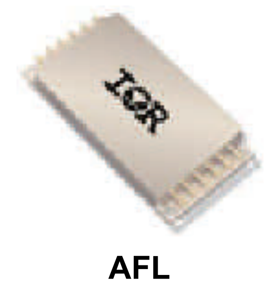
PD-94457D

AFL50XXS SERIES

HYBRID-HIGH RELIABILITY DC-DC CONVERTER

50V Input, Single Output


AFL

Description

The AFL Series of DC-DC converters feature high power density with no derating over the full military temperature range. This series is offered as part of a complete family of converters providing single and dual output voltages and operating from nominal+28V, +50V, +120V or +270V inputs with output power ranging from 80W to 120W. For applications requiring higher output power, individual converters can be operated in parallel. The internal current sharing circuits assure equal current distribution among the paralleled converters. This series incorporates International Rectifier'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 550 kHz. Multiple converters can be synchronized to a system clock in the 500 kHz to 700 kHz range or to the synchronization output of one converter. Under voltage lockout, primary and secondary referenced inhibit, soft-start and load fault protection are provided on all models.

These converters are hermetically packaged in two enclosure variations, utilizing copper core pins to minimize resistive DC losses. Three lead styles are available, each fabricated with International Rectifier's rugged ceramic lead-to-package seal assuring long term hermetically in the most harsh environments.

Manufactured in a facility fully qualified to MIL-PRF-38534, these converters are fabricated utilizing DLA Land and Maritime qualified processes. For available screening options, refer to device screening table in the data sheet.

Variations in electrical, mechanical and screening specifications can be accommodated. Contact IR HiRel San Jose for special requirements.

Features

- 30V To 80V Input Range
- 5V, 8V, 9V, 12V, 15V and 28V Outputs Available
- High Power Density - up to 84 W/in3
- Up To 120W Output Power
- Parallel Operation with Stress and Current Sharing
- Low Profile (0.380") Seam Welded Package
- Ceramic Feed thru Copper Core Pins
- High Efficiency - to 85%
- Full Military Temperature Range
- Continuous Short Circuit and Overload Protection
- Remote Sensing Terminals
- Primary and Secondary Referenced Inhibit Functions
- Line Rejection > 40dB - DC to 50 kHz
- External Synchronization Port
- Fault Tolerant Design
- Dual Output Versions Available
- Standard Microcircuit Drawings Available

Specifications

Absolute Maximum Ratings	
Input voltage	-0.5V_{DC} to +80V_{DC}
Soldering temperature	300°C for 10 seconds
Operating case temperature	-55°C to +125°C
Storage case temperature	-65°C to +135°C

Static Characteristics -55°C $\leq T_{CASE} \leq$ +125°C, 30V $\leq V_{IN} \leq$ 80V unless otherwise specified.

Parameter	Group A Subgroups	Test Conditions	Min	Nom	Max	Unit
Input voltage		Note 6	30	50	80	V
Output voltage						
AFL5005S	1	V_{IN} = 50 Volts, 100% Load	4.95	5.00	5.05	V
AFL5008S	1		7.92	8.00	8.08	
AFL5009S	1		8.91	9.00	9.09	
AFL5012S	1		11.88	12.00	12.12	
AFL5015S	1		14.85	15.00	15.15	
AFL5028S	1		27.72	28.00	28.28	
AFL5005S	2, 3		4.90		5.10	
AFL5008S	2, 3		7.84		8.16	
AFL5009S	2, 3		8.82		9.18	
AFL5012S	2, 3		11.76		12.24	
AFL5015S	2, 3		14.70		15.30	
AFL5028S	2, 3		27.44		28.56	
Output current						
AFL5005S		V_{IN} = 30, 50, 80 Volts - Note 6			16	A
AFL5008S					10	
AFL5009S					10	
AFL5012S					9.0	
AFL5015S					8.0	
AFL5028S					4.0	
Output power						
AFL5005S		Note 6			80	W
AFL5008S					80	
AFL5009S					90	
AFL5012S					108	
AFL5015S					120	
AFL5028S					112	
Maximum capacitive load		Note 1	10,000			µF
Output voltage temperature coefficient		V_{IN} = 50 Volts, 100% Load Notes 1, 6	-0.015		+0.015	%/°C
Output voltage regulation						
AFL5028S Line	1, 2, 3	No Load, 50% Load, 100% Load V_{IN} = 30, 50, 80 Volts	-70		+70	mV
All Others Line	1, 2, 3		-20		+20	mV
Load	1, 2, 3		-1.0		+1.0	%
Output ripple voltage						
AFL5005S	1, 2, 3	V_{IN} = 30, 50, 80 Volts, 100% Load, BW = 10MHz			30	mVpp
AFL5008S	1, 2, 3				40	
AFL5009S	1, 2, 3				40	
AFL5012S	1, 2, 3				45	
AFL5015S	1, 2, 3				50	
AFL5028S	1, 2, 3				100	

For Notes to Static Characteristics, refer to page 4

Static Characteristics (Continued) -55°C < T_{CASE} ≤ +125°C, 30V≤ V_{IN} < 80V unless otherwise specified..

