Features

Regulated Converters

- Compact 10.3x7.5mm SMD package
- 5kVAC reinforced isolation
- 2MOPP (4kVAC)
- 5V or 3.3V post-regulated, selectable outputs
- Low EMI emissions
- Ultra-wide temperature range (-40°C to +140°C)
- Low profile (2.6mm)

RECOM
DC/DC Converter

RxxCTxxS

0.5 Watt 16-Pin SOIC Single Output

UL62368-1 (pending)
CSA/CAN C22.2 No. 62368-1 (pending)
IEC/EN62368-1 (pending)
IEC/EN60601-1 (pending)

Description

Low cost, low profile, 500mW SMD isolated DC/DC single output converter ideal for applications such as communication, current sensing, and medical applications which require robust isolation. The R05CT05S is a single solution with 5V input and a user-definable single, regulated 3.3V or 5V output. There is no minimum load requirement. Standard isolation is 5kVAC/1min with a 2MOPP rating for medical applications. The operating temperature is from -40°C up to +140°C with derating.

Selection Guide

Part Number	Input Voltage Range [VDC]	Selectable Output Voltage [VDC]	Output Power [mW]	Efficiency typ. (1) [%]
R05CT05S	4.5-5.5	3.3 or 5	500	60

Notes:

Note1: nom. V_{IN}= 5VDC, V_{OUT} set to 5VDC, load= 100mA

Model Numbering

R__CT__S-__

- nom. Input Voltage
- nom. Output Voltage
- Packaging (2)
- Single Output

Notes:

Note2: add suffix "-CT" for bag packaging for more details refer to ***"PACKAGING INFORMATION"***
without suffix, standard tape and reel packaging

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

ABSOLUTE MAXIMUM RATINGS (3)

Parameter	Condition	Min.	Typ.	Max.
Absolute Maximum Voltage	$+V_{IN}$ to $-V_{IN}$	-0.3VDC		6VDC
	CTRL, SYNC, SYNC_OK to $-V_{IN}$	-0.3VDC		$+V_{IN}$ + 0.3VDC
	$+V_{OUT}$ to $-V_{OUT}$	-0.3VDC		6VDC
	SEL to $-V_{OUT}$	-0.3VDC		V_{OUT} + 0.3VDC
Operating IC Junction Temperature (T_J)		-40°C		+150°C
Operating Ambient Temperature (T_{AMB})		-40°C		+150°C
Storage Temperature (T_{STO})		-65°C		+150°C

Notes:

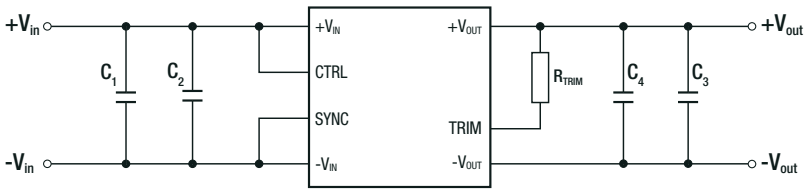
Note3: Stresses beyond those listed under absolute maximum ratings can cause permanent damage to the device. (Values are at non-operating)

