

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)

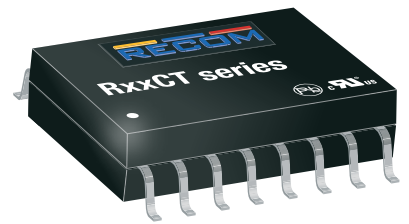
RECOM
DC/DC Converter

RxxCTxxS

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.

0.5 Watt
16-Pin SOIC
Single Output



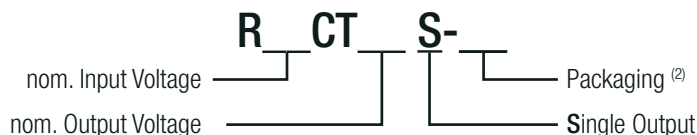
Selection Guide

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



Notes:

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

IEC/EN62368-1 certified
IEC/EN60601-1 certified
ANSI/AAMI ES60601-1 certified
CAN/CSA C22.2 No- 60601-1-14 certified
CB Report

Specifications (measured @ T_a = 25°C, nom. V_{in} , 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:

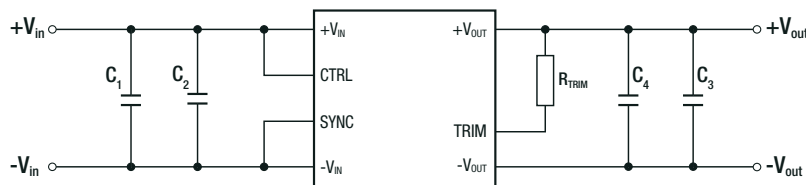
Note3: Stresses beyond those listed under absolute maximum ratings can cause permanent damage to the device. (Values are at non-operating)

Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

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

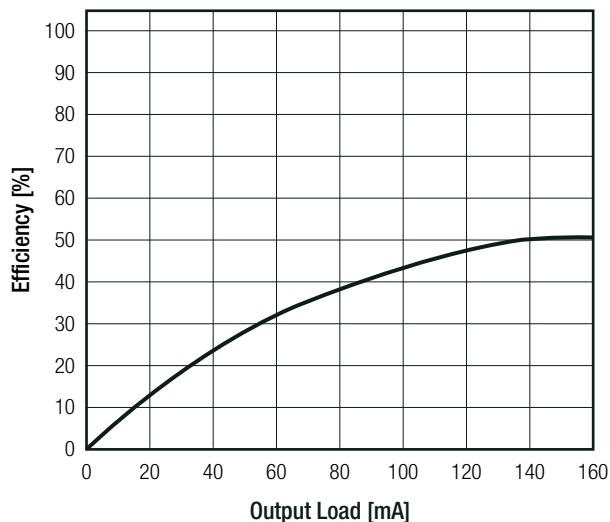
Typical Application Circuit



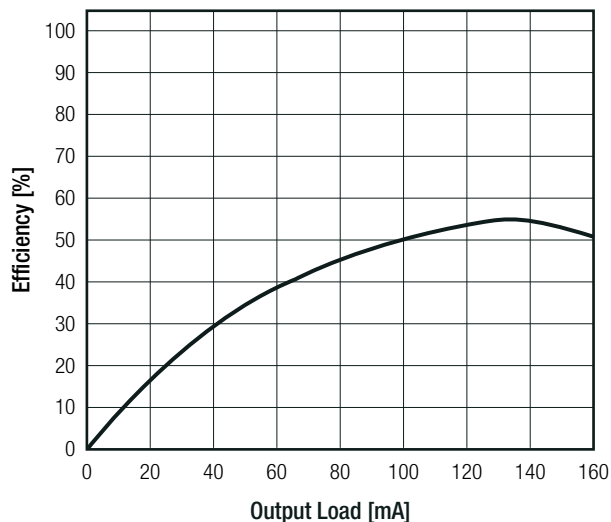
CTRL	R_{TRIM}	V_{out_set}
high	shorted to $+V_{out}$	5.0VDC
high	$100\text{k}\Omega$ to $+V_{out}$	5.4VDC
high	shorted to $-V_{out}$	3.3VDC
high	$100\text{k}\Omega$ to $-V_{out}$	3.7VDC
high	open	unsupported
low	X	0VDC

