

RxxC1TFxxS Series ◊ Isolated Power Module

1W ◊ Isolated ◊ Input 3V-5.5VDC ◊ 12 Pad LGA Package

FEATURES

- Ultra-compact 5x4mm SMD package
- Low profile (1.18mm)
- 3kVAC/1s isolation
- 3.3 or 5V selectable outputs
- 3 - 5.5V wide input range
- Up to 125°C ambient temperature with derating
- Integrated solution
- 3 years warranty



Dimensions (LxWxH): 5.0 x 4.0 x 1.18mm (0.196 x 0.157 x 0.046inch)
0.1g (0.0002lbs)

APPLICATIONS



SAFETY & EMC



DESCRIPTION

The RxxC1TFxxS series is the latest breakthrough in isolated DC/DC converters. With an ultra-compact 5 x 4mm SMD package and a low profile of just 1.18mm, it sets a new standard for size and performance in its class. Offering 3kVAC/1s isolation and selectable 3.3V or 5V outputs, it's perfect for applications like COM port isolation, industrial automation, IoT, and sensor isolation. With a wide input range of 3V to 5.5V and an ambient temperature range up to 125°C with derating, it ensures reliability in diverse environments. Simplifying design with its integrated solution, the RxxC1TFxxS series is your compact, reliable choice for demanding electronic systems.

SELECTION GUIDE

Part Number	Input Voltage Range [VDC]	Output Voltage Range [VDC]	Output Current max. [mA]	Efficiency typ. [%]
R05C1TF05S	3-5.5	3.3	200	44
	4.5-5.5	5	200	50.5

MODEL NUMBERING



Note1: Add suffix "-R" for tape and reel packaging

Add suffix "-CT" for bag packaging (refer to „Packaging information“)

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ABSOLUTE MAXIMUM RATINGS

Parameter	Condition	Min.	Typ.	Max.
Absolute Maximum Voltage	$V_{IN+}/CTRL$ to V_{IN-}	-0.3VDC		6.5VDC
	V_{OUT}/V_{SEL} to V_{OUT-}	-0.3VDC		6.5VDC
Maximum Continuous Power Losses ⁽²⁾	$T_{AMB} = +25^{\circ}C$			2.05W
Junction Temperature	T_J			+150°C
Lead Temperature				+260°C

Note2: Exceeding maximum allowable power dissipation causes device to enter thermal shutdown which protects device from permanent damage.

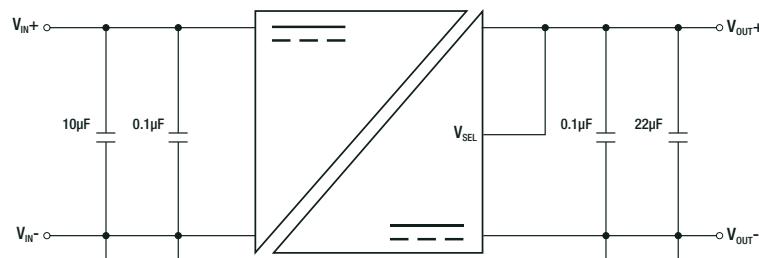
Note3: Stressed beyond those listed under absolute maximum ratings can cause permanent damage to the device.

BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}C$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

