

# Features

## Unregulated Converters

- Fully RoHS 6/6 Conform
- Full Power at 100°C Ambient Temperature
- 1kVDC or 3kVDC Isolation Options
- Suitable for Fully Automated Assembly (including Vapour Phase Soldering)
- Optional Continuous Short Circuit Protection

### Selection Guide

Part Number SMD	(3kV)	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Capacitive Load (max.)
RO.25S**-xx3.3	(H)	3.3, 5, 12, 15, 24	3.3	76	1000µF
RO.25S**-xx05	(H)	3.3, 5, 12, 15, 24	5	50	470µF
RO.25S**-xx09	(H)	3.3, 5, 12, 15, 24	9	28	470µF
RO.25S**-xx12	(H)	3.3, 5, 12, 15, 24	12	21	150µF
RO.25S**-xx15	(H)	3.3, 5, 12, 15, 24	15	17	68µF
RO.25S**-xx24	(H)	3.3, 5, 12, 15, 24	24	10.4	68µF
RO.25D**-xx3.3	(H)	3.3, 5, 12, 15, 24	±3.3	±38	470µF
RO.25D**-xx05	(H)	3.3, 5, 12, 15, 24	±5	±25	220µF
RO.25D**-xx09	(H)	3.3, 5, 12, 15, 24	±9	±14	68µF
RO.25D**-xx12	(H)	3.3, 5, 12, 15, 24	±12	±10.4	68µF
RO.25D**-xx15	(H)	3.3, 5, 12, 15, 24	±15	±8.3	68µF
RO.25D**-xx24	(H)	3.3, 5, 12, 15, 24	±24	±5.2	33µF
RO.25DA**-xx0505		3.3, 5, 12, 15, 24	5/5	25/25	220µF/220µF
RO.25DA**-xx1212		3.3, 5, 12, 15, 24	12/12	10/10	68µF/68µF

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

\* add Suffix "H" for 3kV Isolation, e.g. RO.25S-0505/H, RO.25D-0505/H, RO.25S12-0505/H, RO.25D12-0505/H

\* add Suffix "P" for Continuous Short Circuit Protection, e.g. RO.25S8-0505/P, RO.25S-0505/HP, RO.25D12-0505/HP

\* add suffix -R for tape & reel packing e.g. RO.25S-0505-R. For more details see Application Notes.

RO.25S-  
RO.25D

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

- RO.25S\*\* : \*\* 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)
- RO.25D\*\* : \*\* without marking denotes 6 pins out of 10 fitted (includes /H option, no DA option)  
 RO.25D(A): \*\* with marking **10** denotes with 10 pins out of 10 fitted (/H option not available)  
 RO.25D(A): \*\* with marking **12** denotes 10 pins out of 12 fitted (includes /H option)

### Specifications (measured at T<sub>A</sub> = 25°C, nominal input voltage, full load and after warm-up)

Input Voltage Range	±10%	
Output Voltage Accuracy	±5% typ., ±7% max.	
Line Voltage Regulation	(low line to high line at max. load)	2% max.
Load Voltage Regulation (10% to 100% full load)	3.3V output types	15% typ., 20% max.
	5V, 5/5V output types	12% typ., 15% max.
	9V output type	7% typ., 10% max.
	12V, 12/12V, 15V, 24V output types	6% typ., 10% max.
Output Ripple and Noise (20MHz BW limited)	100mVp-p max.	
Operating Frequency	20kHz min. / 50kHz typ. / 90kHz max.	
Efficiency at Full Load	60%-70%	
Minimum Load = 0%	Specifications valid for 10% minimum load only	
Isolation Voltage	(tested for 1 second)	1000VDC
	(rated for 1 minute)	500VAC / 60Hz
	H-Suffix (tested for 1 second)	3000VDC
	(rated for 1 minute)	1500VAC / 60Hz
RO.25DA Output/ Output Isolation Voltage	(tested for 1 second)	1000VDC
Isolation Capacitance	75pF max.	

# ECONOLINE

DC/DC-Converter

RECOM

## 0.25 Watt SMD Single, Dual & Independent Outputs



E-224736

**UL-60950-1 Certified**  
**EN-60601-1 Certified**  
**EN-60950-1 Certified**  
**(/H suffix)**

# RO.25S RO.25D(A)

### Description

The RO.25S and RO.25D 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°C ~ +100°C without derating and optional continuous short circuit protection.

