LAMBDA ADVANCED ANALOG INC. 🖄

ATR2800T Series

DESCRIPTION

The ATR2800T Series of DC/DC converters provide 30 watts of output power over the full military temperature range with no derating. These devices are pin compatible with the Lambda Advanced Analog ATO series converters but offer twice the maximum output power in a lower profile package. A custom CMOS ASIC pulse width modulator operating at a nominal switching frequency of 550KHz combined with a unique magnetic feedback circuit reduces circuit complexity for enhanced reliability. These converters provide 500 volt input to output isolation and operate in highly efficient single forward mode.

The advanced feedback design and high operating frequency provide an extremely wide bandwidth control loop with high gain and phase margin. This results in fast dynamic line and load response as well as superior audio rejection. The control loop is compensated to provide optimum performance over the full military temperature range and over the 16 to 40 volt input voltage range.

These converters are protected against both continuous output short circuits and output overload. Either load fault condition will result in operating in a low power dissipation foldback mode. The converters will shut down for approximately 15 milliseconds, then attempt to restart. This cycle will continue indefinitely unless the load fault is corrected. Recovery to normal operation is automatic upon removal of the load fault.

Manufactured in a facility fully qualified to MIL-PRF-38534, these converters are 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 Inspections (PI) 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. Variations in electrical, mechanical Hybrid - High Reliability High Power Triple Output DC/DC Converters

and screening can be accommodated. Contact Lambda Advanced Analog with specific requirements.

FEATURES

- 30 Watt Output Power
- Flexible Output Loading
- -55 to +125°C Operation
- Pin Compatible With ATO
- 0.410" Maximum Height
- 16 to 40 Volt Input Range
- 500 Volt Input to Output Isolation
- High Audio Rejection
- MIL-STD-704 Compatible
- Load Fault Protection Short Circuit and Overload
- TTL Level Compatible Synchronization

SPECIFICATIONS

TCASE = -55° C to $+125^{\circ}$ C, VIN = +28 V $\pm 5\%$ unless otherwise specified

ABSOLUTE MAXIMUM RATINGS¹

Input Voltage Range
Power Dissipation
Lead Temperature
Storage Temperature

-0.5 VDC to +50 VDC 14W +300°C -65°C to 150°C case

		Conditions		ATR2812T		ATR2815T	
Test	Symbol	-55° C - Tc - +125°C, VIN = 28 VDC	Limits Min Max		Limits Min Max		Units
STATIC CHARACTERISTI	CS	±5%, CL=0, unless otherwise specified		WIAX	IVIIII	WIAX	
OUTPUT Voltage ¹	Vout	Iou⊤ = 0 (main) +25°C over temperature range	4.95 4.90	5.05 5.10	4.95 4.90	5.05 5.10	Vdc Vdc
0 11224	1	IOUT = 0 (dual) ¹ +25°C over temperature range	±11.88 ±11.76	±12.12 ±12.24	±14.85 ±14.70	±15.15 ±15.30	VDC VDC
		VIN = 16, 28, and 40 VDC (main) $VIN = 16, 28, and 40 VDC (dual)^{1}$	0.0	4000 ±625	100.0 0.0	4000 ±500	mA mA
Ripple Voltage ^{1,3}	VRIP	$V_{IN} = 16, 28, and 40 VDC (dual)BW = 20 Hz to 2 MHz (main)V_{IN} = 16, 28, and 40 VDCBW = 20 Hz to 2 MHz (dual)$		60 40		60 40	mV p-p mV p-p
REGULATION Line ^{1,3}	VRLINE	$V_{IN} = 16, 28, and 40 V_{DC}$ $P_{OUT} = .5, 10, 20 W (main)$ $V_{IN} = 16, 28, and 40 V_{DC} (dual)$		±25		±25	mV
Load ^{1,3}		$P_{OUT} = 0, 20, and 40 VDC (dual)$ $P_{OUT} = 0, 5, 10 watts (dual)^{12}$ $V_{IN} = 16, 28, and 40 VDC$		±60		±75	mV
	POUT = 10, 20, and 10 VIC POUT = .5, 10, 20 W (main) $V_{IN} = 16, 28, and 40 VDc$			±50		±50	mV
		1 001 – 0, 3, 10 watts (ddal)		±00		110	111 V
Current Ripple Current⁴	lin Irip	louτ = 0, inhibit (pin 8) tied to input return (pin 10) louτ = 0, inhibit (pin 8) = open louτ = 4000 mA (main)		15 75		15 75	mA mA
		'ουτ = 10 W (dual) ¹² 3W = 20 Hz to 2 MHz		50		50	mA p-p
EFFICIENCY	Eff	lout = 4000 mA (main) +25°C over temperature range Pout = 10 W (dual) ¹²			75 72		%
ISOLATION	lso	input to output or any pin to case (except pin 8) at 500 TC = +25°C			100		M Ohms
LOAD FAULT POWER DISSIPATION ³	PD	Overload Short circuit		14 9		14 9	W W
SWITCHING FREQUENCY	Fs		500	600	500	600	KHz
SYNC FREQ. RANGE	Fsync	50% load to/from 100% load no load to/from 50% load	500	700	500	700	KHz
INHIBIT OPEN CIRCUIT VOLTAGE	Voi		9	13	9	13	V
OUTPUT RESPONSE TO Step transient load changes ⁷	VOTLOAD	50% load to/from 100% load no load to/from 50% load		+500 +1000	-500 -1000	+500 +1000	mV pk
RECOVERY TIME STEP Step transient load changes ^{7,8}	TTLOAD	50 percent load to/from 100 percent load No load to 50 percent load 50 percent load to no load		200 5 10		200 5 10	µs ms ms

