PRELIMINARY

AIF28515Q

Quad Output, Hybrid - High Reliability
DC/DC Converter

DESCRIPTION

The AIF28515 DC/DC converter features an internal EMI filter and four high performance outputs to obtain a moderate power density without derating over the full military temperature range. This device also offers input conditioning for operation from nominal +28 volt, MIL-STD 704A input power. This series incorporates Lambda Advanced Analog's proprietary magnetic pulse feedback technology providing optimum dynamic line and load regulation response. This feedback system samples the output voltage at the pulse width modulator fixed clock frequency, nominally 600 KHz. Undervoltage lockout, soft-start and load fault protection are provided on this device.

These converters are hermetically packaged in an enclosure of modest dimension, utilizing copper core pins to minimize resistive DC losses. These pin leads are each fabricated with Lambda Advanced Analog's rugged ceramic lead-to-package seal assuring long term hermeticity in the most harsh environments.

Manufactured in a facility fully qualified to MIL-PRF-38534, these converters are available in several screening grades to satisfy a range of requirements. The HB grade is fully processed and screened to the class H requirement of MIL-PRF-38534, but does not have material element evaluated to the class H requirement. This grade is tested to meet the complete group "A" test specification over the full military temperature range without output power deration. Two additional grades with more modest screening are also available for use in less demanding applications. Variations in electrical, mechanical and screening can be accommodated. Contact Lambda Advanced Analog for special requirements.

FEATURES

- **18 To 50 Volt Continuous Input Range**
- **Internal MIL-STD-461 Input EMI**
- **Compatible with MIL-STD-704A Power Bus**
- **45 Watts Output Power**
- **Moderate Power Density ≈ 15 W / in^3**
- **Low Profile Seam Welded Package**
- **Ceramic Feedthru Copper Core Pins**
- **Operation Over Full Military Temperature Range**
- **Continuous Short Circuit and Overload Protection**
- **MIL-HDBK-217F, N2 MTBF of 50K hours at 71ºC, AUF**
- **Device Weight < 100 gms**
- **100 MΩ Isolation, Input to Output and Case**

ABSOLUTE MAXIMUM RATINGS

Input Voltage	-0.5 V to 50 V Continuous +80 V for 100mSec	
Soldering Temperature	300°C for 10 seconds	
Case Temperature	Operating Storage	-55°C to +125°C -65°C to +135°C

Static Characteristics

-55°C ≤ T_{CASE} ≤ +125°C, 18 ≤ V_{IN} ≤ 50 unless otherwise specified.

Parameter	Group A Subgroups	Test Conditions	Min	Nom	Max	Unit
INPUT VOLTAGE		Note 6	18	28	50	V
OUTPUT VOLTAGE		V_{IN} = 28 Volts, 100% Load				
	1	Positive Output 1	4.95	5.00	5.05	V
	1	Negative Output 1	-5.05	-5.00	-4.95	V
	1	Positive Output 2	14.55	15.00	15.45	V
	1	Negative Output 2	-15.45	-15.00	-14.55	V
	2, 3	Positive Output 1	4.90		5.10	V
	2, 3	Negative Output 1	-5.10		-4.90	V
	2, 3	Positive Output 2	14.70		15.30	V
	2, 3	Negative Output 2	-15.30		-14.70	V
OUTPUT CURRENT		V_{IN} = 18, 28, 50 Volts - Notes 6, 11				
		Positive Output 1				A
		Negative Output 1				A
		Either Output 2				A
OUTPUT POWER		Total of All Outputs. Notes 6, 11	45			W
OUTPUT VOLTAGE TEMPERATURE COEFFICIENT		V_{IN} = 28 Volts, 100% Load - Notes 1, 6				
		Positive Output 1	-0.025		+0.025	%/°C
		All other Outputs	–0.075		+0.075	
OUTPUT VOLTAGE REGULATION		Note 10				
Line	1, 2, 3	No Load, 50% Load, 100% Load	-10.0		+10.0	mV
Load	1, 2, 3	V_{IN} = 18, 28, 50 Volts	-1.0		+1.0	%
Cross	1, 2, 3		-1.0		+1.0	%
OUTPUT RIPPLE VOLTAGE		V_{IN} = 18, 28, 50 Volts, 100% Load, BW = 10MHz				
	1, 2, 3	Positive Output 1			30	mV_{pp}
		Negative Output 1			50	mV_{pp}
		Eother Output 2			100	mV_{pp}
INPUT CURRENT		V_{IN} = 28 Volts, I_{OUT} = 0				
No Load	1				100	MA
	2, 3				120	mA
INPUT RIPPLE CURRENT	1, 2, 3	V_{IN} = 28 Volts, 100% Load, BW = 10MHz			60	mA_{pp}
LOAD FAULT POWER DISSIPATION	1, 2, 3	V_{IN} = 28 Volts			32	W
EFFICIENCY	1, 2, 3	100% Load	63			%
SWITCHING FREQUENCY	1, 2, 3		560	600	640	KHz
CURRENT LIMIT POINT		V_{OUT} = 90% V_{NOM} , V_{IN} = 28 Volts, Note 5				
		Positive Output 1	6.8	7.2	7.6	A
		Negative Output 1	0.45	0.48	0.51	A
		Positive Output 2	0.57	0.60	0.63	A
		Negative Otput 2	0.57	0.60	0.63	A

Dynamic Characteristics -55°C ≤ T_{CASE} ≤ +125°C, V_{IN} = 28 Volts unless otherwise specified.

