ARX4435N Transceiver for Macair H009 Specification

Preliminary

Features

- **ARX4435N transceiver meets Macair H009 data bus specifications**
- **Transmitter can be used to drive clock signal line**
- **Operates with ±15 Volts to ±12 Volts power supplies**
- **Low power 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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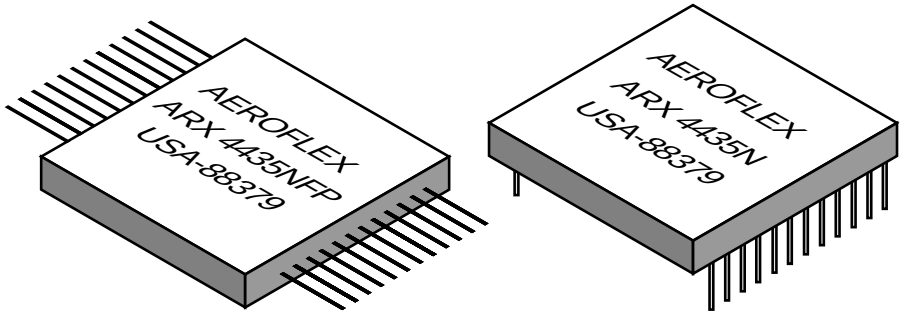
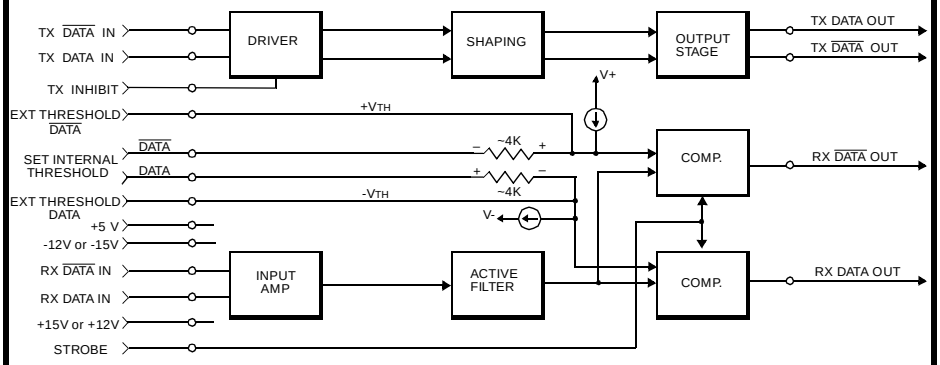


ARX4435NFP / ARX4435N Transceivers



Block Diagram (without Transformer)

General Description

The Aeroflex Laboratories Incorporated model ARX4435N and ARX4435NFP are new generation monolithic transceivers which provides compliance with Macair H009 data bus requirements.

The ARX4435N and ARX4435NFP perform the front-end analog function of inputting and outputting data through a transformer to a H009 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 ARX4435N 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 H009 Macair specifications. The transmitter may be safely operated for an indefinite period with the output short circuited at 100% duty cycle.

