YNL05 Analog POL Series

The YNL05S100xy non-isolated DC-DC converters deliver up to 10 A of output current in an industry-standard surface-mount package. Operating from a 3.0 to 5.5 VDC input, the YNL05S100xy converters are ideal choices for Intermediate Bus Architectures where Point-of-Load (POL) power delivery is generally a requirement. The converters are available in individual output voltage versions, allowing coverage of the output voltage range from 0.9 to 3.3 VDC. Each version is capable of providing an extremely tight, highly regulated and trimmable output.

The YNL05S100xy converters provide exceptional thermal performance, even in high temperature environments with no airflow. No derating is required up to 85 °C , 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 solder and lead-solder-exempted products are available
- Delivers up to 10 A (33 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]
- Co-planarity 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 = 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

Applications

- Intermediate Bus Architectures
- Telecommunications
- Telecommunications
- 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

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Electrical Specifications

Conditions: TA = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 5 VDC, Vout = 0.9 – 3.3 VDC, unless otherwise specified.

Parameter	Notes	Min	Typ	Max	Unit
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]	See Trim equation	-10		+10	%
	Vout = 0.9 VDC	-5		+10	%
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
Input Characteristics					
Operating Input Voltage Range	V_{OUT} = 0.9 – 2.5 VDC	3.0	5.0	5.5	VDC
	V_{OUT} > 2.5 VDC	4.5	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} = 0.9 VDC			3.6	ADC
Input Standby Current (Converter disabled)	Vin = 5.0 VDC		10		mA
Input No Load Current (Converter enabled)	Vin = 5.5 VDC				
	V_{OUT} = 3.3 VDC		90		mA
	V_{OUT} = 2.5 VDC		90		mA
	V_{OUT} = 2.0 VDC		80		mA
	V_{OUT} = 1.8 VDC		75		mA

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	V_{OUT} = 1.5 VDC		70		mA
	V_{OUT} = 1.2 VDC		65		mA
	V_{OUT} = 1.0 VDC		60		mA
	V_{OUT} = 0.9 VDC		50		mA
Input Reflected-Ripple Current - i_S	See Fig. H for setup (BW = 20 MHz)		15		mAP-P
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 Accuracy (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. H)				
Peak-to-Peak	V_{OUT} = 3.3 VDC		30	50	mVP-P
Peak-to-Peak	V_{OUT} = 0.9 VDC		15	30	mVP-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		3		Arms
Dynamic Response					
50% Load current change from 5 A -10 A with di/dt = 5 A/µs[4]	Co = 47 µF tant. + 1 µF ceramic		110		mV
Settling Time (V_{OUT} < 10% peak deviation)[4]			25		µs
50% Load current change from 5 A -10 A with di[4]	Co = 47 µF tant. + 1 µF ceramic		120		mV
Settling Time (V_{OUT} < 10% peak deviation)[4]			25		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} = 0.9 VDC		84.5		%

Additional Notes:
[1]The output voltage should not exceed 3.63 V (taking into account both the trimming 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]See waveforms for dynamic response and settling time for different output voltages

Operations

Input and Output Impedance

The Y-Series converter should be connected via a low impedance to the DC power source. In many applications, the inductance associated with the distribution from the power source to the input of the converter can affect the stability of the converter. The use of decoupling capacitors is recommended in order to ensure stability of the converter and reduce input ripple voltage. Internally, the converter has 52 µF (low ESR ceramics) of input capacitance.

In a typical application, low-ESR tantalum or POS capacitors will be sufficient to provide adequate ripple voltage filtering at the input of the converter. However, very low ESR ceramic capacitors 100-200 µF are recommended at the input of the converter in order to minimize the input ripple voltage. They should be placed as close as possible to the input pins of the converter.

The YNL05S100xy has been designed for stable operation with or without external capacitance. Low ESR ceramic capacitors placed as close as possible to the load (minimum 47 µF) are recommended for improved transient performance and lower output voltage ripple.

It is important to keep low resistance and low inductance PCB traces for connecting load to the output pins of the converter in order to maintain good load regulation.

Fig. A shows the input voltage ripple for various output voltages using four 47 µF input ceramic capacitors. The same plot is shown in Fig. B with one 470 µF polymer capacitor (6TPB470M from Sanyo) in parallel with two 47 µF ceramic capacitors at full load.

Fig. A: Input Voltage Ripple, C_{IN} = 4 x 47 µF ceramic, full load.

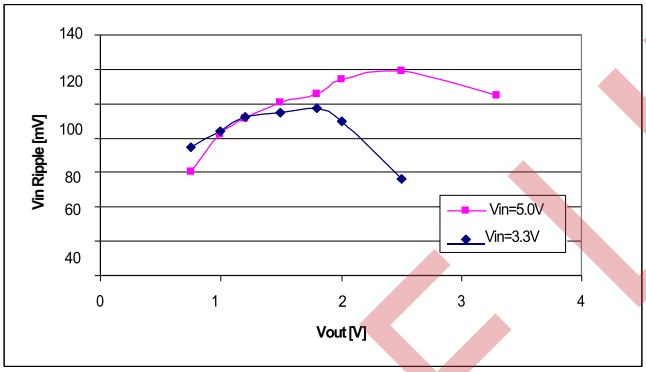
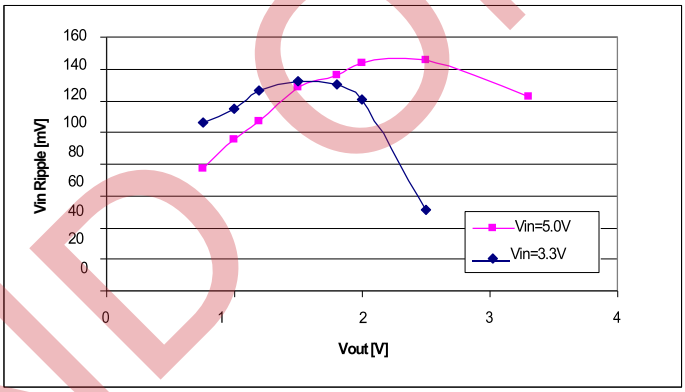


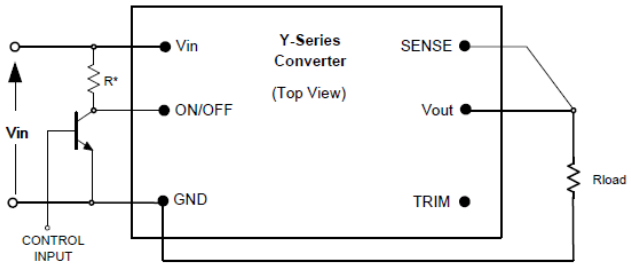
Fig. B: Input Voltage Ripple, C_{IN} = 470 µF polymer + 2 x 47 µF Ceramic



ON / OFF (Pin 1)

The ON/OFF pin is used to turn the power converter on or off remotely via a system signal. There are two remote control options available, positive logic (standard option) and negative logic, with ON/OFF signal referenced to GND. The typical connections are shown in Fig. C.

Fig. C: Circuit Configuration for ON/OFF Function



R* is for negative logic option only

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To turn the converter on the ON/OFF pin should be at a logic low or left open, and to turn the converter off the ON/OFF pin should be at a logic high or connected to Vin. See the Electrical Specifications for logic high/low definitions.

The positive logic version turns the converter on when the ON/OFF pin is at a logic high or left open, and turns the converter off when at a logic low or shorted to GND.

The negative logic version turns the converter on when the ON/OFF pin is at logic low or left open, and turns the converter off when the ON/OFF pin is at a logic high or connected to Vin.

The ON/OFF pin is internally pulled up to Vin for positive logic version, and pulled down for a negative logic version. A TTL or CMOS logic gate, open-collector (open-drain) transistor can be used to drive ON/OFF pin. This device must be capable of:

– sinking up to 1.2 mA at a low level voltage of 0.8 V
– sourcing up to 0.25 mA at a high logic level of 2.3 - 5.5 V.

When using open-collector (open-drain) transistor with a negative logic option, add a pull-up resistor (R*) to Vin as shown in Fig. C:

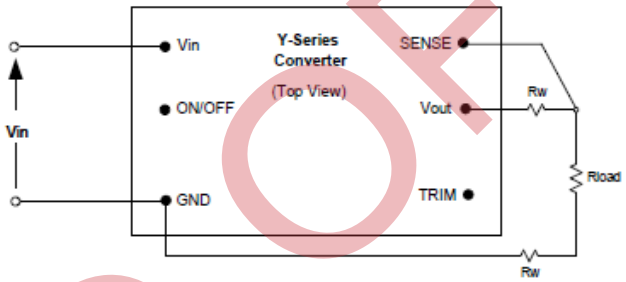
– 20 K, if the minimum Vin is 4.5 V
– 10 K, if the minimum Vin is 3.0 V

5 K, if the undervoltage shutdown at 2.05 - 2.15 V is required.

Remote Sense (Pin 2)

The remote sense feature of the converter compensates for voltage drops occurring only between Vout pin (Pin 4) of the converter and the load. The SENSE (Pin 2) pin should be connected at the load or at the point where regulation is required (see Fig. D). There is no sense feature on the output GND return pin, where the solid ground plane should provide a low voltage drop.

Fig. D: Remote Sense Circuit Configuration



The option without SENSE pin is available; see the Part Numbering Scheme section for the ordering information. However, if remote sensing is not required, the SENSE pin must be connected to the Vout pin (Pin 4) to ensure the converter will regulate at the specified output voltage. If these connections are not made, the converter will deliver an output voltage that is slightly higher than the specified value.

Because the sense lead carries minimal current, large traces on the end-user board are not required. However, the sense trace should be located close to a ground plane to minimize system noise and ensure optimum performance.