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom. $+V_{IN}$= 5VDC	4.5VDC	5VDC	5.5VDC
Under Voltage Lockout (UVLO)	DC-DC ON DC-DC OFF		4.2VDC 3.7VDC	
Under Voltage Lockout Hysteresis			0.5VDC	
Input Current Range		0mA		200mA
Quiescent Current	SEL pin shorted to V_{ISO} (V_{OUT}= 5VDC)		45mA	
	SEL pin with 100kΩ connected to V_{ISO} (V_{OUT}= 5.4VDC)		40mA	
	SEL pin shorted to $-V_{OUT}$ (V_{OUT}= 3.3VDC)		80mA	
	SEL pin with 100kΩ connected to $-V_{IN}$ (V_{OUT}= 3.7VDC)		75mA	
Minimum Load		0%		
Start-up Time	power up using CTRL function		1.5ms 1.2ms	
Rise time			750µs	
ON/OFF CTRL	DC-DC ON DC-DC OFF	2.2VDC 0VDC		5.5VDC 0.8VDC
Input Current of CTRL Pin	CTRL voltage= 5VDC		5µA	10µA
Standby Current	DC-DC OFF			100µA
Internal Operating Frequency		7.2MHz	8MHz	8.8MHz
Output Ripple and Noise (20MHz BW)	10uF + 0.1uF V_{OUT} set to 5.4VDC, load = 90mA		50mVp-p	
	10uF + 0.1uF V_{OUT} set to 5.0VDC, load = 100mA			
	10uF + 0.1uF V_{OUT} set to 3.7VDC, load = 130mA			
	10uF + 0.1uF V_{OUT} set to 3.3VDC, load = 150mA			

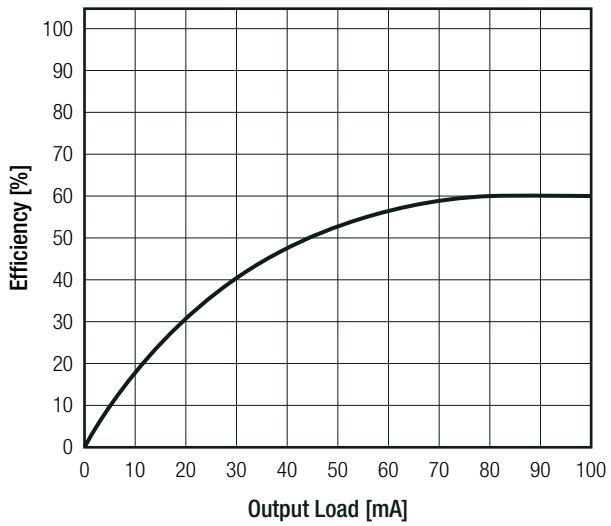
Typical Application Circuit



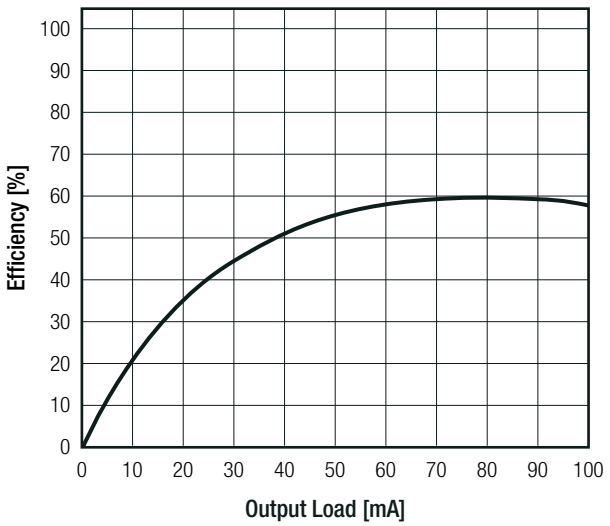
CTRL	R_{TRIM}	$Vout_{set}$
high	shorted to $+V_{OUT}$	5.0VDC
high	100kΩ to $+V_{OUT}$	5.4VDC
high	shorted to $-V_{OUT}$	3.3VDC
high	100kΩ to $-V_{OUT}$	3.7VDC
high	open	unsupported
low	X	0VDC

