



### 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
- Low cost

### Description

The YS12S16 non-isolated DC-DC converters deliver up to 16 A of output current in an industry-standard surface-mount package. Operating from a 9.6-14 VDC input, the YS12S16 converters are ideal choices for Intermediate Bus Architectures where point-of-load power delivery is generally a requirement. They provide an extremely tight regulated programmable output voltage of 0.7525 V to 5.5 V.

The YS12S16 converters provide exceptional thermal performance, even in high temperature environments with minimal airflow. This 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.

### The **maxVZ** Products: Y-Series

#### Features

- RoHS lead-free solder and lead-solder-exempted products are available
- Delivers up to 16 A (88 W)
- Extended input range 9.6 V – 14 V
- High efficiency (0.948 at 5 V output)
- 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: 0.23 oz [6.50 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. 27.2 Million Hours calculated per Telcordia TR-332, Method I Case 1
- All materials meet UL94, V-0 flammability rating
- UL 60950 recognition in U.S. & Canada, and DEMKO certification per IEC/EN 60950

### Electrical Specifications

Conditions:  $T_A=25^\circ\text{C}$ , Airflow=300 LFM (1.5 m/s),  $V_{in}=12\text{VDC}$ ,  $V_{out} = 0.7525 - 5.5\text{V}$ , unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Units
<b>Absolute Maximum Ratings</b>					
Input Voltage	Continuous	-0.3		15	VDC
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-55		125	°C
<b>Feature Characteristics</b>					
Switching Frequency			300		kHz
Output Voltage Trim Range <sup>1</sup>	By external resistor, See Trim Table 1	0.7525		5.5	VDC
Remote Sense Compensation <sup>1</sup>	Percent of $V_{OUT(NOM)}$			0.5	VDC
Turn-On Delay Time <sup>2</sup>	Full resistive load				
With $V_{in} =$ (Converter Enabled, then $V_{in}$ applied)	From $V_{in} = V_{in(min)}$ to $V_o=0.1 * V_o(nom)$		3		ms
With Enable ( $V_{in} = V_{in(nom)}$ applied, then enabled)	From enable to $V_o = 0.1 * V_o(nom)$		3		ms
Rise time <sup>2</sup> (Full resistive load)	From $0.1 * V_o(nom)$ to $0.9 * V_o(nom)$		4		ms
ON/OFF Control (Positive Logic) <sup>3</sup>					
Converter Off		-5		0.8	VDC
Converter On		2.4		$V_{in}$	VDC
ON/OFF Control (Negative Logic) <sup>3</sup>					
Converter Off		2.4		$V_{in}$	VDC
Converter On		-5		0.8	VDC

Additional Notes:

1. The output voltage should not exceed 5.5V (taking into account both the programming and remote sense compensation).
2. Note that start-up time is the sum of turn-on delay time and rise time.
3. The converter is on if ON/OFF pin is left open.

**Electrical Specifications (continued)**

Conditions:  $T_A=25^{\circ}\text{C}$ , Airflow=300 LFM (1.5 m/s),  $V_{in}=12\text{VDC}$ ,  $V_{out} = 0.7525 - 5.5\text{V}$ , unless otherwise specified.

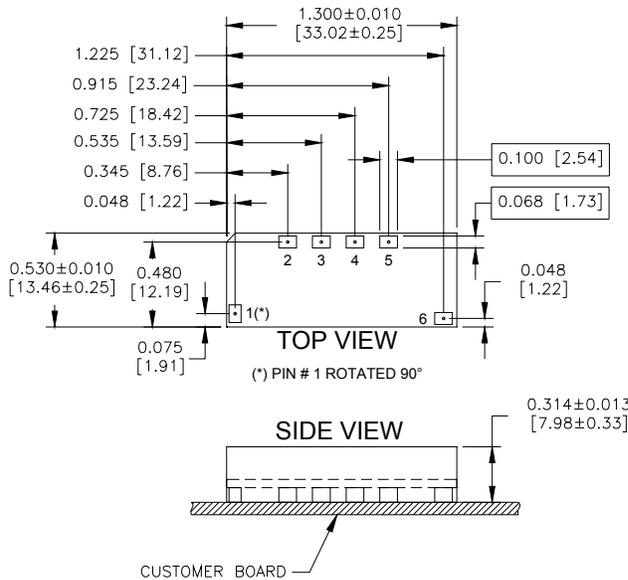
Parameter	Notes	Min	Typ	Max	Units
<b>Input Characteristics</b>					
Operating Input Voltage Range		9.6	12	14	VDC
Input Under Voltage Lockout					
Turn-on Threshold			9		VDC
Turn-off Threshold			8.5		VDC
Maximum Input Current	16 ADC Out @ 9.6 VDC In				
	$V_{OUT} = 5.0\text{ VDC}$			8.9	ADC
	$V_{OUT} = 3.3\text{ VDC}$			6	ADC
	$V_{OUT} = 2.5\text{ VDC}$			4.6	ADC
	$V_{OUT} = 2.0\text{ VDC}$			3.8	ADC
	$V_{OUT} = 1.8\text{ VDC}$			3.4	ADC
	$V_{OUT} = 1.5\text{ VDC}$			2.9	ADC
	$V_{OUT} = 1.2\text{ VDC}$			2.4	ADC
	$V_{OUT} = 1.0\text{ VDC}$			2.1	ADC
	$V_{OUT} = 0.7525\text{ VDC}$			1.7	ADC
Input Stand-by Current (Converter disabled)			3		mA
Input No Load Current (Converter enabled)	$V_{OUT} = 5.0\text{ VDC}$		83		mA
	$V_{OUT} = 3.3\text{ VDC}$		63		mA
	$V_{OUT} = 2.5\text{ VDC}$		53		mA
	$V_{OUT} = 2.0\text{ VDC}$		47		mA
	$V_{OUT} = 1.8\text{ VDC}$		45		mA
	$V_{OUT} = 1.5\text{ VDC}$		43		mA
	$V_{OUT} = 1.2\text{ VDC}$		41		mA
	$V_{OUT} = 1.0\text{ VDC}$		39		mA
	$V_{OUT} = 0.7525\text{ VDC}$		35		mA
Input Reflected-Ripple Current - $i_s$	See Fig. E for setup. (BW = 20 MHz)				
	$V_{OUT} = 5.0\text{ VDC}$		60		mA <sub>P-P</sub>
	$V_{OUT} = 3.3\text{ VDC}$		43		mA <sub>P-P</sub>
	$V_{OUT} = 2.5\text{ VDC}$		35		mA <sub>P-P</sub>
	$V_{OUT} = 2.0\text{ VDC}$		35		mA <sub>P-P</sub>
	$V_{OUT} = 1.8\text{ VDC}$		35		mA <sub>P-P</sub>
	$V_{OUT} = 1.5\text{ VDC}$		33		mA <sub>P-P</sub>
	$V_{OUT} = 1.2\text{ VDC}$		23		mA <sub>P-P</sub>
	$V_{OUT} = 1.0\text{ VDC}$		21		mA <sub>P-P</sub>
	$V_{OUT} = 0.7525\text{ VDC}$		19		mA <sub>P-P</sub>
Input Voltage Ripple Rejection	120 Hz		72		dB

