

# ARX4435 Transceiver for Macair H009 Specification

## Features

- ARX4435 Transceiver meets Macair H009 data bus specifications
- Transmitter can be used to drive clock signal line
- Operates with  $\pm 15$  Volts to  $\pm 12$  Volts power supplies
- Direct replacement for CT1641 and CT1816 devices
- Voltage source output for higher bus drive power
- Plug-in and flat package available
- Monolithic construction using linear ASICs
- Processed and screened to MIL-STD-883 specs
- MIL-PRF-38534 compliant devices available

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## General Description

The Aeroflex Laboratories Incorporated model ARX4435 and ARX4435FP are new generation monolithic transceivers which provides compliance with Macair H009 data bus requirements

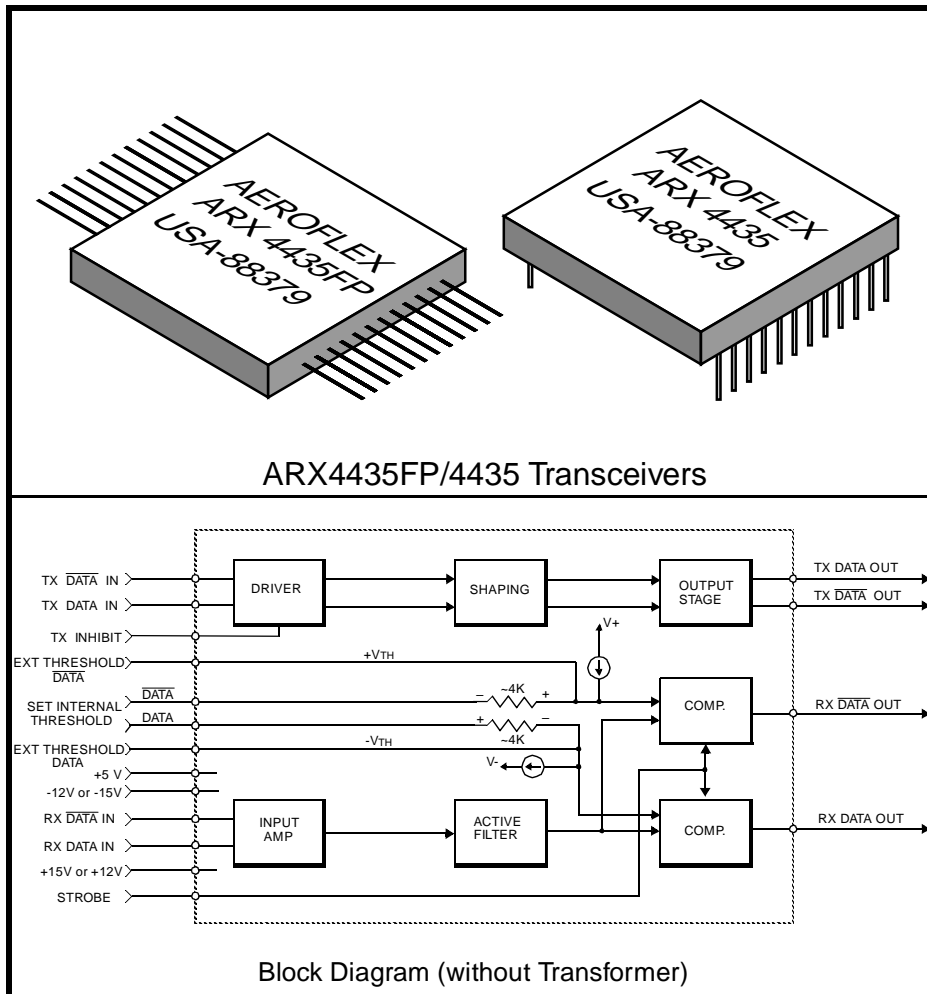
The model ARX4435 and ARX4435FP perform the front-end analog function of inputting and outputting data through a transformer to a H-009 data bus.

Design of these transceivers reflects particular attention to active filter performance. This results in low bit and word error rate with superior waveform purity and minimal zero crossover distortion. The ARX4435 series active filter design has additional high frequency roll-off to provide the required low harmonic distortion waveform without increasing the delay characteristics significantly.

Efficient transmitter electrical and thermal design results in low internal power dissipation and temperature rise at high and low duty cycle.