Efficiency vs. Load

V_{OUT}= 5.0VDC



V_{OUT}= 5.4VDC



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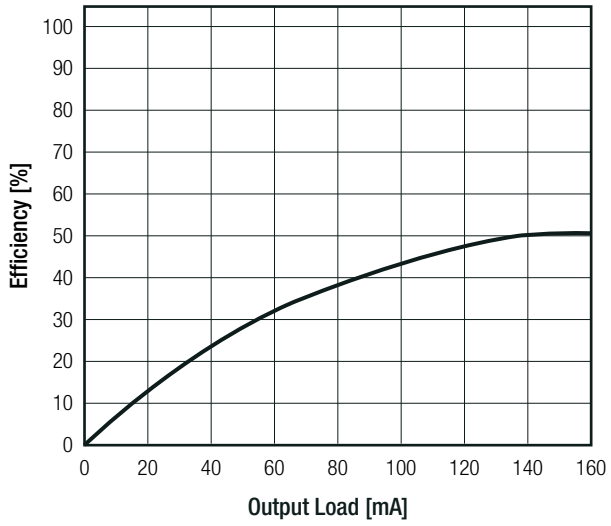
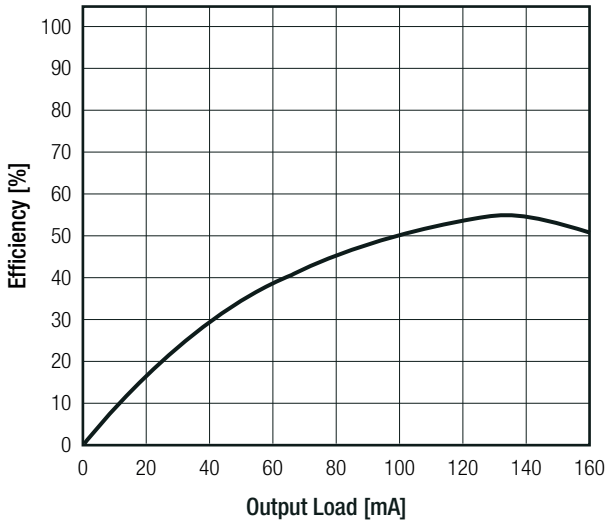
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

V_{OUT}= 3.3VDC



V_{OUT}= 3.7VDC



SYNC FUNCTION (4)

Parameter	Condition	Min.	Typ.	Max.
SYNC Pin Input Current	SYNC Voltage= 5VDC		0.02µA	1µA
SYNC OK Output Voltage	I SYNC_OK= -2mA		150mV	
SYNC OK pin leakage current	V SYNC_OK= 5VDC			1µA

Notes:

Note4: Synchronous clock input pin. Provide a clock signal to synchronize multiple RxxCTxxS devices or connect to -V_{IN} for standalone operation using the internal oscillator. If the SYNC pin is left open it should be separated from any switching noise to avoid false clock coupling.
Active-low, open-drain diagnostic output. Pin is asserted LOW if an no external SYNC clock or one that is outside of the operating range of the RxxCTxxS is detected. In this state, the external clock is ignored and the DC-DC converter is clocked by the device's internal oscillator. The pin is in high-impedance if a good clock is applied on SYNC.

REGULATION

Parameter	Condition	Min.	Typ.	Max.
Output Voltage Accuracy	V_{OUT} set to 5VDC; load= 0mA to 75mA, V_{IN}= 4.5VDC	4.7VDC	5VDC	5.3VDC
	V_{OUT} set to 5VDC; load= 0mA to 100mA, V_{IN}= ≥5VDC	4.7VDC	5VDC	5.3VDC
	V_{OUT} set to 5.4VDC; load= 0mA to 60mA, V_{IN}= 4.5VDC	5.1VDC	5.4VDC	5.7VDC
	V_{OUT} set to 5.4VDC; load= 0mA to 90mA, V_{IN}= ≥5VDC	5.1VDC	5.4VDC	5.7VDC
	V_{OUT} set to 3.3VDC; load= 0mA to 110mA, V_{IN}= 4.5VDC	3.1VDC	3.3VDC	3.5VDC
	V_{OUT} set to 3.3VDC; load= 0mA to 150mA, V_{IN}= ≥5VDC	3.1VDC	3.3VDC	3.5VDC
	V_{OUT} set to 3.7VDC; load= 0mA to 100mA, V_{IN}= 4.5VDC	3.5VDC	3.7VDC	3.9VDC
	V_{OUT} set to 3.7VDC; load= 0mA to 130mA, V_{IN}= ≥5VDC	3.5VDC	3.7VDC	3.9VDC
Line Regulation	low line to high line		1%	
Load Regulation	0% to 100% load		1.5%	