In addition to single, dual and independent outputs, 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

Isolation Resistance	$V_{iso}=500V$	10 G $\Omega$ min.
Short Circuit Protection		1 Second
P-Suffix		Continuous
Operating Temperature Range (free air convection)		-40°C to +100°C (see Graph)
Storage Temperature Range		-50°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 (RO.25S), 1.2g (RO.25D(A))
Packing Quantity	RO.25S, RO.25S8	40 pcs per Tube
	RO.25S12, RO.25D, RO.25D10	33 pcs per tube
	RO.25D12, RO.25DA	33 pcs per tube
	All Types	500 pcs per Reel

MTBF (+25°C)	} Detailed Information see Application Notes chapter "MTBF"	using MIL-HDBK 217F	1345 x 10 <sup>3</sup> hours
(+85°C)		using MIL-HDBK 217F	310 x 10 <sup>3</sup> hours

### Certifications

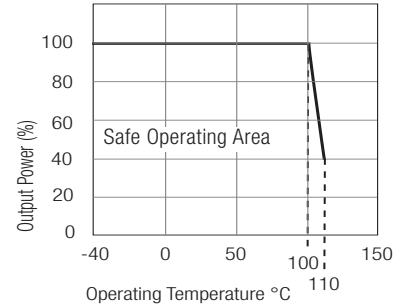
CB Test Report	Report: US/14402A/UL	IEC 60950-1:2001 1st Ed.
UL General Safety	Report: E3224736	UL 60950-1 1st Ed.
CUL General Safety		C22.2 No. 60950-1-03
EN Medical Safety	Report: SPC1005061	EN60601-1
EN General Safety	Report: SPCLVD1005061	EN60950-1, 2nd Edition

### Notes

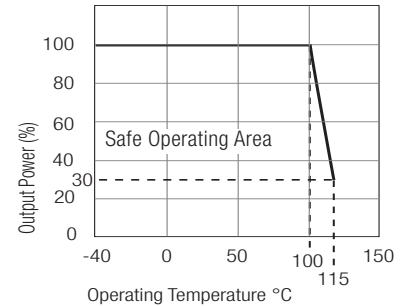
Note 1: Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter.

## Derating-Graph (Ambient Temperature)

### RO.25S-0505, RO.25D-0505, RO.25DA-050505



### RO.25S12-0505, RO.25D12-0505, RO.25DA12-050505

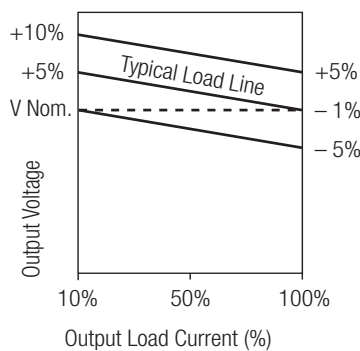


The derating graphs are valid only for the part numbers shown.

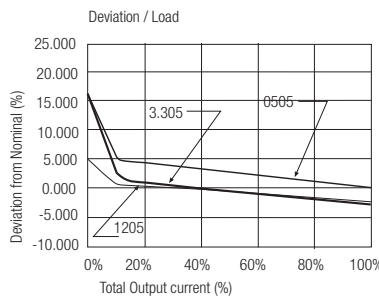
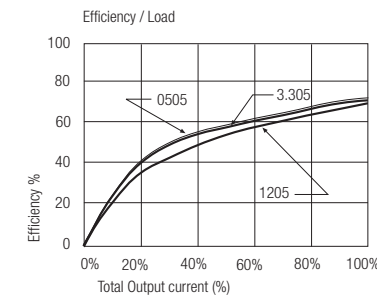
RO.25S-RO.25D

## Typical Characteristics

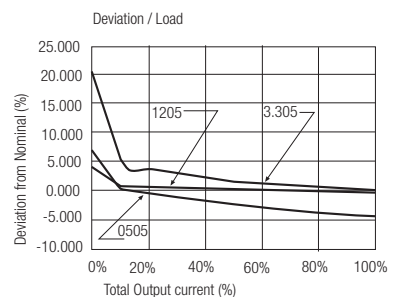
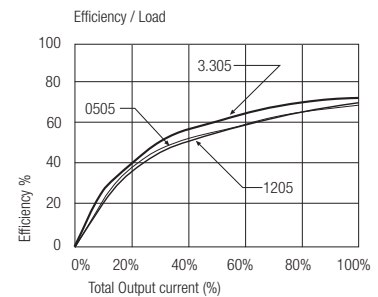
### Tolerance Envelope