## Transmitter

The Transmitter section accepts complementary TTL data at the input, and when coupled to the data bus with a 1:1 transformer, isolated on the transceiver side with two 35 Ohm fault isolation resistors, and loaded by a 170 Ohm termination, the data bus signal produced is 20 volts nominal P-P at A-A'. (See Figure 5.) When both DATA and  $\overline{\text{DATA}}$  inputs are held low or high, the transmitter output impedance is low, and signal is "removed" from the line. In addition,



an overriding "INHIBIT" input returns the output impedance to a high state. A logic "1" applied to the "INHIBIT" takes priority over the condition of the data inputs and disables the transmitter. (See Transmitter Logic Waveforms, Figure 1.)

The transmitter utilizes an active filter to suppress harmonics above 1 MHz to meet H 009 Macair specifications. The transmitter may be safely operated for an indefinite period with the output short circuited at 100% duty cycle.

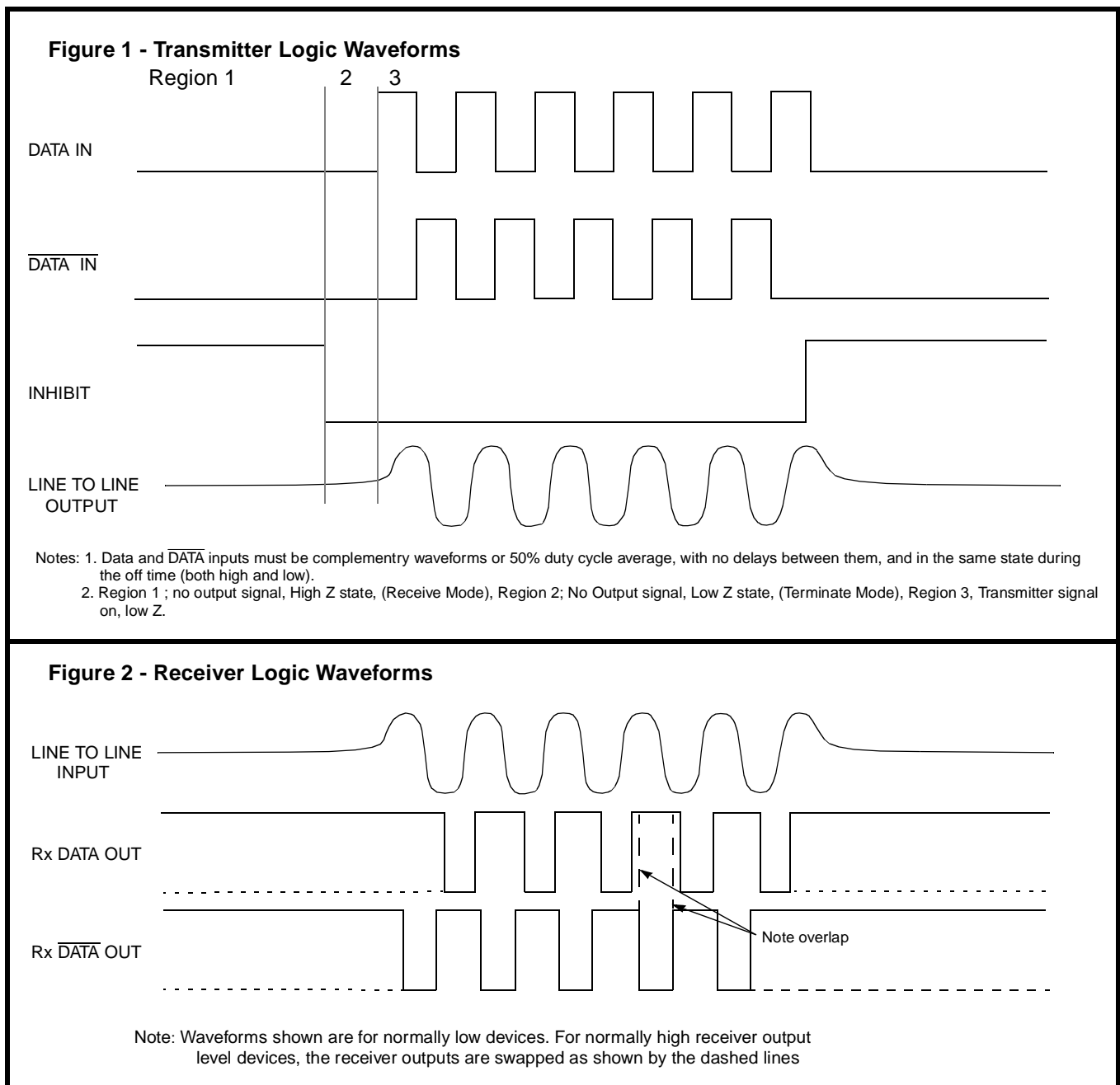
## Receiver

The Receiver section accepts bi-phase differential data at the input and produces two TTL signals at the output. The outputs are DATA and  $\overline{\text{DATA}}$ , and repre-

sent positive and negative excursions of the input beyond a pre-determined threshold. (See Receiver Logic Waveforms, Figure 2.)

