

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 ± 15 Volts to ± 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

AEROFLEX
CIRCUIT TECHNOLOGY
www.aeroflex.com

General Description

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

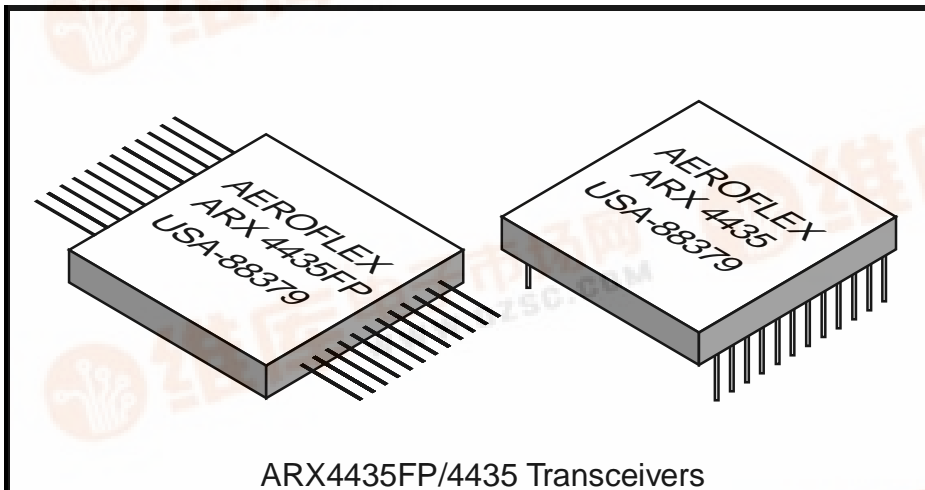
The model ARX4435 and ARX4435FP perform the front-end analog function of inputting and outputting data through a transformer to a H-009 data bus.

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.

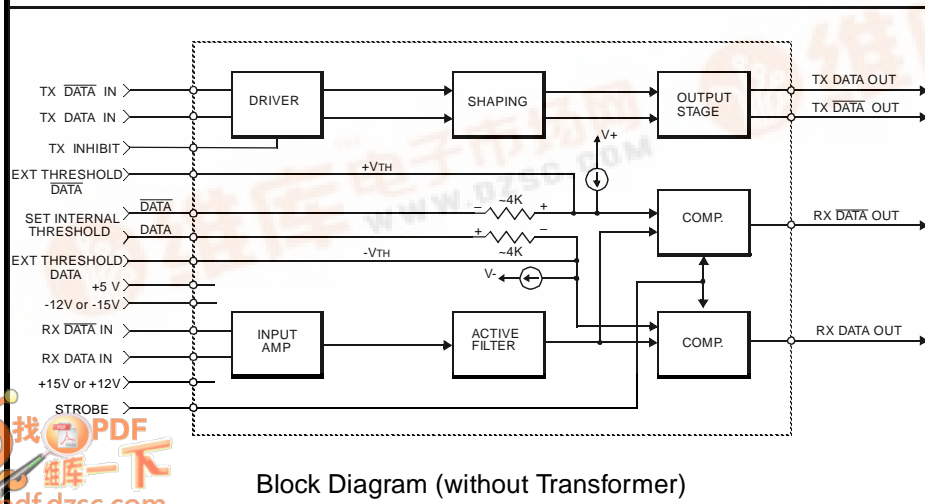
Efficient transmitter electrical and thermal design results in low internal power dissipation and temperature rise at high and low duty cycle.

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,



ARX4435FP/4435 Transceivers



Block Diagram (without Transformer)



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.