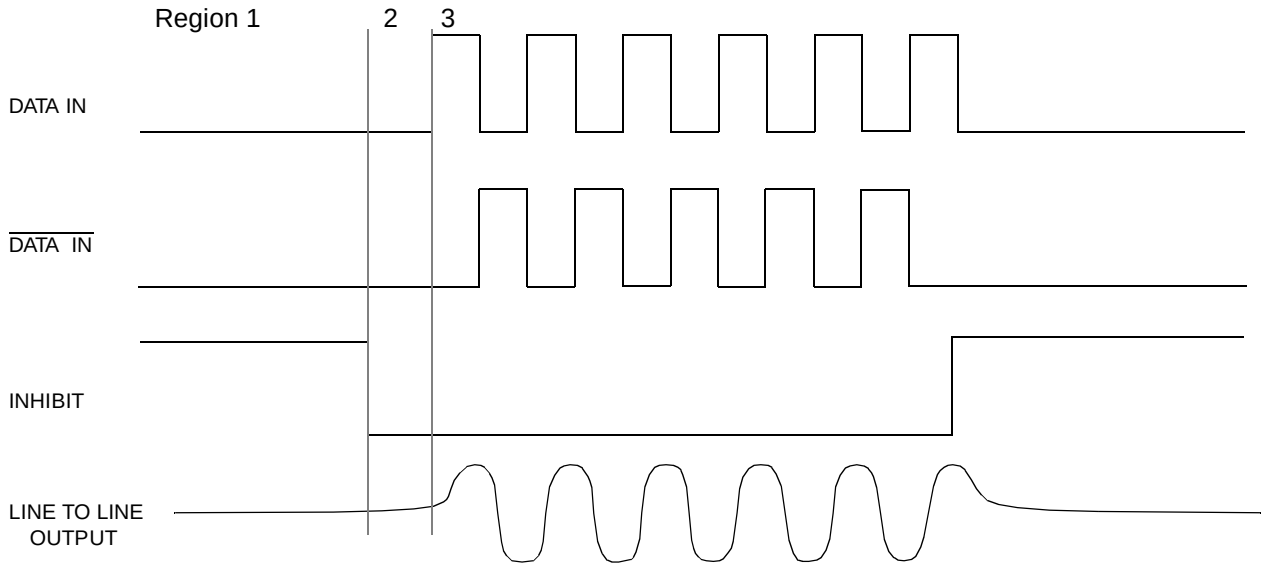
Receiver

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 represent 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).

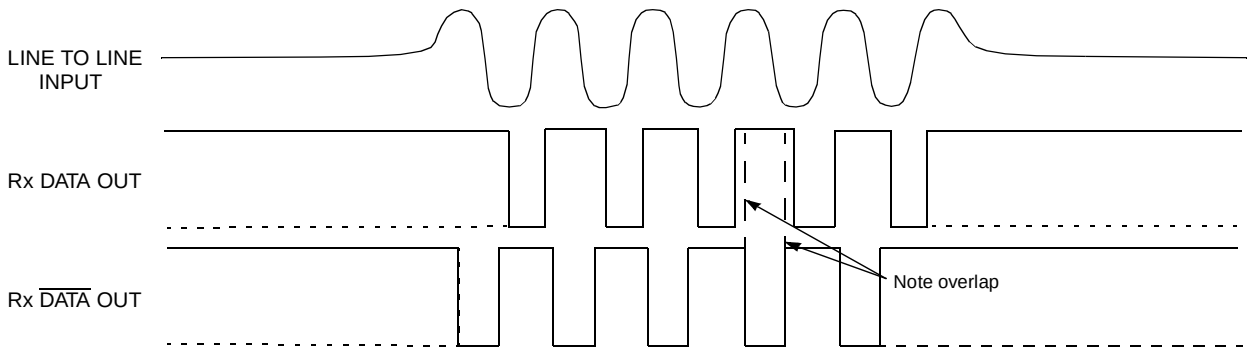
A low level at the Strobe input inhibits the DATA and $\overline{\text{DATA}}$ outputs. If unused, a 2K pull-up to +5 Volts is recommended.

Figure 1 - Transmitter Logic Waveforms



Notes: 1. Data and $\overline{\text{DATA}}$ inputs must be complementry waveforms or 50% duty cycle average, with no delays between them, and in the same state during the off time (both high and low).
2. Region 1 ; no output signal, High Z state, (Receive Mode), Region 2; No Output signal, Low Z state, (Terminate Mode), Region 3, Transmitter signal on, low Z.