Parameter	Group A Subgroups	Test Conditions	Min	Nom	Max	Unit
Input current		V_{IN} = 50 Volts				
No Load	1	I_{OUT} = 0 (All models except			50	mA
	2, 3	AFL5015S & AFL5028S)			60	
No Load	1	I_{OUT} = 0 (AFL5015S& AFL5028S)			60	
	2, 3				65	
Inhibit 1	1, 2, 3	Pin 4 Shorted to Pin 2			5.0	
Inhibit 2	1, 2, 3	Pin 12 Shorted to Pin 8			5.0	
Input ripple current						
AFL5005S	1, 2, 3	V_{IN} = 50 Volts, 100% Load, BW = 10MHz			60	mApp
AFL5008S	1, 2, 3				60	
AFL5009S	1, 2, 3				60	
AFL5012S	1, 2, 3				60	
AFL5015S	1, 2, 3				60	
AFL5028S	1, 2, 3				60	
Current limit point As a percentage of full rated load	1	V_{OUT} = 90% V_{NOM} , V_{IN} = 50 Volts Note 5	115		125	%
	2		105		115	
	3		125		140	
Load fault power dissipation Overload or short circuit	1, 2, 3	V_{IN} = 50 Volts			32	W
Efficiency						
AFL5005S	1, 2, 3	V_{IN} = 50 Volts, 100% Load	78	81		%
AFL5008S	1, 2, 3		79	82		
AFL5009S	1, 2, 3		80	83		
AFL5012S	1, 2, 3		81	84		
AFL5015S	1, 2, 3		82	85		
AFL5028S	1, 2, 3		82	84		
Enable inputs (Inhibit function)						
Converter off	1, 2, 3	Logical Low on Pin 4 or Pin 12,	-0.5		0.8	V
Sink current		Note 1			100	µA
Converter on	1, 2, 3	Logical High on Pin 4 and Pin 12 - Note 9	2.0		50	V
Sink current		Note 1			100	µA
Switching frequency	1, 2, 3		500	550	600	kHz
Synchronization input						
Frequency range	1, 2, 3		500		700	kHz
Pulse amplitude, Hi	1, 2, 3		2.0		10	V
Pulse amplitude, Lo	1, 2, 3		-0.5		0.8	V
Pulse rise time		Note 1			100	ns
Pulse duty cycle		Note 1	20		80	%
Isolation	1	Input to Output or Any Pin to Case (except Pin 3). Test @ 500V_{DC}	100			MΩ
Device weight		Slight Variations with Case Style		85		g
MTBF		MIL-HDBK-217F, AIF @ T_C = 40°C	300			kHrs

For Notes to Static Characteristics, refer to page 4

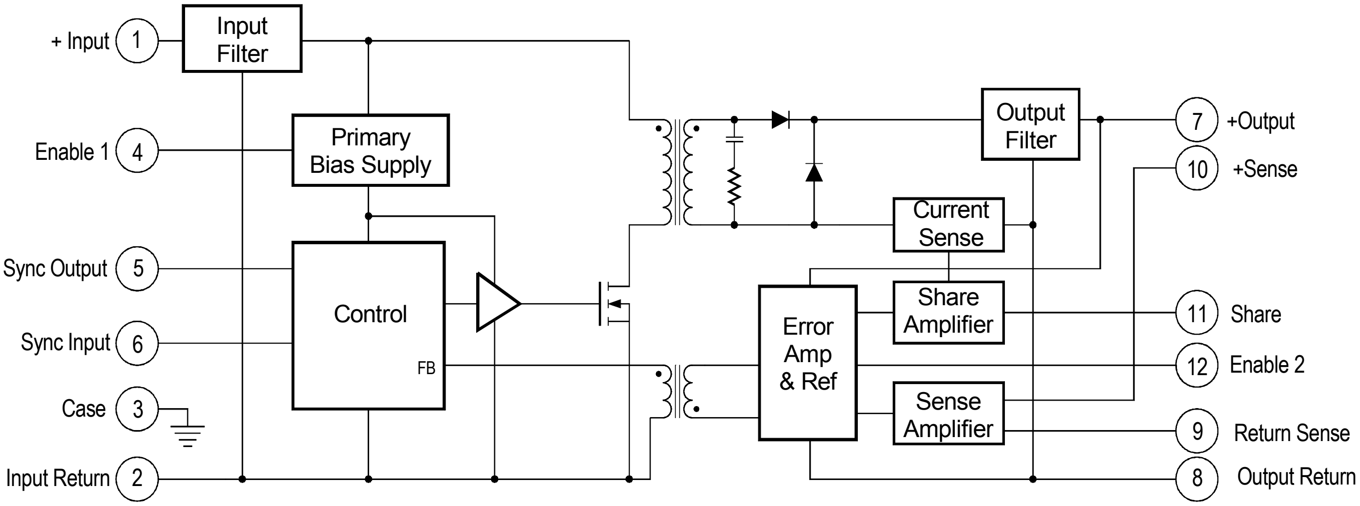
Dynamic Characteristics $-55°C \leq T_{CASE} \leq +125°C, V_{IN} = 50V$ unless otherwise specified.