Efficiency vs. Load

$V_{out} = 3.3\text{VDC}$

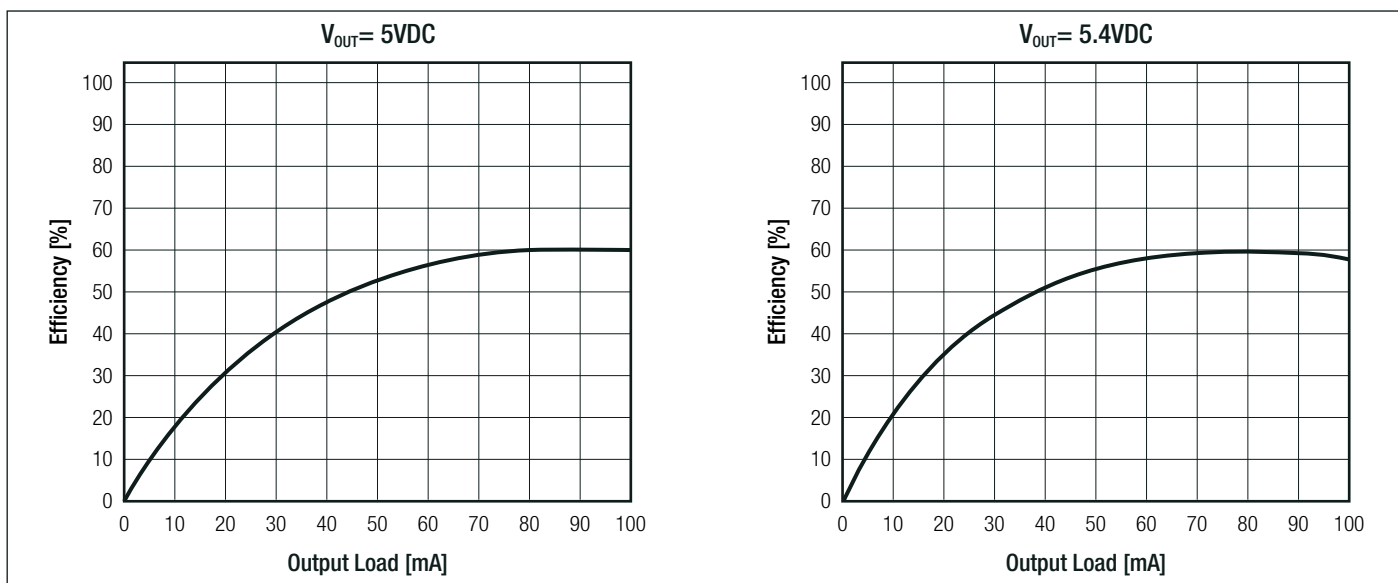


$V_{out} = 3.7\text{VDC}$



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Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)



SYNC FUNCTION ⁽⁴⁾

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

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, $V_{IN} = 4.5\text{VDC}$	4.7VDC	5VDC	5.3VDC
	V_{OUT} set to 5VDC; load= 0mA to 100mA, $V_{IN} = \geq 5\text{VDC}$	4.7VDC	5VDC	5.3VDC
	V_{OUT} set to 5.4VDC; load= 0mA to 60mA, $V_{IN} = 4.5\text{VDC}$	5.1VDC	5.4VDC	5.7VDC
	V_{OUT} set to 5.4VDC; load= 0mA to 90mA, $V_{IN} = \geq 5\text{VDC}$	5.1VDC	5.4VDC	5.7VDC
	V_{OUT} set to 3.3VDC; load= 0mA to 110mA, $V_{IN} = 4.5\text{VDC}$	3.1VDC	3.3VDC	3.5VDC
	V_{OUT} set to 3.3VDC; load= 0mA to 150mA, $V_{IN} = \geq 5\text{VDC}$	3.1VDC	3.3VDC	3.5VDC
	V_{OUT} set to 3.7VDC; load= 0mA to 100mA, $V_{IN} = 4.5\text{VDC}$	3.5VDC	3.7VDC	3.9VDC
	V_{OUT} set to 3.7VDC; load= 0mA to 130mA, $V_{IN} = \geq 5\text{VDC}$	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	$V_{IN} = 4.5\text{VDC}$	215mA
	$V_{IN} = 5\text{VDC}$	240mA
	$V_{IN} = 5.5\text{VDC}$	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	$V_{ISO}= 500VDC, 25^{\circ}C$	$10^{12}\Omega$ typ.
Isolation Capacitance		3.5pF typ.
Insulation Grade		reinforced
Common mode transient immunity		$\pm 100V/ns$
Internal Clearance	solid insulation	$>0.12mm$
External Creepage		$>8mm$
Distance through the insulation	minimum internal gap (internal clearance)	$>120\mu m$
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 <i>"Thermal Derating (6)"</i>	with derating without derating $-40^{\circ}C$ to $+140^{\circ}C$ $-40^{\circ}C$ to $+55^{\circ}C$
ESD	human-body model (HBM), ANSI/ESDA/JEDEC JS-001	$\pm 3.0kV$
	charged-device model (CDM), JEDEC JESD22-C101	$\pm 0.5kV$
Moisture Sensitive Level	MSL peak temp. (5)	Level 3, $260^{\circ}C$, 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		PD1
MTBF	according to TR-332, 50% stress G.B.	+55°C 2500 x 10^6 hours