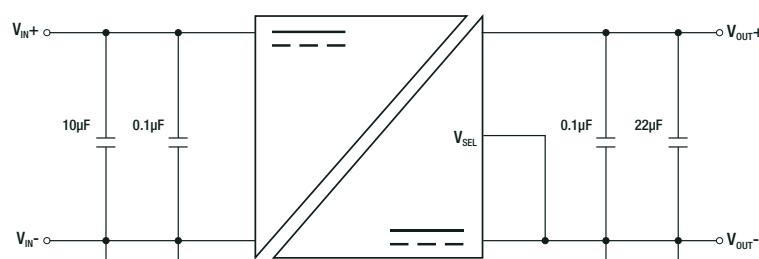
Parameter	Symbol	Condition	Min.	Typ.	Max.
Input Voltage Range	V_{IN}		3VDC		5.5VDC
		$V_{IN} = 5VDC, V_{OUT} = 5VDC, Load = 0mA$		8mA	
		$V_{IN} = 5VDC, V_{OUT} = 5VDC, Load = 200mA$		395mA	
		$V_{IN} = 5VDC, V_{OUT} = 3.3VDC, Load = 0mA$		5mA	
		$V_{IN} = 5VDC, V_{OUT} = 3.3VDC, Load = 200mA$		354mA	
		$V_{IN} = 3.3VDC, V_{OUT} = 3.3VDC, Load = 0A$		5mA	
Input Current		$V_{IN} = 3.3VDC, V_{OUT} = 3.3VDC, Load = 50mA$		115mA	
Under Voltage Lockout UVLO		rising		2.6VDC	2.8VDC
Under Voltage Lockout Hysteresis				220mV	
Output Voltage Accuracy		$V_{OUT} = 5VDC$	4.9VDC	5VDC	5.1VDC
		$V_{OUT} = 3.3VDC$	3.2VDC	3.3VDC	3.4VDC
Soft Start Time		from 0-100%	$V_{IN} = 5VDC, V_{OUT} = 5VDC$		1.1ms
			$V_{IN} = 5VDC, V_{OUT} = 3.3VDC$		0.6ms
			$V_{IN} = 3.3VDC, V_{OUT} = 3.3VDC$		1.5ms
Shutdown Current		$V_{CTRL} = 0VDC$, measured on V_{IN} pin			7µA
Output Ripple Voltage		$V_{IN} = 5VDC, V_{OUT} = 5VDC, Load = 200mA$			60mV
		$V_{IN} = 5VDC, V_{OUT} = 3.3VDC, Load = 200mA$			50mV
		$V_{IN} = 3.3VDC, V_{OUT} = 3.3VDC, Load = 50mA$			30mV
Switching Frequency					26MHz

Typical Application

$V_{IN} = 4.5-5.5VDC, V_{OUT} = 5VDC, I_{OUT} = 200mA$

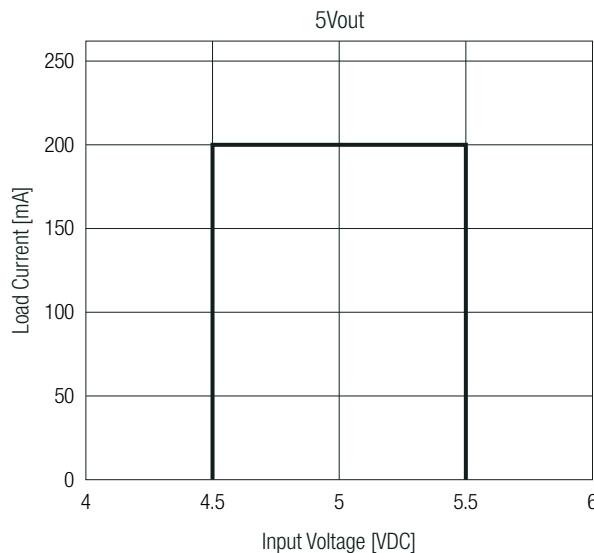
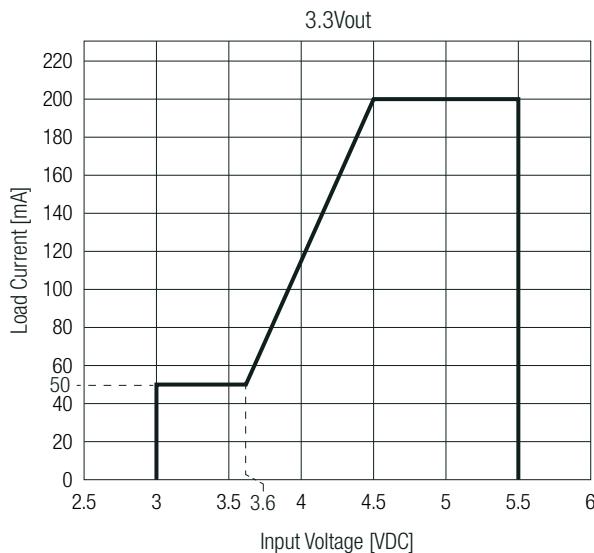


