



### Applications

- Intermediate Bus Architectures
- Distributed Power Architectures
- Data communications
- Telecommunications
- 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 YM12S05 non-isolated dc-dc converters deliver up to 5A of output current in an industry-standard surface-mount package. Operating from a 9.6-14 VDC input, the YM12S05 converters are ideal choices for Intermediate Bus Architectures where Point-of-Load power (POL) delivery is generally a requirement. They provide an extremely tight regulated programmable output voltage of 0.7525 V to 5.5 V.

The Y-Series of converters provide exceptional thermal performance, even in high temperature environments with minimal airflow. No derating is required up to 85 °C (up to 70 °C for 5 V and 3.3 V outputs), even without airflow at natural convection. 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 and lead-solder-exempted products are available
- Delivers up to 5 A (28 W)
- Extended input range 9.6 V – 14 V
- No derating up to 85 °C (70 °C for 5V and 3.3V)
- Surface-mount package
- Industry-standard footprint and pinout
- Small size and low profile: 0.80" x 0.45" x 0.247" (20.32 x 11.43 x 6.27mm)
- Weight: 0.079 oz [2.26 g]
- Co-planarity < 0.003"
- 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 ON/OFF
- Fixed frequency operation
- Auto-reset output overcurrent protection
- Auto-reset overtemperature protection
- High reliability, MTBF approx. 71.8 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			310		kHz
Output Voltage Trim Range <sup>1</sup>	By external resistor, See Trim Table 1	0.7525		5.5	Vdc
Turn-On Delay Time	Full resistive load				
With $V_{in}$ = (Converter Enabled, then $V_{in}$ applied)	From $V_{in} = V_{in}(\text{min})$ to $V_o=0.1 * V_o(\text{nom})$		7.5		ms
With Enable ( $V_{in} = V_{in}(\text{nom})$ applied, then enabled)	From enable to $V_o= 0.1*V_o(\text{nom})$		7.5		ms
Rise time (Full resistive load)	From $0.1*V_o(\text{nom})$ to $0.9*V_o(\text{nom})$		7		ms
<b>ON/OFF Control<sup>2</sup></b>					
Converter Off		2.4		$V_{in}$	Vdc
Converter On		-5		0.8	Vdc

Additional Notes:

1. The output voltage should not exceed 5.5V.
2. The converter is on if the 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			9.0		Vdc
Turn-off Threshold			8.8		Vdc
Maximum Input Current	5 Adc Out @ 9.6 Vdc In				
	$V_{OUT} = 5.0\text{ Vdc}$			2.9	Adc
	$V_{OUT} = 3.3\text{ Vdc}$			2.0	Adc
	$V_{OUT} = 2.5\text{ Vdc}$			1.6	Adc
	$V_{OUT} = 2.0\text{ Vdc}$			1.4	Adc
	$V_{OUT} = 1.8\text{ Vdc}$			1.25	Adc
	$V_{OUT} = 1.5\text{ Vdc}$			1.0	Adc
	$V_{OUT} = 1.2\text{ Vdc}$			0.8	Adc
	$V_{OUT} = 1.0\text{ Vdc}$			0.7	Adc
Input Stand-by Current (Converter disabled)			1		mA
Input No Load Current (Converter enabled)	$V_{OUT} = 5.0\text{ Vdc}$		65		mA
	$V_{OUT} = 3.3\text{ Vdc}$		47		mA
	$V_{OUT} = 2.5\text{ Vdc}$		35		mA
	$V_{OUT} = 2.0\text{ Vdc}$		28		mA
	$V_{OUT} = 1.8\text{ Vdc}$		25		mA
	$V_{OUT} = 1.5\text{ Vdc}$		20		mA
	$V_{OUT} = 1.2\text{ Vdc}$		17		mA
	$V_{OUT} = 1.0\text{ Vdc}$		15		mA
Input Reflected-Ripple Current - $i_s$	See Fig. D for setup. (BW=20MHz)				
	$V_{OUT} = 5.0\text{ Vdc}$		55		mA <sub>P-P</sub>
	$V_{OUT} = 3.3\text{ Vdc}$		48		mA <sub>P-P</sub>
	$V_{OUT} = 2.5\text{ Vdc}$		43		mA <sub>P-P</sub>
	$V_{OUT} = 2.0\text{ Vdc}$		38		mA <sub>P-P</sub>
	$V_{OUT} = 1.8\text{ Vdc}$		35		mA <sub>P-P</sub>
	$V_{OUT} = 1.5\text{ Vdc}$		32		mA <sub>P-P</sub>
	$V_{OUT} = 1.2\text{ Vdc}$		28		mA <sub>P-P</sub>
	$V_{OUT} = 1.0\text{ Vdc}$		25		mA <sub>P-P</sub>
Input Voltage Ripple Rejection	120Hz		72		dB