The internal threshold is nominally set to detect data bus signals exceeding 1.05 Volts P-P and reject signals less than 0.6 volts P-P when used with a 1:1 turns ratio transformer. (See Figure 5 for transformer data and typical connection.)

A low level at the Strobe input inhibits the DATA and  $\overline{\text{DATA}}$  outputs. If unused, a 2K pull-up to +5 Volts is recommended



## Absolute Maximum Ratings

Operating case temperature	-55°C to +125°C	
Storage case temperature	-65°C to +150 °C	
Power supply Voltages	±15 V P.S. to ±18V MAX	+5 V P.S. to +7V MAX
Logic input Voltage	-0.3 V to +5.5 V	
Receiver differential input	±40 V	
Receiver input voltage (common mode)	±10V	
Driver peak output current	300 mA	
Total package power dissipation over the full operating case temperature range	3.8 Watts	
Maximum junction to case temperature rise (100 % duty cycle)	38°C	
Junction-Case thermal resistance	10°C/W	

## Electrical Characteristics, Transmitter Section

### Input Characteristics, TX DATA in or TX DATA in

Parameter	Condition	Symbol	Min	Typ	Max	Unit
"0" Input Current	$V_{IN} = 0.4 V$	$I_{ILD}$		-0.2	-0.4	mA
"1" Input Current	$V_{IN} = 2.7 V$	$I_{IHD}$		1.0	40	μA
"0" Input Voltage		$V_{IHD}$			0.7	V
"1" Input Voltage		$V_{IHD}$	2.0			V

### Inhibit Characteristics

"0" Input Current	$V_{IN}=0.4V$	$I_{ILI}$		-0.2	-0.4	mA
"1" Input Current	$V_{IN}=2.7V$	$I_{IHI}$		1.0	40	μA
"0" Input Voltage		$V_{ILI}$			0.7	V
"1" Input Voltage		$V_{IHI}$	2			V
Delay from TX inhibit(0→1) to inhibited output	Note 1	$t_{DXOFF}$		350	700	nS
Delay from TX inhibit, (1→0) to active output	Note 1	$t_{DXON}$		200	500	nS
Differential output noise, inhibit mode		$V_{NOI}$		0.8	10	mV p-p
Differential output impedance (inhibited)	Note 2	$Z_{OI}$	10K			Ω

### Output Characteristics

Differential output level	$R_L=170 \Omega$	$V_o$	17	21	24	V p-p
Rise and fall times (10% to 90% of p-p output)		$t_r$	200		300	nS
Output offset at point A-A on Figure 5, 2.5 μS after midpoint crossing of the last bit	$R_L=170 \Omega$	$V_{OS}$			±265	mV peak
Delay from 50% point of TX DATA or TX DATA input to zero crossing of differential signal. (note1)		$t_{DTX}$		220	350	nS

## Electrical Characteristics, Receiver Section

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Differential Input Impedance (Note 1)	f= 1MHz	Z <sub>in</sub>	20K			Ω
Differential Input Voltage Range		V <sub>IDR</sub>			40	V p-p
Input Common Mode Voltage Range	Note 1	V <sub>ICR</sub>	10			V p-p
Common Mode Rejection Ratio	Point A-A on Figure 5	CMRR	40			dB

### Strobe Characteristics (Logic "0" inhibits output)

"0" Input Current	V <sub>S</sub> =0.4 V	I <sub>IL</sub>		-0.2	-0.4	mA
"1" Input Current	V <sub>S</sub> =2.7 V	I <sub>IH</sub>		1.0	+40	μA
"0" Input Voltage		V <sub>IL</sub>			0.7	V
"1" Input Voltage		V <sub>IH</sub>	2.0			V
Strobe Delay (turn-on or turn-off)	Note 1.	t <sub>SD</sub>			150	nS