**Electrical Specifications (continued)**

Conditions:  $T_A=25^{\circ}\text{C}$ , Airflow=300 LFM (1.5 m/s),  $V_{in}=12\text{VDC}$ ,  $V_{out} = 0.7525 - 5.5\text{V}$ , unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Units
<b>Output Characteristics</b>					
Output Voltage Set Point (no load)		-1.5	$V_{out}$	+1.5	% $V_{out}$
Output Regulation					
Over Line	Full resistive load		0.5		mV
Over Load	From no load to full load		5		mV
Output Voltage Range (Over all operating input voltage, resistive load and temperature conditions until end of life )		-2.5		+2.5	% $V_{out}$
Output Ripple and Noise - 20MHz bandwidth	Over line, load and temperature (Fig. E)				
Peak-to-Peak	$V_{OUT} = 0.7525\text{ VDC}$		12	19	mV <sub>P-P</sub>
Peak-to-Peak	$V_{OUT} = 5.0\text{ VDC}$		40	65	mV <sub>P-P</sub>
External Load Capacitance	Plus full load (resistive)				
Min ESR > 1mΩ				1,000	μF
Min ESR > 10 mΩ				5,000	μF
Output Current Range		0		16	A
Output Current Limit Inception ( $I_{OUT}$ )			25		A
Output Short- Circuit Current , RMS Value	Short=10 mΩ, continuous		4		A
<b>Dynamic Response</b>					
Load current change from 8A – 16A, $di/dt = 5\text{ A}/\mu\text{S}$	$C_o = 100\mu\text{F ceramic} + 470\mu\text{F POS}$		140		mV
Settling Time ( $V_{OUT} < 10\%$ peak deviation)			45		μs
Unloading current change from 16A – 8A, $di/dt = -5\text{ A}/\mu\text{S}$	$C_o = 100\mu\text{F ceramic} + 470\mu\text{F POS}$		140		mV
Settling Time ( $V_{OUT} < 10\%$ peak deviation)			45		μs
<b>Efficiency</b>					
	Full load (16A)				
	$V_{OUT} = 5.0\text{ VDC}$		94.8		%
	$V_{OUT} = 3.3\text{ VDC}$		92.5		%
	$V_{OUT} = 2.5\text{ VDC}$		90.5		%
	$V_{OUT} = 2.0\text{ VDC}$		89.0		%
	$V_{OUT} = 1.8\text{ VDC}$		88.0		%
	$V_{OUT} = 1.5\text{ VDC}$		86.0		%
	$V_{OUT} = 1.2\text{ VDC}$		84.0		%
	$V_{OUT} = 1.0\text{ VDC}$		80.5		%
	$V_{OUT} = 0.7525\text{ VDC}$		77.0		%

**Physical Information**



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

**YS12S Platform Notes**

- All dimensions are in inches [mm]
- Connector Material: Copper
- Connector Finish: Gold over Nickel
- Converter Weight: 0.23 oz [6.50 g]
- Converter Height: 0.327" Max., 0.301" Min.
- Recommended Surface-Mount Pads:  
Min. 0.080" X 0.112" [2.03 x 2.84]

**YS12S Pinout (Surface Mount)**

**Converter Part Numbering Scheme**

Product Series	Input Voltage	Mounting Scheme	Rated Load Current		Enable Logic	RoHS Compatible
YS	12	S	16	-	0	G
Y-Series	9.6V – 14V	S ⇒ Surface Mount	16A (0.7525V to 5.5V)		0 ⇒ Standard (Positive Logic)  D ⇒ Opposite of Standard (Negative Logic)	Not Populated ⇒ RoHS lead solder exemption compliant  G ⇒ RoHS compliant for all six substances
The example above describes P/N YS12S16-0G: 9.6V – 14V input, surface mount, 16A at 0.7525V to 5.5V output, standard enable logic, and RoHS compliant for all six substances. Please consult factory regarding availability of a specific version.						

NUCLEAR AND MEDICAL APPLICATIONS - Power-One products are not designed, intended for use in, or authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of the respective divisional president of Power-One, Inc.

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