**Electrical Specifications (continued)**

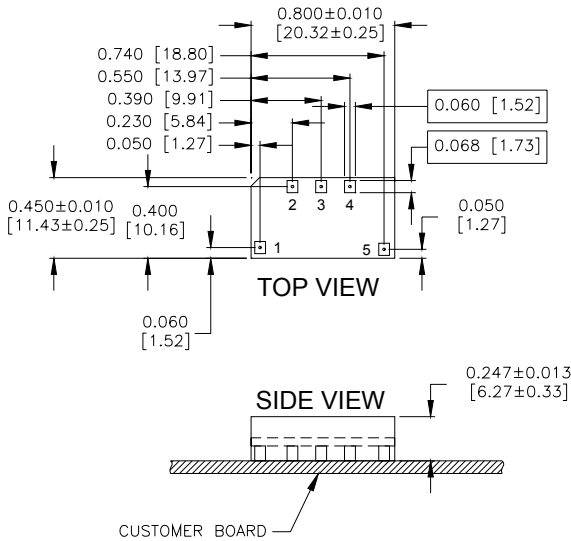
Conditions:  $T_A=25^{\circ}\text{C}$ , Airflow=300 LFM (1.5 m/s),  $V_{in}=12\text{Vdc}$ ,  $V_{out} = 0.7525 - 5.5\text{V}$ , unless otherwise specified.

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 <sup>1</sup>					
Over Line	Full resistive load		1		mV
Over Load	From no load to full load		0.25		% $V_{out}$
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. D)				
Peak-to-Peak	$V_{OUT} = 5.0\text{Vdc}$		55	70	mV <sub>P-P</sub>
Peak-to-Peak	$V_{OUT} = 0.7525\text{Vdc}$		40	50	mV <sub>P-P</sub>
External Load Capacitance	Plus full load (resistive)				
Min ESR > 1mΩ				1,000	μF
Min ESR > 10 mΩ				2,000	μF
Output Current Range		0		5	A
Output Current Limit Inception ( $I_{OUT}$ )			10		A
Output Short- Circuit Current	Short=10 mΩ, continuous		2		Arms
<b>Dynamic Response</b>					
$I_{out}$ step from 2.5A to 5A with $di/dt = 5\text{A}/\mu\text{S}$	$C_o = 47\text{ }\mu\text{F ceramic.} + 1\text{ }\mu\text{F ceramic}$		100		mV
Settling Time ( $V_{OUT} < 10\%$ peak deviation)			20		μs
$I_{out}$ step from 5A to 2.5A with $di/dt = -5\text{A}/\mu\text{S}$	$C_o = 47\text{ }\mu\text{F ceramic} + 1\text{ }\mu\text{F ceramic}$		100		mV
Settling Time ( $V_{OUT} < 10\%$ peak deviation)			20		μs
<b>Efficiency</b>					
	Full load (5A)				
	$V_{OUT} = 5.0\text{Vdc}$		92.0		%
	$V_{OUT} = 3.3\text{Vdc}$		88.5		%
	$V_{OUT} = 2.5\text{Vdc}$		86.5		%
	$V_{OUT} = 2.0\text{Vdc}$		84.5		%
	$V_{OUT} = 1.8\text{Vdc}$		83.5		%
	$V_{OUT} = 1.5\text{Vdc}$		81.5		%
	$V_{OUT} = 1.2\text{Vdc}$		79.0		%
	$V_{OUT} = 1.0\text{Vdc}$		76.0		%

Additional Notes:

1. Trim resistor connected across the GND and TRIM pins of the converter.

**Physical Information**



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

**YM12S Platform Notes**

- All dimensions are in inches [mm]
- Connector Material: Copper
- Connector Finish: Gold over Nickel
- Module Weight: 0.079 oz [2.26 g]
- Module Height: 0.260" Max., 0.234" Min.
- Recommended Surface-Mount Pads: Min. 0.080" X 0.112" [2.03 x 2.84]

**YM12S Pinout (Surface Mount)**

**Converter Part Numbering Scheme**

Product Series	Input Voltage	Mounting Scheme	Rated Load Current	RoHS Compatible
YM	12	S	05	G
Y-Series	9.6V – 14V	S ⇒ Surface Mount	5A (0.7525V to 5.5V)	No Suffix ⇒ RoHS lead-solder-exempt compliant G ⇒ RoHS Compliant

The example above describes P/N YM12S05G: 9.6V – 14V input, surface mount, 5A at 0.7525V to 5.5V output, and RoHS compliant. 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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