

## ADVANCED ANALOG HIGH RELIABILITY HYBRID DC/DC CONVERTERS

### Description

The ASA28XXD 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.

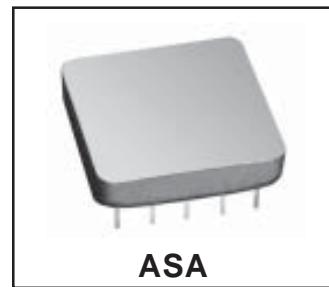
This device is designed to meet MIL-STD-704 input requirements offering full performance over a 16 to 40 volt input range. Output Power of up to 5 watts is available for either balanced or unbalanced loads.

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 $\mu$ 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 to enable Advanced Analog to deliver compliant devices. Three standard temperature grades are offered with the screening options. Refer to Part Number 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 can be accommodated. Extensive computer simulation using complex modeling enables rapid

### ASA28XXD SERIES

28V Input, Dual Output



### Features

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

design modification to be provided. Contact Advanced Analog with specific requirements.

## ASA28XXD Series Specifications

International  
I<sub>R</sub> 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°C ≤ T <sub>c</sub> ≤ +125°C V <sub>IN</sub> = 28V dc ±5% C <sub>L</sub> = 0 unless otherwise specified	Group A Subgroups	ASA2805D/XX		ASA2812D/XX		ASA2815D/XX		Unit
			Min	Max	Min	Max	Min	Max	
Output voltage	I <sub>OUT</sub> = 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 <sup>1, 2</sup>	V <sub>IN</sub> = 16, 28, and 40 V dc either output	1, 2, 3	200	1000	84	333	67	267	mA
Output ripple voltage <sup>3, 4</sup>	V <sub>IN</sub> = 16, 28 and 40 V dc	1, 2, 3		470		200		290	mV <sub>PP</sub>
Line regulation <sup>4</sup>	V <sub>IN</sub> = 16, 28, and 40 V dc I <sub>OUT</sub> = 0, 50%, 100% I <sub>MAX</sub>	1, 2, 3		50		50		50	mV
Load regulation <sup>4</sup>	V <sub>IN</sub> = 16, 28, and 40 V dc I <sub>OUT</sub> = 0, 50%, 100% I <sub>MAX</sub>	1, 2, 3		50		50		50	mV
Cross regulation <sup>5</sup>	20% to 80% load change	1, 2, 3		15		8.0		8.0	%
Input current	I <sub>OUT</sub> = 0 Pin 5 connected to pin 7	1, 2, 3		12		12		12	mA
	I <sub>OUT</sub> = 0 Pin 5 open			60		60		60	
Input ripple current <sup>3, 4</sup>	I <sub>OUT</sub> = I <sub>MAX</sub>	1, 2, 3		100		100		100	mA <sub>PP</sub>
Efficiency <sup>4</sup>	I <sub>OUT</sub> = I <sub>MAX</sub>	1, 3	70		71		71		%
		2	66		68		68		
Isolation	Input to output or any pin to case (except pin 8) at 500 V dc, T <sub>c</sub> = +25°C	1	100		100		100		MΩ
Capacitive load <sup>6, 7</sup>	No effect on dc performance, total for both outputs	4	200			200		200	μF
Power dissipation load fault	Overload <sup>8</sup>	1, 2, 3		4.0		4.0		4.0	W
	Short circuit			2.0		2.0		2.0	
Switching frequency <sup>4</sup>	I <sub>OUT</sub> = I <sub>MAX</sub>	4, 5, 6	500	600	500	600	500	600	KHz
Output response to step transient load changes <sup>4, 9</sup>	I <sub>OUT</sub> = 50% ⇔ 100% I <sub>MAX</sub>	4, 5, 6	-400	+400	-400	+400	-400	+400	mV pk
	I <sub>OUT</sub> = 0 ⇔ 50% I <sub>MAX</sub>		-800	+800	-800	+800	-800	+800	
Recovery time, step transient load changes <sup>4, 9, 10</sup>	I <sub>OUT</sub> = 50% ⇔ 100% I <sub>MAX</sub>	4, 5, 6		100		100		100	μS
	I <sub>OUT</sub> = 0 ⇔ 50% I <sub>MAX</sub>			2000		2000		2000	
Output response transient step line changes <sup>4, 7, 11</sup>	V <sub>IN</sub> = 16 ⇔ 40Vdc, I <sub>OUT</sub> = I <sub>MAX</sub>	4, 5, 6	-750	+750	-750	+750	-750	+750	mV pk
Recovery time transient step line changes <sup>4, 7, 10, 11</sup>	V <sub>IN</sub> = 16 ⇔ 40Vdc, I <sub>OUT</sub> = I <sub>MAX</sub>	4, 5, 6		1200		1200		1200	μS
Turn on overshoot <sup>4</sup>	I <sub>OUT</sub> = 0 and I <sub>MAX</sub>	4, 5, 6		600		600		600	mV pk
Turn on delay <sup>4, 12</sup>	I <sub>OUT</sub> = 0 and I <sub>MAX</sub>	4, 5, 6		25		25		25	ms
Load fault recovery <sup>7</sup>		4, 5, 6		25		25		25	ms

