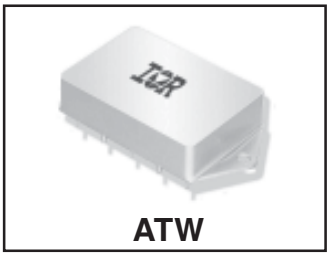
International
IOR Rectifier

PD-97418

ATW28300S
(IR P/N 10207)
28V Input, 300V Single Output

HYBRID HIGH-RELIABILITY DC-DC CONVERTER



ATW

Description

The ATW28300S DC-DC converter features high power density and an extended temperature range for use in military and industrial applications. Designed to MIL-STD-704D input requirements, this device operates with a nominal 28VDC input with an adjustable output of 150 to 300V via external potentiometer. The circuit design incorporates a pulse width modulated push-pull topology operating in the feed-forward mode at a nominal switching frequency of 270KHz. Input to output isolation is achieved through the use of transformers in the forward 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.

Manufactured in a facility fully qualified to MIL-PRF-38534, this converter is available in four screening grades to satisfy a wide range of requirements. The CH grade is fully compliant to the requirements of MIL-PRF-38534 for class H. The HB grade is processed and screened to the class H requirement, but may not necessarily meet all of the other MIL-PRF-38534 requirements, e.g., element evaluation and periodic inspection not required. Both grades are tested to meet the complete group "A" test specification over the full military temperature range without output power deration. Two grades with more limited screening are also available for use in less demanding applications. For screening options, refer to device screening table. Variations in electrical, mechanical and screening can be accommodated. Contact IR San Jose for special requirements.

Features

- 18V to 40VDC Input Range (28VDC Nominal)
- Short Circuit and Overload Protected
- 22.8W/in^3 Power Density
- 30W Output Power
- Adjustable Output Voltage
- Fast Loop Response
- Superior Transient Characteristics
- Operating Temperature Range of -55°C to +125°C
- Popular Industry Standard Pin-Out
- Resistance Seam Welded Case for Superior Long Term Hermeticity
- Shutdown from External Signal
- Full Military Screening
- MIL-PRF-38534 Compliant

Specifications

Absolute Maximum Ratings	
Input voltage	(-0.3V to +40V_{DC}) Continuous, (-0.5V to +50V_{DC}) Up to 1 second
Soldering temperature, Lead	300°C for 10 seconds
Operating case temperature	-55°C to +125°C
Storage case temperature	-65°C to +135°C

Electrical Performance Characteristics

Test	Symbol	Conditions -55°C ≤Tc ≤+125°C V_{IN}= 28V_{DC} ±5%, C_L = 0 R_{ADJ} = 455 Ohms Unless otherwise specified	Group A Subgroups	Limits		Unit
				Min	Max	
Output voltage Min [10]	V_{OUT} Min	V_{IN} = 18, 28, and 40V_{DC} I_{OUT} = 5.0mA, R_{ADJ} = 30 Ohms	1,2,3	130	145	V_{DC}
Output voltage Max [10]	V_{OUT} Max	V_{IN} = 18, 28, and 40V_{DC} I_{OUT} = 5.0mA, R_{ADJ} = 940 Ohms	1,2,3	305	320	V_{DC}
Output voltage stability		I_{OUT} = 100mA up to 1000 hrs	1,2,3		2.0	%
Output current [8]	I_{OUT}	V_{IN} = 18, 28, and 40V_{DC}	1,2,3	5.0	100	mA_{DC}
Output ripple voltage [7]	V_{RIP}	V_{IN} = 18, 28, and 40V_{DC}, Iout = 50mA, Iout = 100mA, B.W. = DC to 1.0MHz	1,2,3		1000	mVp-p
Output power [4, 8]	P_{OUT}	V_{IN} = 18, 28, 40V_{DC}. R_{ADJ} = 940 Ohms	1,2,3	30		W
Line regulation	VR_{LINE}	V_{IN} = 18, 28, and 40V_{DC}, I_{OUT} = 5.0, 50, and 100mA	1,2,3		1.0	%
Load regulation	VR_{LOAD}	V_{IN} = 18, 28, and 40V_{DC}, I_{OUT} = 5.0, 50, and 100mA	1,2,3		1000	mV
Input current	I_{IN}	I_{OUT} = 0, Enable (pin 2) tied to Input Return	1,2,3		18	mA_{DC}
		I_{OUT} = 0, Enable (pin2) = open	1,2,3		80	mA_{DC}
Input ripple current	I_{RIP}	I_{OUT} = 100mA	1,2,3		50	mAp-p
Efficiency	E_{FF}	I_{OUT} = 100mA, R_{ADJ} = 940 Ohms	1 2,3	80 78		%
Isolation	ISO	Input to output or any pin to case (except pin 2) at 500V_{DC}, Tc = 25°C	1	100		MΩ
Capacitive load [6, 9]	C_L	No effect on DC performance	4		10	µF
Power dissipation load fault	P_D	Overload [3]	1		14	W
		Short circuit	1		9.0	W
Switching frequency	F_S	I_{OUT} = 100mA	1,2,3	250	300	KHz
Output response to step transient load changes [5]	VO_{TLOAD}	50mA load to/from100mA load	4,5,6	-3.0	+3.0	Vpk
		5.0mA load to/from100mA load	4,5,6	-10	+10	Vpk
Recovery time step transient load changes [1, 5]	TT_{LOAD}	50mA load to/from100mA load	4,5,6		2.0	ms
		5.0mA load to/from100mA load	4,5,6		5.0	ms

