YS05S10 DC-DC Converter Data Sheet
3.0-5.5 VDC Input; 0.7525-3.63 VDC Programmable @ 10 A

The maXyz Products: Y-Series

RoHS Compliant

Applications

- Intermediate Bus Architectures
- Telecommunications
- Data communications
- Distributed Power Architectures
- Servers, workstations

Benefits

- High efficiency – no heat sink required
- Reduces total solution board area
- Tape and reel packing
- Compatible with pick & place equipment
- Minimizes part numbers in inventory
- Cost effective

Features

- RoHS lead-free solder and lead-solder-exempted products are available
- Delivers up to 10 A (36 W)
- No derating up to 85 °C
- Surface-mount package
- Industry-standard footprint and pinout
- Small size and low profile: 1.30” x 0.53” x 0.314” (33.02 x 13.46 x 7.98 mm)
- Weight: 0.22 oz [6.12 g]
- Coplanarity less than 0.003”, maximum
- Synchronous Buck Converter topology
- Start-up into pre-biased output
- No minimum load required
- Programmable output voltage via external resistor
- Operating ambient temperature: -40 °C to 85 °C
- Remote output sense
- Remote ON/OFF (Positive or Negative)
- Fixed-frequency operation
- Auto-reset output overcurrent protection
- Auto-reset overtemperature protection
- High reliability, MTBF approx. 32.54 million hours calculated per Telcordia TR-332, Method I Case 1
- All materials meet UL94, V-0 flammability rating
- UL60950 recognition in U.S. & Canada, and DEMKO certification per IEC/EN60950

Description

The YS05S10 non-isolated DC-DC converter delivers up to 10 A of output current in an industry-standard surface-mount package. Operating from a 3.0 – 5.5 V input, the YS05S10 converter is an ideal choice for Intermediate Bus Architectures where Point-of-Load (POL) power delivery is generally a requirement. It provides an extremely tightly-regulated programmable output voltage from 0.7525 V to 3.63 V.

The YS05S10 converter provides exceptional thermal performance, even in high temperature environments with minimal airflow. No derating is required up to 85 °C, even without airflow at natural convection. This performance is accomplished through the use of advanced circuitry, packaging, and processing techniques to achieve a design possessing ultra-high efficiency, excellent thermal management, and a very low-body profile.

The low-body profile and the preclusion of heat sinks minimize impedance to system airflow, thus enhancing cooling for both upstream and downstream devices. The use of 100% automation for assembly, coupled with advanced power electronics and thermal design, results in a product with extremely high reliability.

Electrical Specifications

Conditions: T_A = 25 ºC, Airflow = 300 LFM (1.5 m/s), Vin = 5 VDC, Vout = 0.7525 – 3.63 V, unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Units
Absolute Maximum Ratings					
Input Voltage	Continuous	-0.3		6	VDC
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-55		125	°C
Feature Characteristics					
Switching Frequency	Full Temperature Range	250	300	350	kHz
Output Voltage Trim Range[1, 4]	By external resistor, See Trim Table 1	0.7525		3.63	VDC
Remote Sense Compensation[1]	Percent of V_{OUT}(NOM)			0.5	VDC
Turn-On Delay Time[2]	Full resistive load				
With Vin = (Converter Enabled, then Vin applied)	From Vin = Vin(min) to Vo = 0.1* Vo(nom)	3	3.5	4.5	ms
With Enable (Vin = Vin(nom) applied, then enabled)	From enable to Vo = 0.1*Vo(nom)	3	3.5	4.5	ms
Rise time[2]	From 0.1*Vo(nom) to 0.9*Vo(nom)	3	3.5	5	ms
ON/OFF Control (Positive Logic)[3]					
Converter Off		-5		0.8	VDC
Converter On		2.4		5.5	VDC
ON/OFF Control (Negative Logic)[3]					
Converter Off		2.4		5.5	VDC
Converter On		-5		0.8	VDC

Additional Notes:

1 The output voltage should not exceed 3.63 V (taking into account both the programming and remote sense compensation).
2 Note that startup time is the sum of turn-on delay time and rise time.
3 The converter is on if ON/OFF pin is left open.
4 Trim resistor connected across the GND (pin 5) and TRIM (pin 3) pins of the converter.
5 See waveforms for dynamic response and settling time for different output voltages.

