

**ADVANCED ANALOG
HIGH RELIABILITY
HYBRID DC/DC CONVERTERS**

ASA28XXS SERIES
28V Input, Single Output

Description

The ASA28XXS Series of DC/DC converters are high reliability thick film hybrid converters that use flyback topology operating at a nominal frequency of 550Khz. High input to output isolation is achieved through the use of transformers in the flyback power and feedback circuits.

The advanced feedback design provides fast loop response for superior line and load transient characteristics and offers greater reliability than devices incorporating optical feedback circuits.

This device is designed to meet MIL-STD-704D input requirements offering full performance over a 16 to 40 volt input range. Output Power of up to 5 watts is available.

Connecting the inhibit pin (pin 5) to the input common (pin 7) will cause the converter to shut down. It is recommended that the inhibit pin be driven by an open collector device capable of sinking at least 400 μ A. The open circuit voltage of the inhibit pin is 11.5 \pm 0.5 volts.

These converters are manufactured in a facility fully qualified to MIL-PRF-38534. All processes used to manufacture these converters have been qualified thereby enabling Advanced Analog to deliver fully compliant devices. Three standard temperature grades are offered with the screening options. Refer to Screening Level section. The CH grade converters are fully compliant to MIL-PRF-38534 for class H. The HB grade converters are processed with the same screening as the CH grade, but do not have class H element evaluation as required by MIL-PRF-38534. These two grades are fully tested and operate over the full military temperature range without derating of output power. A commercial grade is also available. Variations in electrical, mechanical and screening requirements can be accommodated. Extensive computer simulation using



Features

- Up To 5 Watt Output Power
- 5, 12,15 Volt Outputs
- High Reliability
- Wide Input Voltage Range -16 To 40 Volts
- Indefinite Short Circuit and Overload Protection
- Popular Industry Standard Pin-Out
- Military Screening Available
- Parallel Seam Welded Package
- No External Capacitors Required
- Input Voltage Surge Protected to MIL-STD-704A
- Under Voltage Lockout
- Available as Standard Military Drawing

complex modeling allows design modifications to be examined. Contact Advanced Analog with specific requirements.

ASA28XXS Series Specifications

International
IRF Rectifier

| ABSOLUTE MAXIMUM RATINGS | |
|--------------------------|---|
| Input Voltage | -0.5 V to 50 V Continuous. 80 V, 100 mSec |
| Power Output | Internally limited (6.5 W typical) |
| Soldering | 300°C for 10 Sec. |
| Temperature Range | Operating -55°C to +125°C Case Storage -65°C to +150°C |