Figure 2 - Receiver Logic Waveforms



Note: Waveforms shown are for normally low devices. For normally high receiver output level devices, the receiver outputs are swapped as shown by the dashed lines

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	150 mA	
Total package power dissipation over the full operating case temperature range	3.0 Watts	
Maximum junction to case temperature rise (100 % duty cycle)	15°C	
Junction-Case thermal resistance	5°C/W	

Electrical Characteristics, Transmitter Section

Input Characteristics, TX DATA in or TX $\overline{\text{DATA}}$ 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, pt A-A on Fig. 5	R_L=170 Ω	V_O	17	21	24	V p-p
Rise and fall times (10% to 90% of p-p output), pt A-A on Fig. 5		t_r	200		300	nS
Output offset at pt A-A on Fig. 5, 2.5 µS after midpoint crossing of the last bit	R_L=170 Ω	V_{OS}			±265	mV peak
Delay from 50% point of TX DATA or $\overline{\text{TX DATA}}$ 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_{In}	20K			Ω
Differential Input Voltage Range		V_{IDR}			40	V p-p
Input Common Mode Voltage Range	Note 1	V_{ICR}	10			V p-p
Common Mode Rejection Ratio	Point A-A on Figure 5	CMRR	40			dB

Strobe Characteristics (Logic "O" inhibits output)

"0" Input Current	V_S=0.4 V	I_{IL}		-0.2	-0.4	mA
"1" Input Current	V_S=2.7 V	I_{IH}		1.0	+40	µA
"0" Input Voltage		V_{IL}			0.7	V
"1" Input Voltage		V_{IH}	2.0			V
Strobe Delay (turn-on or turn-off)	Note 1.	t_{SD}			150	nS

Threshold Characteristics (Sinewave input)

Internal Threshold Voltage (Referred to the bus) Pins 6 and 11 to GND	100KHz-1MHz	V_{TH}	0.60	0.80	1.15	V_{P-P}
External Threshold Pins 6 & 11 open, Pin 5 and Pin 12 with a 10K resistor to GND, 1MHZ Sinewave applied to point A-A		$V_{TH(EXT)}$	1.9	2.2	2.5	V_{P-P}

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

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

Power Data

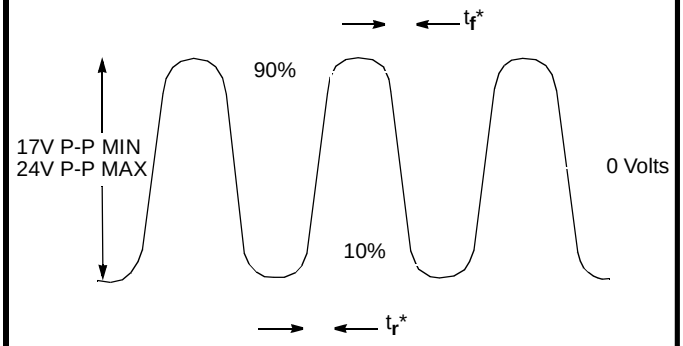
Power Supply Currents (Power supplies set at +15V, -15V, +5V)

Duty Cycle	+V I_{CC}		-V I_{EE}		5V I_L	
	TYP	MAX	TYP	MAX	TYP	MAX
Transmitter Standby	5mA	10mA	25mA	35mA	25mA	35mA
25% duty cycle	20mA	30mA	40mA	60mA		
50% duty cycle	40mA	60mA	60mA	80mA		
100% duty cycle	85mA	120mA	105mA	140mA		

Recommended Power Supply Voltage Range

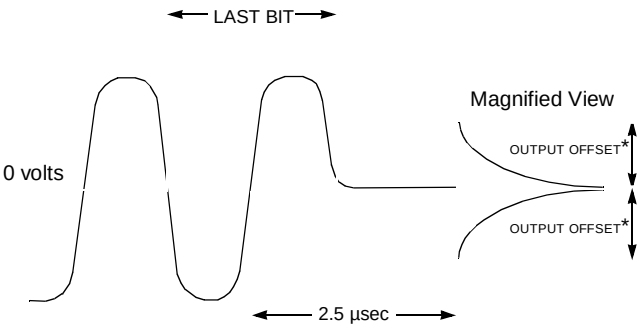
+V	+11.4 Volts to +15.75 Volts
-V	-11.4 Volts to -15.75 Volts
Logic	+4.5 Volts to +5.5 Volts