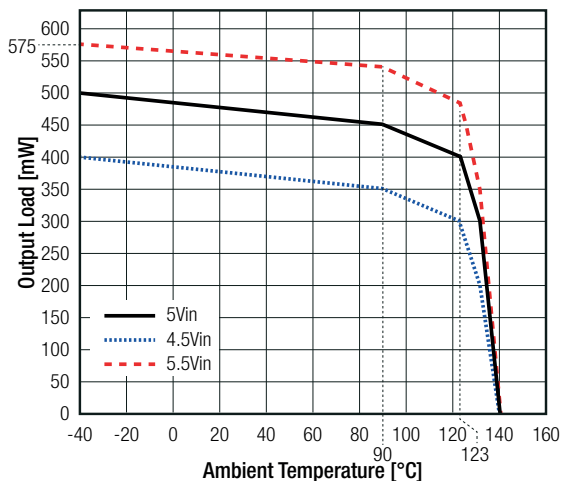
Notes:

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

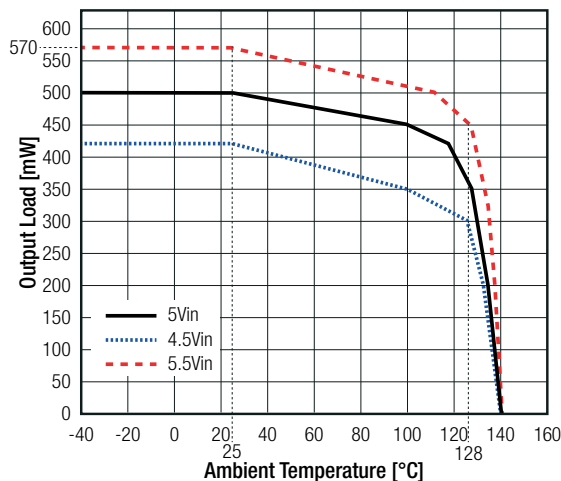
Note6: Tested with 54.0 x 85.6mm 2 layer PCB with 105μm copper

Thermal Derating (6)