Electrical Specifications (continued)

Conditions: T_A = 25 ºC, Airflow = 300 LFM (1.5 m/s), Vin = 5 VDC, Vout = 0.7525 – 3.63 V, unless otherwise specified.

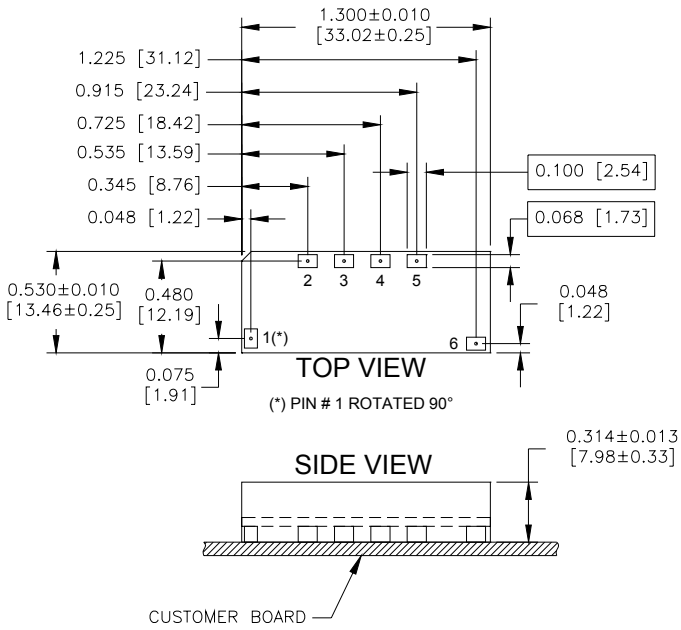
Parameter	Notes	Min	Typ	Max	Units
Input Characteristics					
Operating Input Voltage Range		3.0	5.0	5.5	VDC
Input Undervoltage Lockout					
Turn-on Threshold	Guaranteed by controller	1.95	2.05	2.15	VDC
Turn-off Threshold	Guaranteed by controller	1.73	1.9	2.07	VDC
Maximum Input Current					
V_{IN} = 4.5 VDC, I_{OUT} = 10 A	V_{OUT} = 3.3 VDC			7.9	ADC
V_{IN} = 3.0 VDC, I_{OUT} = 10 A	V_{OUT} = 2.5 VDC			9.1	ADC
V_{IN} = 3.0 VDC, I_{OUT} = 10 A	V_{OUT} = 2.0 VDC			7.3	ADC
V_{IN} = 3.0 VDC, I_{OUT} = 10 A	V_{OUT} = 1.8 VDC			6.7	ADC
V_{IN} = 3.0 VDC, I_{OUT} = 10 A	V_{OUT} = 1.5 VDC			5.7	ADC
V_{IN} = 3.0 VDC, I_{OUT} = 10 A	V_{OUT} = 1.2 VDC			4.7	ADC
V_{IN} = 3.0 VDC, I_{OUT} = 10 A	V_{OUT} = 1.0 VDC			4.0	ADC
V_{IN} = 3.0 VDC, I_{OUT} = 10 A	V_{OUT} = 0.7525 VDC			3.2	ADC
Input Stand-by Current (Converter disabled)	Vin = 5.0 VDC		3.0		mA
Input No Load Current (Converter enabled)	Vin = 5.5 VDC				
	V_{OUT} = 3.3 VDC		80		mA
	V_{OUT} = 2.5 VDC		80		mA
	V_{OUT} = 2.0 VDC		72		mA
	V_{OUT} = 1.8 VDC		68		mA
	V_{OUT} = 1.5 VDC		60		mA
	V_{OUT} = 1.2 VDC		55		mA
	V_{OUT} = 1.0 VDC		50		mA
	V_{OUT} = 0.7525 VDC		42		mA
Input Reflected-Ripple Current - i_S	See Fig. E for setup (BW = 20 MHz)		10		mA_{P-P}

