

# Features

# Unregulated Converters

- 1W Power in SMD package
- Pin compatible with R1S/R1D series
- -40°C To +100°C Operating temperature @ full load
- High 3kVDC/1 second or 1kVDC/1 second isolation
- IEC/EN/UL62368-1 certified, CB Report
- 5000m operation

## Description

Low cost, low profile, open-frame 1W SMD isolated DC/DC converters available with single (R1SX) or dual (R1DX) outputs. The R1SX is available with 3.3V or 5V inputs and offers a single unregulated 3.3V or 5V output. The R1DX operates from 5V and offers  $\pm 5$ ,  $\pm 9$ ,  $\pm 12$  or  $\pm 15$  dual outputs. There is no minimum load requirement and the quiescent consumption is less than 150mW. Standard isolation is 1kVDC/1s and a /H version with 3kVDC/1s is available. The operating temperature is from -40°C up to +100°C without derating. The pin-out is industry standard and compatible with the R1S/R1D series, but at half the height. The converters are fully certified to IEC/EN/UL62368 and IEC/EN/UL60950 and are 10/10 RoHS-conform. Class A EMC conformity requires only an input capacitor and a simple low cost LC filter is all that is needed for Class B EMC. Standard packaging is tape and reel.

## Selection Guide

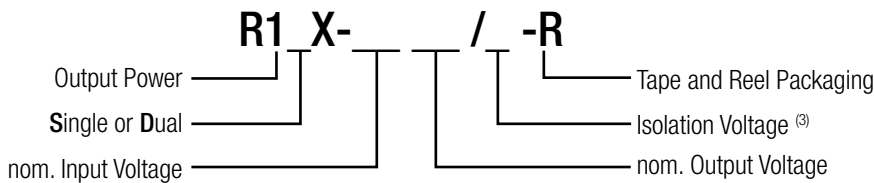
Part Number	nom. Input Voltage [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. <sup>(1)</sup> [%]	max. Capacitive Load <sup>(2)</sup> [ $\mu$ F]
R1SX-3.33.3	3.3	3.3	303	74	2200
R1SX-3.305	3.3	5	200	78	2200
R1SX-0505	5	5	200	78	2200
R1DX-0505	5	$\pm 5$	$\pm 100$	78	$\pm 1000$
R1DX-0509	5	$\pm 9$	$\pm 56$	78	$\pm 470$
R1DX-0512	5	$\pm 12$	$\pm 42$	80	$\pm 220$
R1DX-0515	5	$\pm 15$	$\pm 33$	80	$\pm 220$

### 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

## Model Numbering



### Notes:

Note3: without suffix, standard isolation voltage (1kVDC/1 second)  
with suffix „/H“, high isolation voltage (3kVDC/1 second)

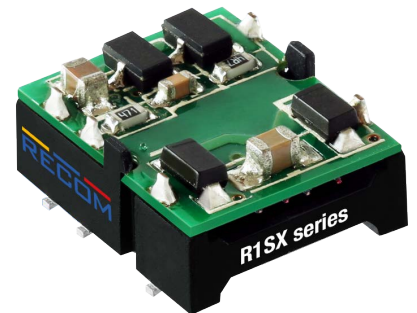
### Ordering Examples:

R1SX-3.305-R	3.3Vin	5Vout	Single Output	1kVDC/1 second isolation	tape and reel packaging
R1DX-0505-R	5Vin	$\pm 5$ Vout	Dual Output	1kVDC/1 second isolation	tape and reel packaging
R1SX-0505/H-R	5Vin	5Vout	Single Output	3kVDC/1 second isolation	tape and reel packaging
R1DX-0515/H-R	5Vin	$\pm 15$ Vout	Dual Output	3kVDC/1 second isolation	tape and reel packaging

**RECOM**  
DC/DC Converter

## R1SX/R1DX

1 Watt  
SMD  
Single & Dual  
Output



**UL**  
E224736

IEC/EN62368-1 certified  
UL62368-1 certified  
IEC/EN60950-1 certified  
C22.2 No. 62368-1-14 certified  
CB Report  
EN55032 compliant  
EN55024 compliant

