

# Features

- 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

# Unregulated Converters

## 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.

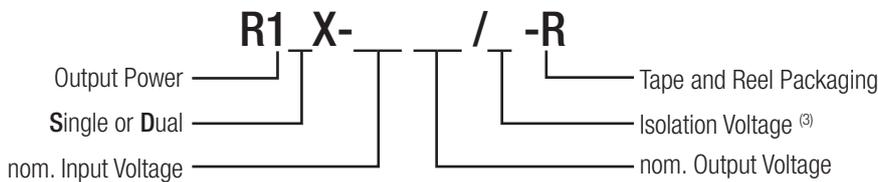
## Selection Guide

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 PENDING  
 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)

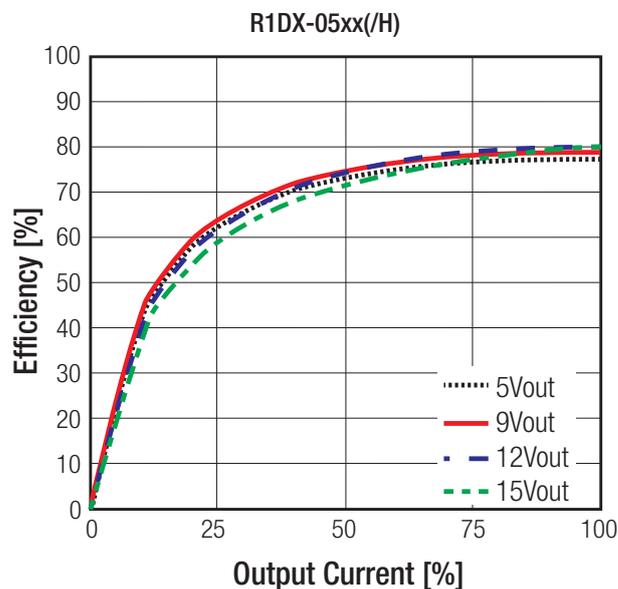
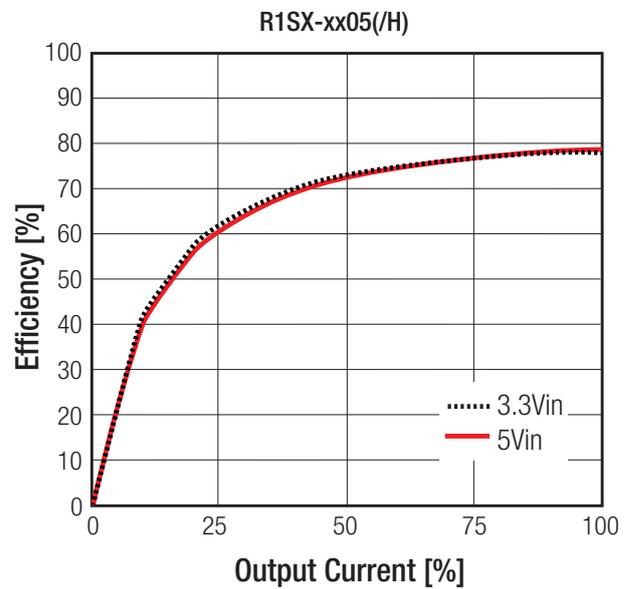
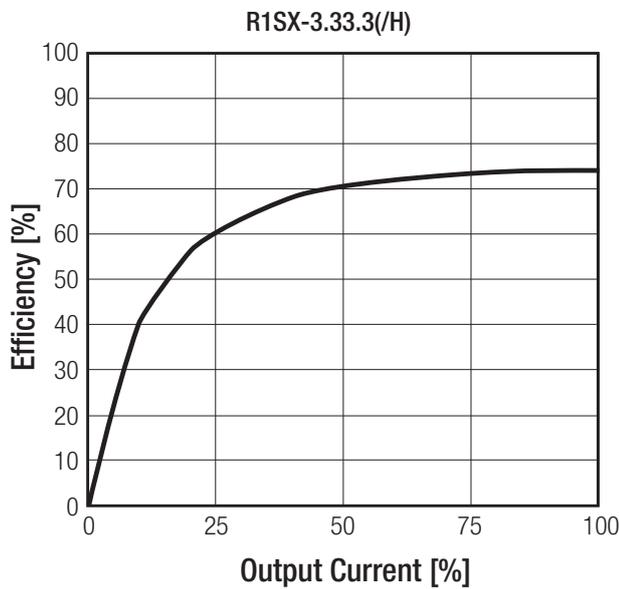
### BASIC CHARACTERISTICS