## RO.25S\*\*-xx05



## RO.25D\*\*-xx05

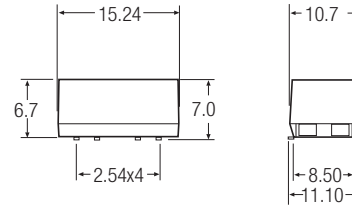
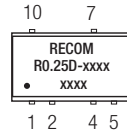
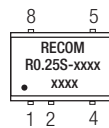
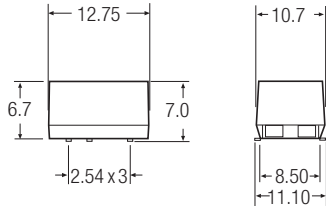


Package Style and Pinning (mm)

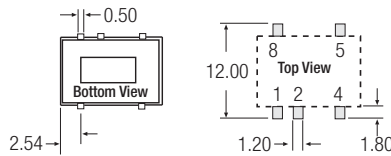
**5 PIN Single SMD Package**

Note: /H option is available in these pin packages

**6 PIN Dual SMD Package**



**Recommended Footprint Details**



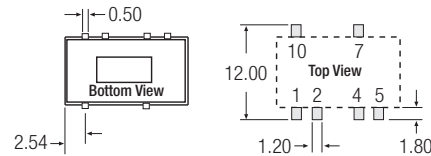
**Pin Connections**

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

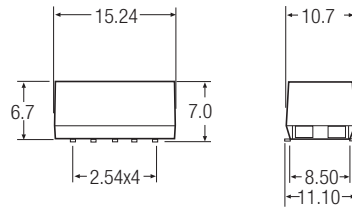
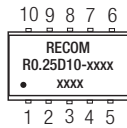
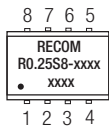
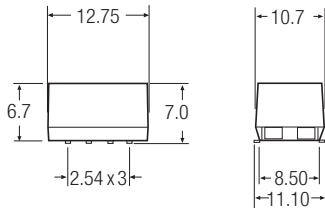
**Recommended Footprint Details**



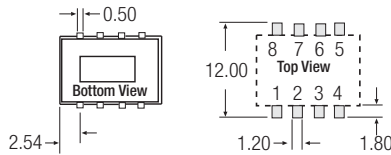
**8 PIN Single SMD Package**

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

**10 PIN Dual SMD Package**



**Recommended Footprint Details**



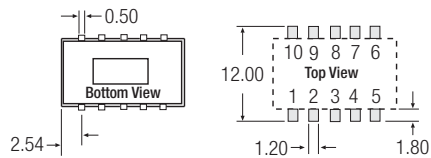
**Pin Connections**

Pin #	Single	Dual	Dual Independent
1	-Vin	-Vin	-Vin
2	+Vin	+Vin	+Vin
3	NC	NC	No Pin
4	-Vout	Com	-Vout1
5	+Vout	-Vout	+Vout1
6	NC	NC	-Vout2
7	NC	+Vout	+Vout2
8	NC	NC	No Pin
9	-	NC	No Pin
10	-	NC	NC

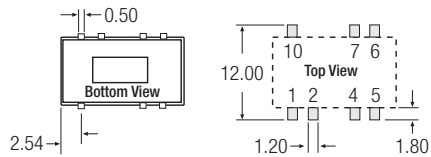
NC = No Connection

XX.X ± 0.5 mm  
XX.XX ± 0.25 mm

**Recommended Footprint Details (Dual)**



**Recommended Footprint Details Dual Independent**



RO.25S-  
RO.25D

RO.25S\*\* : \*\* 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. RO.25S-0505, RO.25S-0505/H, RO.25S-0505/HP  
e.g. RO.25S8-0505, RO.25S8-0505/P

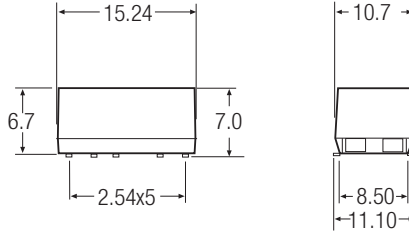
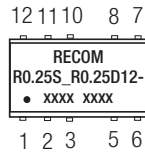
RO.25D\*\* : \*\* without marking denotes 6 pins out of 10 fitted (includes /H option)  
\*\* with marking **10** denotes with 10 pins out of 10 fitted (/H option not available)

e.g. RO.25D-0505, RO.25D-0505/H, RO.25D-0505/HP  
e.g. RO.25D10-0505, RO.25D10-0505/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