For Notes to Specifications, refer to page 3

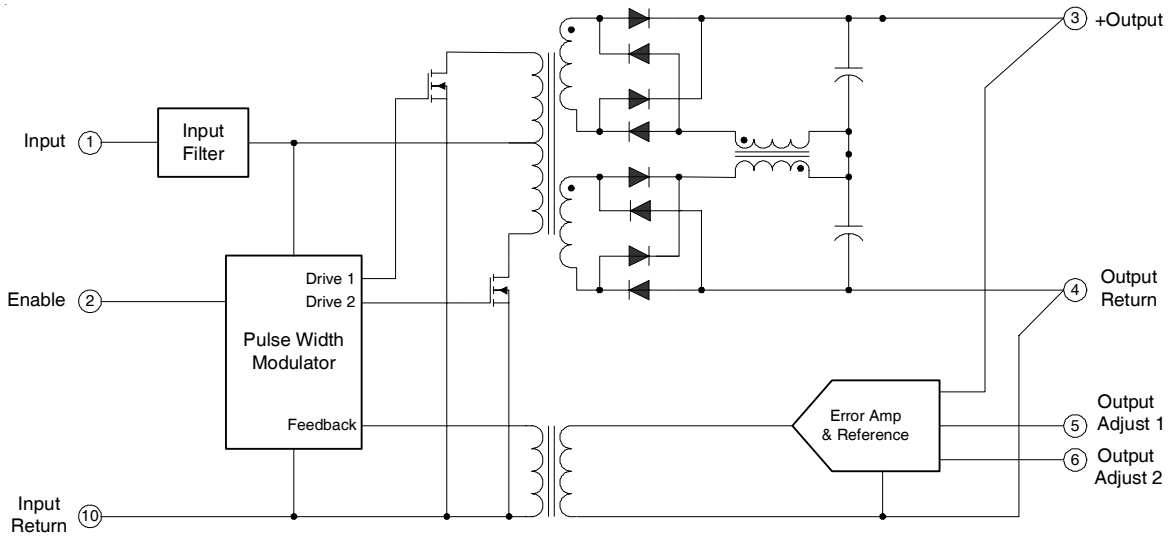
Electrical Performance Characteristics - continued

Test	Symbol	Conditions -55°C ≤Tc ≤+125°C V_{IN} = 28V_{DC} ±5%, C_L = 0 R_{ADJ} = 455 Ohms Unless otherwise specified	Group A Subgroups	Limits		Unit
				Min	Max	
Output response transient step line changes [5, 9]	VO_{TLINE}	Input step 18 to/from 40V_{DC}	4,5,6	-10	+10	Vpk
Recovery time transient step line changes [1, 5, 9]	TT_{LINE}	Input step 18 to/from 40V_{DC}	4,5,6		2.0	ms
Turn on overshoot	$VTon_{OS}$	I_{OUT} = 0 and 100mA, R_{ADJ} = 940 Ohms	4,5,6		20	Vpk
Turn on delay [2]	Ton_D	I_{OUT} = 0 and 100mA, R_{ADJ} = 940 Ohms	4,5,6		350	ms
Load fault recovery [9]	Tr_{LF}	V_{IN} = 18 to 40V_{DC}, R_{ADJ} = 940 Ohms	4,5,6		350	ms
Weight		Flange			75	g