For Notes to Specifications, refer to page 3

Notes to Specifications

1. Parameter guaranteed by line, load, and cross regulation tests.
2. Up to 80 percent of full power is available from either output provided the total output does not exceed 5 W.
3. Bandwidth of DC to 20 MHz is guaranteed by design. Tested for 20 KHz to 2 MHz.
4. Load current split equally between  $+V_{OUT}$  and  $-V_{OUT}$ .
5. 1.0 watt load on output under test, 1.0 to 4.0 watt load change on other output.
6. 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.
7. Parameter shall be tested as part of design characterization and after design or process changes. Thereafter, parameters shall be guaranteed to the limits specified.
8. An overload is a condition with a load in excess of rated but less than that necessary to trigger the short circuit protection and is the condition of maximum power dissipation.
9. Load step transition time between 2 and 10 microseconds.
10. Recovery time is measured from the initiation of the transient to where  $V_{OUT}$  has returned to within  $\pm 1$  percent of  $V_{OUT}$  at 50 percent load.
11. Input step transition time between 2 and 10 microseconds.
12. Turn-on delay time measurements is for either a step application of power at the input or the removal of ground connection from enable pin (pin 5) with power applied to the input.

**Available Screening Levels and Process Variations for ASA28XXD Series**

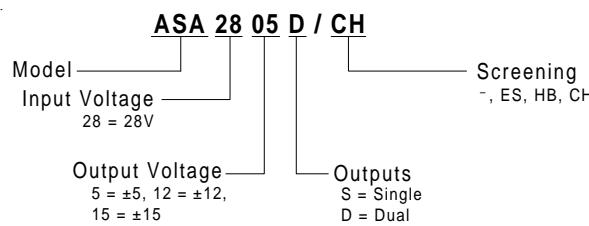
Requirement	MIL-STD-883 Method	No Suffix	ES Suffix	HB Suffix	CH Suffix
Temperature Range		-20°C to +85°C	-55°C to +125°C	-55°C to +125°C	-55°C to +125°C
Element Evaluation					MIL-PRF-38534
Internal Visual	2017	*	✓	✓	✓
Temperature Cycle	1010		Cond B	Cond C	Cond C
Constant Acceleration	2001,		500g	Cond 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**

ASA2812D/CH	5962-9564801
ASA2815D/CH	5962-9464901

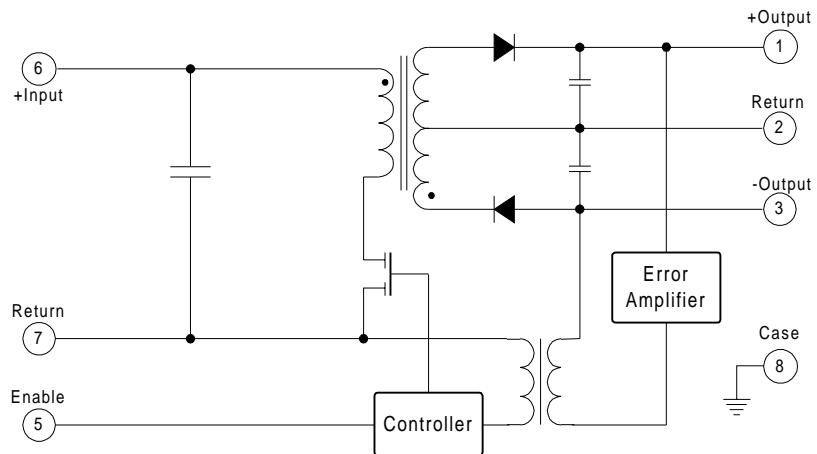
**Part Numbering**



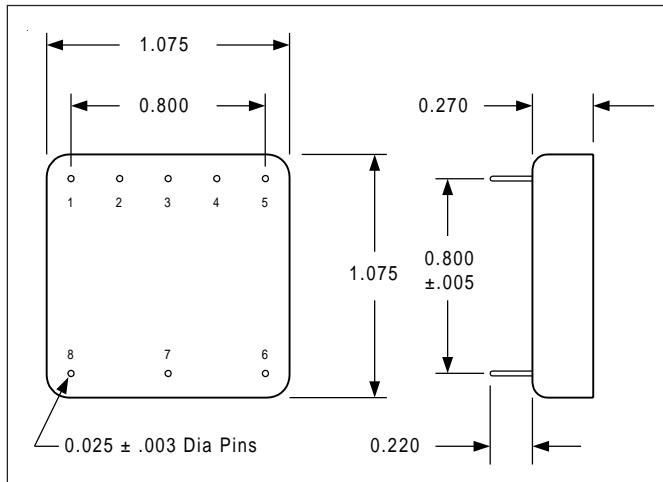
## ASA28XXD Series

International  
**IR** Rectifier

### ASA28XXD Block Diagram



### ASA28XXD Case Outline



### ASA28XXD Pin Designation

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

International  
**IR** Rectifier

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Visit us at [www.irf.com](http://www.irf.com) for sales contact information.

*Data and specifications subject to change without notice. 09/02*