$V_{IN} = 3-3.6VDC, V_{OUT} = 3.3VDC, I_{OUT} = 50mA$



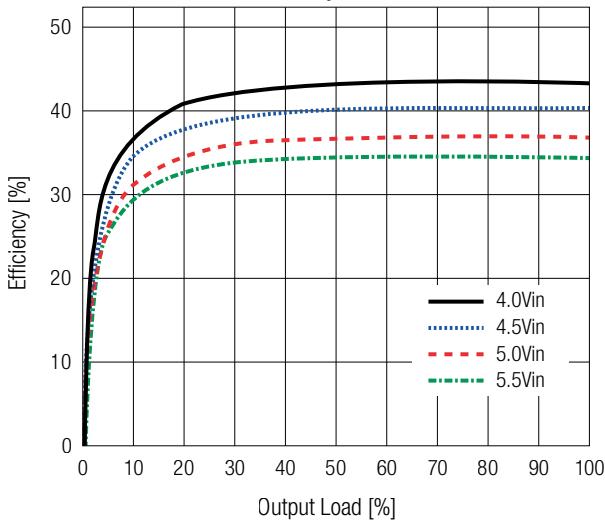
BASIC CHARACTERISTICS

Safe Operating Area

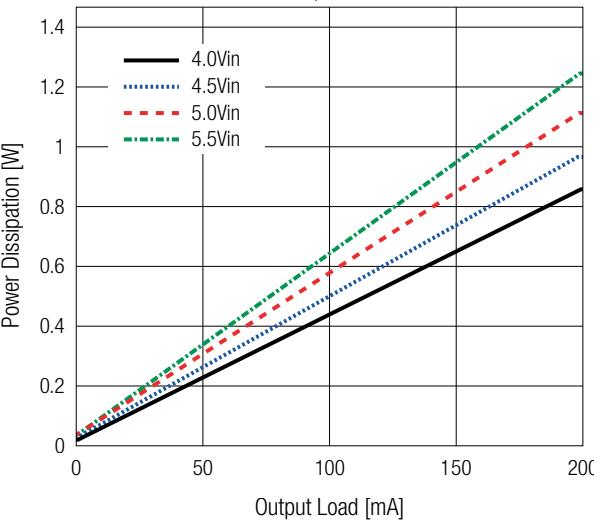


3.3Vout

Efficiency vs. Load

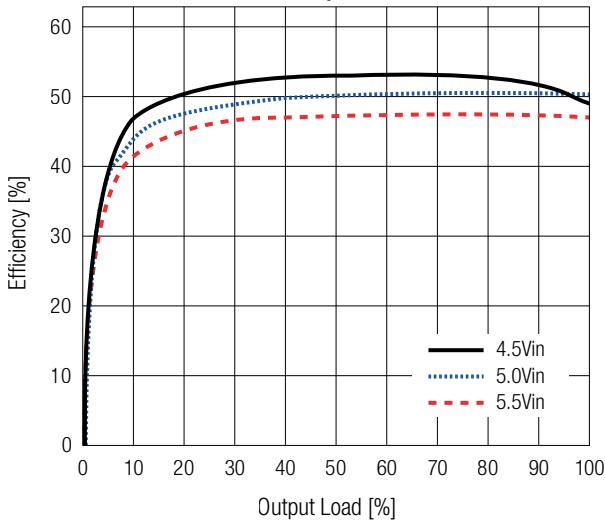


Power Dissipation vs. Load

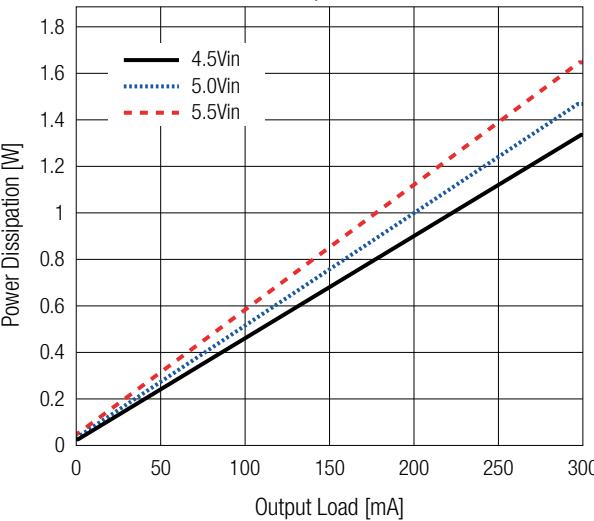


5Vout

Efficiency vs. Load



Power Dissipation vs. Load



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REGULATIONS

Parameter	Condition	Value
Line Regulation	$V_{IN} = 3V-3.6VDC$, full load	$\pm 0.5\%$ typ.
	$V_{IN} = 4.5V-5.5VDC$, full load	$\pm 0.5\%$ typ.
Load Regulation	from 0-100%	$\pm 0.4\%$ typ.

CTRL AND SYNC OPERATING CONDITIONS

Parameter	Condition	Min.	Typ.	Max.
CTRL Input High Threshold ⁽⁵⁾	DC-DC ON			2VDC
CTRL Input Low Threshold ⁽⁵⁾	DC-DC OFF	0.4VDC		
CTRL Input Leakage Current	$V_{IN} = 5VDC$, CTRL connect to V_{IN-}		-5 μ A	
	$V_{IN} = 3.3VDC$, CTRL connect to V_{IN-}		-3.3 μ A	

Note4: CTRL pin shouldn't be floating and can connect to V_{IN+} directly or through resistor divider.

Note5: When applying a voltage higher than 2V and input voltage is higher than V_{IN} UVLO, R05C1TF05S will enable all functions and start switching operation. Switching operation is disabled when the CTRL voltage falls below its lower threshold and shutdown occurs when $CTRL < 0.4V$.