### Threshold Characteristics (Sinewave input)

Internal Threshold Voltage (Referred to the bus) Pins 6 and 11 to GND For 4435-701 only – Pins 6 and 11 to GND	100KHz-1MHz	V <sub>TH</sub>	0.60	0.80	1.15	V P-P
			1.2	1.6	2.3	V P-P
External Threshold Pins 6 & 11 open, Pin 5 with a 5.9K resistor to GND, Pin 12 with a 6.65K resistor to GND, 1MHz Sinewave applied to point A-A		V <sub>TH(EXT)</sub>	1.65	1.95	2.24	V P-P

### Output Characteristics, RX DATA and RX $\overline{\text{DATA}}$

"1" State	I <sub>OH</sub> = -0.4 mA	V <sub>OH</sub>	2.5	3.6		V
"0" State	I <sub>OL</sub> = 4 mA	V <sub>OL</sub>		0.35	0.5	V
Delay, (average) from differential input zero crossings to RX DATA and RX $\overline{\text{DATA}}$ output 50% points		t <sub>DRX</sub>		275	450	nS

## Power Data

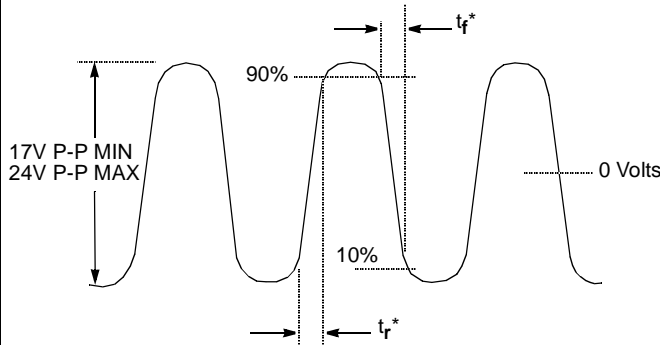
### Power Supply Currents (Power supplies set at +15V, -15V, +5V)

Duty Cycle	+V		-V		5V	
	TYP	MAX	TYP	MAX	TYP	MAX
Transmitter Standby	45mA	60mA	65mA	75mA	28mA	35mA
25% duty cycle	60mA	80mA	85mA	95mA		
50% duty cycle	75mA	105mA	100mA	120mA		
100% duty cycle	110mA	140mA	130mA	160mA		

### Recommended Power Supply Voltage Range

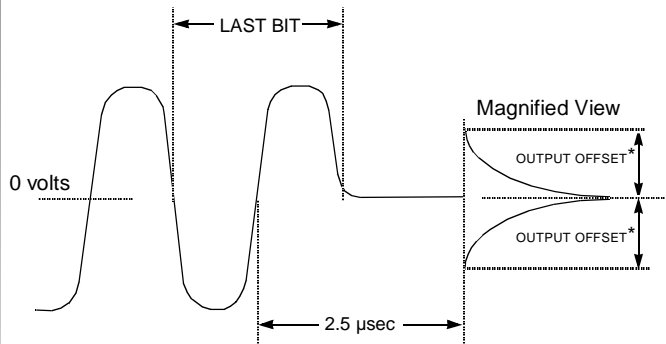
+V	+11.4 Volts to +15.75 Volts
-V	-11.4 Volts to -15.75 Volts
Logic	+4.5 Volts to +5.5 Volts

**Figure 3 – Transmitter (TX) Output Wave form**



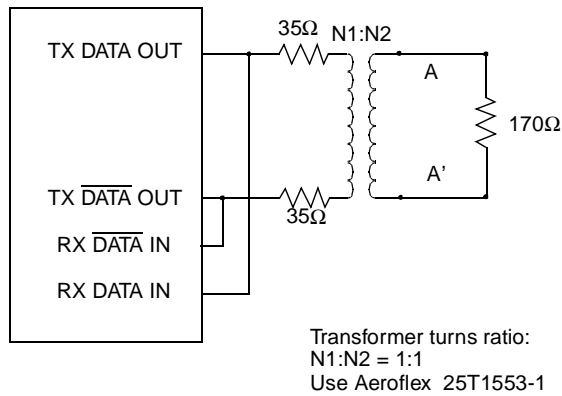
\* Rise and fall times measured at point A-A' in Fig 5