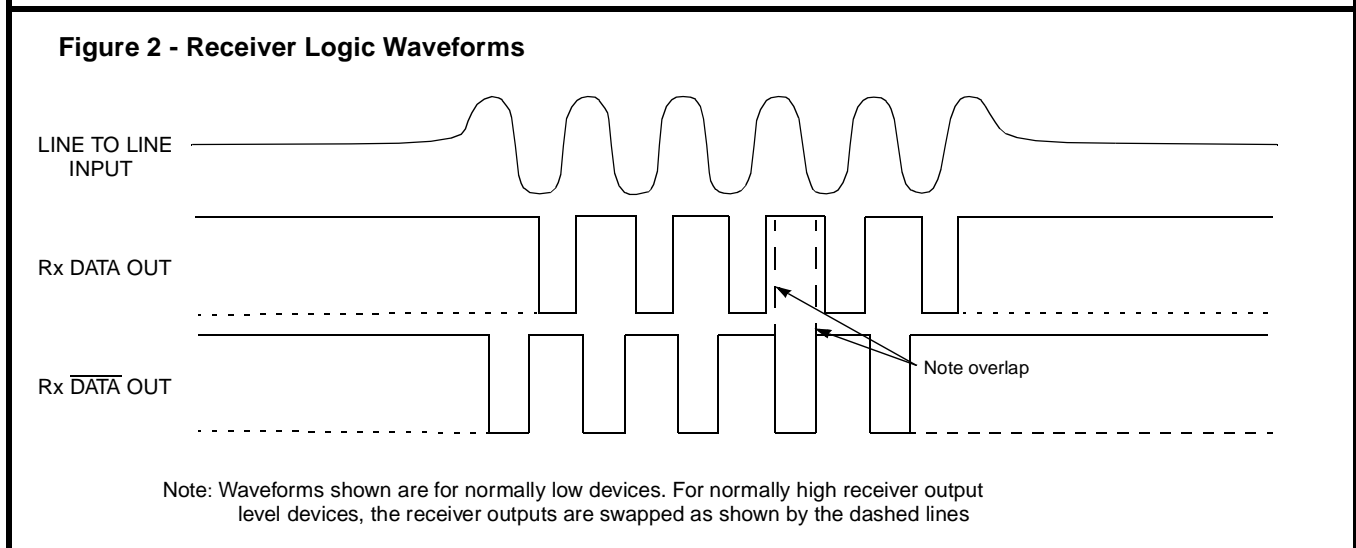
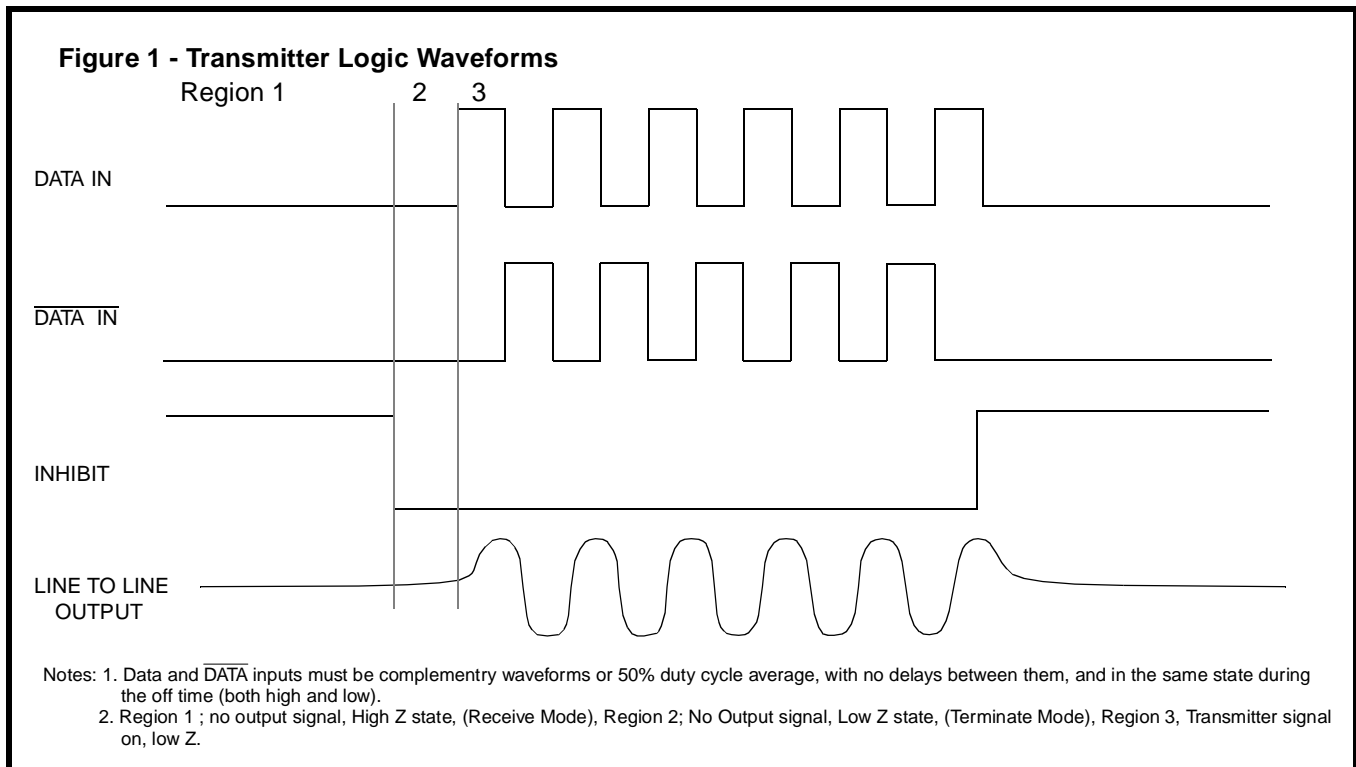
Receiver