Specifications (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

### BASIC CHARACTERISTICS

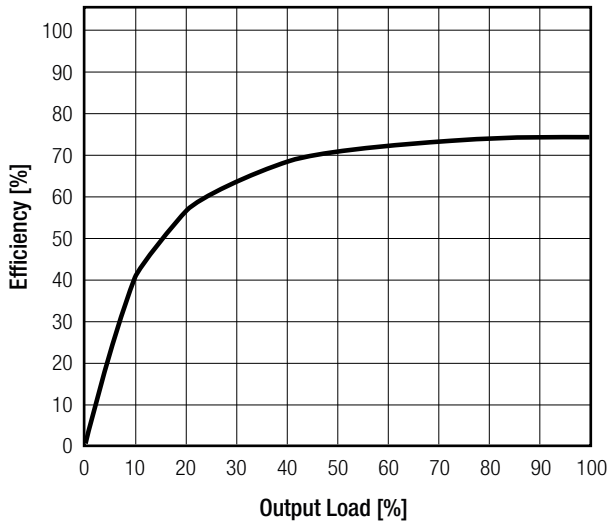
Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter				capacitor
Input Voltage Range			±10.0%	
Quiescent Current				40mA
Minimum Load		0%		
Internal Operating Frequency		20kHz	60kHz	100kHz
Output Ripple and Noise <sup>(4)</sup>	20MHz BW			100mVp-p

**Notes:**

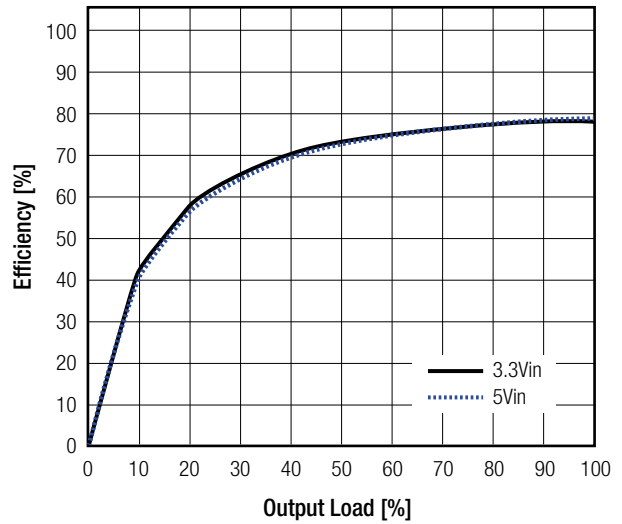
Note4: Measurements are made with a 0.1µF MLCC across output. (low ESR)

### Efficiency vs. Load

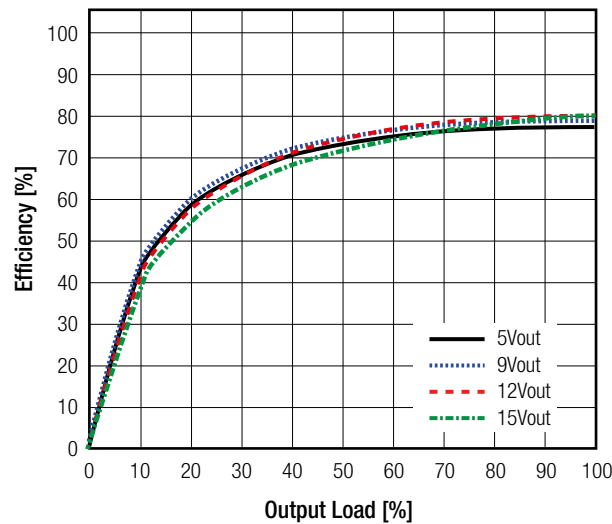
R1SX-3.33.3(/H)



R1SX-xx05(/H)



R1DX-05xx(/H)