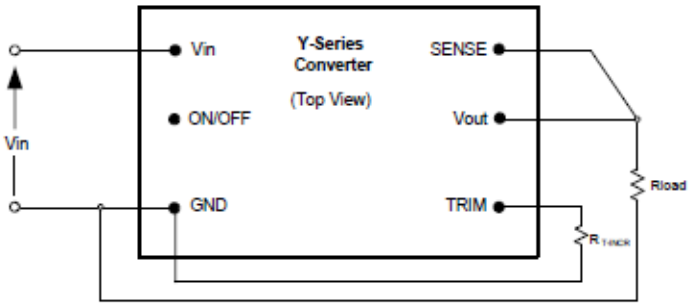
When utilizing the remote sense feature, care must be taken not to exceed the maximum allowable output power capability of the converter, which is equal to the product of the nominal output voltage and the allowable output current for the given conditions.

When using remote sense, the output voltage at the converter can be increased up to 0.5 V above the nominal rating in order to maintain the required voltage across the load. Therefore, the designer must, if necessary, decrease the maximum current (originally obtained from the derating curves) by the same percentage to ensure the converter's actual output power remains at or below the maximum allowable output power.

Output Voltage Adjust / Trim (Pin 3)

The output voltage can be adjusted up 10% or down 10% of its nominal output rating using an external resistor. The converter without Trim feature is also available; see the Part Numbering Scheme section for the ordering information.

Fig. E: Configuration for Increasing Output Voltage



To trim up the output voltage, refer to Fig. E.A trim resistor, R_{T-INCR}, should be connected between TRIM pin (Pin 3) and GND pin (Pin 5) with value of:

For $V_{O-NOM} \geq 1.2$ V,

$$R_{T-DECR} = \frac{24.08}{(V_{O-REQ} - V_{O-NOM})} - R_{INT} \quad [k\Omega]$$

For V_{O-NOM} = 1.0 V and 0.9 V,

$$R_{T-DECR} = \frac{21.07}{(V_{O-REQ} - V_{O-NOM})} - R_{INT} \quad [k\Omega]$$

Where,

R_{T-DECR} = Required value of trim-up resistor [kΩ]

V_{O-REQ} = Desired (trimmed) output voltage [V]

V_{O-NOM} = Nominal output voltage [V]

R_{INT} = Internal series resistor according to Table 1 [kΩ]

Table 1: Internal series Resistors R_{INT}

V_{O-NOM} [V]	3.3	2.5	2.0	1.8	1.5	1.2	1.0	0.9
R_{INT} [kΩ]	59	78.7	100	100	100	59	30.1	5.11

To trim down the output voltage (Fig. F), a trim resistor, R_{T-DECR}, should be connected between the TRIM pin (Pin 3) and SENSE pin (Pin 2), with a value of:

For $V_{O-NOM} \geq 1.2$ V,

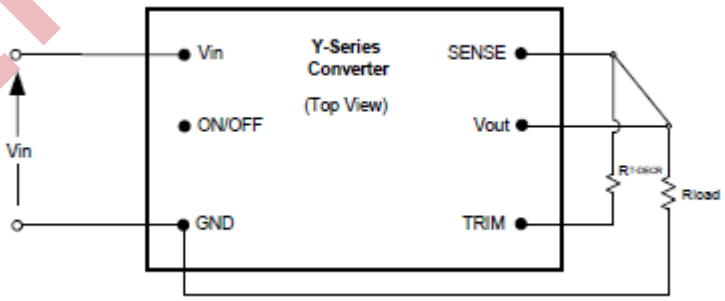
$$R_{T-DECR} = \frac{(V_{O-REQ} - 0.8) * 30.1}{(V_{O-NOM} - V_{O-REQ})} - R_{INT} \quad [k\Omega]$$

For V_{O-NOM} = 1.0 V, 0.9 V,

$$R_{T-DECR} = \frac{(V_{O-REQ} - 0.7) * 30.1}{(V_{O-NOM} - V_{O-REQ})} - R_{INT} \quad [k\Omega]$$

where, R_{T-DECR} = Required value of trim-down resistor [kΩ]

Fig. F: Configuration for Decreasing Output Voltage.



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Standard 1% and 5% resistors can be used for trimming. Ground pin of the trim resistor should be connected directly to the module GND pin (Pin5) with no voltage drop in between.

The output voltage can be trimmed up or down using an external voltage source:

For $V_{O\text{-}NOM} \geq 1.2$ V,

$$V_{TRIM} = 0.8 - \frac{(V_{O-REQ} - V_{O-NOM}) * R_{INT}}{30.1} \quad [V]$$

For $V_{O\text{-}NOM} = 1.0$ V, 0.9 V,

$$V_{TRIM} = 0.7 - \frac{(V_{O-REQ} - V_{O-NOM}) * R_{INT}}{30.1} \quad [V]$$

where, V_{TRIM} = Output voltage applied to TRIM pin (referenced to GND) [V]

The trim equations for the converters with $V_{O\text{-}NOM} \geq 1.2$ V are industry standard; thus allowing easy second sourcing.

Protection Features

Input Undervoltage Lockout

Input undervoltage lockout is standard with this converter. The converter will shut down when the input voltage drops below a pre-determined voltage; it will start automatically when Vin returns to a specified range.

The input voltage must be typically 2.05 V for the converter to turn on. Once the converter has been turned on, it will shut off when the input voltage drops below typically 1.9 V.

Output Overcurrent Protection (OCP)

The converter is protected against overcurrent and short circuit conditions. Upon sensing an overcurrent condition, the converter will enter hiccup mode. Once an over-load or short circuit condition is removed, Vout will return to nominal value.

Overtemperature Protection (OTP)

The converter will shut down under an overtemperature condition to protect itself from overheating caused by operation outside the thermal derating curves, or operation in abnormal conditions such as system fan failure. After the converter has cooled to a safe operating temperature, it will automatically restart.

Safety Requirements

The converter meets North American and International safety regulatory requirements per UL60950 and EN60950. The maximum DC voltage between any two pins is Vin under all operating conditions. Therefore, the unit has ELV (extra low voltage) output; it meets SELV requirements under the condition that all input voltages are ELV.

The converter is not internally fused. To comply with safety agencies' requirements, a recognized fuse with a maximum rating of 20 Amps must be used in series with the input line.

Characterization

General Information

The converter has been characterized for many operational aspects, to include thermal derating (maximum load current as a function of ambient temperature and airflow) for vertical and horizontal mountings, efficiency, startup and shutdown parameters, output ripple and noise, transient response to load step-change, overload, and short circuit.

The figures are numbered as Fig. x.y, where x indicates the different output voltages, and y associates with specific plots (y = 1 for the vertical thermal derating, …). For example, Fig. x.1 will refer to the vertical thermal derating for all the output voltages in general.

The following pages contain specific plots or waveforms associated with the converter. Additional comments for specific data are provided below.

Test Conditions

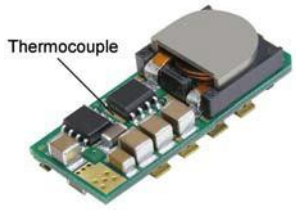
All data presented were taken with the converter soldered to a test board, specifically a 0.060" thick printed wiring board (PWB) with four layers. The top and bottom layers were not metalized. The two inner layers, comprised of two-ounce copper, were used to provide traces for connectivity to the converter.

The lack of metalization on the outer layers as well as the limited thermal connection ensured that heat transfer from the converter to the PWB was minimized. This provides a worst-case but consistent scenario for thermal derating purposes.

All measurements requiring airflow were made in the vertical and horizontal wind tunnels using Infrared (IR) thermography and thermocouples for thermometry.

Ensuring components on the converter do not exceed their ratings is important to maintaining high reliability. If one anticipates operating the converter at or close to the maximum loads specified in the derating curves, it is prudent to check actual operating temperatures in the application. Thermographic imaging is preferable; if this capability is not available, then thermocouples may be used. The use of AWG #40 gauge thermocouple is recommended to ensure measurement accuracy. Careful routing of the thermocouple leads will further minimize measurement error. Refer to Fig. G for the optimum measuring thermocouple location.

Fig. G: Location of the Thermocouple for Thermal Testing.



Thermal Derating

Load current vs. ambient temperature and airflow rates are given in Figs. x.1 and Figs. x.2 for maximum temperature of 110°C. Ambient temperature was varied between 25 °C and 85 °C, with airflow rates from 30 to 500 LFM (0.15 m/s to 2.5 m/s), and vertical and horizontal mountings. The airflow during the testing is parallel to the short axis of the converter, going from pin 1 and pin 6 to pins 2–5.

For each set of conditions, the maximum load current is defined as the lowest of:

(i) The output current at which any MOSFET temperature does not exceed a maximum specified temperature (110°C) as indicated by the thermographic image, or

(ii) The maximum current rating of the converter (10 A).

During normal operation, derating curves with maximum FET temperature less than or equal to 110 °C should not be exceeded. Temperature on the PCB at the thermocouple location shown in Fig. G should not exceed 110 °C in order to operate inside the derating curves.

Efficiency

Fig. x.3 shows the efficiency vs. load current plot for ambient temperature of 25 ºC, airflow rate of 200 LFM (1 m/s), and input voltages of 4.5 V, 5.0 V, and 5.5 V.

Power Dissipation

Fig. x.4 shows the power dissipation vs. load current plot for Ta = 25 ºC, airflow rate of 200 LFM (1 m/s) with vertical mounting and input voltages of 4.5 V, 5.0 V, and 5.5 V.

Ripple and Noise

The output voltage ripple waveform is measured at full rated load current. Note that all output voltage waveforms are measured across a 1 µF ceramic capacitor.

The output voltage ripple and input reflected-ripple current waveforms are obtained using the test setup shown in Fig. H.