PROTECTIONS

Parameter	Condition	Values
Short Circuit Protection (SCP)		power limiting, continuous protection
Short Circuit Input Current	V_{IN}= 4.5VDC	215mA
	V_{IN}= 5VDC	240mA
	V_{IN}= 5.5VDC	260mA
Isolation Voltage	1 minute	5kVAC

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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Parameter	Condition	Values
Maximum repetitive peak isolation voltage		1.414kV peak
Maximum working isolation voltage		1kVAC
		1.414kVDC
Maximum transient isolation voltage	1 minute	7.071kV peak
Maximum surge isolation voltage	according IEC62368-1= 1.2/50us	6.25kV peak
Isolation Resistance	V_{ISO}= 500VDC, 25°C	$10^{12}\Omega$ typ.
Isolation Capacitance		3.5pF typ.
Insulation Grade		reinforced
Common mode transient immunity		±100V/ns
Internal Clearance	solid insulation	>0.12mm
External Creepage		>8mm
Distance through the insulation	minimum internal gap (internal clearance)	>120µm
Comparative tracking index	DIN EN 60112 (VDE 0303-11); IEC 60112	>600V
Insulation Material Group	according to IEC 60664-1	I

ENVIRONMENTAL

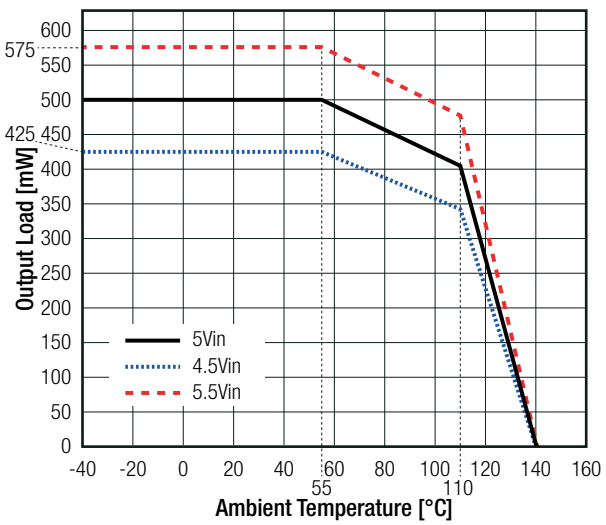
Parameter	Condition		Value
Operating Temperature Range	@ natural convection 0.1m/s; refer to ***"Thermal Derating [6]"***	with derating without derating	-40°C to +140°C -40°C to +55°C
ESD	human-body model (HBM), ANSI/ESDA/JEDEC JS-001		±3.0kV
	charged-device model (CDM), JEDEC JESD22-C101		±0.5kV
Moisture Sensitive Level	MSL peak temp. [5]		Level 3, 260°C, 168hrs
Temperature Coefficient			50ppm/K
Thermal Impedance [6]	junction to T_{AMB}		63.8K/W
	junction to case (top)		21.4K/W
	junction to case (bottom)		37.2K/W
	junction to board		38.5K/W
Operating Altitude			5000m
Operating Humidity			95% RH max.
Pollution Degree			PD2
MTBF	according to TR-332, 50% stress G.B.	+55°C	2500 x 10^6 hours

Notes:

Note5: The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature

Note6: Tested with 54.0 x 85.6mm 2 layer PCB with 105µm copper

Thermal Derating [6]