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

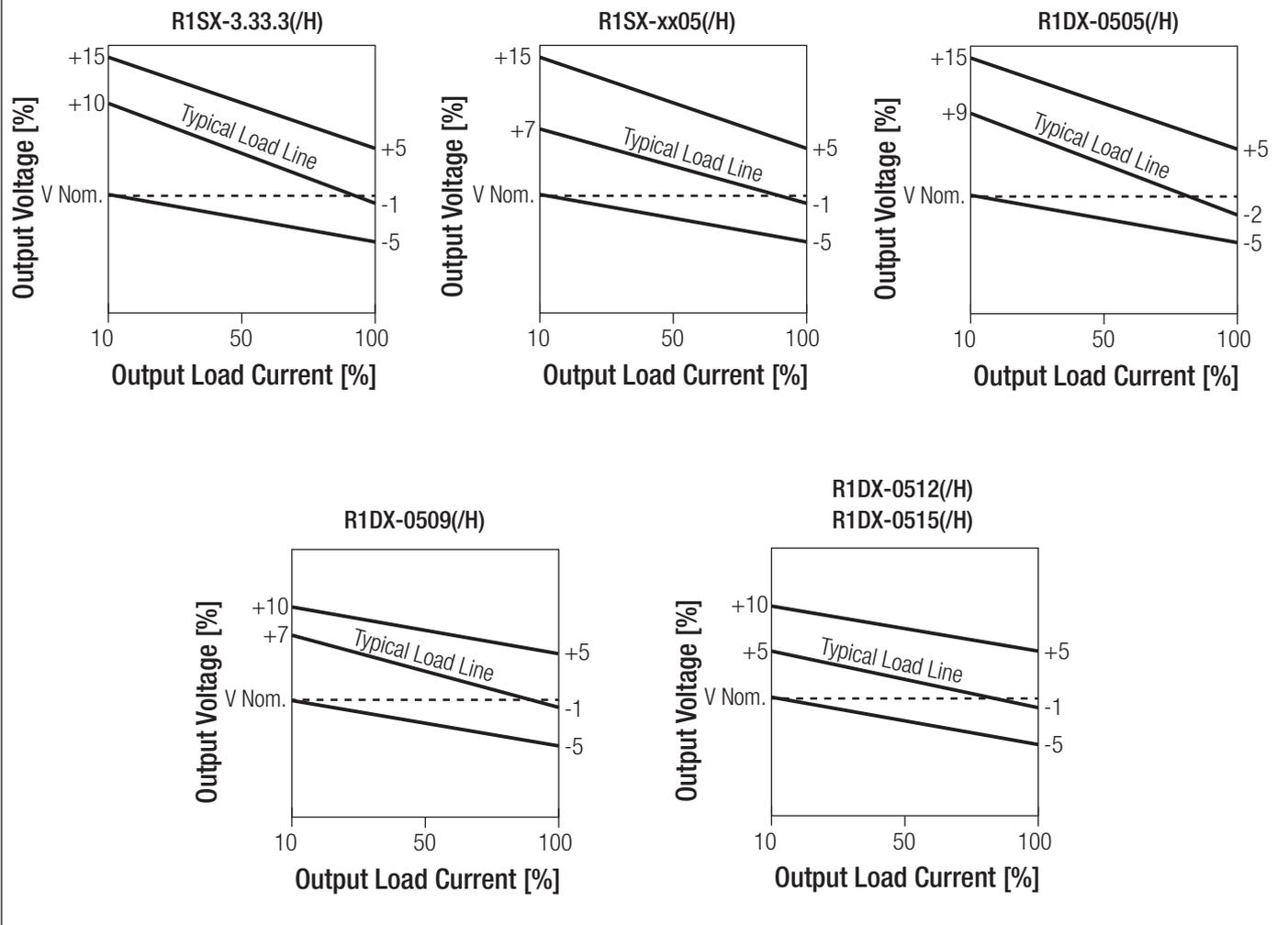


Specifications (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

**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**



**PROTECTIONS**

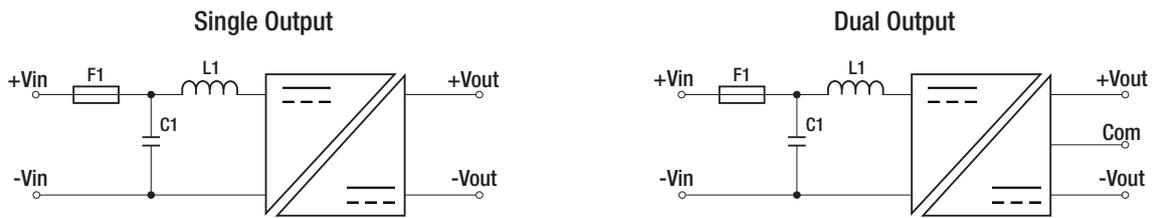
Parameter	Type		Value
Isolation Voltage	I/P to O/P	standard	tested for 1 second rated for 1 minute <sup>(5)</sup> 1kVDC 500VAC
	I/P to O/P	with suffix "/H"	tested for 1 second rated for 1 minute <sup>(5)</sup> 3kVDC 1.5kVAC

continued on next page

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

Parameter	Type	Value
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**



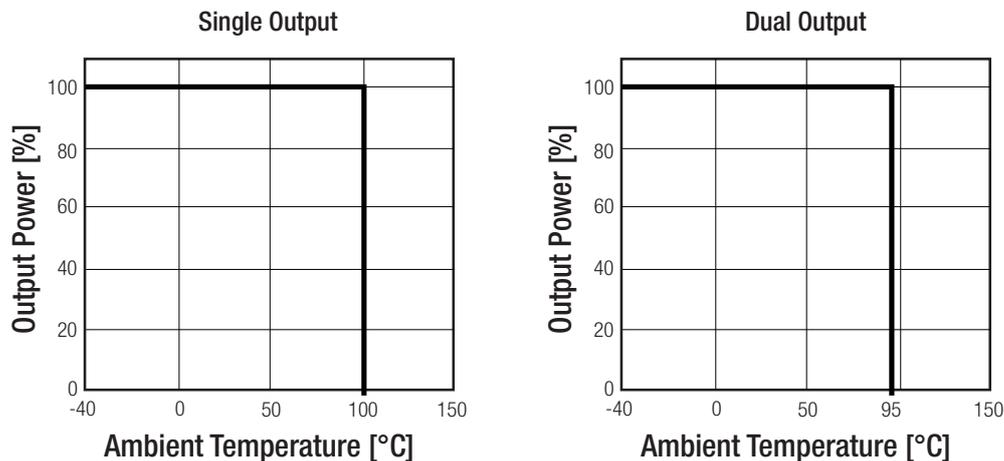