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 _{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 "0" 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 For 4435-701 only – Pins 6 and 11 to GND | 100KHz-1MHz | V _{TH} | 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 _{TH(EXT)} | 1.65 | 1.95 | 2.24 | V P-P |

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

| | | | | | | |
|--|---------------------------|------------------|-----|------|-----|----|
| "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 $\overline{\text{DATA}}$ output 50% points | | t _{DRX} | | 275 | 450 | nS |

Power Data

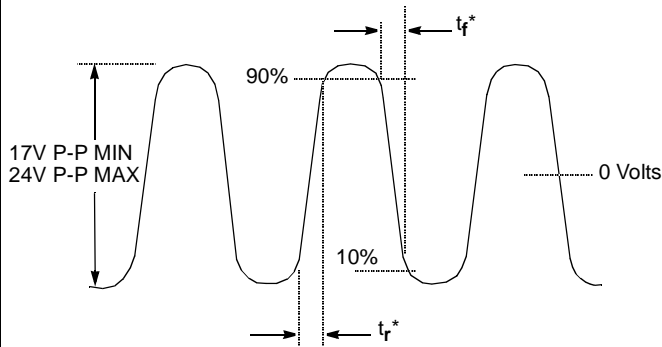
Power Supply Currents (Power supplies set at +15V, -15V, +5V)

| 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

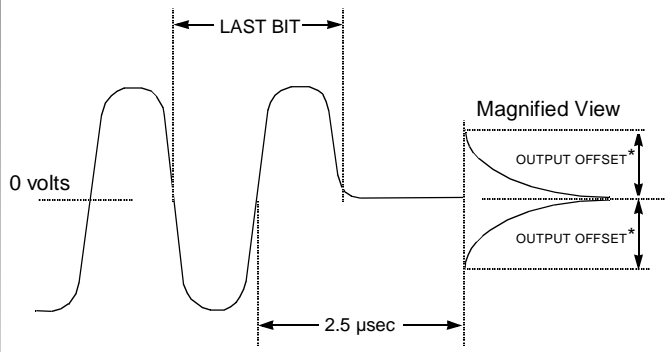
| | |
|-------|-----------------------------|
| +V | +11.4 Volts to +15.75 Volts |
| -V | -11.4 Volts to -15.75 Volts |
| Logic | +4.5 Volts to +5.5 Volts |

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

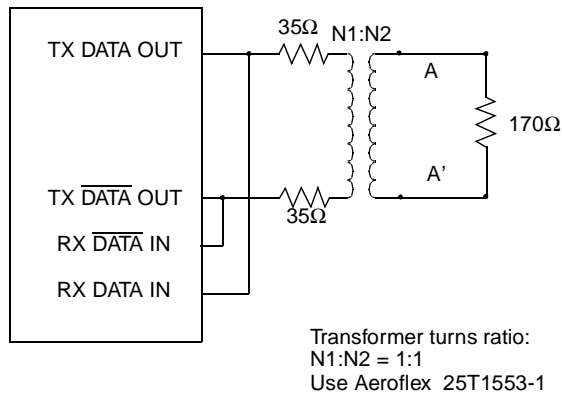
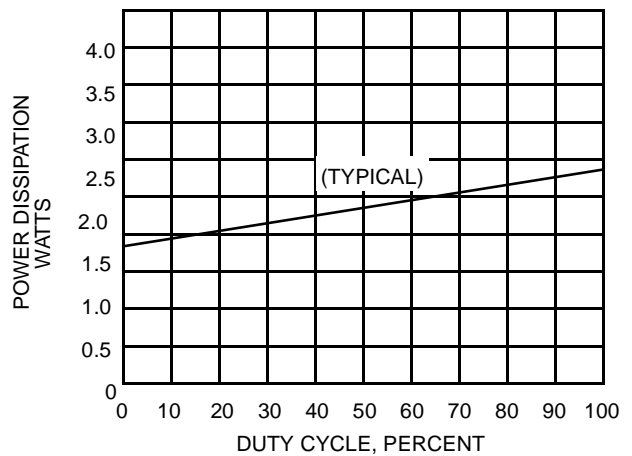


Figure 6 – Power Dissipation vs. Duty Cycle



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.