Parameter		Group A Subgroups	Test Conditions	Min	Nom	Max	Unit
Load transient response			Notes 2, 8				
AFL5005S	Amplitude	4, 5, 6	Load Step 50% 100%	-450		450	mV
	Recovery	4, 5, 6				200	µs
	Amplitude	4, 5, 6	Load Step 10% 50%	-450		450	mV
	Recovery	4, 5, 6				300	µs
AFL5008S	Amplitude	4, 5, 6	Load Step 50% 100%	-500		500	mV
	Recovery	4, 5, 6				200	µs
	Amplitude	4, 5, 6	Load Step 10% 50%	-500		500	mV
	Recovery	4, 5, 6				300	µs
AFL5009S	Amplitude	4, 5, 6	Load Step 50% 100%	-600		600	mV
	Recovery	4, 5, 6				200	µs
	Amplitude	4, 5, 6	Load Step 10% 50%	-600		600	mV
	Recovery	4, 5, 6				300	µs
AFL5012S	Amplitude	4, 5, 6	Load Step 50% 100%	-750		750	mV
	Recovery	4, 5, 6				200	µs
	Amplitude	4, 5, 6	Load Step 10% 50%	-750		750	mV
	Recovery	4, 5, 6				300	µs
AFL5015S	Amplitude	4, 5, 6	Load Step 50% 100%	-750		750	mV
	Recovery	4, 5, 6				200	µs
	Amplitude	4, 5, 6	Load Step 10% 50%	-750		750	mV
	Recovery	4, 5, 6				300	µs
AFL5028S	Amplitude	4, 5, 6	Load Step 50% 100%	-1200		1200	mV
	Recovery	4, 5, 6				200	µs
	Amplitude	4, 5, 6	Load Step 10% 50%	-1200		1200	mV
	Recovery	4, 5, 6				300	µs
Line transient response			Notes 1, 2, 3 V_{IN} Step = 30 ⇔ 80 Volts				
	Amplitude			-500		500	mV
	Recovery					500	µs
Turn-on characteristics			V_{IN} = 30, 50, 80 Volts, Note 4 Enable 1, 2 on. (Pins 4, 12 high or open)				
	Overshoot	4, 5, 6				250	mV
	Delay	4, 5, 6		50	75	120	ms
Load fault recovery			Same as Turn On Characteristics.				
Line rejection			MIL-STD-461D, CS101, 30Hz to 50 kHz, Note 1	40	50		dB

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 ±1.0% of V_{OUT} at 50% load.
3. Line transient transition time $\geq$ 100µs.
4. Turn-on delay is measured with an input voltage rise time of between 100V and 500V 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 $\geq$ 10µs.
9. Enable inputs internally pulled high. Nominal open circuit voltage $\approx 4.0V_{DC}$.

Fig I. Block Diagram - AFL Single Output



Circuit Operation and Application Information

The AFL series of converters employ a forward switched mode converter topology. (refer to Fig I.) Operation of the device is initiated when a DC voltage whose magnitude is within the specified input limits is applied between pins 1 and 2. If pin 4 is enabled (at a logical 1 or open) the primary bias supply will begin generating a regulated housekeeping voltage bringing the circuitry on the primary side of the converter to life. A power MOSFET is used to chop the DC input voltage into a high frequency square wave, applying this chopped voltage to the power transformer at the nominal converter switching frequency. Maintaining a DC voltage within the specified operating range at the input assures continuous generation of the primary bias voltage.

The switched voltage impressed on the secondary output transformer winding is rectified and filtered to generate the converter DC output voltage. An error amplifier on the secondary side compares the output voltage to a precision reference and generates an error signal proportional to the difference. This error signal is magnetically coupled through the feedback transformer into the controller section of the converter varying the pulse width of the square wave signal driving the MOSFET, narrowing the width if the output voltage is too high and widening it if it is too low, thereby regulating the output voltage.