For automatic startup, connect the CTRL pin to V_{IN} directly or through a resistor divider. Operation between these 2 thresholds is not specified.

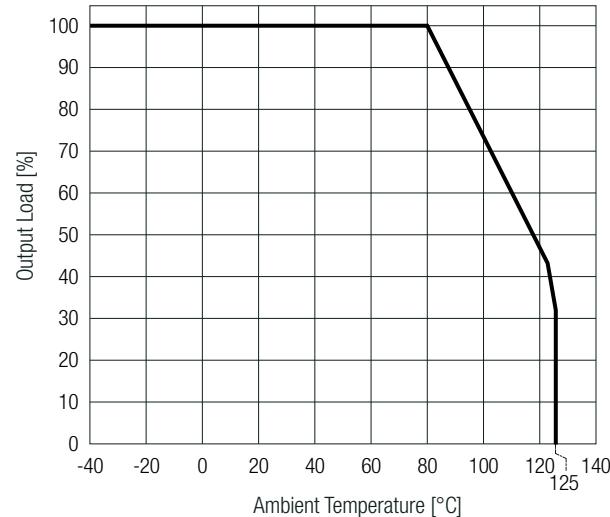
THERMAL OPERATING CONDITIONS (measured @ $T_{AMB} = 25^{\circ}C$, $V_{IN} = 3V-5.5VDC$, full load and after warm-up unless otherwise stated)

Parameter	Symbol	Condition	Min.	Typ.	Max.
Operating Junction Temperature	T_J	refer to „Derating Graph“	-40°C		+125°C
Thermal Resistance ⁽⁴⁾	$R_{th_{JA}}$	junction to ambient		61K/W	
	$R_{th_{JC}}$	junction to case		19K/W	

Note4: Test PCB= 6.4 x 6.4cm double sided PCB with 2oz copper, natural convection

Derating Graph

(@ Chamber and natural convection 0.1m/s)



ENVIRONMENTAL

Parameter	Condition	Value
Moisture Sensitive Level		Level 3
ESD	human-body-model	$\pm 5kV$
	charged-device-model	$\pm 2kV$

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PROTECTIONS

Parameter	Condition	Value
Short Circuit Protection (SCP)		current limited, continuous
Over Load Protection (OLP) ⁽⁵⁾		current limited, continuous
Isolation Voltage	rated for 60 seconds	2.5kVAC
	tested for 1 second	3kVAC
Isolation Resistance	$V_{ISO} = 500VDC$	50GΩ min.
Isolation Capacitance		5pF typ.
Thermal Shutdown	IC junction	150°C typ.
	hysteresis	20°C

Note6: During over load or output short circuit condition, the output voltage drops due to internal current limit. After over current or short circuit condition removed, RxxC1TFxxS will resume.

