

The **maxVZ** Products: Y-Series



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

Description

The YM05S05 non-isolated dc-dc converters deliver up to 5 A of output current in an industry-standard surface-mount package. Operating from a 3.0 – 5.5 V input, these converters are ideal choices for Intermediate Bus Architectures where Point-of-Load (POL) power delivery is generally a requirement. They provide an extremely tight regulated programmable output voltage from 0.7525 V to 3.63 V.

The Y-Series of converters 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.

Features

- RoHS lead free and lead-solder-exempted products are available
- Delivers up to 5 A
- No derating up to 85 °C
- Surface-Mount package
- Industry-standard footprint and pinout
- Small size and low profile:
 - 0.80" x 0.45" x 0.247"
 - 20.32 mm x 11.43 mm x 6.27 mm
- Weight: 0.08 oz [2.22 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 ON/OFF
- Fixed frequency operation
- Auto-reset output over-current protection
- Auto-reset over-temperature protection
- High reliability, MTBF approx. 69 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

Electrical Specifications

Conditions: $T_A = 25\text{ }^\circ\text{C}$, Airflow = 300 LFM (1.5 m/s), $V_{in} = 5\text{ VDC}$, $V_{out} = 0.7525 - 3.63\text{ V}$, unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Units
Absolute Maximum Ratings					
Input Voltage	Continuous	-0.3		6	VDC
Operating Ambient Temperature		-40		85	$^\circ\text{C}$
Storage Temperature		-55		125	$^\circ\text{C}$
Feature Characteristics					
Switching Frequency			300		kHz
Output Voltage Trim Range ¹	By external resistor, See Trim Table 1	0.7525		3.63	VDC
Turn-On Delay Time ²	Full resistive load				
With $V_{in} =$ (Converter Enabled, then V_{in} applied)	From $V_{in} = V_{in}(\text{min})$ to $V_o = 0.1 * V_o(\text{nom})$		3.5		ms
With Enable ($V_{in} = V_{in}(\text{nom})$ applied, then enabled)	From enable to $V_o = 0.1 * V_o(\text{nom})$		3.5		ms
Rise time ² (Full resistive load)	From $0.1 * V_o(\text{nom})$ to $0.9 * V_o(\text{nom})$		3.5		ms
ON/OFF Control 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.
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.

Electrical Specifications (continued)

Conditions: $T_A = 25\text{ }^\circ\text{C}$, Airflow = 300 LFM (1.5 m/s), $V_{in} = 5\text{ VDC}$, $V_{out} = 0.7525 - 3.63\text{ VDC}$, unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Units
Input Characteristics					
Operating Input Voltage Range	For $V_{out} > 2.5\text{ V}$	4.5	5.0	5.5	VDC
	For $V_{out} \leq 2.5\text{ V}$	3.0	5.0	5.5	VDC
Input Undervoltage Lockout					
Turn-on Threshold			2.3	2.5	VDC
Turn-off Threshold		2	2.2		VDC
Maximum Input Current					
$V_{IN} = 4.5\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 3.3\text{ VDC}$			4.2	ADC
$V_{IN} = 3.0\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 2.5\text{ VDC}$			4.5	ADC
$V_{IN} = 3.0\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 2.0\text{ VDC}$			3.7	ADC
$V_{IN} = 3.0\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 1.8\text{ VDC}$			3.4	ADC
$V_{IN} = 3.0\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 1.5\text{ VDC}$			2.9	ADC
$V_{IN} = 3.0\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 1.2\text{ VDC}$			2.35	ADC
$V_{IN} = 3.0\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 1.0\text{ VDC}$			2.0	ADC
$V_{IN} = 3.0\text{ VDC}$, $I_{OUT} = 5\text{ A}$	$V_{OUT} = 0.7525\text{ VDC}$			1.6	ADC
Input Standby Current (Converter disabled)	$V_{in} = 5.0\text{ VDC}$		2		mA
Input No Load Current (Converter enabled)					
	$V_{OUT} = 3.3\text{ VDC}$		70		mA
	$V_{OUT} = 2.5\text{ VDC}$		65		mA
	$V_{OUT} = 2.0\text{ VDC}$		60		mA
	$V_{OUT} = 1.8\text{ VDC}$		55		mA
	$V_{OUT} = 1.5\text{ VDC}$		50		mA
	$V_{OUT} = 1.2\text{ VDC}$		40		mA
	$V_{OUT} = 1.0\text{ VDC}$		35		mA
	$V_{OUT} = 0.7525\text{ VDC}$		30		mA
Input Reflected-Ripple Current - I_s	See Fig. D for setup. (BW = 20 MHz)		TBD		mA _{P-P}

Electrical Specifications (continued)