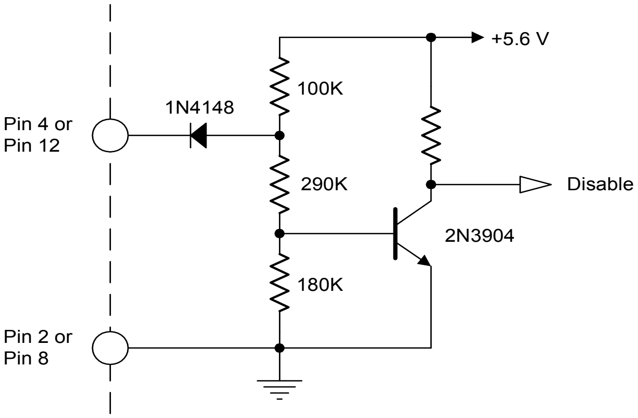
Remote Sensing

Connection of the + and - sense leads at a remotely located load permits compensation for excessive resistance between the converter output and the load when their physical separation could cause undesirable voltage drop. This connection allows regulation to the placard voltage at of application. When the remote sensing feature is not used, the sense lead should be connected to their respective output terminals at the converter. Fig. III. illustrates a typical remotely sensed application.

Inhibiting Converter Output (Enable)

As an alternative to application and removal of the DC voltage to the input, the user can control the converter output by providing TTL compatible, positive logic signals to either of two enable pins (pin 4 or 12). The distinction between these two signal ports is that enable 1 (pin 4) is referenced to the input return (pin 2) while enable 2 (pin 12) is referenced to the output return (pin 8). Thus, the user has access to an inhibit function on either side of the isolation barrier. Each port is internally pulled “high” so that when not used, an open connection on both enable pins permits normal converter operation. When their use is desired, a logical “low” on either port will shut the converter down.

Fig. II. Enable Input Equivalent Circuit



Internally, these ports differ slightly in their function. In use, a low on Enable 1 completely shuts down all circuits in the converter, while a low on Enable 2 shuts down the secondary side while altering the controller duty cycle to near zero. Externally, the use of either port is transparent to the user save for minor differences in idle current. (See specification table).

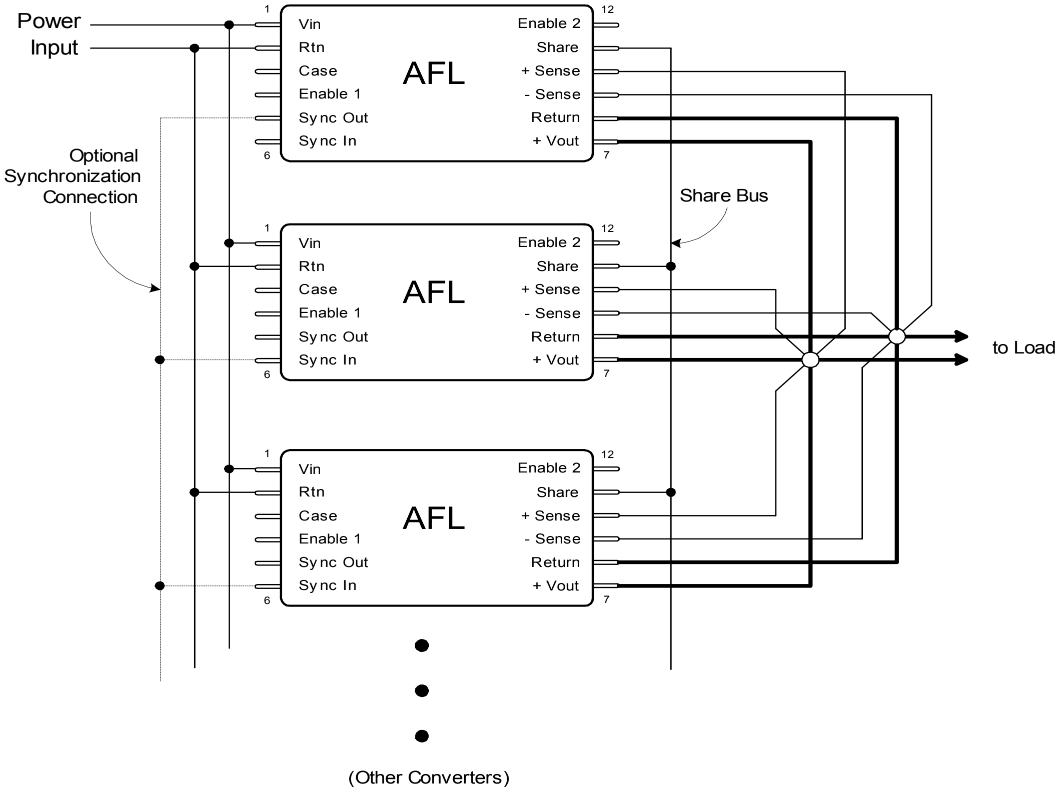
Synchronization of Multiple Converters

When operating multiple converters, system requirements often dictate operation of the converters at a common frequency. To accommodate this requirement, the AFL series converters provide both a synchronization input and output.