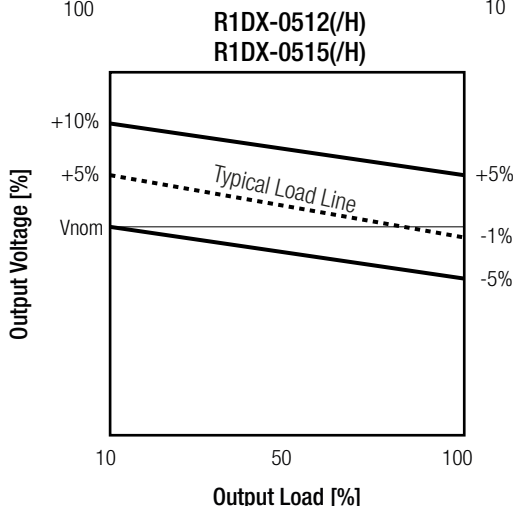
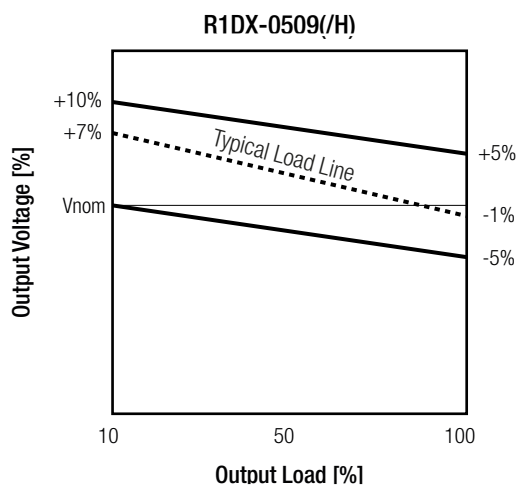
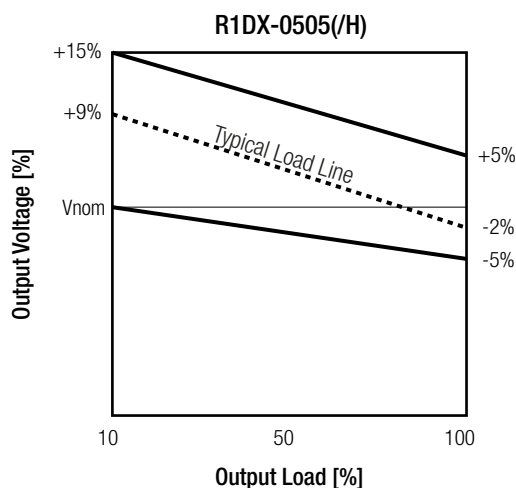
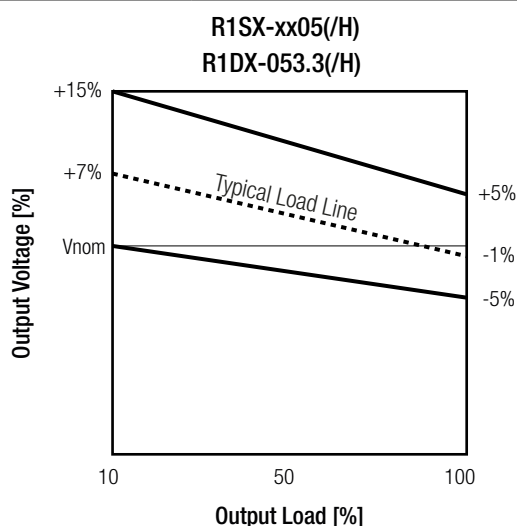
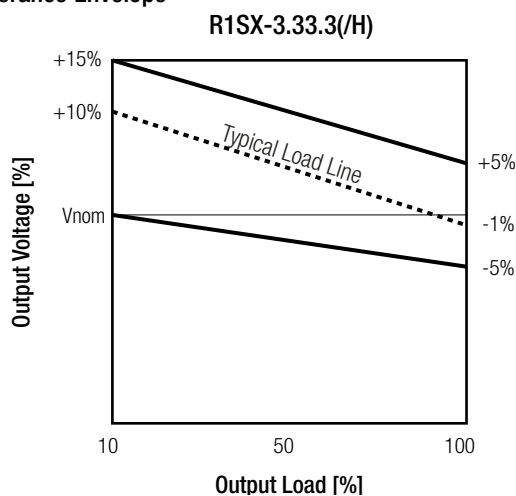


