

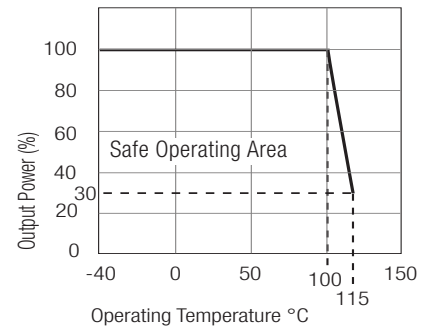
Operating Temperature Range (free air convection)	-40°C to +100°C (see Graph)		
Storage Temperature Range	-55°C to +125°C		
Reflow Temperature	ROHS compliant	245°C (30 sec), Peak 255°C (5 sec) max.	
Vapour Phase Process	(for more details see Application Notes)		230°C (90 sec) max.
Relative Humidity	95% RH		
Humidity Susceptibility Test	1000 hrs / 90% humidity / +85°C ambient		
Package weight	1.0g (R1S), 1.2g (R1D)		
Packing Quantity	R1S, R1S8	40 pcs per Tube	
	R1S12, R1D	33 pcs per tube	
	All Types	500 pcs per Reel	
MTBF (+25°C)	} Detailed Information see Application Notes chapter "MTBF"	using MIL-HDBK 217F	1045 x 10 <sup>3</sup> hours
		using MIL-HDBK 217F	183 x 10 <sup>3</sup> hours
Certifications			
CB Test Report	Report: US/14402/UL	UL 60950-1 1st Ed.	
UL General Safety	Report: E322406	C22.2 No. 60950-1-03	
CUL General Safety			

## Derating-Graphs (Ambient Temperature)

### R1S-0505, R1D-0505

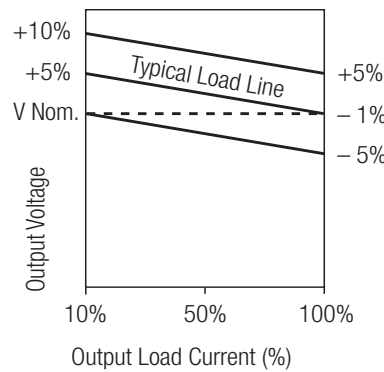


### R1S12-0505, R1D12-0505



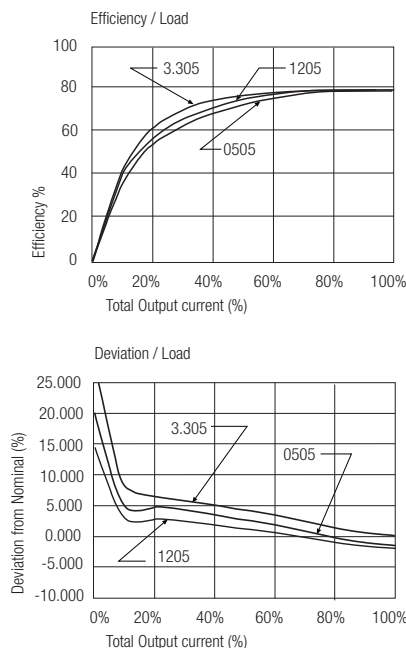
The derating graphs are valid only for the shown part numbers. The converters have been tested at full load with 100°C ambient temperature and all internal component temperatures are within limits. However, Recom can only guarantee continuous operation of up to +85°C to maintain the validity of the UL certificates.

## Tolerance Envelope

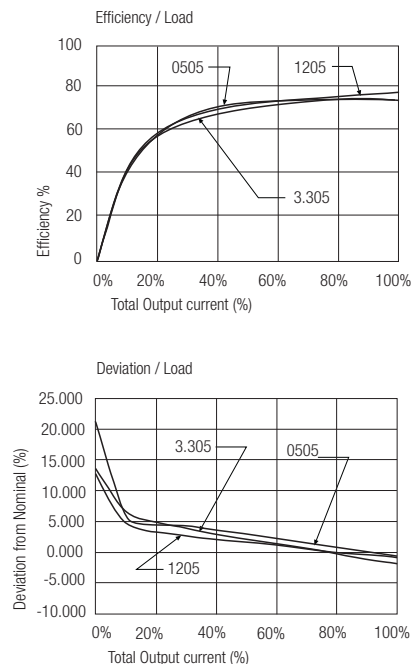


## Typical Characteristics

### R1S\*\*-xx05



### R1D\*\*-xx05

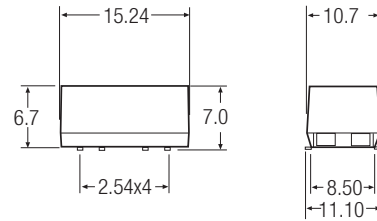
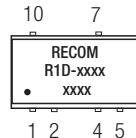
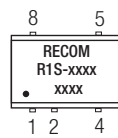
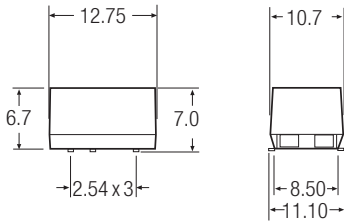


