

International **IR** Rectifier

ADVANCED ANALOG HYBRID-HIGH RELIABILITY DC/DC CONVERTERS

Description

The ATR28XXD Series of DC/DC converters feature high power density and an extended temperature range for use in military and industrial applications. Designed to MIL-STD-704D input requirements, these devices have nominal 28VDC inputs with $\pm 12V$ and $\pm 15V$ dual outputs to satisfy a wide range of requirements. The circuit design incorporates a pulse width modulated single forward topology operating in the feed-forward mode at a nominal switching frequency of 550KHz. 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 and radiation tolerance than devices incorporating optical feedback circuits.

Three standard temperature grades are offered with screening options. Refer to Part Number section. They can be provided in a standard plug-in package for PC mounting or in a flanged package for more severe environments.

These converters are manufactured in a facility certified to MIL-PRF-38534. All processes used to manufacture these converters have been qualified to enable Advanced Analog to deliver compliant devices.

Four screening grades are available to satisfy a wide range of requirements. The CH grade converters are fully compliant to MIL-PRF-38534 for class H. The HB grade converters are processed to full class H screening but do not have class H element evaluation as required by MIL-PRF-38534. Both grades are fully tested and operate over the full military temperature range without derating of output power. The ES version is a full temperature device without the full class H or element evaluation. The non-suffix device is a low cost

PD - 94550

ATR28XXD SERIES

28V Input, Dual Output

Features

- 16 to 40 VDC Input Range (28 VDC Nominal)
- $\pm 12V$ and $\pm 15V$ Outputs Available
- Indefinite Short Circuit and Overload Protection
- 35 W/in³ Power Density
- 30 Watt Output Power
- Fast Loop Response for Superior Transient Characteristics
- Operating Temperature Range from -55°C to +125°C
- Popular Industry Standard Pin-Out
- Resistance Seam Welded Case for Superior Long Term Hermeticity
- Ceramic Feed-thru Pins
- External Synchronization
- High Efficiency
- Shutdown from External Signal
- Military Screening

limited temperature range option. Variations in electrical, mechanical and screening can be accommodated.

Extensive computer simulation using complex modeling enables rapid design modification to be provided. Contact Advanced Analog with specific requirements.

ATR28XXD Series Specifications

International
IR Rectifier

$T_{CASE} = -55^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{IN} = +28\text{V} \pm 5\%$ unless otherwise specified

ABSOLUTE MAXIMUM RATINGS							
Input Voltage	-0.5V to 50VDC						
Power Output	Internally limited, 36W typical						
Soldering	300°C for 10 seconds						
Temperature Range ¹	Recommended Operating -55°C to +85°C						
	Maximum Operating -55°C to +115°C						
	Storage -65°C to +135°C						
PARAMETER	Condition $-55^{\circ}\text{C} \leq T_C \leq +85^{\circ}\text{C}$, $V_{IN} = 28\text{V}_{DC}$ $\pm 5\%$, $CL=0$, unless otherwise specified	ATR2812D			ATR2815D		
		Min	Typ	Max	Min	Typ	Max
STATIC CHARACTERISTICS							
OUTPUT							
Voltage	$V_{IN} = 16$ to 40V_{DC}						
Current ⁵	$I_{OUT} = 0$ to Full Load	± 11.76 0.0	± 12.00	± 12.24 ±1.25	± 14.70 0.0	± 15.00	± 15.30 ±1.0
Ripple	Full Load, 20KHz to 2MHz		40	85		40	85
Accuracy	$T_{CASE} = 25^{\circ}\text{C}$, Full Load	± 11.88 30	± 12.00	± 12.12	± 14.85 30	± 15.00	± 15.15
Power ¹							
REGULATION							
Line Load	$V_{IN} = 16$ to 40V_{DC}			75 120			75 150
CROSS REGULATION ⁶	$V_{IN} = 16, 28$			±5			±5
INPUT							
Voltage Range							
Current	No Load, pin 2 = open	16.0	28.0	40.0 75 18	16.0	28.0	40.0 75 18
Ripple Current	Inhibited, pin 2 tied to pin 10		25	50		25	50
Full Load	Full Load						
EFFICIENCY	Full Load $T_c = +25^{\circ}\text{C}$		82			82	
ISOLATION	Input to output @500 V_{DC}	100		100			$\text{M}\Omega$
CAPACITIVE LOAD	No effect on performance $T_c = +25^{\circ}\text{C}$ (total for both outputs)			100			100
Load Fault Power Dissipation	Short Circuit			9			9
	Overload, $T_c = +25^{\circ}\text{C}$			14			14
Switching Frequency	$I_{OUT} = \text{Full Load}$	500		600	500		600
SYNC Frequency Range ⁷		500		700	500		700
DYNAMIC CHARACTERISTICS							
Step Load Changes							
Output Transient	50% Load to 100% Load No Load to 50% Load		± 100 ±250			± 100 ±250	
Recovery ²	50% Load to 100% Load No Load to 50% Load 50% Load to No Load		25 500 3			25 500 3	
Step Line Changes							
Output Transient	Input step 16 to 40V_{DC} Input step 40 to 16V_{DC} Input step 16 to 40V_{DC} Input step 40 to 16V_{DC}		± 180 -600 5 5			± 180 -600 5 5	
Recovery ²							
TURN-ON							
Overshoot Delay ³	$V_{IN} = 16$ to 40V_{DC}		0 14	600 25		0 14	600 25
Load Fault Recovery	$V_{IN} = 16$ to 40V_{DC}		14	25		14	25