| TEST | Conditions -55° ≤ T _c ≤ +125°C V _{IN} = 28V dc ±5% C _L = 0 unless otherwise specified | Group A Subgroups | ASA2805S/xx | | ASA2812S/xx | | ASA2815S/xx | | Unit |
|---|---|----------------------|-------------|------|-------------|-------|-------------|-------|------------------|
| | | | Min | Max | Min | Max | Min | Max | |
| Output voltage | I _{OUT} = 0 | 1 | 4.95 | 5.05 | 11.88 | 12.12 | 14.85 | 15.15 | V |
| | | 2, 3 | 4.90 | 5.10 | 11.76 | 12.24 | 14.70 | 15.30 | |
| Output current ¹ | V _{IN} = 16, 28, and 40 V dc | 1, 2, 3 | | 1000 | | 417 | | 333 | mA |
| Output ripple voltage ² | V _{IN} = 16, 28 and 40 V dc | 1 | | 190 | | 200 | | 200 | mV _{pp} |
| | | 2, 3 | | 475 | | 290 | | 290 | |
| Line regulation | V _{IN} = 16, 28, and 40 V dc I _{OUT} = 0, 50%, 100% I _{MAX} | 1 | | 25 | | ±25 | | ±25 | mV |
| | | 2, 3 | | 50 | | ±50 | | ±50 | |
| Load regulation | V _{IN} = 16, 28, and 40 V dc I _{OUT} = 0, 50%, 100% I _{MAX} | 1 | | 25 | | ±25 | | ±25 | mV |
| | | 2, 3 | | 50 | | ±50 | | ±50 | |
| Input current | I _{OUT} = 0 Pin 5 to Pin 7 | 1, 2, 3 | | 18 | | 18 | | 18 | mA |
| | I _{OUT} = 0 Pin5 open | | | 50 | | 50 | | 50 | |
| Input ripple current ² | I _{OUT} = I _{MAX} | 1, 2, 3 | | 100 | | 100 | | 100 | mA _{pp} |
| Efficiency | I _{OUT} = I _{MAX} | 1 | 66 | | 71 | | 71 | | % |
| | | 2, 3 | | | 68 | | 68 | | |
| Isolation - Input to output or any pin to case | V _{TEST} 500 Vdc, Tc = +25°C | 1 | 100 | | 100 | | 100 | | MΩ |
| Capacitive load ^{3,4} | No effect on dc performance, Tc = +25°C | 4 | | 500 | | 200 | | 200 | μf |
| Power dissipation, load fault | Overload ⁵ | 1, 2, 3 | | 4.0 | | 4.0 | | 4.0 | W |
| | Short circuit | | | 2.0 | | 2.0 | | 2.0 | |
| Switching frequency ⁴ | I _{OUT} = I _{MAX} | 4, 5, 6 | 500 | 600 | 500 | 600 | 500 | 600 | KHz |
| Output response to step transient load changes ⁶ | ½ I _{MAX} ⇔ I _{MAX} | 4 | -300 | +300 | -450 | +450 | -400 | +450 | mV pk |
| | | 5, 6 | -450 | +450 | | | | | |
| | 0 mA ⇔ I _{MAX} | 4 | -500 | +500 | -750 | +750 | -800 | +750 | |
| | | 5, 6 | -750 | +700 | | | | | |
| Recovery time, step transient load changes | I _{OUT} = I _{MAX} | 4, 5, 6 | | 200 | | 100 | | 100 | μS |
| | 0 mA ⇔ ½ I _{MAX} | | | 1 | | 1 | | 1 | ms |
| Output response transient step line changes ^{4,8} | Input step 16 ⇔ 40 V dc I _{OUT} = I _{MAX} | 4, 5, 6 | | 500 | | 1000 | | 1000 | mV pk |
| Recovery time transient step line changes ^{4,7,8} | Input step 16 ⇔ 40 V dc I _{OUT} = I _{MAX} | 4, 5, 6 | | 800 | | 800 | | 800 | μS |
| Turn on overshoot | I _{OUT} = 0 mA, I _{MAX} | 4, 5, 6 | | 600 | | 600 | | 600 | mV pk |
| Turn on delay ⁹ | I _{OUT} = 0 or I _{MAX} | 4, 5, 6 | | 20 | | 25 | | 25 | ms |
| Load fault recovery ⁴ | | 4, 5, 6 | | 20 | | 25 | | 25 | ms |

For Notes to Specifications, refer to page 3

Notes to Specifications

1. Parameter guaranteed and measured during line and load regulation tests.
2. Bandwidth guaranteed by design. Tested for 20 kHz to 2 MHz.
3. Capacitive load may be any value from 0 to the maximum limit without compromising dc performance. A capacitive load in excess of the maximum limit will not disturb loop stability but may interfere with the operation of the load fault detection circuitry, appearing as a short circuit during turn-on.
4. Parameter shall be tested as part of design characterization and after design or process changes.
5. An overload is that condition of load in excess of rated load but less than that necessary to trigger the short circuit protection and is the condition of maximum power dissipation.
6. Load step transition time between 2 and 10 microseconds.
7. Recovery time is measured from the initiation of the transient to where V_{OUT} has returned to within ± 1 percent of V_{OUT} at 50 percent load.
8. Input step transition time between 2 and 10 microseconds.
9. Turn-on delay time measurement is for either a step application of power at the input or the removal of a ground signal from the inhibit pin (pin 2) while power is applied to the input.