## Package Style and Pinning (mm)

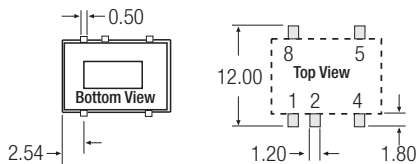
### 5 PIN Single SMD Package

Note: /H option is available in these pin packages

### 6 PIN Dual SMD Package



### Recommended Footprint Details



### Pin Connections

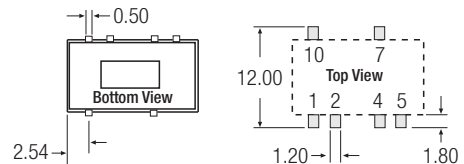
Pin #	Single	Dual
1	-Vin	-Vin
2	+Vin	+Vin
4	-Vout	Com
5	+Vout	-Vout
7	No Pin	+Vout
8	NC	No Pin
10	No Pin	NC

NC = No Connection

XX.X ± 0.5 mm

XX.XX ± 0.25 mm

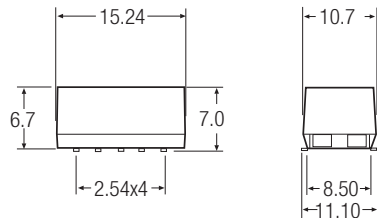
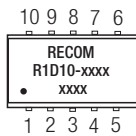
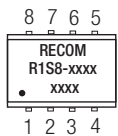
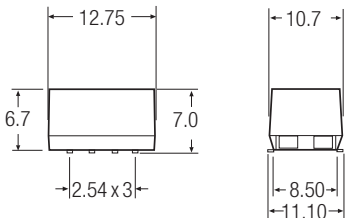
### Recommended Footprint Details



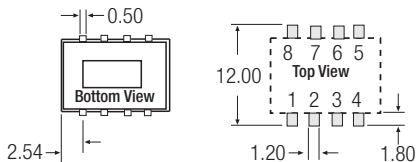
### 8 PIN Single SMD Package

Note: /H option is not available in these pin packages

### 10 PIN Dual SMD Package



### Recommended Footprint Details



### Pin Connections

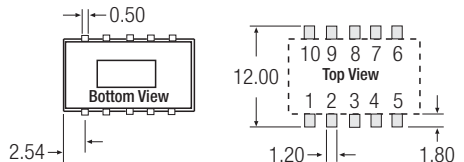
Pin #	Single	Dual
1	-Vin	-Vin
2	+Vin	+Vin
3	NC	NC
4	-Vout	Com
5	+Vout	-Vout
6	NC	NC
7	NC	+Vout
8	NC	NC
9	-	NC
10	-	NC

NC = No Connection

XX.X ± 0.5 mm

XX.XX ± 0.25 mm

### Recommended Footprint Details



R1S\*\* : \*\* without marking denotes 5 pins out of 8 fitted (includes /H option)  
 \*\* with marking **8** denotes 8 pins out of 8 fitted (/H option not available)

e.g. R1S-0505, R1S-0505/H, R1S-0505/HP  
 e.g. R1S8-0505, R1S8-0505/P

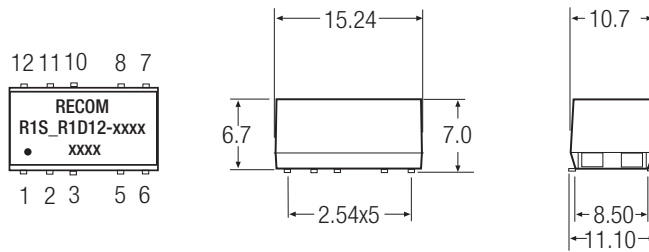
R1D\*\* : \*\* without marking denotes 6 pins out of 10 fitted (includes /H option)  
 \*\* with marking **10** denotes with 10 pins out of 10 fitted (/H option not available)

e.g. R1D-0505, R1D-0505/H, R1D-0505/HP  
 e.g. R1D10-0505, R1D10-0505/P

**Package Style and Pinning (mm)**

**12 PIN Single and Dual SMD Package**

Note: /H option is available in this pin package



**Pin Connections**

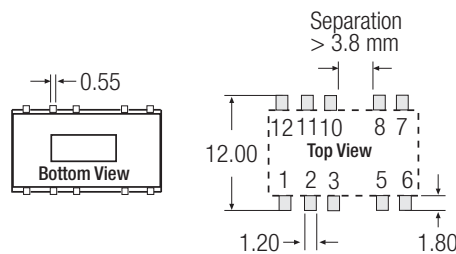
Pin #	Single	Dual
1	-Vin	-Vin
2	+Vin	+Vin
3	NC	NC
5	-Vout	Com
6	NC	-Vout
7	NC	NC
8	+Vout	+Vout
10	NC	NC
11	NC	NC
12	NC	NC

NC = No Connection

XX.X ± 0.5 mm

XX.XX ± 0.25 mm

**Recommended Footprint Details**



R1S\*\* : \*\* with marking 12 denotes 10 pins out of 12 fitted (includes /H option)  
R1D\*\* : \*\* with marking 12 denotes 10 pins out of 12 fitted (includes /H option)

e.g. R1S12-0505, R1S12-0505/H, R1S12-0505/HP  
e.g. R1D12-0505, R1D12-0505/H, R1D12-0505/HP

**EMC Filtering - Suggestion for EN55022 Class B (Conducted and Emitted)**