Notes to Specifications

1. Above $+85^{\circ}\text{C}$ case temperature, derate output power linearly to 0 at $+115^{\circ}\text{C}$ case.
2. Recovery time is measured from the initiation of the input transient to where V_{OUT} has returned to within $\pm 1\%$ of V_{OUT} at 50% load.
3. Turn-on delay time measurement is for either an application of power at the input or a signal at the inhibit pin.
4. Load current split equally between $+V_{OUT}$ and $-V_{OUT}$.
5. Up to 90% of Full Power is available from either output provided. The total power output does not exceed 30 watts.
6. 3W load on output under test, 3W to 27W on other output.
7. Sync. Input signal: $V_{IL} = -0.5\text{V}$ Min, $V_{IN} = 2.5\text{V}$ Min, 10% to 90% duty cycle,
0.8V Max 11.5V Max

International
IR Rectifier
Specifications

ATR28XXD Series

$T_{CASE} = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_{IN} = +28\text{V} \pm 5\%$ unless otherwise specified

ABSOLUTE MAXIMUM RATINGS							
Input Voltage	-0.5V to 50VDC						
Power Output	Internally limited, 36W typical						
Soldering	300°C for 10 seconds						
Temperature Range ¹	Recommended Operating -55°C to +125°C						
	Maximum Operating -55°C to +135°C						
	Storage -65°C to +135°C						