Figure 3 – Transmitter (TX) Output Wave form



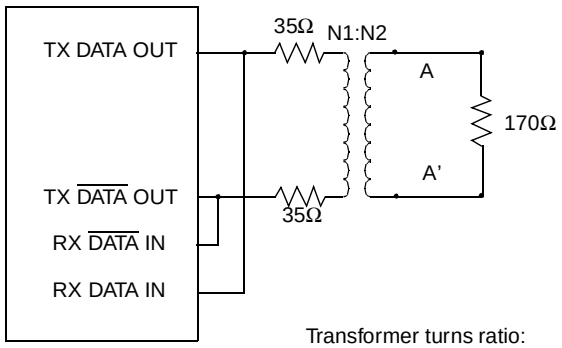
* Rise and fall times measured at point A-A' in Fig 5

Figure 4 – Transmitter (TX) Output offset



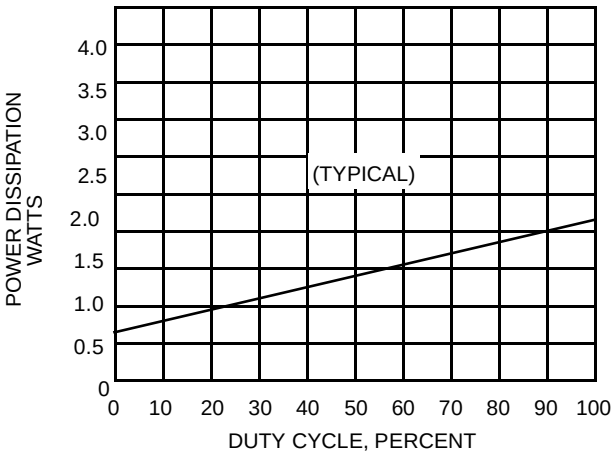
*Offset measured at point A-A' in Fig 5

Figure 5 – Typical Transformer connection



Transformer turns ratio:
N1:N2 = 1:1
Use Aeroflex 25T1553-1

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.

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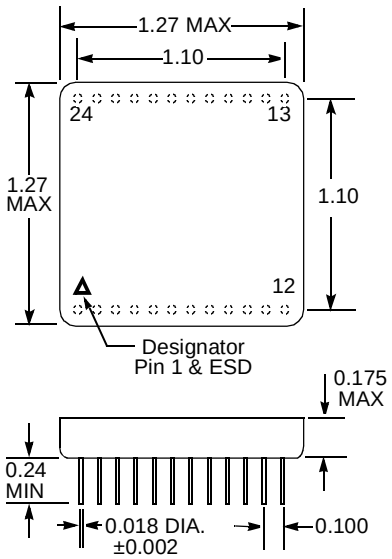
Package Configurations and Pinouts

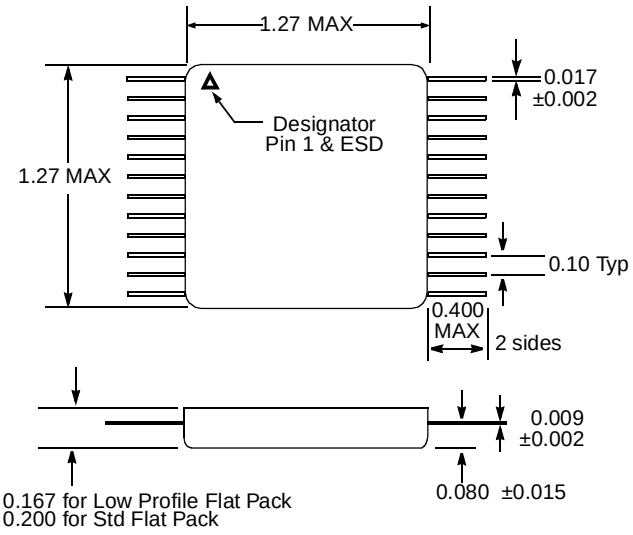
PLUG-IN PACKAGE



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)

FLAT PACKAGE



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.
ARX4435N	To Be Assigned	Normally High	Plug In	H009 Macair
ARX4435N-FP	To Be Assigned	Normally High	Flat Pack	H009 Macair

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