Electrical Specifications (continued)

Conditions: T_A = 25 ºC, Airflow = 300 LFM (1.5 m/s), Vin = 5 VDC, Vout = 0.7525 – 3.63 V, unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Units
Output Characteristics					
Output Voltage Set Point (no load)		-1.5	Vout	+1.5	%Vout
Output Regulation[4]					
Over Line	Full resistive load		0.1	0.5	%Vout
Over Load	From no load to full load		0.1	0.5	%Vout
Output Voltage Range (Over all operating input voltage, resistive load and temperature conditions until end of life)		-3		+3	%Vout
Output Ripple and Noise – 20 MHz bandwidth	Over line, load and temperature (Fig. E)				
Peak-to-Peak	V_{OUT} = 3.3 VDC		40	60	mV_{P-P}
Peak-to-Peak	V_{OUT} = 0.7525 VDC		25	35	mV_{P-P}
External Load Capacitance	Plus full load (resistive)				
Min ESR > 1 mΩ				1,000	µF
Min ESR > 10 mΩ				5,000	µF
Output Current Range		0		10	A
Output Current Limit Inception (I_{OUT})			18		A
Output Short-Circuit Current (Hiccup mode)	Short = 10 mΩ, continuous		2		Arms
Dynamic Response					
50% Load current change from 5 A -10 A - 5 A with di/dt = 5 A/µs[5]	Co = 100 µF tant. + 1 µF ceramic		150		mV
Settling Time (V_{OUT} < 10% peak deviation)[5]			60		µs
Efficiency	Full load (10 A)				
	V_{OUT} = 3.3 VDC		94.5		%
	V_{OUT} = 2.5 VDC		93.0		%
	V_{OUT} = 2.0 VDC		92.0		%
	V_{OUT} = 1.8 VDC		91.5		%
	V_{OUT} = 1.5 VDC		89.5		%
	V_{OUT} = 1.2 VDC		87.5		%
	V_{OUT} = 1.0 VDC		86.0		%
	V_{OUT} = 0.7525 VDC		83.0		%

Physical Information



YS05S Pinout (Surface-Mount)

Pad/Pin Connections	
Pad/Pin #	**Function**
1	ON/OFF
2	SENSE
3	TRIM
4	Vout
5	GND
6	Vin

YS05S Platform Notes

- All dimensions are in inches [mm]
- Connector Material: Copper
- Connector Finish: Gold over Nickel
- Converter Weight: 0.22 oz [6.12 g]
- Converter Height: 0.327" Max., 0.301" Min.
- Recommended Surface-Mount Pads: Min. 0.080" X 0.112" [2.03 x 2.84]

Converter Part Numbering Scheme

Product Series	Input Voltage	Mounting Scheme	Rated Load Current		Enable Logic	Environmental
YS	**05**	**S**	**10**	**–**	**0**	
Y-Series	3.0 – 5.5 V	S ⇒ Surface-Mount	10 A (0.7525 V to 3.63 V)		0 ⇒ Standard (Positive Logic) D ⇒ Opposite of Standard (Negative Logic)	No Suffix ⇒ RoHS lead-solder-exempt compliant G ⇒ RoHS compliant for all six substances
The example above describes P/N YS05S10-0: 3.0 – 5.5 V input, surface mount, 10 A at 0.7525 V to 3.63 V output, standard enable logic, and Eutectic Tin/Lead solder. Please consult factory for the complete list of available options.						