**Notes:**

- Note5: Customers are allowed to test once in their production. Thereafter the test voltage and time must be reduced for any repeat testing
- Note6: An input fuse is required if the mains supply is not over-current protected. Recommended fuse: T1A slow blow type

ENVIRONMENTAL				
Parameter	Condition			Value
Operating Temperature Range	without derating (see 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.	+25°C	single	21400 x 10 <sup>3</sup> hours
		+100°C		7800 x 10 <sup>3</sup> hours
		+25°C	dual	20900 x 10 <sup>3</sup> hours
		+95°C		7200 x 10 <sup>3</sup> hours

**Derating Graph**

(@ Chamber and natural convection 0.1m/s)



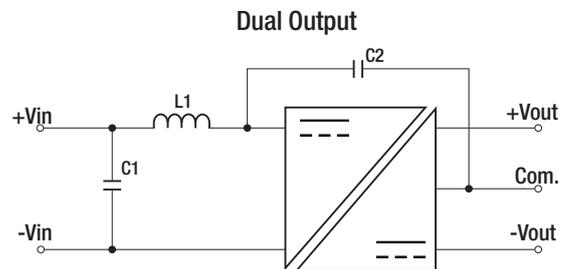
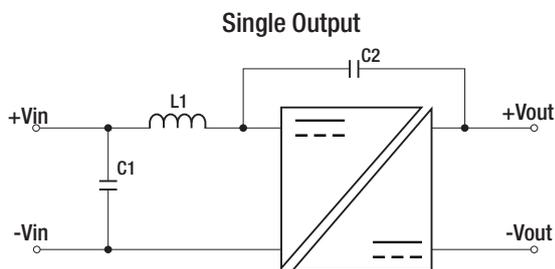
**Specifications** (measured @ Ta= 25°C, nominal input voltage, full load unless otherwise specified)