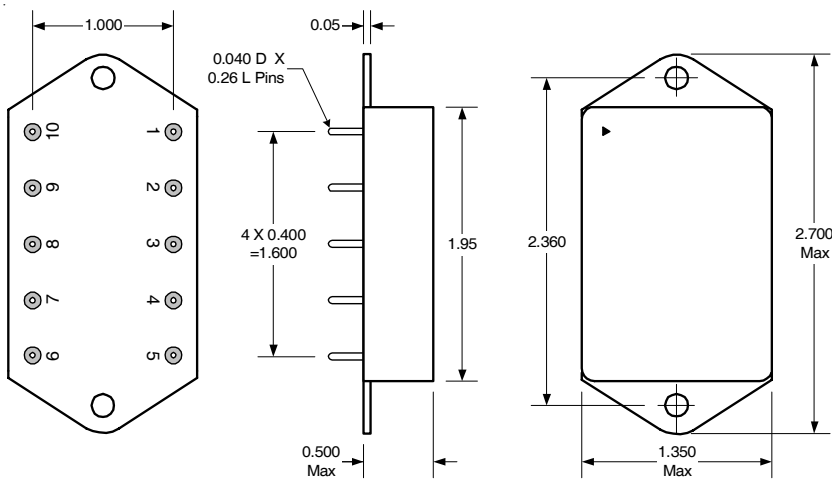
Notes to Specifications

1 Recovery time is measured from the initiation of the transient to where V_{OUT} has returned to within ±1.0% of V_{OUT} at 50% load.
2 Turn-on delay time measurement is for either a step application of power at the input or the removal of ground signal from the Enable pin (pin 2) while power is applied to the input.
3 An overload is that condition with a load in excess of the rated load but less than that necessary to trigger the short circuit protection and is a condition of maximum power dissipation.
4 Above +125°C case, derate output power linearly to 0 to +135°C case.
5 Transition time >10μs.
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 may disturb loop stability and may interfere with the operation of the load fault detection circuitry, appearing as an overload during turn-on.
7 Bandwidth guaranteed by design. Tested for 20KHz to 1.0MHz.
8 Parameter guaranteed by line and load regulation tests.
9 Parameter shall be tested as part of design characterization and after design or process changes. Thereafter parameters shall be guaranteed to the limits specified in this table.
10 Output voltage can be adjusted to the range of 150V to 300V with an external 1KOhms trim pot. The trim pot shall be connected to pin 5 (Output Adjust 1) and pin 6 (Output Adjust 2).

Block Diagram



Mechanical Outline



Notes:

1) All dimensions are in inches

2) The tolerance for X.XXX = ±0.005

Pin Designation

Pin #	Designation	Pin #	Designation
1	+Input	6	Output Adjust 2
2	Enable	7	Case
3	+ Output	8	N/C
4	Output Return	9	N/C
5	Output Adjust 1	10	Input Return

Device Screening

Requirement	MIL-STD-883 Method	No Suffix	ES ②	HB	CH
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	N/A	N/A	N/A	Class H
Non-Destructive Bond Pull	2023	N/A	N/A	N/A	N/A
Internal Visual	2017	①	Yes	Yes	Yes
Temperature Cycle	1010	N/A	Cond B	Cond C	Cond C
Constant Acceleration	2001, Y1 Axis	N/A	500 Gs	3000 Gs	3000 Gs
PIND	2020	N/A	N/A	N/A	N/A
Burn-In	1015	N/A	48 hrs@hi temp	160 hrs@125°C	160 hrs@125°C
Final Electrical (Group A)	MIL-PRF-38534 & Specification	25°C	25°C ②	-55°C, +25°C, +125°C	-55°C, +25°C, +125°C
PDA	MIL-PRF-38534	N/A	N/A	N/A	10%
Seal, Fine and Gross	1014	Cond A	Cond A, C	Cond A, C	Cond A, C
Radiographic	2012	N/A	N/A	N/A	N/A
External Visual	2009	①	Yes	Yes	Yes

Notes:
① Best commercial practice
② Sample tests at low and high temperatures

Part Numbering

ATW 28 300 S /CH

- Model
- Input Voltage Nominal
  28 = 28V
- Output Voltage
  300 = 300V
- Output
  S = Single
- Screening Level
  (Please refer to Screening Table)
  No Suffix, ES, HB, CH

Part Definition

IR P/N 10207EM = ATW28300S/ES
IR P/N 10207FM = ATW28300S/HB

International
IOR Rectifier

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Data and specifications subject to change without notice. 12/2010