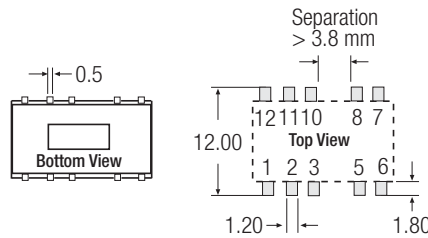
NC = No Connection

XX.X ± 0.5 mm  
XX.XX ± 0.25 mm

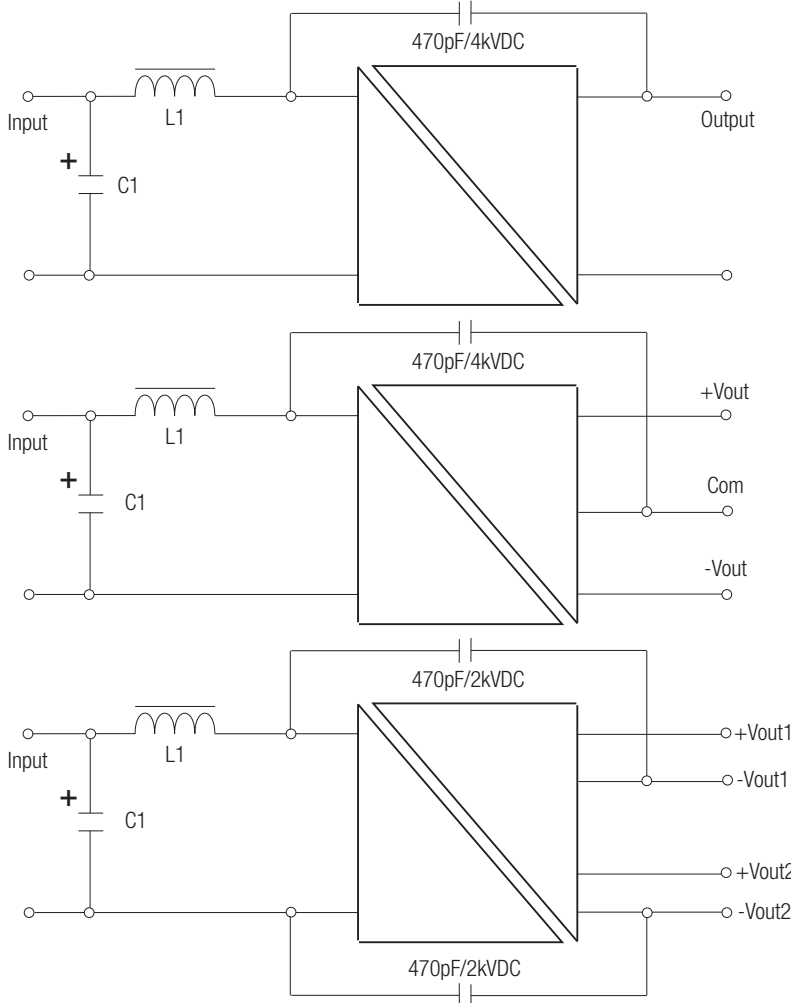
RO.25S\*\* : \*\* with marking 12 denotes 10 pins out of 12 fitted (includes /H option)  
e.g. RO.25S12-0505  
RO.25S12-0505/H  
RO.25S12-0505/HP

RO.25D\*\* : \*\* with marking 12 denotes 10 pins out of 12 fitted (includes /H option)  
e.g. RO.25D12-0505  
RO.25D12-0505/H  
RO.25D12-0505/HP

**Recommended Footprint Details**



**EMC Filtering - Suggestion for EN5022 Class B (Conducted and Emitted)**



**Standard and /H versions**

C1	L1	Vin
2.2µF	3.3µH	3.3V
2.2µF	4.7µH	5V
2.2µF	10µH	9V
1.0µF	22µH	12V
1.0µF	22µH	15V
470nF	47µH	24V

**/P and /HP versions**

C1	L1	Vin
2.2µF	3.3µH	3.3V
2.2µF	4.7µH	5V
2.2µF	10µH	9V
1.0µF	22µH	12V
1.0µF	22µH	15V
470nF	47µH	24V

C1 = MLCC  
L1 = SMD Inductor

**RO.25S-RO.25D**