**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
Audio/video, information and communication technology equipment - Safety requirements (LVD)	pending	UL62368, 2nd Edition, 2014 CAN/CSA -C22.2 No. 62368-1-14, 2nd Edition, 2014
Audio/video, information and communication technology equipment - Safety requirements (CB Scheme)	L0339m29-CB-1-B	IEC62368-1:2014, 2nd Edition + C2:2015 EN62368-1:2014 + AC:2015
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 below)	EN55032:2015, Class B
Information technology equipment - Immunity characteristics Limits and methods of measurement		EN55024:2010 +A1:2015
ESD Electrostatic discharge immunity test	Air: ±8, 6, 4, 2kV Contact: ±4, 2kV	IEC61000-4-2:2008, Criteria A
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	±0.5kV	IEC61000-4-5:2014, Criteria B
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

**EMC Filtering Suggestions for EN55022**



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			4.7µH SMD Inductor
R1DX-05xxD	10µF MLCC		10µH SMD Inductor

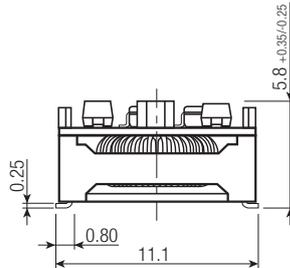
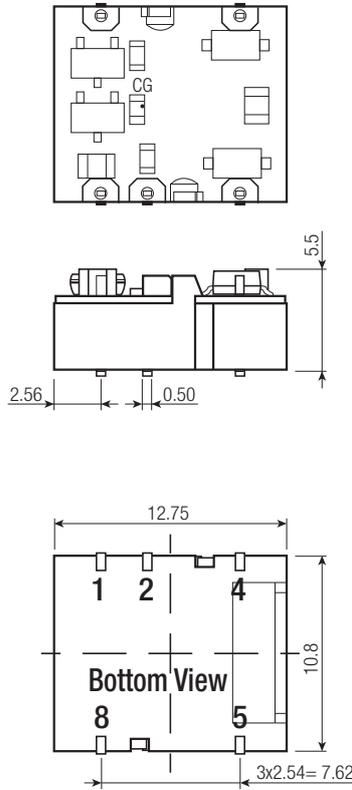
**DIMENSION and PHYSICAL CHARACTERISTICS**

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.

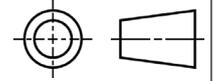
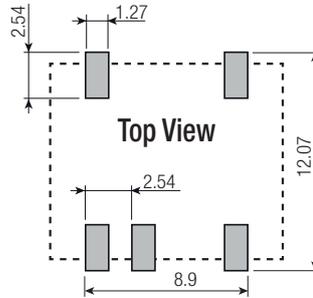
continued on next page

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

### Dimension Drawing R1SX (mm)



### Recommended Footprint Details



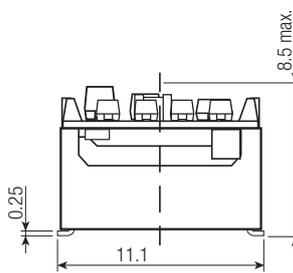
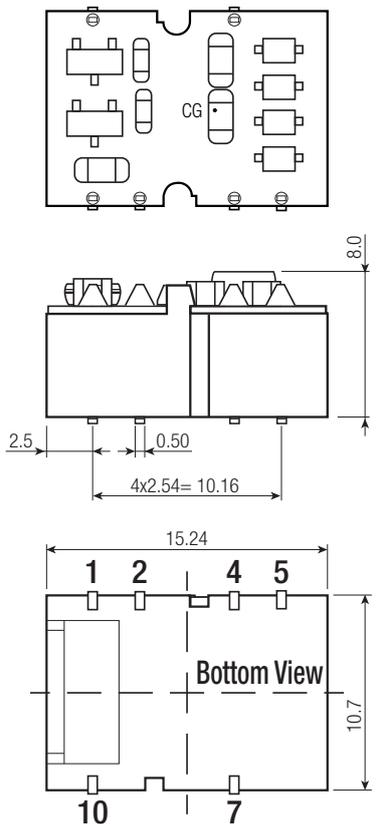
### Pin Connection

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

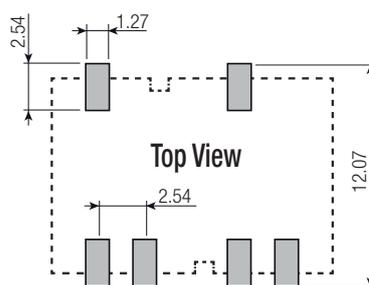
CG= center of gravity  
NC= no connection  
Tolerance: xx.x=  $\pm 0.5$ mm  
xx.xx=  $\pm 0.25$ mm