PARAMETER	Condition $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$, $V_{IN} = 28$ $V_{DC} \pm 5\%$, CL=0, unless otherwise specified	ATR2812D/ES			ATR2815D/ES			Units
		Min	Typ	Max	Min	Typ	Max	
STATIC CHARACTERISTICS								
OUTPUT Voltage	$V_{IN} = 16$ to 40 V_{DC}	± 11.76	± 12.00	± 12.24	± 14.70	± 15.00	± 15.30	V_{DC}
Current ⁵	$I_{OUT} = 0$ to Full Load	0	40	± 1.25	0	40	± 1.0	A_{DC}
Ripple	Full Load, 20KHz to 2MHz	± 11.88	± 12.00	± 12.12	± 14.85	± 15.00	± 15.15	mV p-p
Accuracy	$T_{CASE} = 25^{\circ}\text{C}$, Full Load	30		30	30			V_{DC}
Power ¹								W
REGULATION								
Line Load	$V_{IN} = 16$ to 40 V_{DC}			75			75	mV
	$I_{OUT} = 0$ to Full Load			120			150	mV
CROSS REGULATION ⁶	$V_{IN} = 16, 28,$ and 40 V_{DC}			± 5			± 5	%
INPUT								
Voltage Range		16.0	28.0	40.0	16.0	28.0	40.0	V_{DC}
Current	No Load, pin 2 = open			75			75	mA_{DC}
	Inhibited, pin 2 tied to pin 10			18			18	mA_{DC}
Ripple Current	Full Load		25	50		25	50	mA p-p
EFFICIENCY	Full Load $T_c = +25^{\circ}\text{C}$	80	82		79	82		%
ISOLATION	Input to output @ 500 V_{DC}	100			100			$\text{M}\Omega$
CAPACITIVE LOAD	No effect on performance $T_c = +25^{\circ}\text{C}$ (total for both outputs)			100			100	μF
Load Fault Power Dissipation	Short Circuit Overload, $T_c = +25^{\circ}\text{C}$			9			9	W
				14			14	W
Switching Frequency	$I_{OUT} = \text{Full Load}$	500		600	500		600	KHz
SYNC Frequency Range ⁷		500		700	500		700	KHz
DYNAMIC CHARACTERISTICS								
Step Load Changes								
Output Transient	50% Load to 100% Load No Load to 50% Load		± 100			± 100		mVpk
Recovery ²	50% Load to 100% Load No Load to 50% Load 50% Load to No Load		± 250			± 250		mVpk
			25			25		μs
			500			500		μs
			3			3		ms
Step Line Changes								
Output Transient	Input step 16 to 40 V_{DC}		± 180			± 180		mVpk
Recovery ²	Input step 40 to 16 V_{DC}		-600			-600		mVpk
	Input step 16 to 40 V_{DC}		5			5		ms
	Input step 40 to 16 V_{DC}		5			5		ms
TURN-ON Overshoot Delay ³	$V_{IN} = 16$ to 40 V_{DC}		0	600		0	600	mVpk
	$I_{OUT} = 0$ to Full Load		14	25		14	25	ms
Load Fault Recovery	$V_{IN} = 16$ to 40 V_{DC}		14	25		14	25	ms

Notes to Specifications

1. Above $+125^{\circ}\text{C}$ case temperature, derate output power linearly to 0 at $+135^{\circ}\text{C}$ case.
2. Recovery time is measured from the initiation of the input transient to where V_{OUT} has returned to within $\pm 1\%$ of V_{OUT} at 50% load.
3. Turn-on delay time measurement is for either an application of power at the input or a signal at the inhibit pin.
4. Load current split equally between $+V_{OUT}$ and $-V_{OUT}$.
5. Up to 90% of Full Power is available from either output provided. The total power output does not exceed 30 watts.
6. 3W load on output under test, 3W to 27W on other output.
7. Sync. Input signal: $V_{IL} = -0.5\text{V}$ Min, $V_{IN} = 2.5\text{V}$ Min, 10% to 90% duty cycle
 0.8V Max, 11.5V Max

ATR28XXD Series Specifications

International
IR Rectifier

$T_{CASE} = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_{IN} = +28\text{V} \pm 5\%$ unless otherwise specified

ABSOLUTE MAXIMUM RATINGS							
Input Voltage	-0.5V to 50VDC						
Power Output	Internally limited, 36W typical						
Soldering	300°C for 10 seconds						
Temperature Range ¹	Recommended Operating Maximum Operating Storage	-55°C to +125°C -55°C to +135°C -65°C to +135°C					