Fig. H: Test Setup for Measuring Input Reflected-ripple Currents, i_S and Output Voltage Ripple

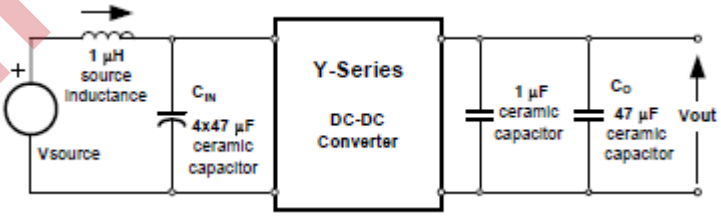


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Fig. 3.3V.1: Available load current vs. ambient temperature and airflow rates for YNL05S10033 converter mounted vertically with Vin = 5 V, and maximum MOSFET temperature ≤ 110 °C.

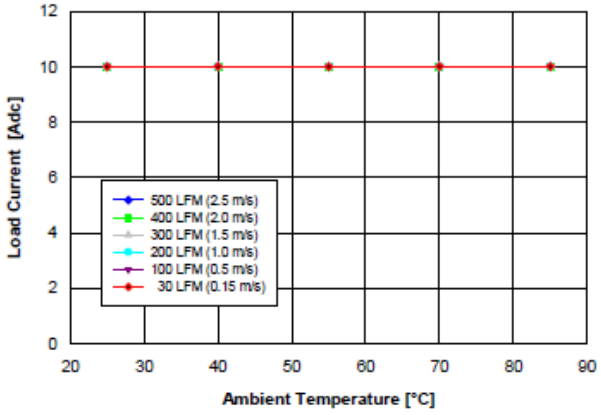

Fig. 3.3V.2: Available load current vs. ambient temperature and airflow rates for YNL05S10033 converter mounted horizontally with Vin = 5 V, and maximum MOSFET temperature ≤ 110 °C.

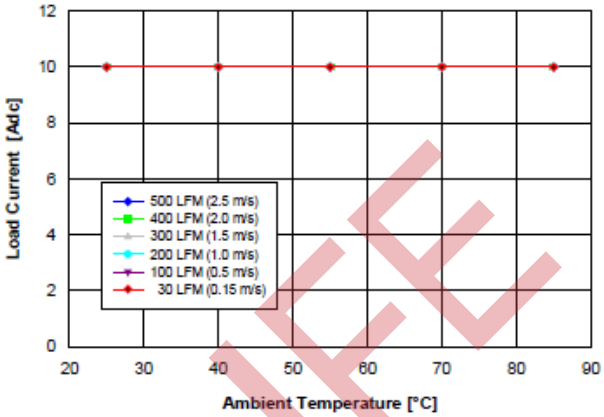

Fig. 3.3V.3: Efficiency vs. load current and input voltage for YNL05S10033 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

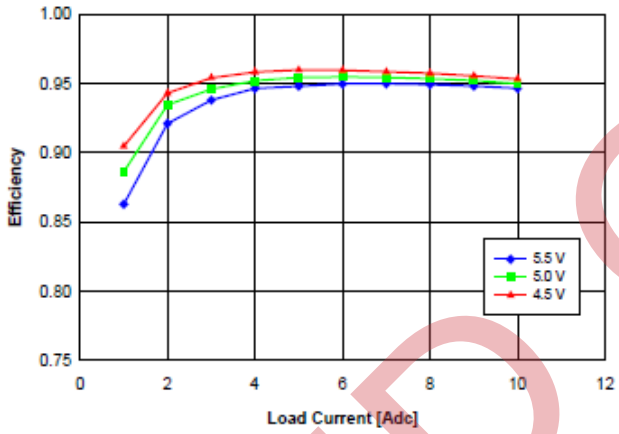

Fig. 3.3V.4: Power Loss vs. load current and input voltage for YNL05S10033 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

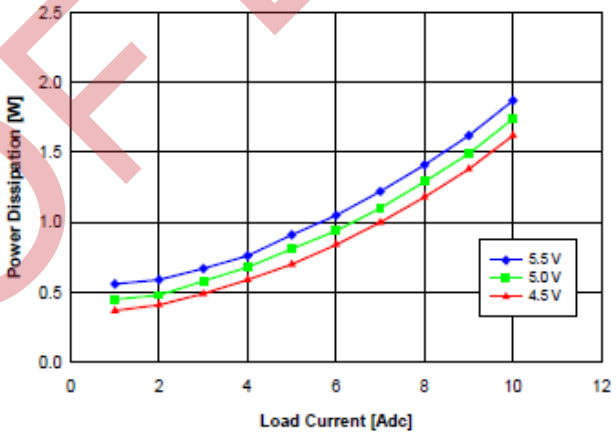

Fig. 3.3V.5: Turn-on transient (YNL05S10033) with the application of Enable signal at full rated load current (resistive) and 47 µF external capacitance at Vin = 5 V. Top trace: Enable signal (2 V/div.); Bottom trace: output voltage (1 V/div.); Time scale: 2 ms/div.

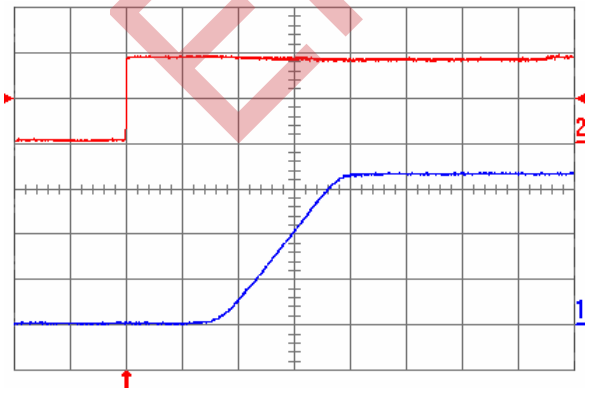

Fig. 3.3V.6: Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with external capacitance 47 µF ceramic + 1 µF ceramic and Vin = 5 V (YNL05S10033) Time scale: 2 µs/div.

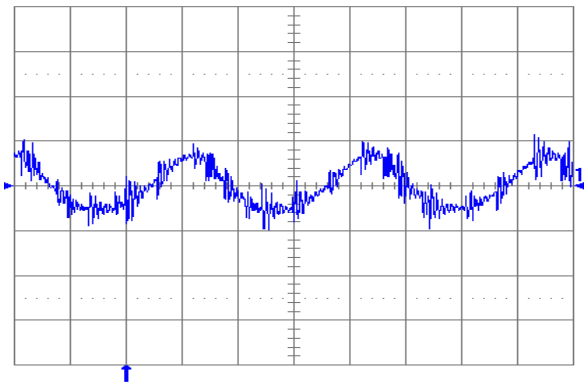

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Fig. 3.3V.7: Output voltage (YNL05S10033) to positive load current step change from 5 A to 10 A with slew rate of 5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

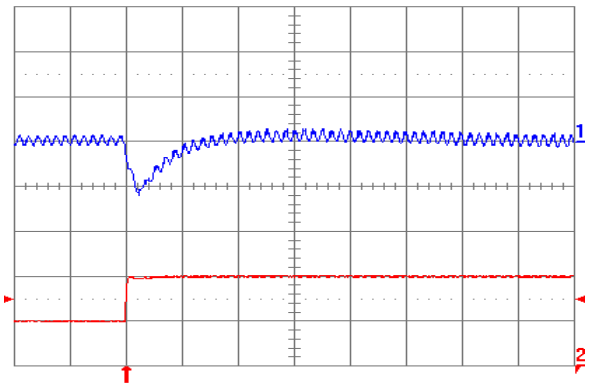

Fig. 3.3V.8: Output voltage response (YNL05S10033) to negative load current step change from 10 A to 5 A with slew rate of -5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

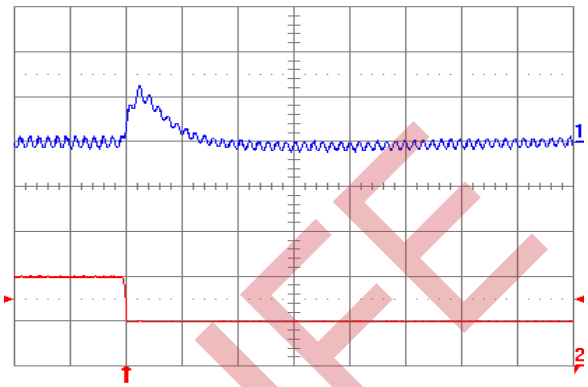

Fig. 2.5V.1: Available load current vs. ambient temperature and airflow rates for YNL05S10025 converter mounted vertically with Vin = 5 V, and maximum MOSFET temperature ≤ 110 °C.

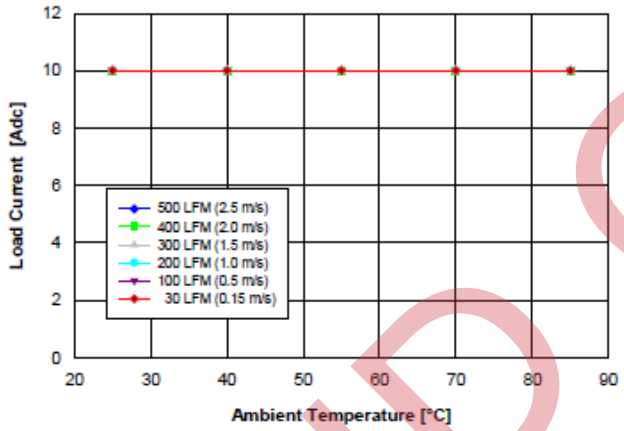

Fig. 2.5V.2: Available load current vs. ambient temperature and airflow rates for YNL05S10025 converter mounted horizontally with Vin = 5 V, and maximum MOSFET temperature ≤ 110 °C.