Specifications (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

**REGULATIONS**

Parameter	Condition		Value
Output Accuracy			±5.0% max.
Line Regulation	low line to high line		±1.2% typ. at ±1.0% of Vin typ.
Load Regulation	10% to 100% load	single output	3.3VDC 5VDC 10.0% typ. / 15.0% max. 7.0% typ. / 15.0% max.
		dual output	3.3VDC, 5VDC 9VDC, 12VDC, 15VDC 10.0% typ. / 15.0% max. 8.0% typ. / 10.0% max.
Cross Regulation	dual output only		±6.5% max.

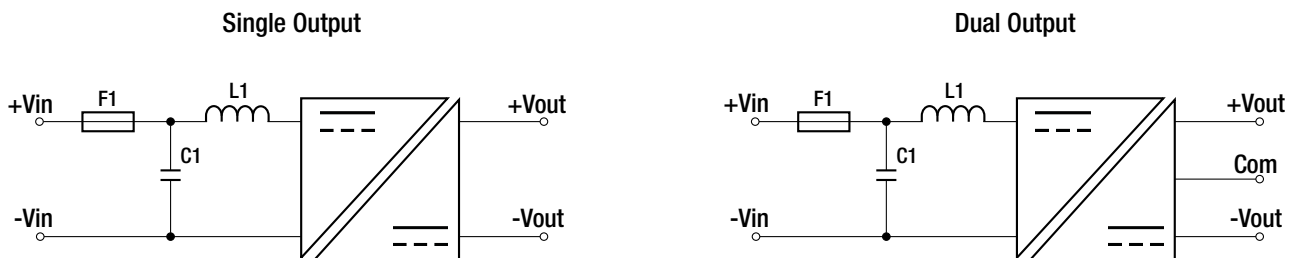
**Tolerance Envelope**



**Specifications** (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

PROTECTIONS			
Parameter	Type		Value
Isolation Voltage	I/P to O/P	standard	tested for 1 second rated for 1 minute <sup>(5)</sup> 1kVDC 500VAC
	I/P to O/P	with suffix "/H"	tested for 1 second rated for 1 minute <sup>(5)</sup> 3kVDC 1.5kVAC
Isolation Resistance			10GΩ min.
Isolation Capacitance	single		70pF max.
	dual		100pF max.
Leakage Current	standard		1μA max.
	with suffix "/H"		3μA max.
Insulation Grade			functional

### Protection Circuit



### Notes:

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note6: Refer to local wiring regulations if input over-current protection is also required. Recommended fuse: T1A slow blow type