The sync input port permits synchronization of an AFL converter to any compatible external frequency source operating between 500 kHz and 700 kHz. This input signal should be referenced to the input return and have a 10% to 90% duty cycle. Compatibility requires transition times less than 100ns, maximum low level of +0.8V and a minimum high level of +2.0V. The sync output of another converter which has been designated as the master oscillator provides a convenient frequency source for this mode of operation. When external synchronization is not required, the sync in pin should be left open (unconnected) thereby permitting the converter to operate at its' own internally set frequency.

The sync output signal is a continuous pulse train set at 550 ± 50 kHz, with a duty cycle of 15 ± 5.0%. This signal is referenced to the input return and has been tailored to be compatible with the AFL sync input port. Transition times are less than 100ns and the low level output impedance is less than 50Ω. This signal is active when the DC input voltage is within the specified operating range and the converter is not inhibited. This output has adequate drive reserve to synchronize at least five additional converters.
A typical connection is illustrated in Figure III.

Fig. III. Preferred Connection for Parallel Operation



Parallel Operation-Current and Stress Sharing

Figure III. illustrates the preferred connection scheme for operation of a set of AFL converters with outputs operating in parallel. Use of this connection permits equal sharing among the members of a set whose load current exceeds the capacity of an individual AFL. An important feature of the AFL series operating in the parallel mode is that in addition to sharing the current, the stress induced by temperature will also be shared. Thus if one member of a paralleled set is operating at a higher case temperature, the current it provides to the load will be reduced as compensation for the temperature induced stress on that device.

When operating in the shared mode, it is important that symmetry of connection be maintained as an assurance of optimum load sharing performance. Thus, converter outputs should be connected to the load with equal lengths of wire of the same gauge and sense leads from each converter should be connected to a common physical point, preferably at the load along with the converter output and return leads. All converters in a paralleled set must have their share pins connected together. This arrangement is diagrammatically illustrated in Fig. III. showing the outputs and return pins connected at a star point which is located close as possible to the load.

As a consequence of the topology utilized in the current sharing circuit, the share pin may be used for other functions. In applications requiring only a single converter, the voltage appearing on the share pin may be used as a "current monitor". The share pin open circuit voltage is nominally +1.00V at no load and increases linearly with increasing output current to +2.20V at full load.

Thermal Considerations

Because of the incorporation of many innovative technological concepts, the AFL series of converters is capable of providing very high output power from a package of very small volume. These magnitudes of power density can only be obtained by combining high circuit efficiency with effective methods of heat removal from the die junctions. This requirement has been effectively addressed inside the device; but when operating at maximum loads, a significant amount of heat will be generated and this heat must be conducted away from the case. To maintain the case temperature at or below the specified maximum of 125°C, this heat must be transferred by conduction to an appropriate heat dissipater held in intimate contact with the converter base-plate.

Since the effectiveness of this heat transfer is dependent on the intimacy of the baseplate/heat sink interface, it is strongly recommended that a high thermal conductivity heat transferring medium is inserted between the baseplate and heat sink. The material most frequently utilized at the factory during all testing and burn-in processes is sold under the trade name of Sil-Pad® 4001.This particular product is an insulator but electrically conductive versions are also available. Use of these materials assures maximum surface contact with the heat dissipater thereby compensating for any minor surface variations. While other available types of heat conductive materials and thermal compounds provide similar effectiveness, these alternatives are often less convenient and can be somewhat messy to use.

A conservative aid to estimating the total heat sink surface area (AHEAT SINK) required to set the maximum case temperature rise (DT) above ambient temperature is given by the following expression:

$$A_{\text{HEAT SINK}} \approx \left\{ \frac{\Delta T}{80P^{0.85}} \right\}^{-1.43} - 3.0$$