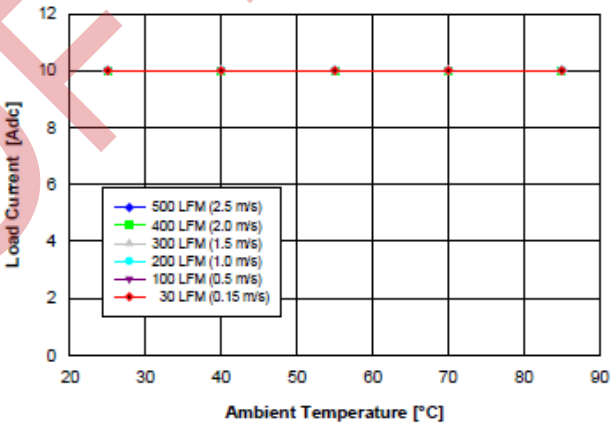

Fig. 2.5V.3: Efficiency vs. load current and input voltage for YNL05S10025 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

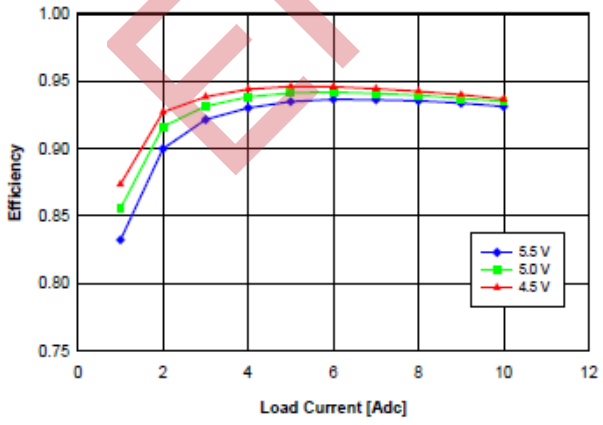

Fig. 2.5V.4: Efficiency vs. load current and input voltage for YNL05S10025 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

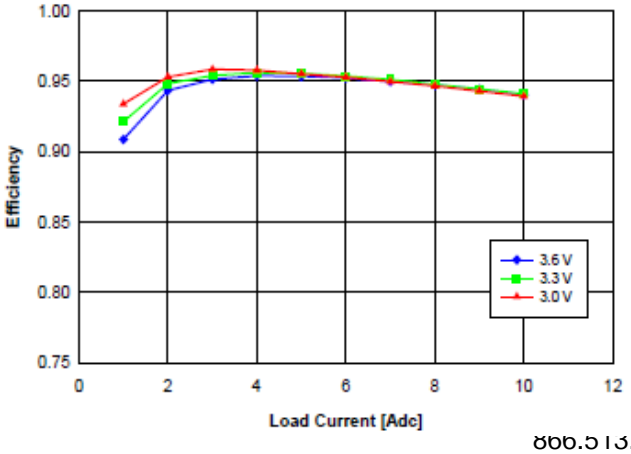

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Fig. 2.5V.5: Turn-on transient (YNL05S10025) with the application of Enable signal at full rated load current (resistive) and 47 µF external capacitance at Vin = 5 V. Top trace: Enable signal (2 V/div.); Bottom trace: output voltage (1 V/div.); Time scale: 2 ms/div

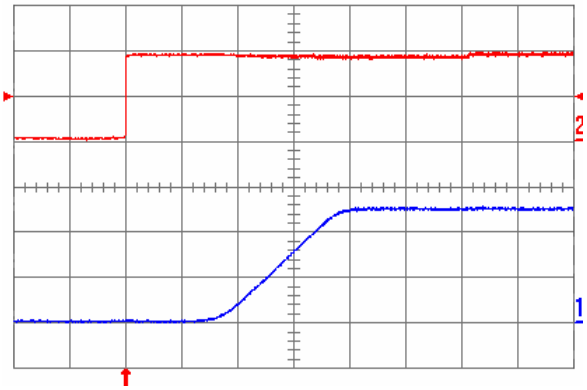

Fig. 2.5V.6: Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with external capacitance 47 µF ceramic + 1 µF ceramic and Vin = 5 V (YNL05S10025) Time scale: 2 µs/div.

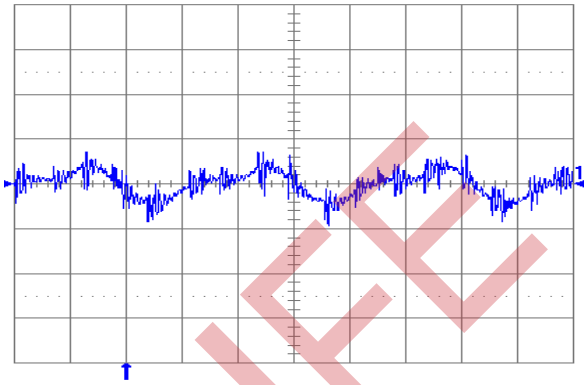

Fig. 2.5V.7: Output voltage response (YNL05S10025) to positive load current step change from 5 A to 10 A with slew rate of 5 A/µs at Vin = 5 V. Top trace: output voltage 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

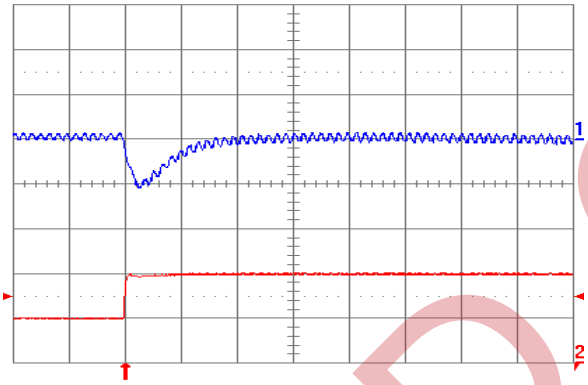

Fig. 2.5V.8: Output voltage response (YNL05S10025) to negative load current step change from 10 A to 5 A with slew rate of - 5 A/µs at Vin = 5 V. Top trace: output voltage 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

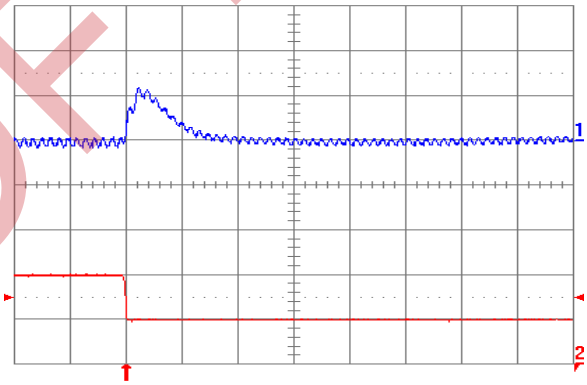

Fig. 2.0V.1: Available load current vs. ambient temperature and airflow rates for YNL05S10020 converter mounted vertically with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

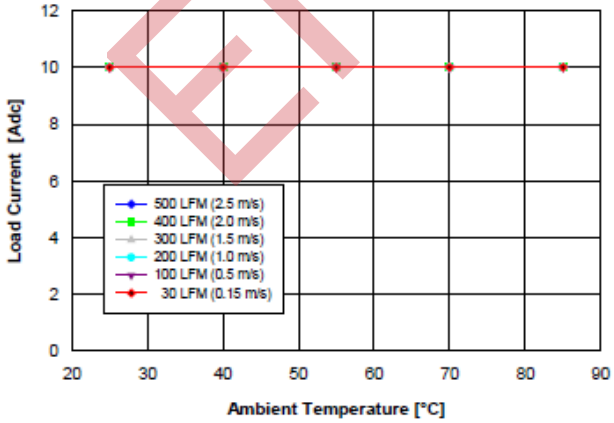

Fig. 2.0V.2: Available load current vs. ambient temperature and airflow rates for YNL05S10020 converter mounted horizontally with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

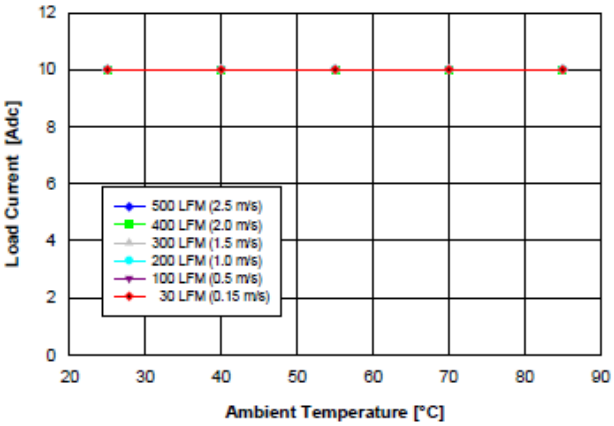

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Fig. 2.0V.3: Efficiency vs. load current and input voltage for YNL05S10020 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

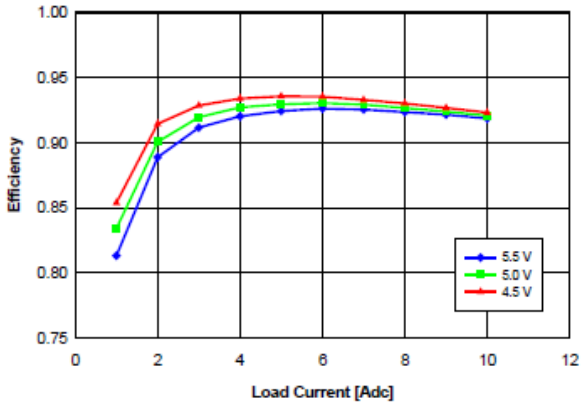

Fig. 2.0V.4: Efficiency vs. load current and input voltage for YNL05S10020 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

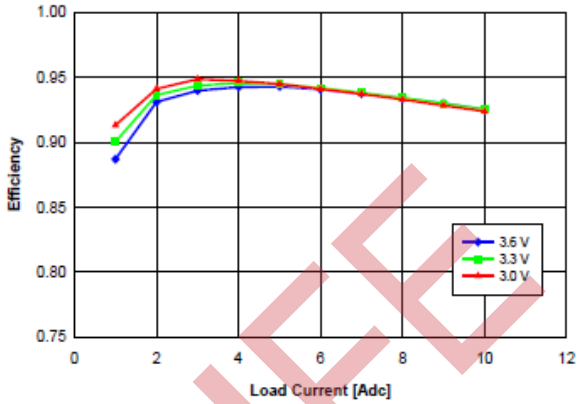

Fig. 2.0V.5: Turn-on transient (YNL05S10020) with the application of Enable signal at full rated load current (resistive) and 47 µF external capacitance at Vin = 5 V. Top (500 mV/div.); Time scale: 2 ms/div.