PARAMETER	Condition $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$, $V_{IN} = 28\text{V}_{DC}$ $\pm 5\%$, $CL=0$, unless otherwise specified	ATR2812D/HB			ATR2815D/HB			Units
		Min	Typ	Max	Min	Typ	Max	
STATIC CHARACTERISTICS								
OUTPUT Voltage	$V_{IN} = 16$ to 40V_{DC}							
Current ⁵	$I_{OUT} = 0$ to Full Load	± 11.76 0.0	± 12.00	± 12.24 ± 1.25	± 14.70 0.0	± 15.00	± 15.30 ± 1.0	V_{DC} A_{DC} $\text{mV}_{\text{p-p}}$ V_{DC} W
Ripple	Full Load, 20KHz to 2MHz		40	85		40	85	
Accuracy	$T_{CASE} = 25^{\circ}\text{C}$, Full Load	± 11.88 30	± 12.00	± 12.12	± 14.85 30	± 15.00	± 15.15	
Power ¹								
REGULATION								
Line ⁶ Load ⁴	$V_{IN} = 16$ to 40V_{DC}			75 120			75 150	$\text{mV}_{\text{p-p}}$
CROSS REGULATION ⁶	$V_{IN} = 16$, 28 , and 40V_{DC}			± 5			± 5	%
INPUT								
Voltage Range		16.0	28.0	40.0 75 18	16.0	28.0 18	40.0 75 18	V_{DC} mA_{DC} mA_{DC} $\text{mA}_{\text{p-p}}$
Current	No Load, pin 2 = open Inhibited, pin 2 tied to pin 10		25	50		25	50	
Ripple Current	Full Load							
EFFICIENCY	Full Load $T_c = +25^{\circ}\text{C}$	80	82		79	82		%
ISOLATION	Input to output @ 500V_{DC}	100			100			$\text{M}\Omega$
CAPACITIVE LOAD	No effect on performance $T_c = +25^{\circ}\text{C}$ (total for both outputs)			100			100	μF
Load Fault Power Dissipation	Short Circuit Overload, $T_c = +25^{\circ}\text{C}$			9 14			9 14	W
Switching Frequency	$I_{OUT} = \text{Full Load}$	500		600	500		600	KHz
SYNC Frequency Range ⁷		500		700	500		700	KHz
DYNAMIC CHARACTERISTICS								
Step Load Changes								
Output ⁴	50% Load to 100% Load No Load to 50% Load		± 100 ± 250	± 450 ± 760		± 100 ± 250	± 450 ± 750	mVpk mVpk
Transient								
Recovery ²	50% Load to 100% Load No Load to 50% Load 50% Load to No Load		25 500 3	70 1500 5		25 500 3	70 1500 5	μs μs ms
Step Line Changes								
Output	Input step 16 to 40V_{DC}		± 180 -600	1200 -1500		± 180 -600	1500 -1500	mVpk mVpk
Transient	Input step 40 to 16V_{DC}		5	10		5	10	ms
Recovery ²	Input step 16 to 40V_{DC}		5	10		5	10	ms
TURN-ON								
Overshoot	$V_{IN} = 16$ to 40V_{DC}		0	600		0	600	mVpk
Delay ³	$I_{OUT} = 0$ to Full Load	14	25		14	25		ms
Load Fault Recovery	$V_{IN} = 16$ to 40V_{DC}		14	25		14	25	ms

Notes to Specifications

1. Above $+125^{\circ}\text{C}$ case temperature, derate output power linearly to 0 at $+135^{\circ}\text{C}$ case.
2. Recovery time is measured from the initiation of the input transient to where V_{OUT} has returned to within $\pm 1\%$ of V_{OUT} at 50% load.
3. Turn-on delay time measurement is for either an application of power at the input or a signal at the inhibit pin.
4. Load current split equally between $+V_{OUT}$ and $-V_{OUT}$.
5. Up to 90% of Full Power is available from either output provided. The total power output does not exceed 30 watts.
6. 3W load on output under test, 3W to 27W on other output.
7. Sync. Input signal: $V_{IL} = -0.5\text{V}$ Min, $V_{IN} = 2.5\text{V}$ Min, 10% to 90% duty cycle
 0.8V Max, 11.5V Max

International
IR Rectifier
Specifications

ATR28XXD Series

$T_{CASE} = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_{IN} = +28\text{V} \pm 5\%$ unless otherwise specified

ABSOLUTE MAXIMUM RATINGS							
Input Voltage	-0.5V to 50VDC						
Power Output	Internally limited, 36W typical						
Soldering	300°C for 10 seconds						
Temperature Range ¹	Recommended Operating	-55°C to +125°C					
	Maximum Operating	-55°C to +135°C					
	Storage	-65°C to +135°C					