Where

$\Delta T =$ Case temperature rise above ambient

$P =$ Device dissipation in Watts $= P_{OUT}\left\{ \frac{1}{Eff} - 1 \right\}$

As an example, it is desired to maintain the case temperature of an AFL5015S at ≤ +85°C while operating in an open area whose ambient temperature is held at a constant +25°C; then

$$\Delta T = 85 - 25 = 60°C$$

If the worst case full load efficiency for this device is 83%; then the power dissipation at full load is given by

$$P = 120 \bullet \left\{ \frac{1}{.83} - 1 \right\} = 120 \bullet (0.205) = 24.6\text{W}$$

and the required heat sink area is

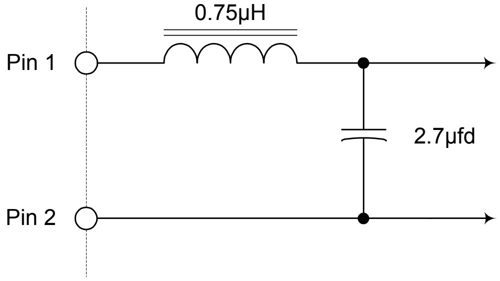
$$A_{\text{HEAT SINK}} = \left\{ \frac{60}{80 \bullet 24.6^{0.85}} \right\}^{-1.43} - 3.0 = 71\ \text{in}^2$$

Thus, a total heat sink surface area (including fins, if any) of 71 in^2 in this example, would limit case rise to 60°C above ambient. A flat aluminum plate, 0.25" thick and of approximate dimension 4" by 9" (36 in2 per side) would suffice for this application in a still air environment. Note that to meet the criteria in this example, both sides of the plate require unrestricted exposure to the ambient air.

Input Filter

The AFL50XXS series converters incorporate a LC input filter whose elements dominate the input load impedance characteristic at turn-on. The input circuit is as shown in Figure IV.

Fig. IV. Input Filter Circuit



---

[1] Sil-Pad is a registered Trade Mark of Bergquist, Minneapolis, MN

Under Voltage Lockout

A minimum voltage is required at the input of the converter to initiate operation. This voltage is set to 26.5 ± 1.5V. To preclude the possibility of noise or other variations at the input falsely initiating and halting converter operation, a hysteresis of approximately 2.0V is incorporated in this circuit. Thus if the input voltage droops to 24.5 ± 1.5V, the converter will shut down and remain inoperative until the input voltage returns to ≈ 25V.

Output Voltage Adjust

In addition to permitting close voltage regulation of remotely located loads, it is possible to utilize the converter sense pins to incrementally increase the output voltage over a limited range. The adjustments made possible by this method are intended as a means to “trim” the output to a voltage setting for some particular application, but are not intended to create an adjustable output converter. These output voltage setting variations are obtained by connecting an appropriate resistor value between the +sense and -sense pins while connecting the -sense pin to the output return pin as shown in Figure V. below. The range of adjustment and corresponding range of resistance values can be determined by use of the following equation.

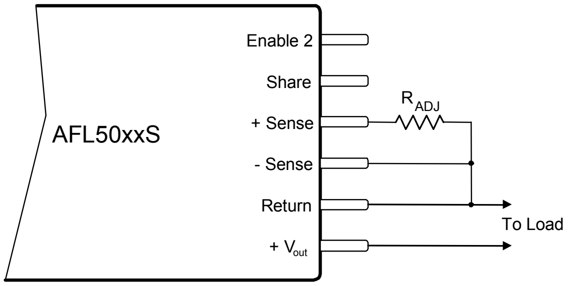
$$R_{adj} = 100 \bullet \left\{ \frac{V_{NOM}}{V_{OUT} - V_{NOM} - .025} \right\}$$

Where

V_{NOM} = device nominal output voltage, and
V_{OUT} = desired output voltage

Finding a resistor value for a particular output voltage, is simply a matter of substituting the desired output voltage and the nominal device voltage into the equation and solving for the corresponding resistor value.

Fig. V. Connection for V_{OUT} Adjustment



Note: R_{ADJ} must be set ≥ 500Ω

Attempts to adjust the output voltage to a value greater than 120% of nominal should be avoided because of the potential of exceeding internal component stress ratings and subsequent operation to failure. Under no circumstance should the external setting resistor be made less than 500Ω. By remaining within this specified range of values, completely safe operation fully within normal component de-rating limits is assured.

Examination of the equation relating output voltage and resistor value reveals a special benefit of the circuit topology utilized for remote sensing of output voltage in the AFL50XXS series of converters. It is apparent that as the resistance increases, the output voltage approaches the nominal set value of the device. In fact the calculated limiting value of output voltage as the adjusting resistor becomes very large is ≈ 25mV above nominal device voltage.

The consequence is that if the +sense connection is unintentionally broken, an AFL50XXS has a fail-safe output voltage of V_{OUT} + 25mV, where the 25mV is independent of the nominal output voltage. It can be further demonstrated that in the event of both the + and - sense connections being broken, the output will be limited to V_{OUT} + 440mV. This 440mV is also essentially constant independent of the nominal output voltage.