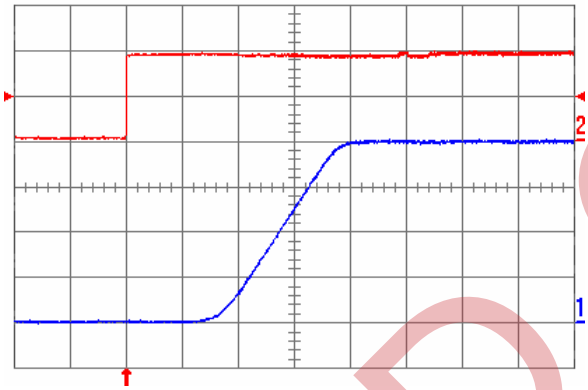

Fig. 2.0V.6: Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with external capacitance 47 µF ceramic + 1 µF ceramic and Vin = 5 V (YNL05S10020). Time scale: 2 µs/div.

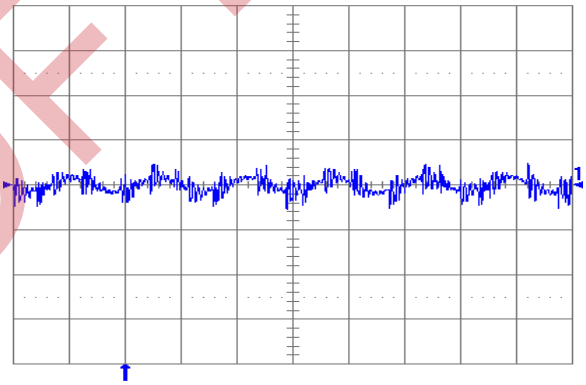

Fig. 2.0V.7: Output voltage response (YNL05S10020) to positive load current step change from 5 A to 10 A with slew rate of 5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

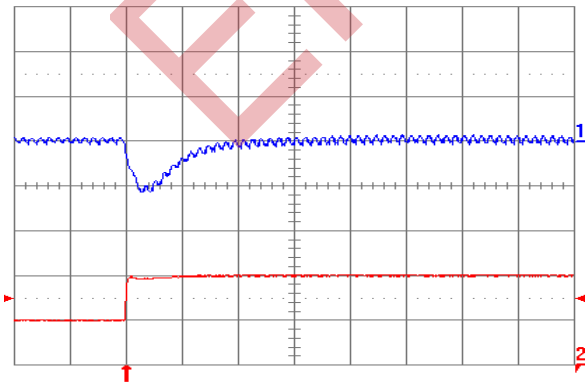

Fig. 2.0V.8: Output voltage response (YNL05S10020) to negative load current step change from 10 A to 5 A with slew (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

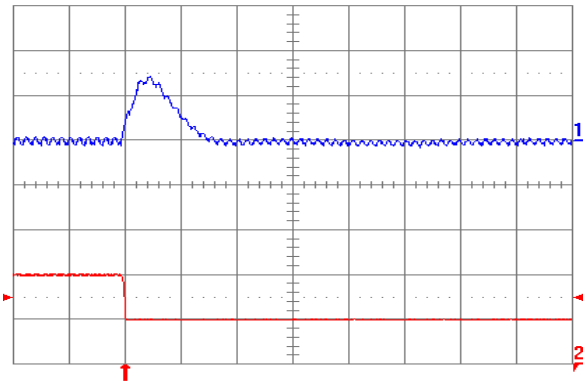

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Fig. 1.8V.1: Available load current vs. ambient temperature and airflow rates for YNL05S10018 converter mounted vertically with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

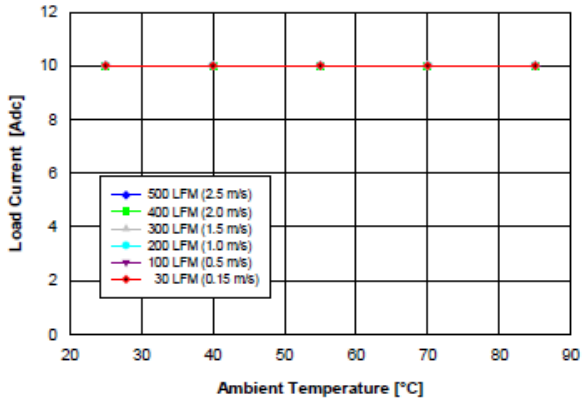

Fig. 1.8V.2: Available load current vs. ambient temperature and airflow rates for YNL05S10018 converter mounted horizontally with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

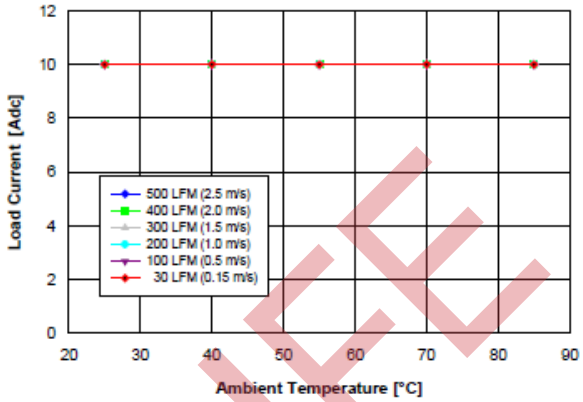

Fig. 1.8V.3: Efficiency vs. load current and input voltage for YNL05S10018 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

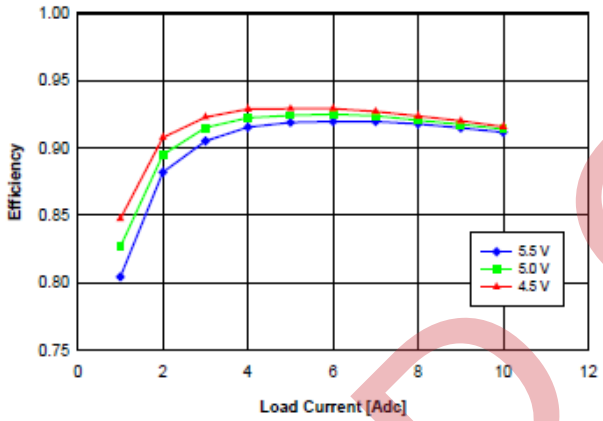

Fig. 1.8V.4: Efficiency vs. load current and input voltage for YNL05S10018 converter mounted vertically with air flowing a a rate of 200 LFM (1 m/s) and Ta = 25 °C.

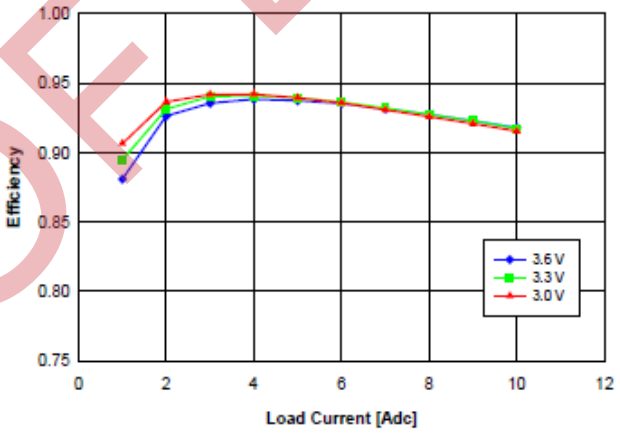

Fig. 1.8V.5: Turn-on transient (YNL05S10018) with the application of Enable signal at full rated load current (resistive) and 47 µF external capacitance at Vin = 5 V. Top trace: Enable signal (2 V/div.); Bottom trace: output voltage (500 mV/div.); Time scale: 2 ms/div.

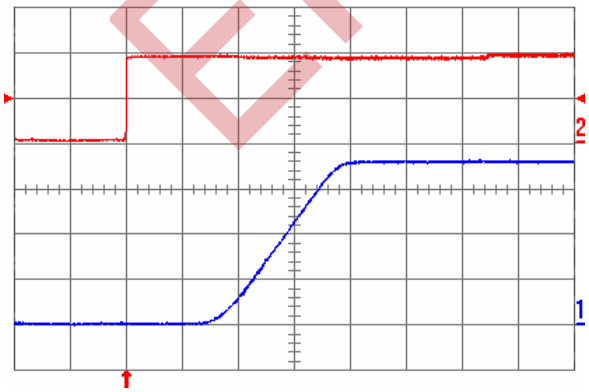

Fig. 1.8V.6: Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with external capacitance 47 µF ceramic + 1 µF ceramic and Vin = 5 V (YNL05S10018). Time scale: 2 µs/div.