PARAMETER	Condition -55°C ≤ TC ≤ +125°C, $V_{IN} = 28\text{V}_{DC}$ ±5%, CL=0, unless otherwise specified	ATR2812D/CH			ATR2815D/CH			Units
		Min	Typ	Max	Min	Typ	Max	
STATIC CHARACTERISTICS								
OUTPUT	$V_{IN} = 16$ to 40V_{DC} $I_{OUT} = 0$ to Full Load	± 11.76 0.0	± 12.00 40	± 12.24 85 ± 12.12	± 14.70 0.0	± 15.00 40	± 15.30 85 ± 15.15	V_{DC} A_{DC} mV p-p V_{DC} W
Voltage Current ⁵	Full Load, 20KHz to 2MHz	± 11.88 30	± 12.00		± 14.85 30	± 15.00		
Ripple Accuracy	$T_{CASE} = 25^{\circ}\text{C}$, Full Load							
Power ¹								
REGULATION								
Line ⁴	$V_{IN} = 16$ to 40V_{DC} $I_{OUT} = 0$ to Full Load			75 120			75 150	mV mV
Load ⁴								
CROSS REGULATION ⁶	$V_{IN} = 16, 28, and } 40\text{V}_{DC}$			±5			±5	%
INPUT								
Voltage Range								
Current	No Load, pin 2 = open	16.0	28.0	40.0 75 18 50	16.0	28.0 18	40.0 75 18 50	V_{DC} mA_{DC} mA_{DC} mA p-p
Ripple Current	Inhibited, pin 2 tied to pin 10		25			25		
Full Load								
EFFICIENCY	Full Load $T_c = +25^{\circ}\text{C}$	80	82		79	82		%
ISOLATION	Input to output @500 V_{DC}	100			100			$\text{M}\Omega$
CAPACITIVE LOAD	No effect on performance			100			100	μF
$T_c = +25^{\circ}\text{C}$ (total for both outputs)								
Load Fault Power Dissipation	Short Circuit			9 14			9 14	W W
	Overload, $T_c = +25^{\circ}\text{C}$							
Switching Frequency	$I_{OUT} = \text{Full Load}$	500		600	500		600	KHz
		500		700	500		700	KHz
SYNC Frequency Range ⁷								
DYNAMIC CHARACTERISTICS								
Step Load Changes								
Output ⁴	50% Load to 100% Load			± 100 ± 250	± 450 ± 760		± 100 ± 250	± 450 ± 750
Transient	No Load to 50% Load							mVpk mVpk
Recovery ²	50% Load to 100% Load		25	70		25	70	μs μs
	No Load to 50% Load		500	1500		500	1500	μs μs
	50% Load to No Load	3	5	5	5	3	5	ms ms
Step Line Changes								
Output	Input step 16 to 40 V_{DC}			± 180 -600	1200 -1500		± 180 -600	1500 -1500
Transient	Input step 40 to 16 V_{DC}			5	10		5	10
Recovery ²	Input step 16 to 40 V_{DC}			5	10		5	10
	Input step 40 to 16 V_{DC}							ms ms
TURN-ON								
Overshoot	$V_{IN} = 16$ to 40V_{DC}			0	600		0	mVpk
Delay ³	$I_{OUT} = 0$ to Full Load			14	25		14	25
Load Fault Recovery	$V_{IN} = 16$ to 40V_{DC}			14	25		14	25
								ms