Available Screening Levels and Process Variations for ASA28XXS Series

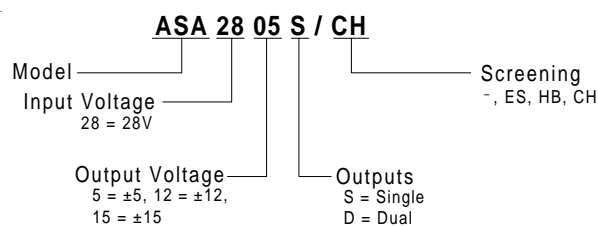
| Requirement | MIL-STD-883 Method | No Suffix | ES Suffix | HB Suffix | CH Suffix |
|----------------------------|--------------------|----------------|-----------------|------------------|------------------|
| Temperature Range | | -20°C to +85°C | -55°C to +125°C | -55°C to +125°C | -55°C to +125°C |
| Element Evaluation | | | | | MIL-PRF-38534 |
| Internal Visual | 2017 | * | ✓ | ✓ | ✓ |
| Temperature Cycle | 1010 | | Cond B | Cond C | Cond C |
| Constant Acceleration | 2001, | | 500g | Cond A | Cond A |
| Burn-in | 1015 | 48hrs @ 85°C | 48hrs @ 125°C | 160hrs @ 125°C | 160hrs @ 125°C |
| Final Electrical (Group A) | MIL-PRF-38534 | 25°C | 25°C | -55, +25, +125°C | -55, +25, +125°C |
| Seal, Fine & Gross | 1014 | Cond C | Cond A, C | Cond A, C | Cond A, C |
| External Visual | 2009 | * | ✓ | ✓ | ✓ |

* per Commercial Standards

Available Standard Military Drawing (SMD) Cross Reference

| | |
|-------------|--------------|
| ASA2805S/CH | 5962-9462901 |
| ASA2812S/CH | 5962-9463101 |
| ASA2815S/CH | 5962-9463001 |

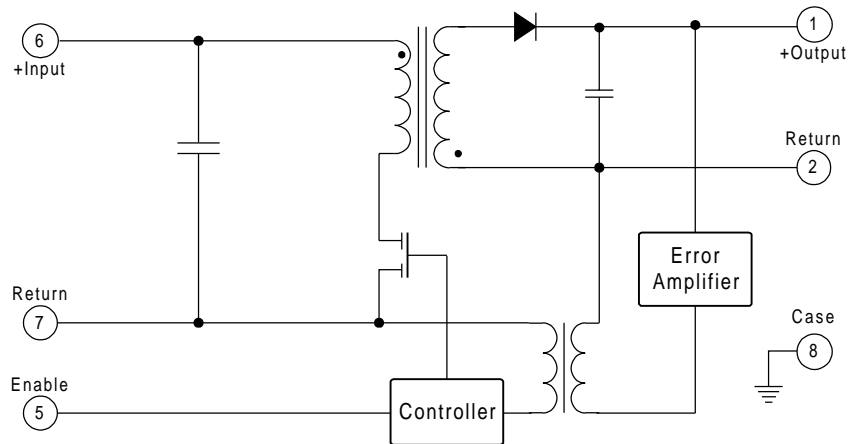
Part Numbering



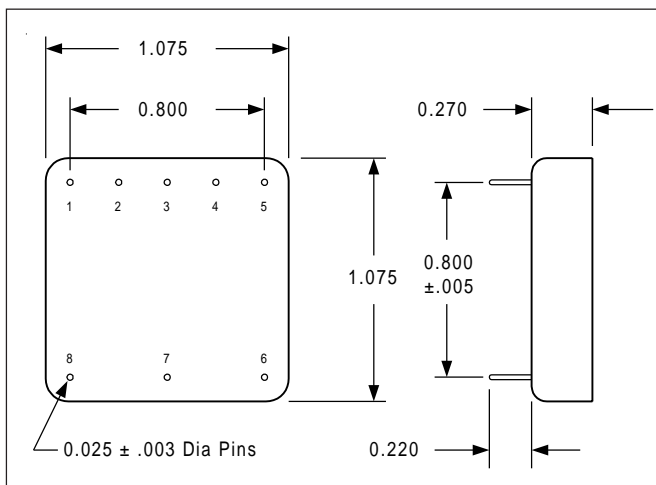
ASA28XXS Series

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ASA28XXS Block Diagram



ASA28XXS Case Outline



ASA28XXS Pin Designation

| Pin No. | Designation |
|---------|-----------------|
| 1 | Positive Output |
| 2 | Output Return |
| 3 | N/C |
| 4 | N/C |
| 5 | Enable |
| 6 | Positive Input |
| 7 | Input Return |
| 8 | Case |

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Visit us at www.irf.com for sales contact information.
Data and specifications subject to change without notice. 09/02