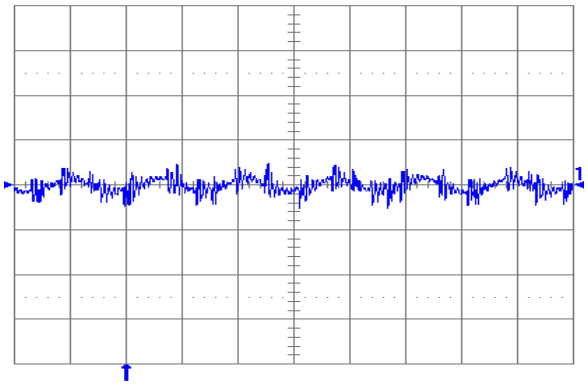

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Fig. 1.8V.7: Output voltage response (YNL05S10018) to positive load current step change from 5 A to 10 A with slew rate of 5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

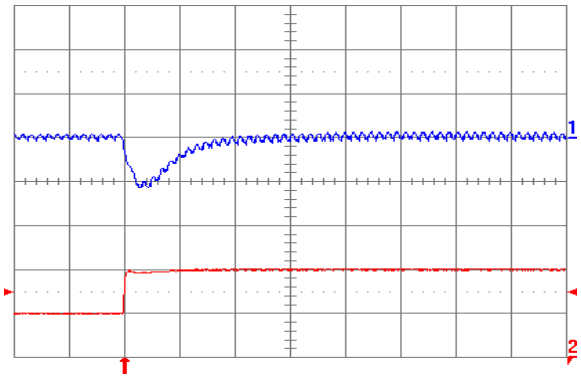

Fig. 1.8V.8: Output voltage response (YNL05S10018) to negative load current step change from 10 A to 5 A with slew rate of -5 A/µs at Vin = 5 V. Top trace: output voltage 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

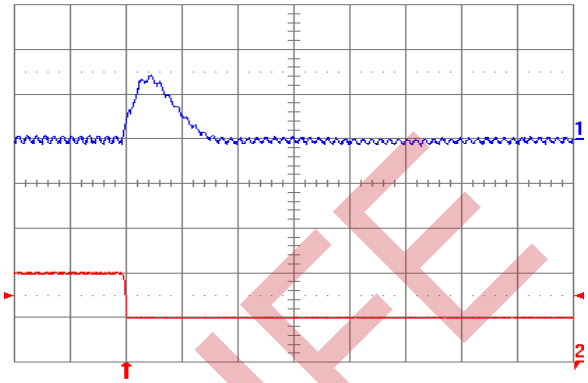

Fig. 1.5V.1: Available load current vs. ambient temperature and airflow rates for YNL05S10015 converter mounted vertically with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

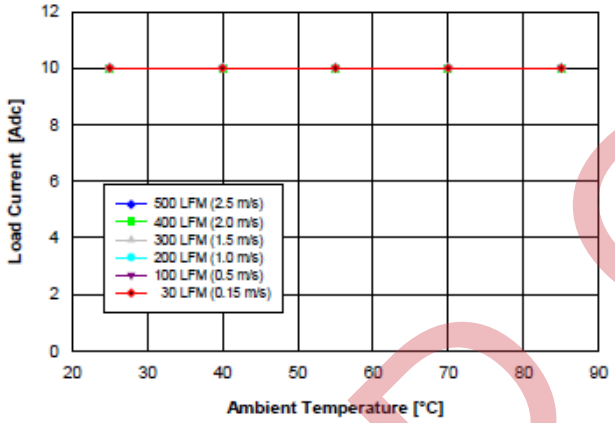

Fig. 1.5V.2: Available load current vs. ambient temperature and airflow rates for YNL05S10015 converter mounted horizontally with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

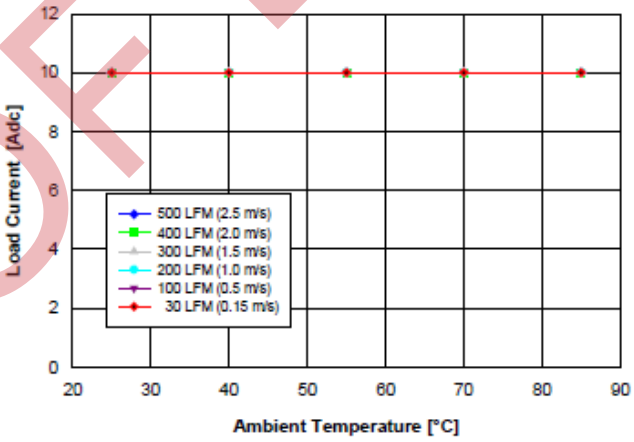

Fig. 1.5V.3: Efficiency vs. load current and input voltage for YNL05S10015 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C..

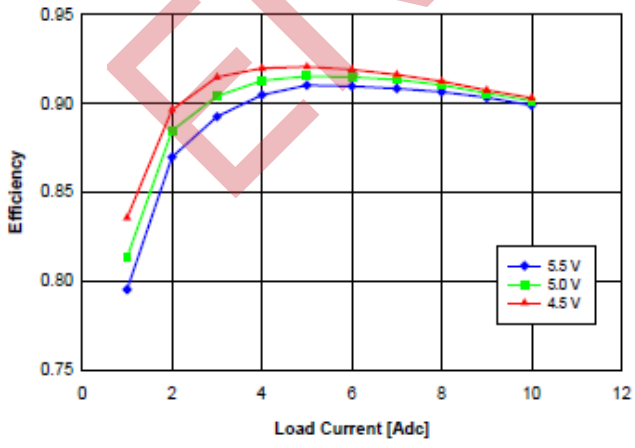

Fig. 1.5V.4: Efficiency vs. load current and input voltage for YNL05S10015 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

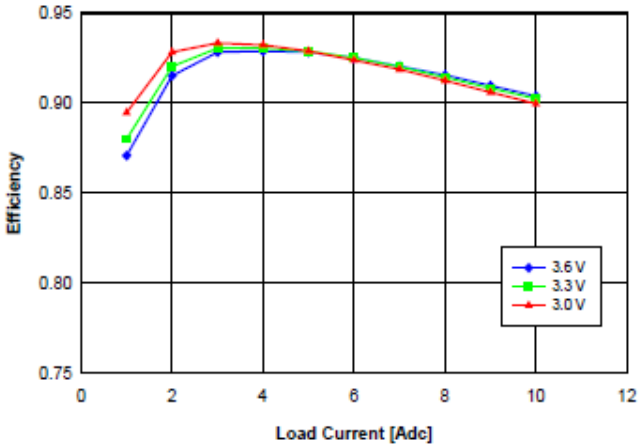

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Fig. 1.5V.5: Turn-on transient (YNL05S10015) with the application of Enable signal at full rated load current (resistive) and 47 µF external capacitance at Vin = 5 V. Top trace: Enable signal (2 V/div.); Bottom trace: output voltage (500 mV/div.); Time scale: 2 ms/div.

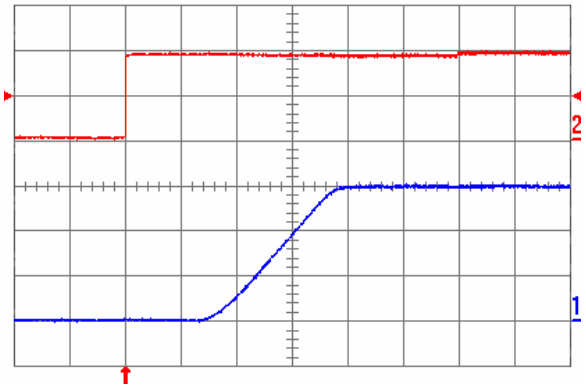

Fig. 1.5V.6: Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with external capacitance 47 µF ceramic + 1 µF ceramic and Vin = 5 V (YNL05S10015). Time scale: 2 µs/div.

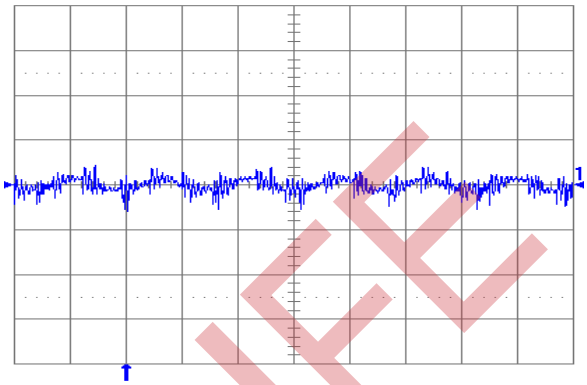

Fig. 1.5V.7: Output voltage response (YNL05S10015) to positive load current step change from 5 A to 10 A with slew rate of 5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

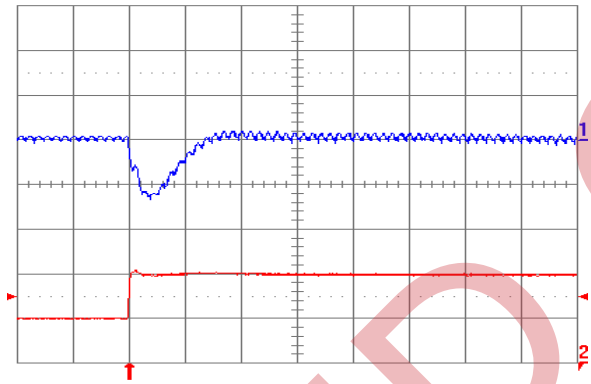

Fig. 1.5V.8: Output voltage response (YNL05S10015) to negative load current step change from 10 A to 5 A with slew rate of -5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div

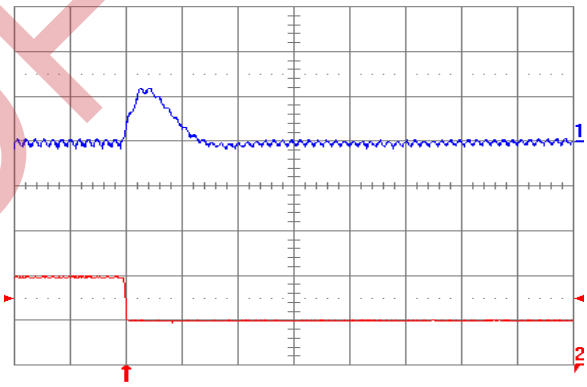

Fig. 1.2V.1: Available load current vs. ambient temperature and airflow rates YNL05S10012 converter mounted vertically with Vin = 5 V, and maximum MOSFET temperature≤110 °C.