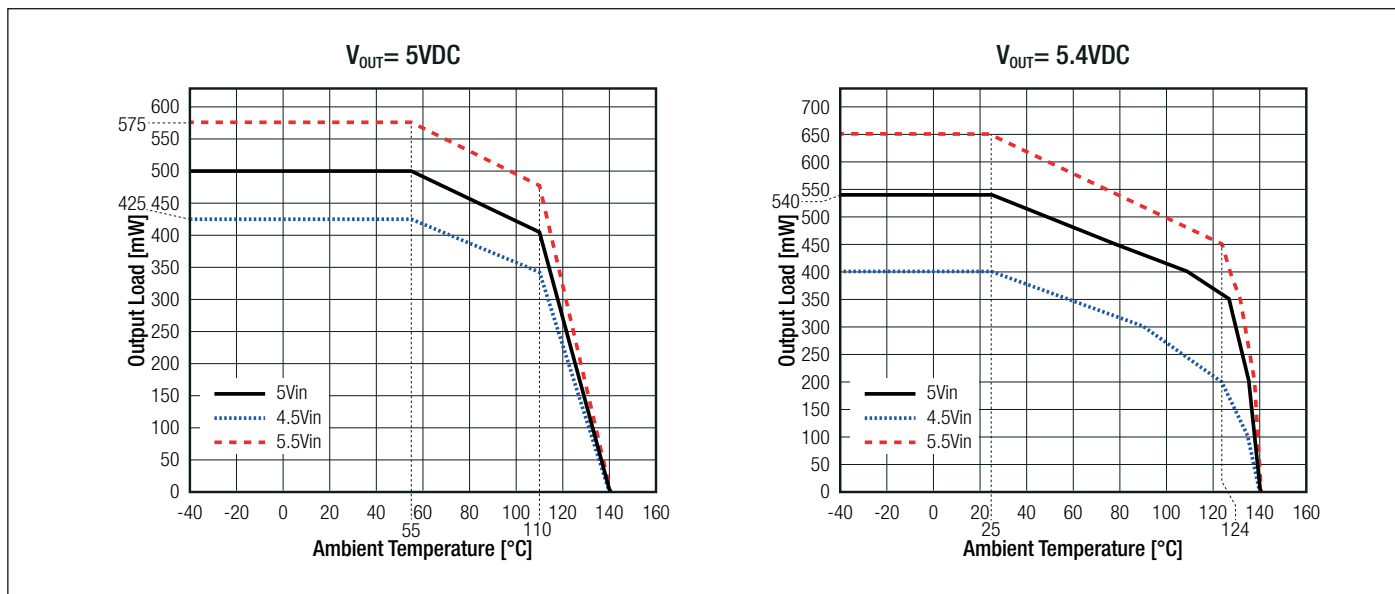
$V_{OUT}= 3.3VDC$



$V_{OUT}= 3.7VDC$



Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Information Technology Equipment - General Requirements for Safety (CB Scheme)	E224736-A6022-CB-1	IEC60950-1:2005 2nd Edition + A2:2013
Information Technology Equipment - General Requirements for Safety		EN60950-1:2006 + A2:2013
Medical electrical equipment Part 1: General requirements for basic safety and essential performance	E314885	ANSI/AAMI ES60601-1:2005 + A2:2010/(R)2012 CAN/CSA-C22.2 No. 60601-1:14, 3rd Edition
Medical electrical equipment Part 1: General requirements for basic safety and essential performance (CB Scheme)	E314885-D1008-1-A0-C0-CB	IEC60601-1:2005, 3rd Edition + AM1:2012
Medical electrical equipment Part 1: General requirements for basic safety and essential performance (LVD)		EN60601-1:2006 + A1:2013
Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB Scheme)	E224736-A6021-CB-1	IEC62368-1:2018 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements		EN IEC 62368-1:2020 + A11:2020
RoHS2		RoHS 2011/65/EU + AM2015/863

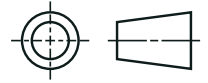
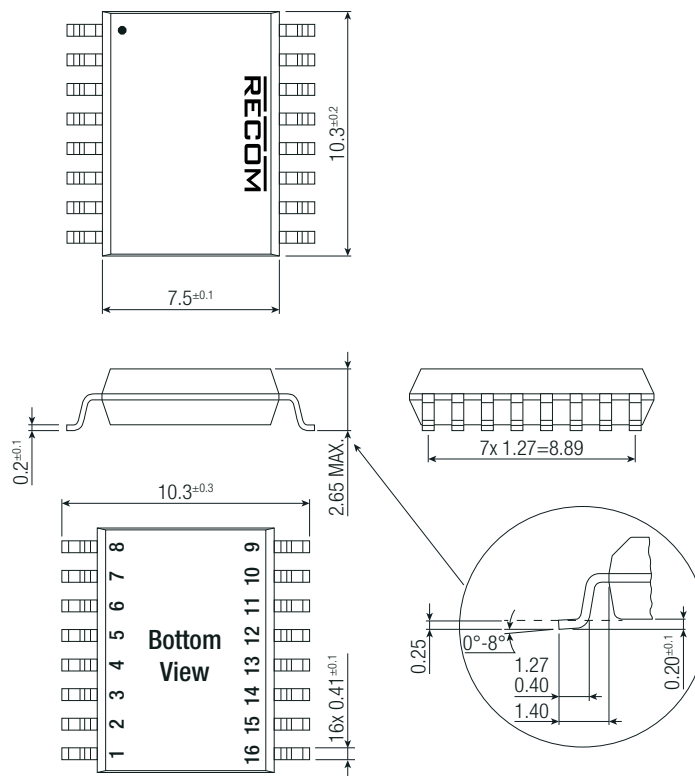
DIMENSION AND PHYSICAL CHARACTERISTICS

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

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

Dimension Drawing (mm)

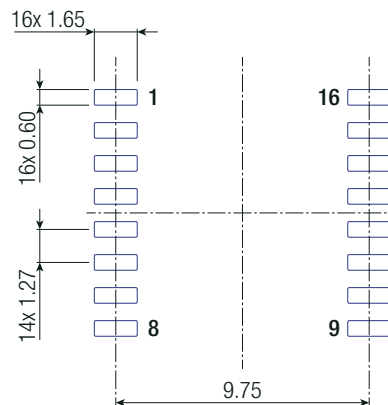


Pad Information

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

Tolerances: x.x = ± 0.1 mm
x.xx = ± 0.05 mm

Recommended Footprint Details
(Top View)



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	reel (diameter + width)	$\varnothing 177.8 \times 16.4$ mm
	tape and reel (carton)	$260.0 \times 240.0 \times 60.0$ mm
	moisture barrier bag ("CT")	$100.0 \times 100.0 \times 30$ mm
Tape Width		24 mm
Packaging Quantity	tape and reel	500 pcs
	moisture barrier bag ("CT")	10 pcs
Storage Temperature Range		-65°C to +150°C

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