General Application Information

The AFL50XXS series of converters are capable of providing large transient currents to user loads on demand. Because the nominal input voltage range in this series is relatively low, the resulting input current demands will be correspondingly large. It is important therefore, that the line impedance be kept very low to prevent steady state and transient input currents from degrading the supply voltage between the voltage source and the converter input. In applications requiring high static currents and large transients, it is recommended that the input leads be made of adequate size to minimize resistive losses, and that a good quality capacitor of approximately 100mF be connected directly across the input terminals to assure an adequately low impedance at the input terminals. Table I relates nominal resistance values and selected wire sizes.

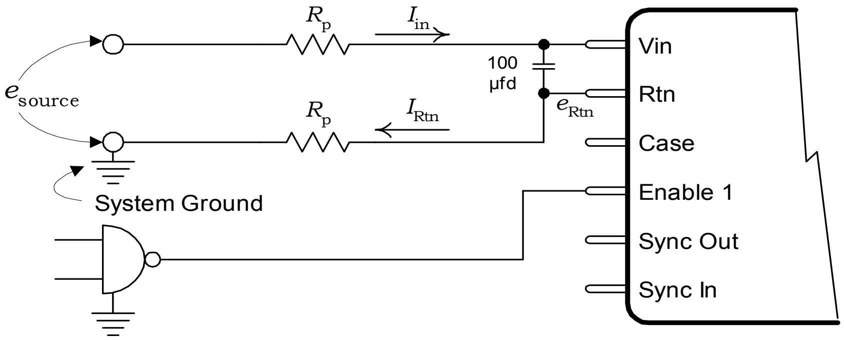
Table 1. Nominal Resistance of Cu Wire

Wire Size, AWG	Resistance per fit
24Ga	25.7mΩ
22Ga	16.2mΩ
20Ga	10.1mΩ
18Ga	6.4mΩ
16Ga	4.0mΩ
14Ga	2.5mΩ
12Ga	1.6mΩ

Incorporation of a 100µF capacitor at the input terminals is recommended as compensation for the dynamic effects of the parasitic resistance of the input cable reacting with the complex impedance of the converter input, and to provide an energy reservoir for transient input current requirements.

Fig. VI. Problems of Parasitic Resistance in input Leads

(See text)



Pin Designation

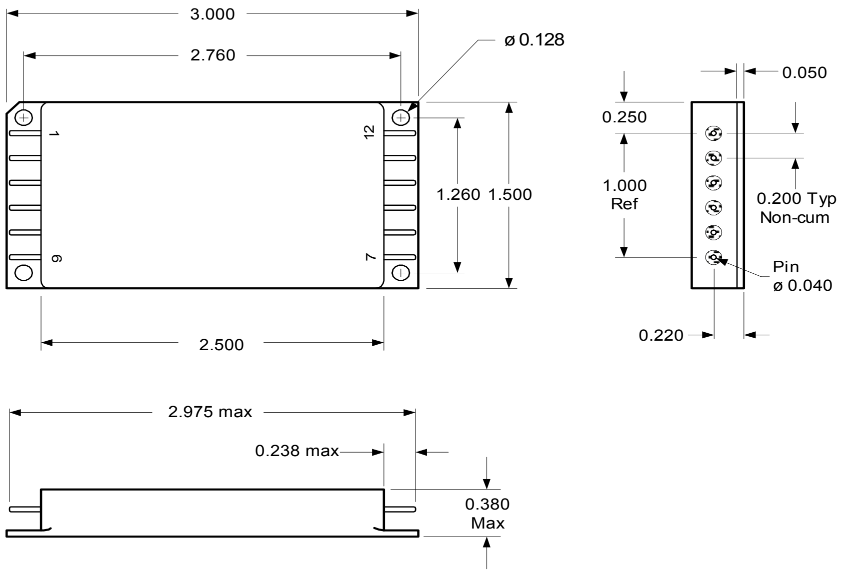
Pin #	Designation
1	+ Input
2	Input Return
3	Case Ground
4	Enable 1
5	Sync Output
6	Sync Input
7	+ Output
8	Output Return
9	Return Sense
10	+ Sense
11	Share
12	Enable 2

Standard Microcircuit Drawing Equivalence Table

Standard Microcircuit Drawing Number	IR Standard Part Number
5962-02557	AFL5005S
5962-02558	AFL5008S
5962-02559	AFL5009S
5962-02560	AFL5012S
5962-02561	AFL5015S
5962-02562	AFL5028S