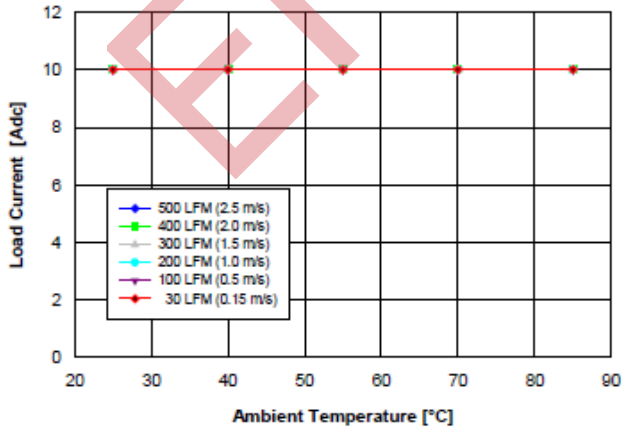

Fig. 1.2V.2: Available load current vs. ambient temperature and airflow rates for YNL05S10012 converter mounted horizontally with Vin = 5 V, and maximum MOSFET temperature≤110 °C.

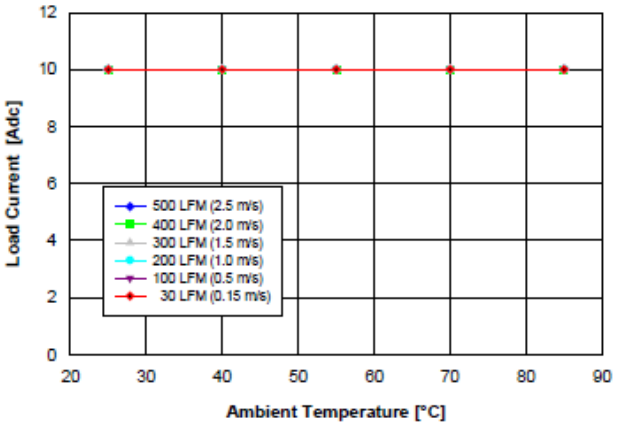

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Fig. 1.2V.3: Efficiency vs. load current and input voltage for YNL05S10012 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25°C.

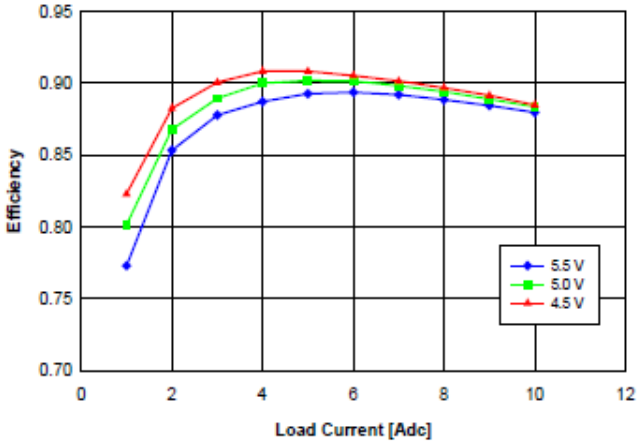

Fig. 1.2V.4: Efficiency vs. load current and input voltage for YNL05S10012 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25°C.

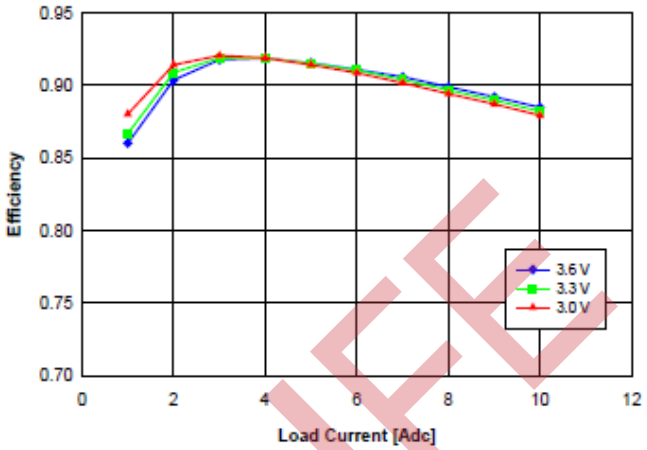

Fig. 1.2V.5: Turn-on transient (YNL05S10012) with the application of Enable signal at full rated load current (resistive) and 47 µF external capacitance at Vin = 5 V. Top trace: Enable signal (2 V/div.); Bottom trace: output voltage (500 mV/div.); Time scale: 2 ms/div.

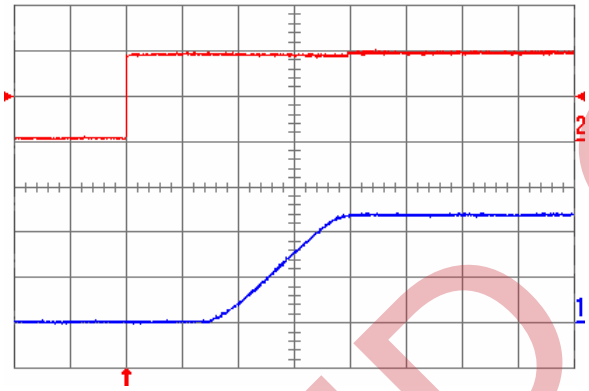

Fig. 1.2V.6: Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with external capacitance 47 µF ceramic + 1 µF ceramic and Vin = 5 V (YNL05S10012). Time scale: 2 µs/div.

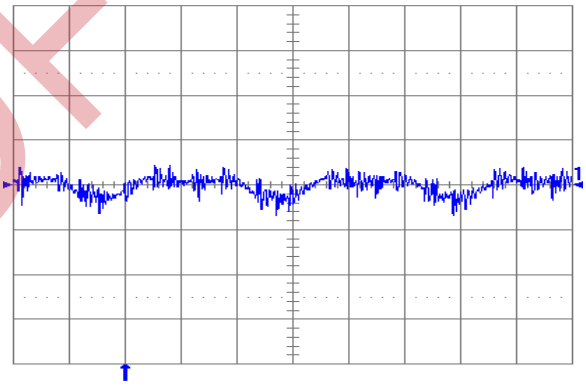

Fig. 1.2V.6: Output voltage response (YNL05S10012) to positive load current step change from 5 A to 10 A with slew rate of 5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

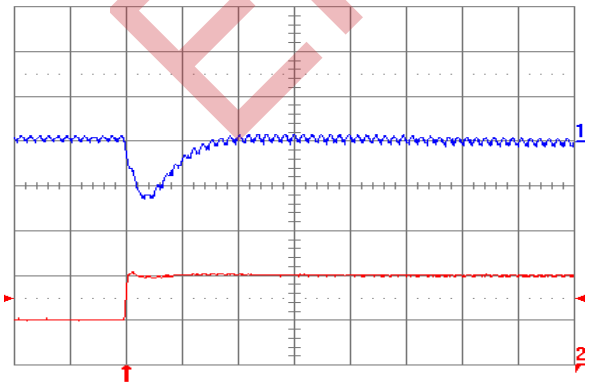

Fig. 1.2V.8: Output voltage response (YNL05S10012) to negative load current step change from 10 A to 5 A with slew rate of -5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

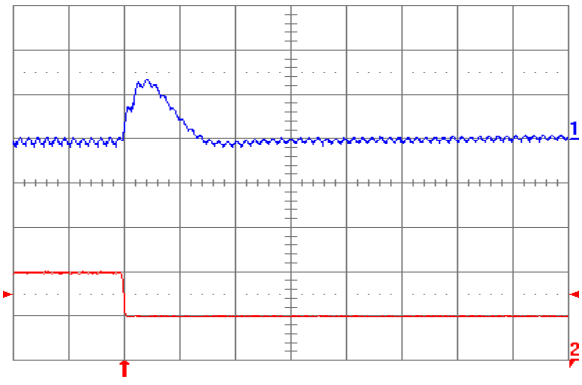

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Fig. 1.0V.1: Available load current vs. ambient temperature and airflow rates YNL05S10010 converter mounted vertically with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

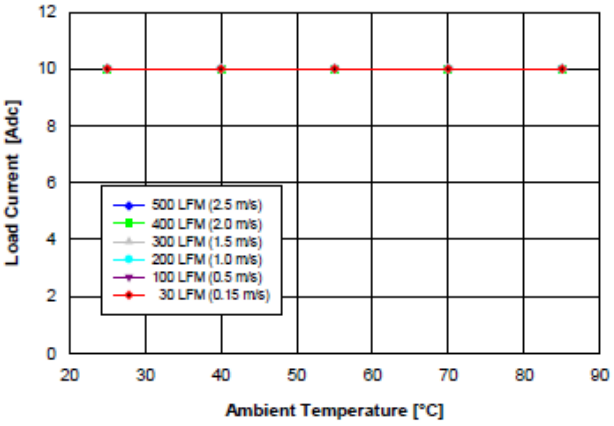

Fig. 1.0V.2: Available load current vs. ambient temperature and airflow rates for YNL05S10010 converter mounted horizontally with Vin = 5 V, and maximum MOSFET temperature ≤110 °C.