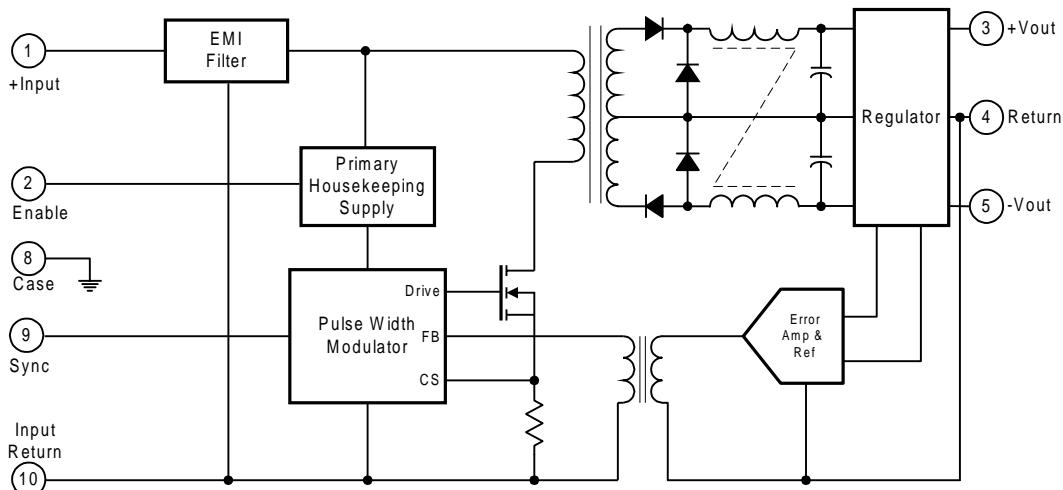
Notes to Specifications

1. Above $+125^{\circ}\text{C}$ case temperature, derate output power linearly to 0 at $+135^{\circ}\text{C}$ case.
2. Recovery time is measured from the initiation of the input transient to where V_{OUT} has returned to within $\pm 1\%$ of V_{OUT} at 50% load.
3. Turn-on delay time measurement is for either an application of power at the input or a signal at the inhibit pin.
4. Load current split equally between $+V_{OUT}$ and $-V_{OUT}$.
5. Up to 90% of Full Power is available from either output provided. The total power output does not exceed 30 watts.
6. 3W load on output under test, 3W to 27W on other output.
7. Sync. Input signal: $V_{II} = -0.5\text{V}$ Min, $V_{IN} = 2.5\text{V}$ Min, 10% to 90% duty cycle
 0.8V Max, 11.5V Max

ATR28XXD Series

ATR28XXD Block Diagram

International
Rectifier



Application Information

Inhibit Function

Connecting the inhibit input (Pin 2) to input common (Pin 10) 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 μ A of current. The open circuit voltage of the inhibit input is 11.5 \pm 1 VDC.

EMI Filter

An EMI filter (AFC461), available as an option, will reduce the input ripple current to levels below the limits imposed by MIL-STD-461B CEO3.

Device Synchronization

Whenever multiple DC/DC converters are utilized in a single system, significant low frequency noise may be generated due to slight difference in the switching frequencies of the converters (beat frequency noise). Because of the low frequency nature of this noise (typically less than 10KHz), it is difficult to filter out and may interfere with proper operation of sensitive systems (communications, radar or telemetry). The Advanced Analog ATR28xx converters provide a synchronizing input permitting synchronization of multiple converters to the frequency of the users system clock, thereby minimizing this type of noise.

Thermal Management

Assuming that there is no forced air flow, the package temperature rise above ambient (ΔT) may be calculated using the following expression:

$$\Delta T = 80 A^{-0.7} P_d^{0.85} (\text{°C}) \quad (1)$$

where A = the effective surface area in square inches (including heat sink if used), P_d = power dissipation in watts.

The total surface area of the ATR standard package is 7.34 square inches. If a worse case full load efficiency of 78% is assumed, then the case temperature rise can be calculated as follows:

$$P_d = P_{OUT} \left[\frac{1}{Eff} - 1 \right] = 30 \left[\frac{1}{78} - 1 \right] = 8.5W$$

$$\text{and} \quad \Delta T = 80 (7.34)^{-0.7} (8.5)^{0.85} = 122^{\circ}\text{C}$$

Hence, if $T_{AMBIENT} = +25^{\circ}\text{C}$, the DC/DC converter case temperature will be approximately 147 $^{\circ}\text{C}$ if no heat sink or air flow is provided.