**Figure 4 – Transmitter (TX) Output offset**

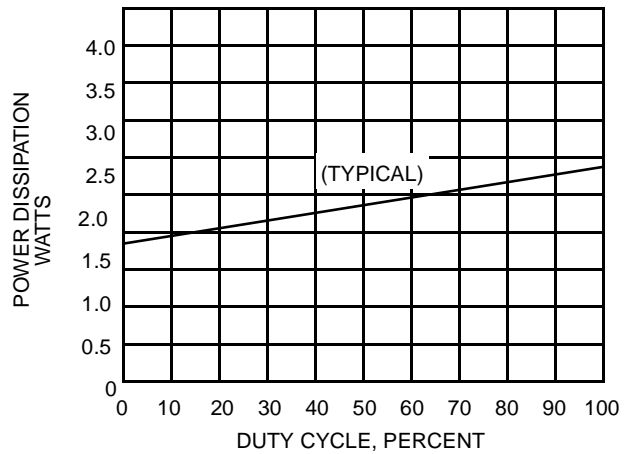


\*Offset measured at point A-A' in Fig 5

**Figure 5 – Typical Transformer connection**



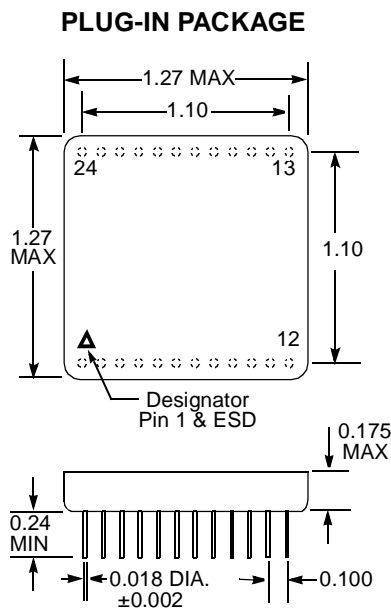
**Figure 6 – Power Dissipation vs. Duty Cycle**



**Notes:**

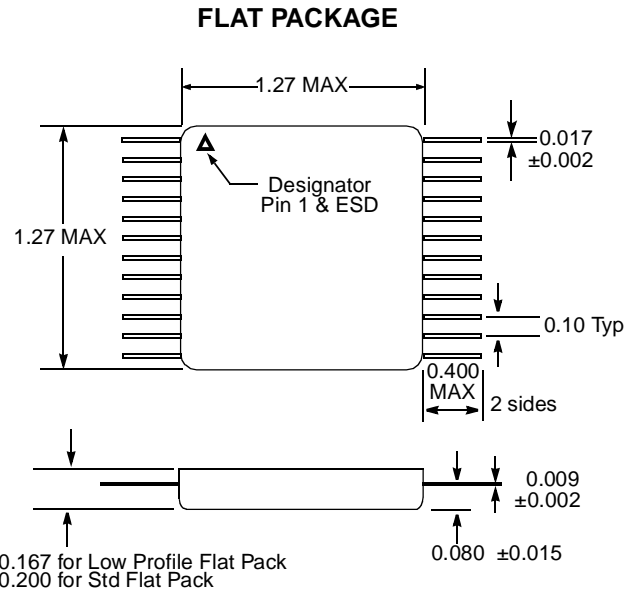
1. Characteristics guaranteed by design, not production tested.
2. Measured at 1mHz at point A-A', power on or off.
3. Specifications apply over the temperature range of -55°C to +125°C (case temperature) unless otherwise noted.
4. All typical values are measured at +25°C.

## Package Configurations and Pinouts



### Pin Connections

1. TX DATA OUT
2. TX DATA OUT
3. TX GND (+5V)
4. +15V (TX)
5. EXT. DATA THRES
6. INT. DATA THRES
7. RX DATA OUT
8. STROBE
9. RX GND (+5V)
10. RXDATA OUT
11. INT DATA THRES
12. EXT DATA THRES
13. +15V (RX)
14. N.C.
15. RX DATA IN
16. RX DATA IN
17. GND
18. CASE GND
19. -15V (RX)
20. +5V
21. TX INHIBIT
22. TX DATA IN
23. TX DATA IN
24. -15V (TX)



- Notes 1. Dimensions shown are in inches.  
2. Pins are equally spaced at 0.100±0.002 tolerance non-cumulative each row.

## Configurations and Ordering Information

Model No.	DESC No.	Receiver Data level	Case	Specs.
ARX4435	To Be Assigned	Normally High	Plug In	H009 Macair
ARX4435-FP	To Be Assigned	Normally High	Flat Pack	H009 Macair
ARX4435-701	-	Normally High	Plug In	H009 Macair Commercial (0°C - 70°C)

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Specifications subject to change without notice.

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