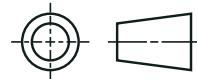
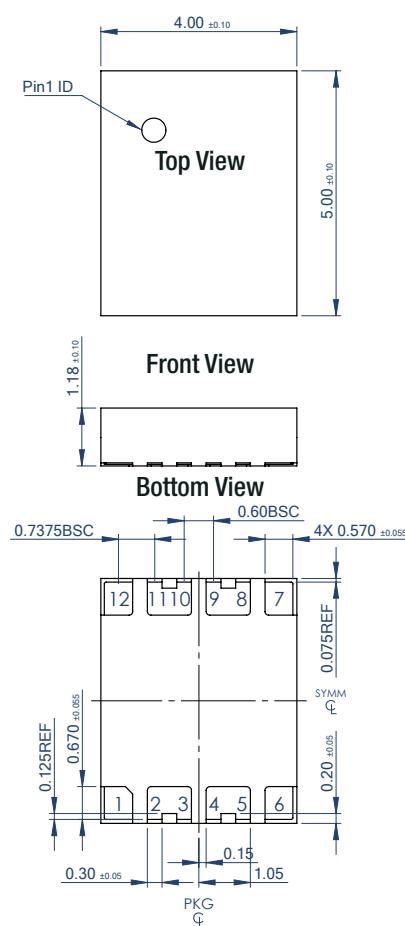
SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
RoHS2		RoHS 2011/65EU + AM2015/863

DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Dimension (LxWxH)		5.0 x 4.0 x 1.18mm 0.197 x 0.157 x 0.046inch
Weight		0.1g typ. 0.0002lbs

Dimension Drawing (mm)



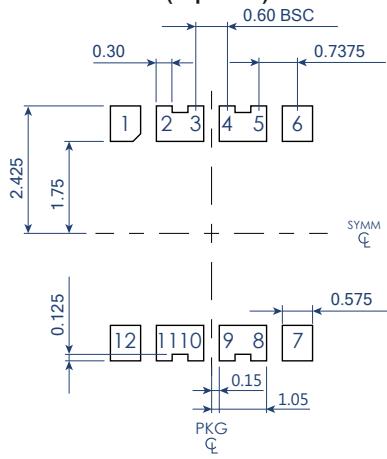
Side View



Pad Information

Pad #	Function
1, 2, 3	VIN-
4, 5	VIN+
6	CTRL
7	V_{SEL}
8, 9	VOUT+
10, 11, 12	VOUT-

Recommended Footprint Details (Top View)



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

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DIMENSION & PHYSICAL CHARACTERISTICS

Pad Information

Pad #	Function	Description
1, 2, 3	VIN-	Side 1 Ground Pin. Use large copper for GND1, and add multiple vias to improve thermal performance.
4, 5	VIN+	Power Supply Input Pin. Connect to a 3V-5.5V power supply, typically connect a 10µF plus 0.1µF between V _{IN} and GND1 to make IC work stable.
6	CTRL	Power Enable Pin. Pull high to enable RxxC1TFxxS, pull low to disable RxxC1TFxxS. Don't let this pin floating.
7	V _{SEL}	Output voltage set pin. Must connect to V _{OUT} or float for 5V output and must connect to GND2 for 3.3V output. Don't bias V _{SEL} with other power and 5V output can't switch to 3.3V output after startup. Refer to „Typical Application“.
8, 9	VOUT+	Power Output Pin. Typically connect a 22µF plus 0.1µF between V _{OUT} and GND2 to decrease V _{OUT} ripple and noise.
10, 11, 12	VOUT-	Side 2 Ground Pin. Don't use large copper for GND2 for EMI concern.

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	Suffix -R: tape & reel (diameter)	Ø330.2
	tape and reel (carton)	370 x 350 x 55mm
	Suffix -CT: moisture barrier bag	100 x 100 x 30mm
Packaging Quantity	Suffix -R: tape & reel	500pcs
	Suffix -CT: moisture barrier bag	10pcs
Tape Width		12mm
Storage Temperature Range		-65°C to +150°C
Storage Humidity	non-condensing	60% RH max.

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