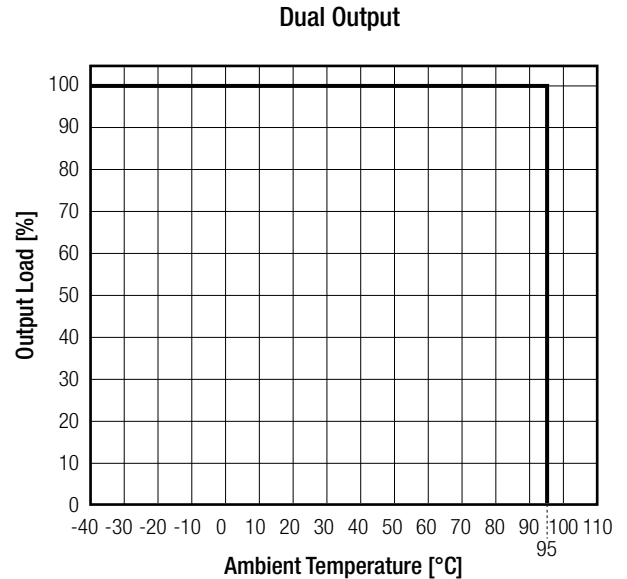
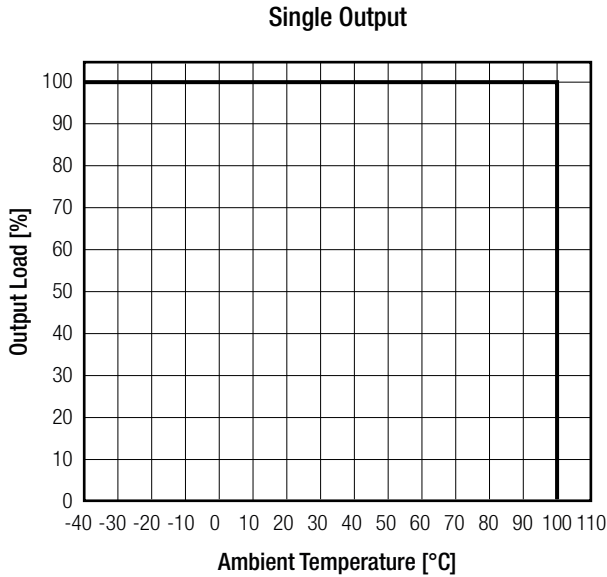
ENVIRONMENTAL				
Parameter	Condition		Value	
Operating Temperature Range	full load (refer to derating graph)	single	-40°C to +100°C	
		dual	-40°C to +95°C	
Operating Altitude			5000m	
Operating Humidity	non-condensing		5% - 95% RH max.	
Pollution Degree			PD2	
Vibration			according to MIL-STD-202G	
MTBF	according to MIL-HDBK-217F, G.B.	single	+25°C	21400 x 10 <sup>3</sup> hours
			+100°C	7800 x 10 <sup>3</sup> hours
		dual	+25°C	20900 x 10 <sup>3</sup> hours
			+95°C	7200 x 10 <sup>3</sup> hours

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**Specifications** (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

**Derating Graph**

(@ Chamber and natural convection 0.1m/s)



**SAFETY AND CERTIFICATIONS**

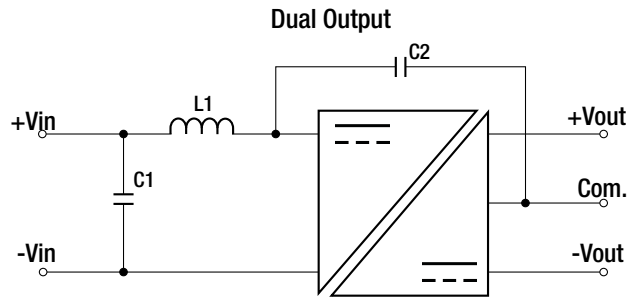
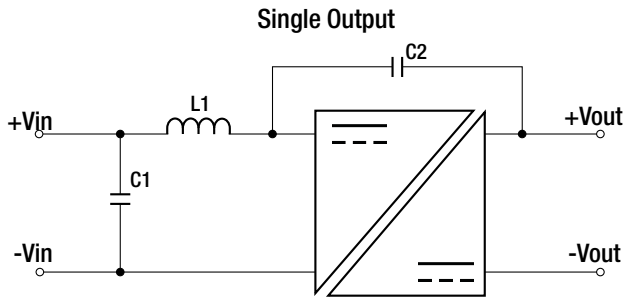
Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E224736	UL60950-1, 2nd Edition 2014 CAN/CSA C22.2 No. 60950-1-07, 2nd Edition 2014
Information Technology Equipment, General Requirements for Safety (CB)	E224736-4788277362-2	IEC60950-1:2005 2nd Edition + A2:2013
Information Technology Equipment, General Requirements for Safety		EN60950-1:2006 + A2:2013
Audio/video, information and communication technology equipment - Safety requirements (LVD)	E224736	UL62368, 2nd Edition, 2014 CAN/CSA -C22.2 No. 62368-1-14, 2nd Edition, 2014
Audio/video, information and communication technology equipment - Safety requirements	E224736-4788277362-1	EN62368-1:2014 + A11:2017
Audio/video, information and communication technology equipment - Safety requirements (CB)		IEC62368-1:2014 2nd Edition
RoHS2+		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external filter (see filter suggestion)	EN55032:2015, Class B
Information technology equipment - Immunity characteristics Limits and methods of measurement		EN55024:2010 +A1:2015
ESD Electrostatic discharge immunity test	R1DX Air: ±8, 6, 4, 2kV Contact: ±4, 2kV	IEC61000-4-2:2008, Criteria A
	R1SX Air: ±8, 6, 4, 2kV Contact: ±4, 2kV	IEC61000-4-2:2008, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	3 V/m	IEC61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	±0.5kV	IEC61000-4-4:2012, Criteria A
Surge Immunity	R1DX only	IEC61000-4-5:2014, Criteria B
	R1SX ±0.5kV	IEC61000-4-5:2014, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	3V r.m.s.	IEC61000-4-6:2013, Criteria A
Power Magnetic Field Immunity	50Hz / 1A/m	IEC61000-4-8:2009, Criteria A