Pin Thickness:  $\pm 0.05$ mm  
Length:  $+0.25/-0.50$ mm

### Dimension Drawing R1DX (mm)



### Recommended Footprint Details



### Pin Connection

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

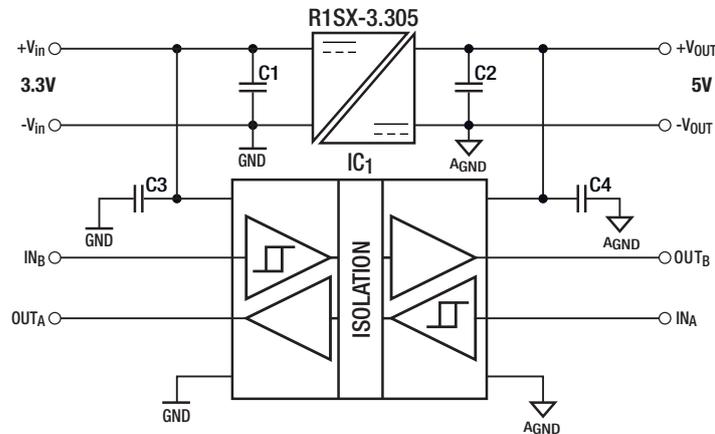
CG= center of gravity  
NC= no connection  
Tolerance: xx.x=  $\pm 0.5$ mm  
xx.xx=  $\pm 0.25$ mm

Pin Thickness:  $\pm 0.05$ mm  
Length:  $+0.25/-0.50$ mm

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

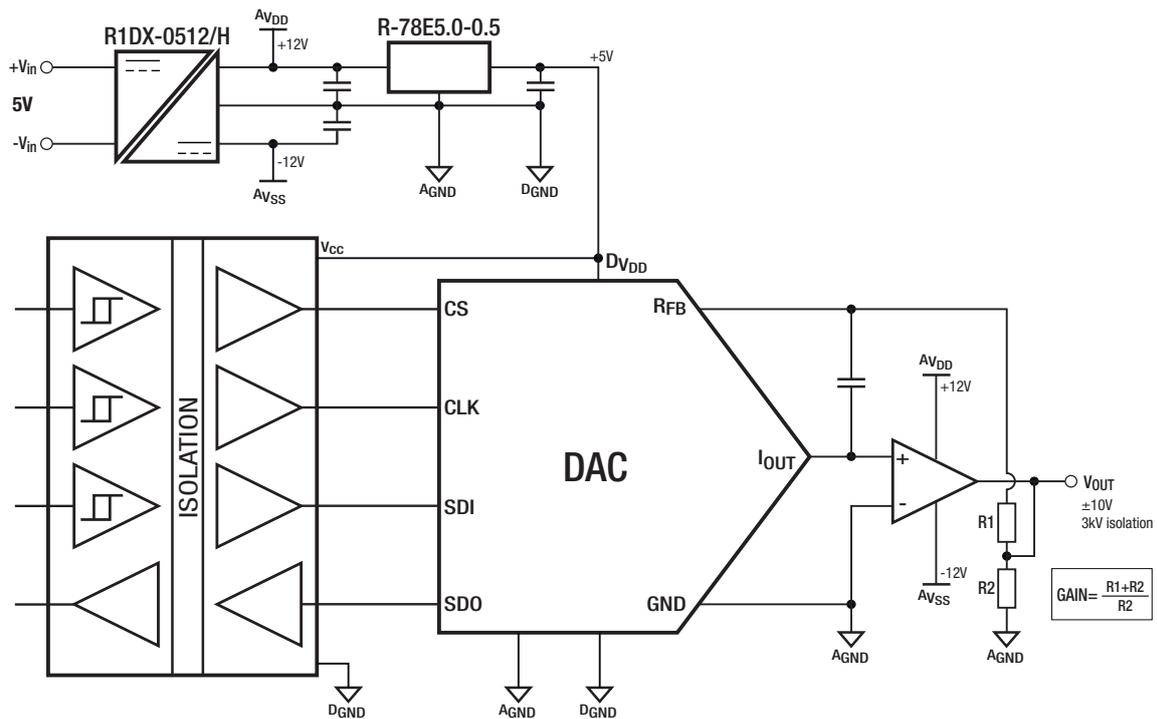
## INSTALLATION and APPLICATION

### 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.

### Isolated DAC ( $\pm 10\text{VDC}$ )



## 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.

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.