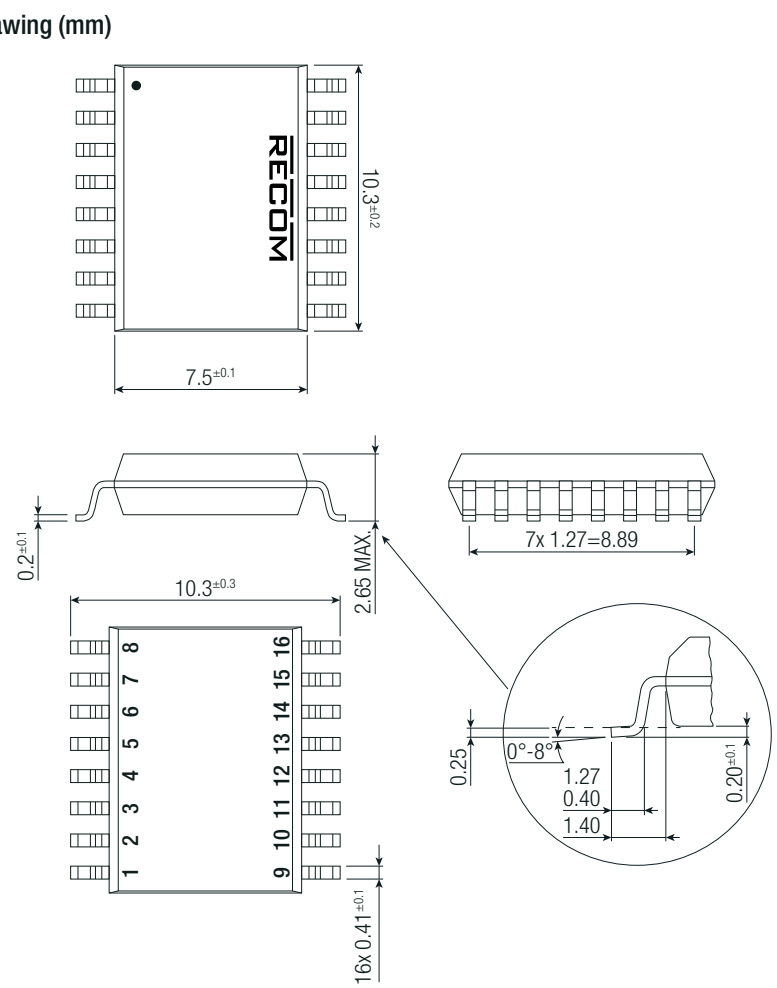


Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Dimension (LxWxH)		10.3 x 7.5 x 2.65mm
Weight		0.1g typ.

Dimension Drawing (mm)

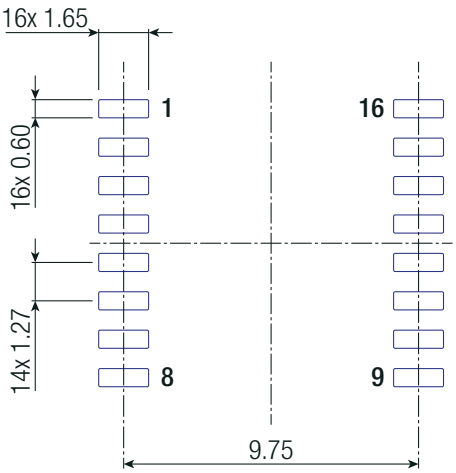


Pad Information

Pad #	Function
1	CTRL
2	$-V_{IN}$
3	$+V_{IN}$
4	SYNC
5	SYNC OK
6, 7, 8, 10, 11, 12	NC
9, 15, 16	$-V_{OUT}$
13	TRIM
14	$+V_{OUT}$

Tolerances: x.x= ±0.1mm
x.xx= ±0.05mm

Recommended Footprint Details (Top View)



Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

PACKAGING INFORMATION		
Parameter	**Type**	**Value**
Packaging Dimension (LxWxH)	reel (diameter + width) tape and reel (carton)	Ø330.0 + 16.4mm height 350.0 x 350.0 x 43.0mm
	moisture barrier bag ("-CT")	100.0 x 100.0 x 30mm
Packaging Quantity	tape and reel	500pcs
	moisture barrier bag ("-CT")	10pcs
Storage Temperature Range		-65°C to +150°C