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Specifications (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

### EMC Filtering Suggestions for EN55032



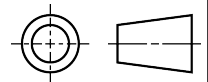
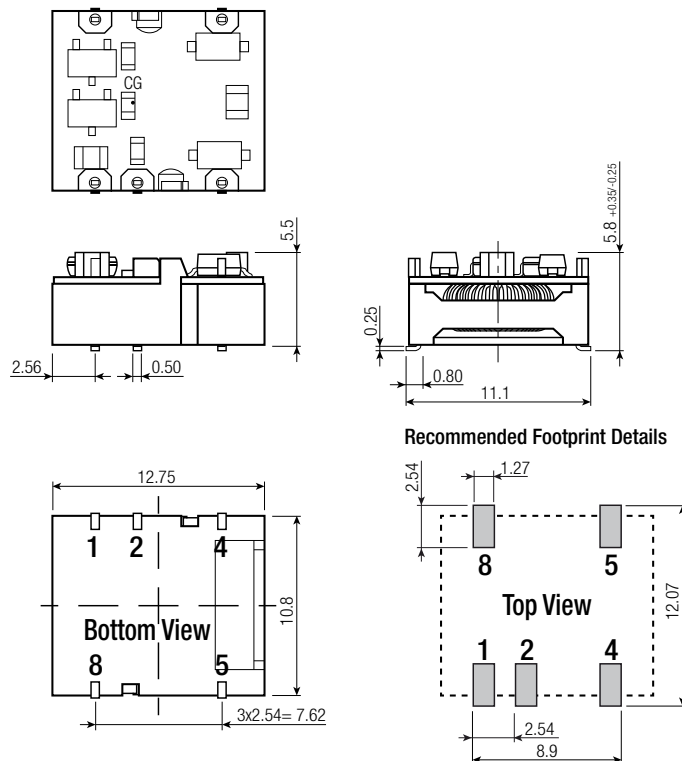
Component Liss Class A			
Model	C1	C2	L1
R1SX-3.3xxS	22µF MLCC	470pF/4kVDC	N/A
R1SX-05xxS			
R1DX-05xxD	10µF MLCC		10µH SMD Inductor

Component Liss Class B			
Model	C1	C2	L1
R1SX-3.3xxS	22µF MLCC	470pF/4kVDC	3.3µH SMD Inductor
R1SX-05xxS	10µF MLCC		4.7µH SMD Inductor
R1DX-05xxD			10µH SMD Inductor

### DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	black plastic (UL94V-0)
	PCB	FR4 (UL94V-0)
Package Dimension (LxWxH)	single	12.75 x 11.10 x 5.80mm
	dual	15.24 x 11.10 x 8.00mm
Package Weight	single	1.0g typ.
	dual	1.2g typ.