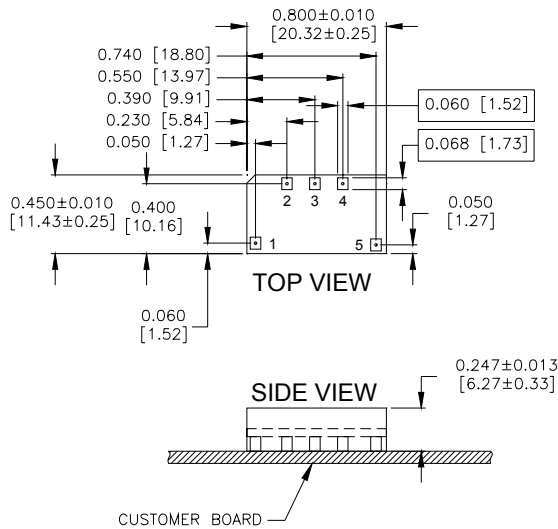
Conditions: $T_A = 25\text{ }^\circ\text{C}$, Airflow = 300 LFM (1.5 m/s), $V_{in} = 5\text{ VDC}$, $V_{out} = 0.7525 - 3.63\text{ VDC}$, unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Units
Output Characteristics					
Output Voltage Set Point (no load)		-1.5	V_{out}	+1.5	% V_{out}
Output Regulation ¹					
Over Line	$V_{in} = 3.0\text{ V} - 5.5\text{ V}$, Full resistive load		0.1	0.2	% V_{out}
Over Load	From no load to full load		0.3	0.4	% V_{out}
Output Voltage Tolerance (Over all operating input voltage, resistive load and temperature conditions until end of life)		-3		+3	% V_{out}
Output Ripple and Noise – 20 MHz bandwidth	Over line, load and temperature				
Peak-to-Peak	$V_{OUT} = 3.3\text{ VDC}$ Full load		50	70	mV _{P-P}
Peak-to-Peak	$V_{OUT} = 0.7525\text{ VDC}$ Full load		30	50	mV _{P-P}
External Load Capacitance	Plus full load (resistive)				
Min ESR > 1 mΩ				1,000	μF
Min ESR > 10 mΩ				2,000	μF
Output Current Range		0		5	A
Output Current Limit Inception (I_{OUT})			10	14	A
Output Short-Circuit Current (Hiccup mode)	Short = 10 mΩ, continuous		3	5	Arms
Dynamic Response					
Load current change from 2.5 A – 5 A, $di/dt = 5\text{ A}/\mu\text{s}$	$C_o = 47\text{ }\mu\text{F}$ ceramic. + 1 μF ceramic		110		mV
Settling Time ($V_{OUT} < 10\%$ peak deviation)			35		μs
Unloading current change 5 A – 2.5 A, $di/dt = -5\text{ A}/\mu\text{s}$	$C_o = 47\text{ }\mu\text{F}$ ceramic + 1 μF ceramic		110		mV
Settling Time ($V_{OUT} < 10\%$ peak deviation)			35		μs
Efficiency					
	Full load (5 A)				
	$V_{OUT} = 3.3\text{ VDC}$		94.0		%
	$V_{OUT} = 2.5\text{ VDC}$		92.0		%
	$V_{OUT} = 2.0\text{ VDC}$		90.0		%
	$V_{OUT} = 1.8\text{ VDC}$		89.5		%
	$V_{OUT} = 1.5\text{ VDC}$		87.0		%
	$V_{OUT} = 1.2\text{ VDC}$		85.5		%
	$V_{OUT} = 1.0\text{ VDC}$		83.5		%
	$V_{OUT} = 0.7525\text{ VDC}$		80.0		%

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

YM05S Platform Notes

- All dimensions are in inches [mm]
- Connector Material: Copper
- Connector Finish: Gold over Nickel
- Converter Weight: 0.08 oz [2.22 g]
- Converter Height: 0.260" Max., 0.234" Min.
- Recommended Surface-Mount Pads:
Min. 0.080" X 0.072" [2.03 x 1.83]

YM05S Pinout (Surface Mount)

Converter Part Numbering Scheme

Product Series	Input Voltage	Mounting Scheme	Rated Load Current	RoHS Compatible
YM	05	S	05	-
Y-Series	3.0 – 5.5 V	S ⇒ Surface-Mount	5 A (0.7525 V to 3.63 V)	No Suffix ⇒ RoHS lead-solder-exempt compliant G ⇒ RoHS compliant for all six substances

The example above describes P/N YM05S05: 3.0 – 5.5 V input, surface-mount, 5 A at 0.7525 V to 3.63 V output. Please consult factory regarding availability of a specific (including RoHS compliant with Pb free solder) 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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