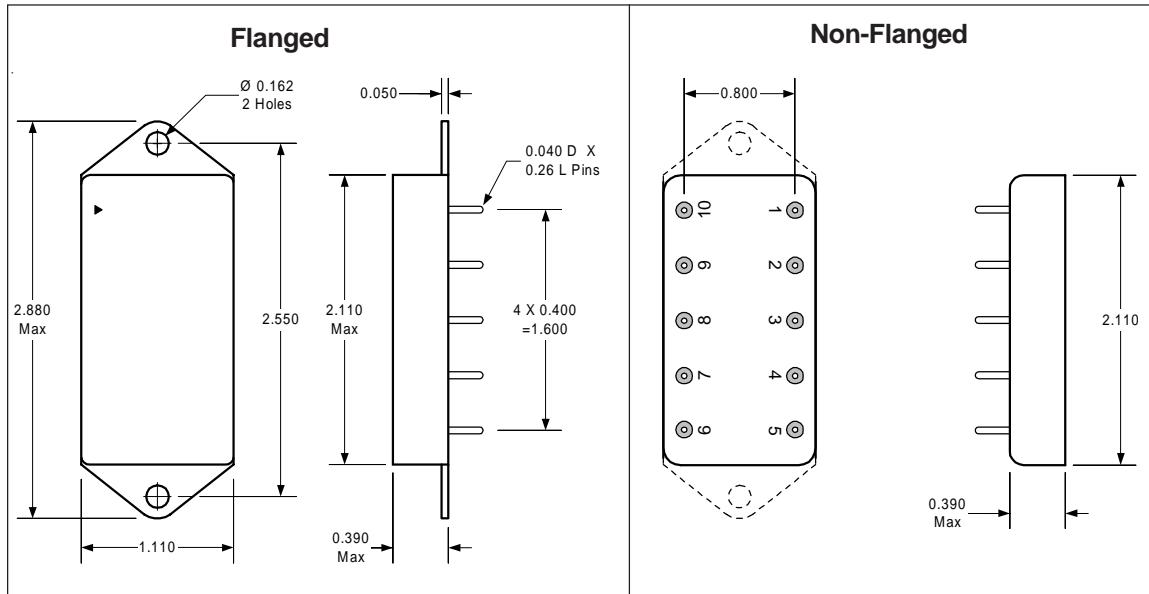
To calculate the heat sink area required to maintain a specific case temperature rise, equation (1) may be manipulated as follows:

$$A_{HEATSINK} = \left[\frac{\Delta T}{80 P_d^{0.85}} \right]^{-1.43} - A_{PKG}$$

As an example, if it is desired to limit the case temperature rise to a maximum of 50 $^{\circ}\text{C}$ above ambient, the required effective heat sink area is:

$$A_{HEATSINK} = \left[\frac{50}{80 (8.5)^{0.85}} \right]^{-1.43} - 7.34 = 19.1 \text{ in}^2$$

ATR28XXD Case Outlines



Pin Designation

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

Part Numbering

ATR 28 15 S F / CH

Model: ATR 28 15

Input Voltage: 28 = 28V Nominal

Output Voltage: Single - 05, 12, 15VDC
 Dual - 12 = $\pm 12V$, 15 = $\pm 15V$
 Triple - 12 = 5V, $\pm 12V$
 15 = 5V, $\pm 15V$

Screening: -, ES, HB, CH

Package Style: F = Flange
 Omit for Non-flange

Outputs: S = Single
 D = Dual
 T = Triple

ATR28XXD Series

International
IR Rectifier

Available Screening Levels and Process Variations for ATR28XXD Series

Requirement	MIL-STD-883 Method	No Suffix	ES Suffix	HB Suffix	CH Suffix
Temperature Range		-20 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	*	Yes	Yes	Yes
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 A, C	Cond A, C	Cond A, C
External Visual	2009	*	Yes	Yes	Yes

* Per Commercial Standards

Available Standard Military Drawing (SMD) Cross Reference

Standardized Military Drawing Pin	Vendor CAGE Code	Vendor Similar Pin
5962-9462701	52467	ATR2812D
5962-9462801	52467	ATR2815D

International
IR Rectifier

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331
ADVANCED ANALOG: 2270 Martin Av., Santa Clara, California 95050, Tel: (408) 727-0500

Visit us at www.irf.com for sales contact information.
Data and specifications subject to change without notice. 10/02