### Dimension Drawing R1SX (mm)



### Pin Connection

Pin #	Single
1	-Vin
2	+Vin
4	-Vout
5	+Vout
8	NC

CG= center of gravity

NC= no connection

Tolerance: xx.x= ±0.5mm

xx.xx= ±0.25mm

Pin

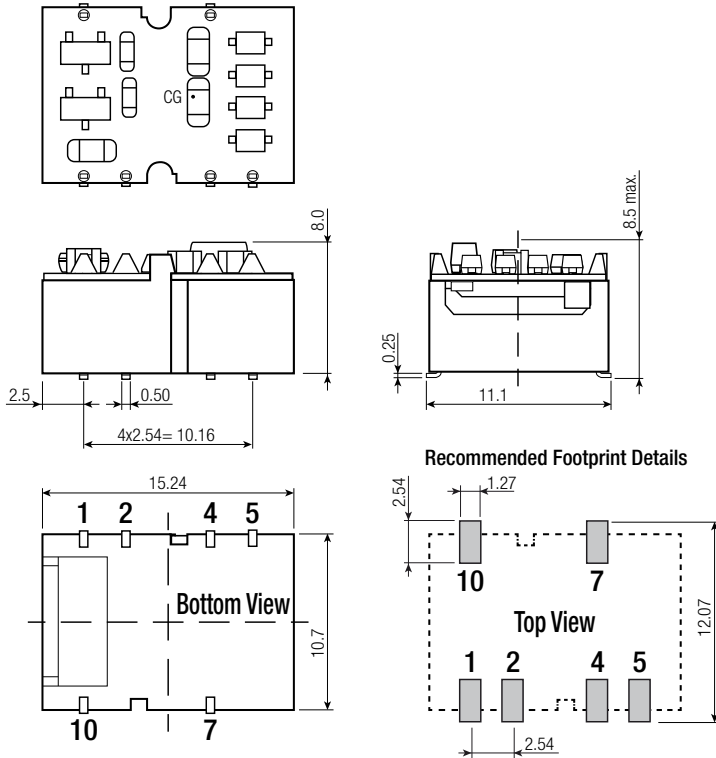
Thickness: ±0.05mm

Length: +0.25/-0.50mm

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Specifications (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

Dimension Drawing R1DX (mm)



Pin Connection

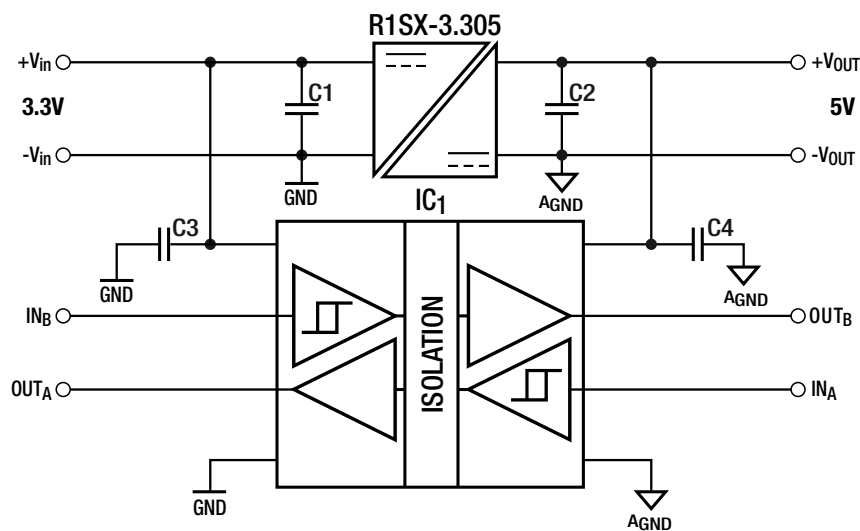
Pin #	Dual
1	-Vin
2	+Vin
4	Com.
5	-Vout
7	+Vout
10	NC

CG= center of gravity  
NC= no connection  
Tolerance: xx.x= ±0.5mm  
          xx.xx= ±0.25mm