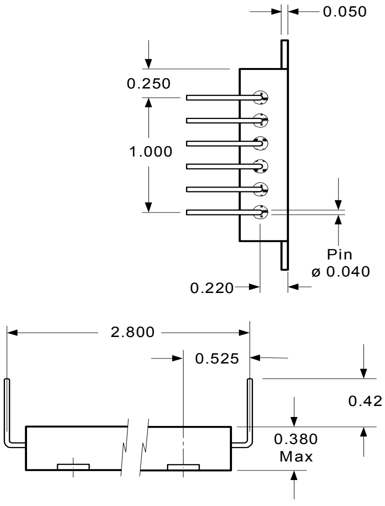
Mechanical Outline

Case X

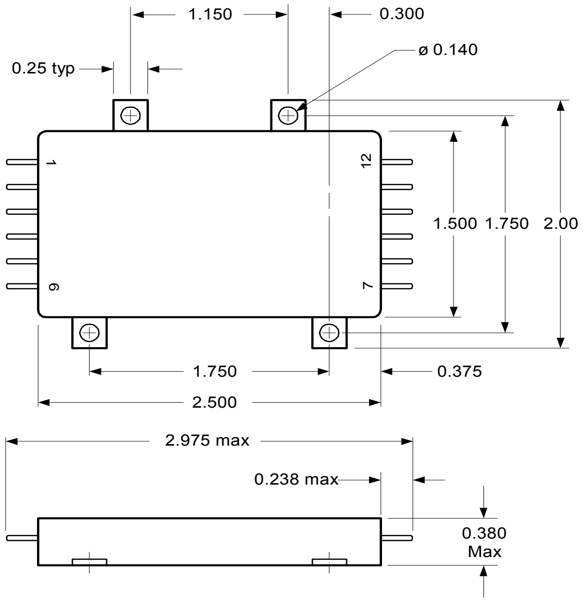


Case W

Pin Variation of Case Y

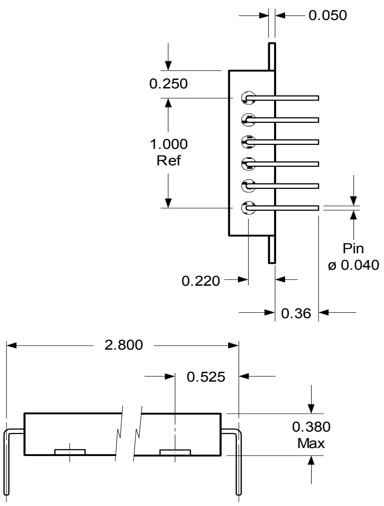


Case Y



Case Z

Pin Variation of Case Y



Tolerances, unless otherwise specified: .XX = ±0.010
.XXX = ±0.005

BERYLLIA WARNING: These converters are hermetically sealed; however they contain BeO substrates and should not be ground or subjected to any other operations including exposure to acids, which may produce Beryllium dust or fumes containing Beryllium.

Device Screening

Requirement	MIL-STD-883 Method	No Suffix ②	ES②	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	48hrs @ Hi Temp	160 hrs @ 125°C	160 hrs @ 125°C
Final Electrical (Group A)	MIL-PRF-38534 & Specification	25°C	25°C②	-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	①

Notes:
① Best commercial practice.
② Sample tests at low and high temperatures.
③ -55°C to +105°C for AHE, ATO, ATW

Part Numbering

AFL 50 05 S X /CH

Model

Input Voltage
28 = 28V
50 = 50V
120 = 120V
270 = 270V

Output Voltage
05 = 5V, 06 = 6V
07 = 7V, 08 = 8V
09 = 9V, 12 = 12V
15 = 15V, 28 = 28V

Screening Level
(Please refer to Screening Table)
No suffix, ES, HB, CH

Case Style
W, X, Y, Z

Output
S = Single

IR HiRel
An Infineon Technologies Company

IR HiRel Headquarters: 101 N. Sepulveda Blvd., El Segundo, California 90245, USA Tel: (310) 252-7105
IR HiRel Leominster: 205 Crawford St., Leominster, Massachusetts 01453, USA Tel: (978) 534-5776
IR HiRel San Jose: 2520 Junction Avenue, San Jose, California 95134, USA Tel: (408) 434-5000
Data and specifications subject to change without notice.

IMPORTANT NOTICE

The information given in this document shall be in no event regarded as guarantee of conditions or characteristic. The data contained herein is a characterization of the component based on internal standards and is intended to demonstrate and provide guidance for typical part performance. It will require further evaluation, qualification and analysis to determine suitability in the application environment to confirm compliance to your system requirements.

With respect to any example hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind including without limitation warranties on non- infringement of intellectual property rights and any third party.

In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s product and any use of the product of Infineon Technologies in customer’s applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of any customer’s technical departments to evaluate the suitability of the product for the intended applications and the completeness of the product information given in this document with respect to applications.

For further information on the product, technology, delivery terms and conditions and prices, please contact your local sales representative or go to (www.infineon.com/hirel).

WARNING

Due to technical requirements products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.