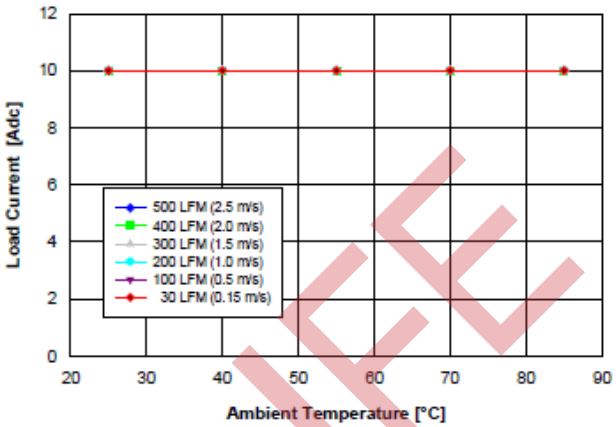

Fig. 1.0V.3: Efficiency vs. load current and input voltage for YNL05S10010 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

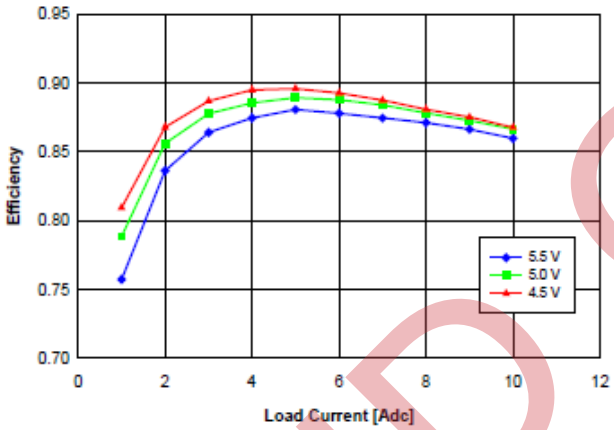

Fig. 1.0V.4: Efficiency vs. load current and input voltage for YNL05S10010 converter mounted vertically with air flowing at a rate of 200 LFM (1 m/s) and Ta = 25 °C.

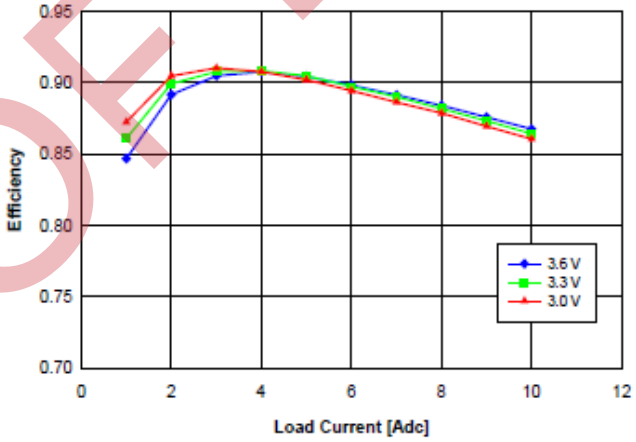

Fig. 1.0V.5: Turn-on transient (YNL05S10010) with the application of Enable signal at full rated load current (resistive) and 47 µF external capacitance at Vin = 5 V. Top trace: Enable signal (2 V/div.); Bottom trace: output voltage (500 mV/div.); Time scale: 2 ms/div.

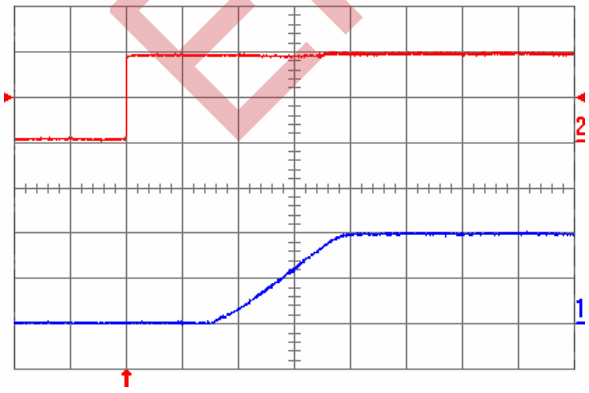

Fig. 1.0V.6: Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with external capacitance 47 µF ceramic + 1 µF ceramic and Vin = 5 V (YNL05S10010). Time scale: 2 µs/div.

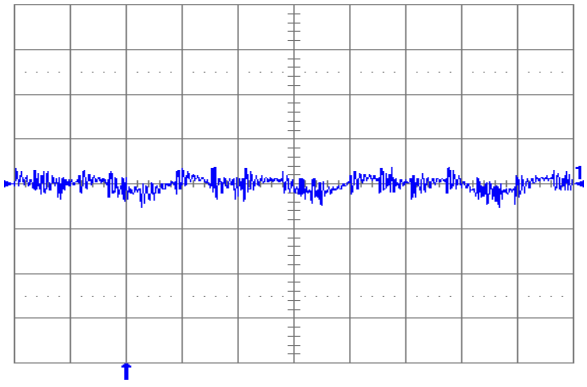

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Fig. 1.0V.7: Output voltage response (YNL05S10010) to positive load current step change from 5 A to 10 A with slew rate of 5 A/µs at Vin = 5 V. Top trace: output voltage (100 mV/div.); Bottom trace: load current (5 A/div.). Co = 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.

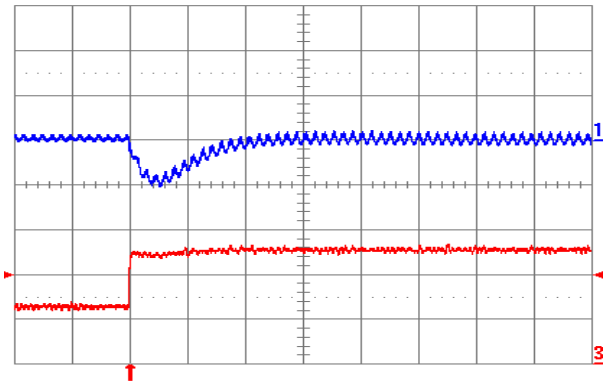
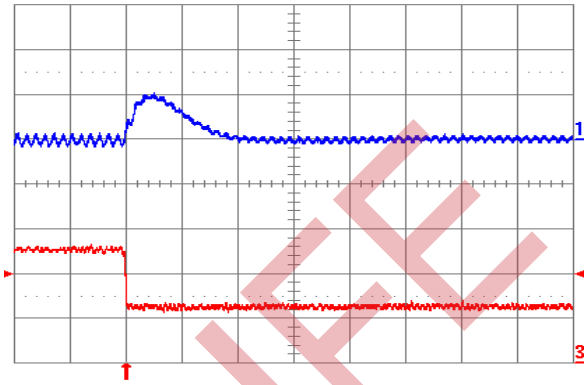
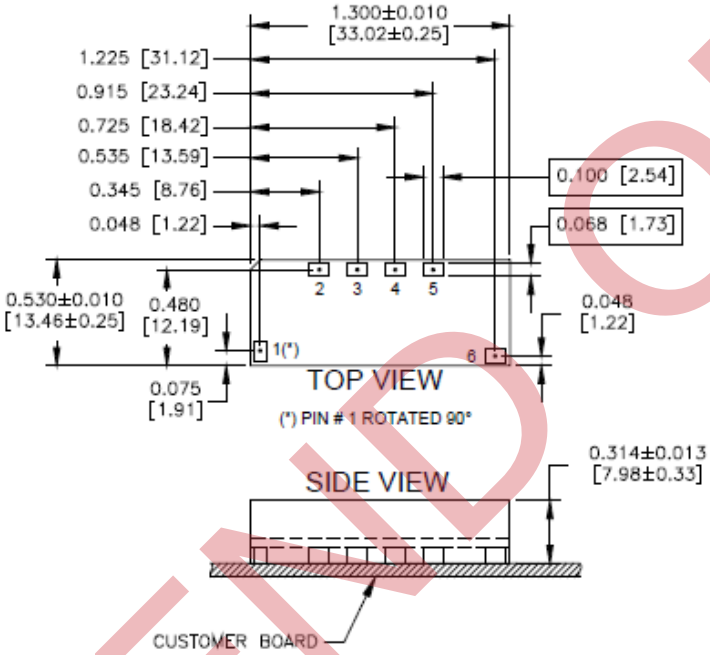


Fig. 1.0V.8: Output voltage response (YNL05S10010) to negative load current step change from 10 A to 5 A with slew rate of -5 A/µs at Vin = 5 V. Top trace: output voltage 47 µF ceramic + 1 µF ceramic. Time scale: 20 µs/div.



Physical Information



YNL05S Pinout (Surface-mount)

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

YNL05S 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]

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YNL05S100xy DC-DC Converter Family Data Sheet
3.0 to 5.5 VDC Input; 0.9 to 3.3 VDC @ 10 A Output

Converter Part Numbering Scheme

Product Series	Input Voltage	Mounting Scheme	Rated Load Current	Output Voltage		Enable Logic	Special Feature	Environmental
YNL	**05**	**S**	**10**	**033**	**–**	**0**		
Y-Series	3.0 – 5.5 V	S ⇒ Surface-mount	10 A	009 ⇒ 0.9 V 010 ⇒ 1.0 V 012⇒1.2 V 015 ⇒ 1.5 V 018 ⇒ 1.8 V 020 ⇒ 2.0 V 025 ⇒ 2.5 V 033 ⇒ 3.3 V		0 ⇒ Standard (Positive Logic) D ⇒ Opposite of Standard (Negative Logic)	1 ⇒ No Trim Pin Option 2 ⇒ No Remote Sense Pin Option 3 ⇒ No Trim & Remote Sense Pin Option	No Suffix ⇒ RoHS lead-solder-exemption compliant G ⇒ RoHS compliant for all six substances
The example above describes P/N YNL05S10033-0: 3.0 – 5.5 V input, surface-mount, 10 A @ 3.3 V output, standard enable logic, and Eutectic Tin/Lead solder[1]. Please consult factory for the complete list of available options. **Note: The TRIM and/or SENSE pin will not be populated depending on the selected special feature "01", "02" or "03".**								

Model numbers and ROHS highlighted in yellow or shaded are not recommended for new designs.

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.
TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

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