Pin Thickness: ±0.05mm  
Length: +0.25/-0.50mm

INSTALLATION and APPLICATION

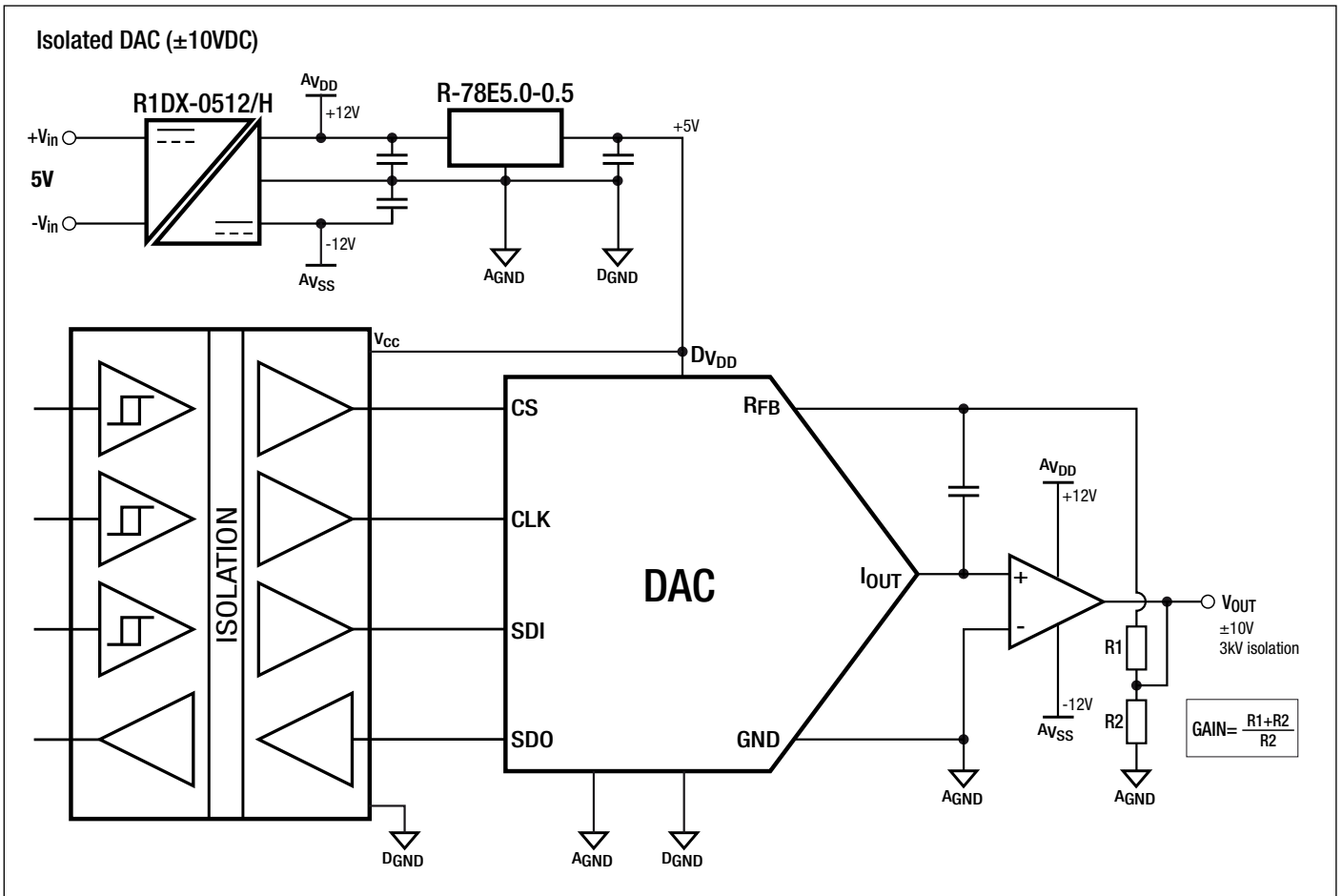
Isolated Bus



Block diagram of an isolated data interface with 3.3V to 5V logic level shifting. Typical Applications include microcontroller interfacing, logic level translation and multi-channel test and measurement systems.

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Specifications (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)



### PACKAGING INFORMATION

Packaging Dimension (LxWxH)	tape and reel (carton)	355.0 x 340.0 x 35.0mm
	reel	330.2 x 330.2 x 30.0mm
Packaging Quantity	single	450pcs
	dual	250pcs
Tape Width		24.0mm
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95% RH max.

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