Parameter	Group A Subgroups	Test Conditions	Min	Nom	Max	Unit
LOAD TRANSIENT RESPONSE		Note 2, 8				
Positive Output 1 Amplitude	4, 5, 6	Load Step 50% ⇔ 100%	-250		250	mV
Recovery	4, 5, 6				250	µSec
Amplitude	4, 5, 6	Load Step 10% ⇔ 50%	-250		250	mV
Recovery	4, 5, 6				250	µSec
Negative Output 1 Amplitude	4, 5, 6	Load Step 50% ⇔ 100%	-40		40	mV
Recovery	4, 5, 6				200	µSec
Amplitude	4, 5, 6	Load Step 10% ⇔ 50%	-40		40	mV
Recovery	4, 5, 6				200	µSec
Positive Output 2 Amplitude	4, 5, 6	Load Step 50% ⇔ 100%	-500		500	mV
Recovery	4, 5, 6				200	µSec
Amplitude	4, 5, 6	Load Step 10% ⇔ 50%	-500		500	mV
Recovery	4, 5, 6				200	µSec
Negative Output 2 Amplitude	4, 5, 6	Load Step 50% ⇔ 100%	-500		500	mV
Recovery	4, 5, 6				200	µSec
Amplitude	4, 5, 6	Load Step 10% ⇔ 50%	-500		500	mV
Recovery	4, 5, 6				200	µSec
LINE TRANSIENT RESPONSE		Note 1, 2, 3				
Amplitude		V_{IN} Step = 18 ⇔ 50 Volts	-200		200	mV
Recovery					500	µSec
TURN-ON CHARACTERISTICS		V_{IN} = 18, 28, 50 Volts. Note 4				
Overshoot	4, 5, 6				250	mV
Delay	4, 5, 6		2		15	mSec
LOAD FAULT RECOVERY		Same as Turn On Characteristics.			5	mSec
LINE REJECTION		MIL-STD-461D, CS101, 30Hz to 50KHz Note 1	45	50		dB
CONDUCTED EMISSIONS		MIL-STD-461C, N2, 10 KHz – 50 MHz	< 20			DB Over Spec Limit

Notes to Specifications:

1. Parameters not 100% tested but are guaranteed to the limits specified in the table.
2. Recovery time is measured from the initiation of the transient to where V_{OUT} has returned to within ±1% of V_{OUT} at 50% load.
3. Line transient transition time ≥ 100 µSec.
4. Turn-on delay is measured with an input voltage rise time of between 100 and 500 volts per millisecond.
5. Current limit point is that condition of excess load causing output voltage to drop to 90% of nominal.
6. Parameter verified as part of another test.
7. All electrical tests are performed with the remote sense leads connected to the output leads at the load.
8. Load transient transition time ≥ 12 µSec.
9. Enable inputs internally pulled high. Nominal open circuit voltage ≈ 4.0VDC.
10. Load regulation is tested with 50%load on the outputs not being tested.
11. Output load must be distributed so that a miniimum of 20% of the total output power is being provided by one of the outputs.
12. Cross regulation measured with load on tested output at 50% of maximum load while changing the load on the other outputs from 10% to 50%.

Insert Case Drawing Here

AIF28515Q Pin Designation

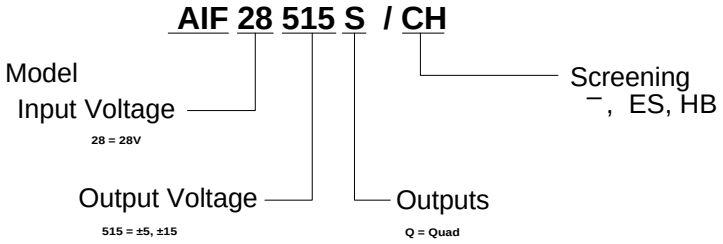
Pin No.	Designation
1	N/C
2	N/C
3	N/C
4	N/C
5	+28 V Input
6	Input Return
7	Positive Output 1
8	Output 1 Return
9	Negative Output 1
10	Positive Output 2
11	Output 2 Return
12	Negative Output 2

Available Screening Levels and Process Variations for AIF28515Q Converters

Requirement	MIL-STD-883 Method	No Suffix	ES Suffix	HB Suffix
Temperature Range		-20°C to +85°C	-55°C to +125°C	-55°C to +125°C
Element Evaluation				
Internal Visual	2017			
Temperature Cycle	1010		Cond B	Cond C
Constant Acceleration	2001,		500g	Cond A
Burn-in	1015		96hrs @ 125°C	160hrs @ 125°C
Final Electrical (Group A)	MIL-PRF-38534 Specification	25°C	25°C	-55, +25, +125°C
Seal, Fine & Gross	1014	Cond C	Cond A, C	Cond A, C
External Visual	2009			

per Commercial Standards

Part Numbering



LAMBDA ADVANCED ANALOG INC. ⚠

MIL-PRF-38534 Qualified
ISO 9001 Registered

2270 Martin Avenue
Santa Clara CA 95050-2781
(408) 988-4930 FAX (408) 988-2702