SPECIFICATIONS

TCASE = -55°C to +125°C, VIN = +28 V ±5% unless otherwise specified

ABSOLUTE MAXIMUM RATINGS Input Voltage Power Output Soldering Temperature Range⁶

-0.5 V to +50 V Internally limited, 17.5W typical 300°C for 10 seconds Operating -55°C to 135°C case Storage -65°C to +135°C

		Conditions	ATR	2812T	ATR2	815T	
		-55°C - Tc - +125°C, VIN = 28 VDC	Limits		Limits		Units
Test	Symbol	\pm 5%, CL=0, unless otherwise specified	Min	Max	Min	Max	
STATIC CHARACTERISTICS							
OUTPUT RESPONSE TO Transient step ⁹ Line changes ¹⁰	VOTLINE	Input step 16 from/to 40VDC IOUT = 4000 mA (main) Pout = 10 W (dual)		±1500		±1500	mV pk
RECOVERY TIME ⁸ Transient step ⁹ Line changes ¹⁰	TTLINE	Input step 16 form/to 40VDC IOUT = 4000 mA (main) Pout = 10 W (dual)		10		10	ms
TURN ON OVERSHOOT ¹	VTONos	louт = 0 and 4000 mA (main) Роит = 0, 10 W (dual)		1000		1000	mV pk
TURN ON DELAY ^{1,11}							
	TOND	lout = 0 and 4000 mA (main) Pout = 0, 10 W (dual)		25		25	ms
LOAD FAULT RECOVERY ¹⁰							
				25		25	ms

Notes:

- 1. Tested at each output.
- 2. Parameter guaranteed by line and load regulation tests.
- Although operation with no load is permissible, light loading on the main (+5 volt) output may cause the output voltage of the auxiliary outputs (±12 volt or ±15 volt) to drop out of regulation. It is therefore recommended that at least 100 mA or 20 percent of the output power, whichever is greater, be taken from the main (+5 volt) output.
- 4. Total combined output power 30 watts.
- 5. Bandwidth guaranteed by design. Tested for 20 KHz to 2 MHz.
- 6. An overload is that condition with a load in excess of the rated load but less than that necessary to trigger the overload protection circuit and is the condition of maximum power dissipation.
- 7. Load step transition time between 2 and 10 microseconds.
- 8. Recovery time is measured from the initiation of the transient to where Vout has returned to within ±1 percent of Vout at 50 percent load.
- 9. Input step transition time between 2 and 10 microseconds.
- 10. 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 the table.
- 11. 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 8) while power is applied to the input.



Available Screening Levels and Process Variations for ATR Series

Requirement	MIL-STD-883 method	No Suffix	ES Suffix	HB Suffix	CH Suffix
Temperature Range		-55°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	◆	~	v	v
Temperature Cycle	1010, Cond C		Cond A	v	v
Constant Acceleration	2001, Cond A		500g	5,000g	5,000g
Burn-in	1015		96hrs @125°C	160hrs @125°C	160hrs @125°C
Final Electrical (Group A)	Specification	25°C	25°C	-55, +25, +125°C	-55,+25, +125°C
Seal, Fine & Gross	1014		~	 ✓ 	v
External Visual	2009	◆	✓	 ✓ 	v

♦ per Commercial Standards

STANDARDIZED MILITARY DRAWING CROSS REFERENCE

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN
5962-9315801HXX	52467	ATR2812T/CH
5962-9315801HZX	52467	ATR2812TF/CH
5962-9215901HXX	52467	ATR2815T/CH
5962-9215901HZX	52467	ATR2815TF/CH

NOTES

 $^{\rm C}{\rm Lambda}$ Advanced Analog

The information in this data sheet has been carefully checked and is believed to be accurate; however no responsibility is assumed for possible errors. These specifications are subject to change without notice.

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