ARX4808 Dual Transceivers for MACAIR A3818, A5690, A5232, A4905 & MIL-STD-1553

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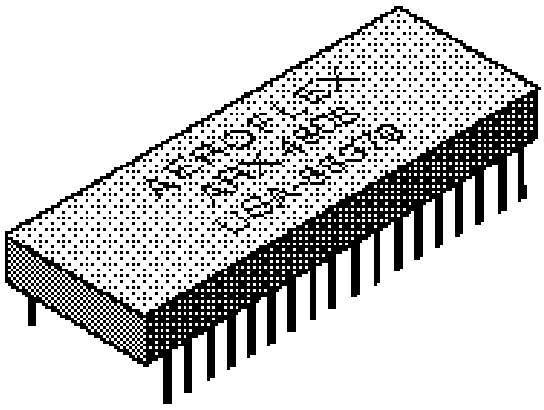
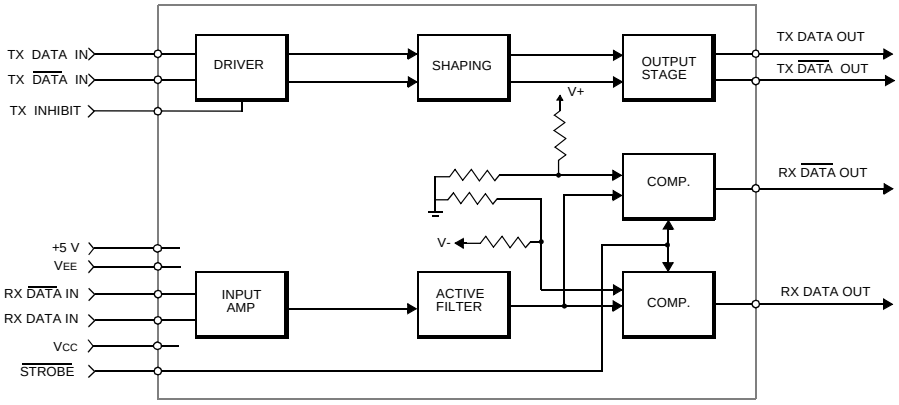
Features

- **ARX4808 Dual Transceiver meets MIL-STD-1553A & B, Macair A3818, A5690, A5232 and A4905 specs**
- **Operates with ±12 V to ±15 V & +5 V Power Supplies**
- **Voltage source output for higher bus drive power**
- **Plug-in or Flat Package**
- **Monolithic construction using linear ASICs**
- **Low receiver data level version, ARX4868**
- **Processed and Screened to MIL-STD-883 specs**
- **DESC SMD (Standard Military Drawing) Pending**



ARX4808 Transceiver



Block Diagram (without Transformer), 1/2 of unit shown

General Description:

The Aeroflex Laboratories transceiver model ARX4808 is a new generation Dual monolithic transceiver which provides full compliance with Macair and MIL-STD-1553 data bus requirements

The model ARX4808 performs the front-end analog function of inputting and outputting data through a transformer to a MIL-STD-1553 or Macair data bus. The ARX4808 can be considered a "Universal" Transceiver in that it is compatible with MIL-STD-1553A & B, Macair A-3818, A-4905, A-5232 and A-5690.

Design of this transceiver 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 ARX4808 series active filter design has additional high frequency roll-off to provide the required Macair low harmonic distortion waveform without increasing the pulse delay characteristics significantly.

Efficient transmitter electrical and thermal design provides low internal power dissipation and heat rise at high and well as low duty cycles.The receiver input threshold is set Internally.

Transmitter

The Transmitter section accepts bi-phase TTL data at the input and when coupled to the data bus with a 1:1 transformer, isolated on the data bus side with two 52.5 Ohm fault isolation resistors, and loaded by two 70 Ohm terminations plus additional

receivers, the data bus signal produced is 7.5 volts minimum P-P at A-A' (See Figure 5.). When both DATA and $\overline{\text{DATA}}$ inputs are held low or high, the transmitter output becomes a high impedance and is "removed" from the line. In addition, an overriding "INHIBIT" input provides for the removal of the transmitter output from the line. 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 Macair specifications A-3818, A-4905, A-5232 and A-5690. The transmitter may be safely operated for an indefinite period at 100% duty cycle into a data bus short circuit.

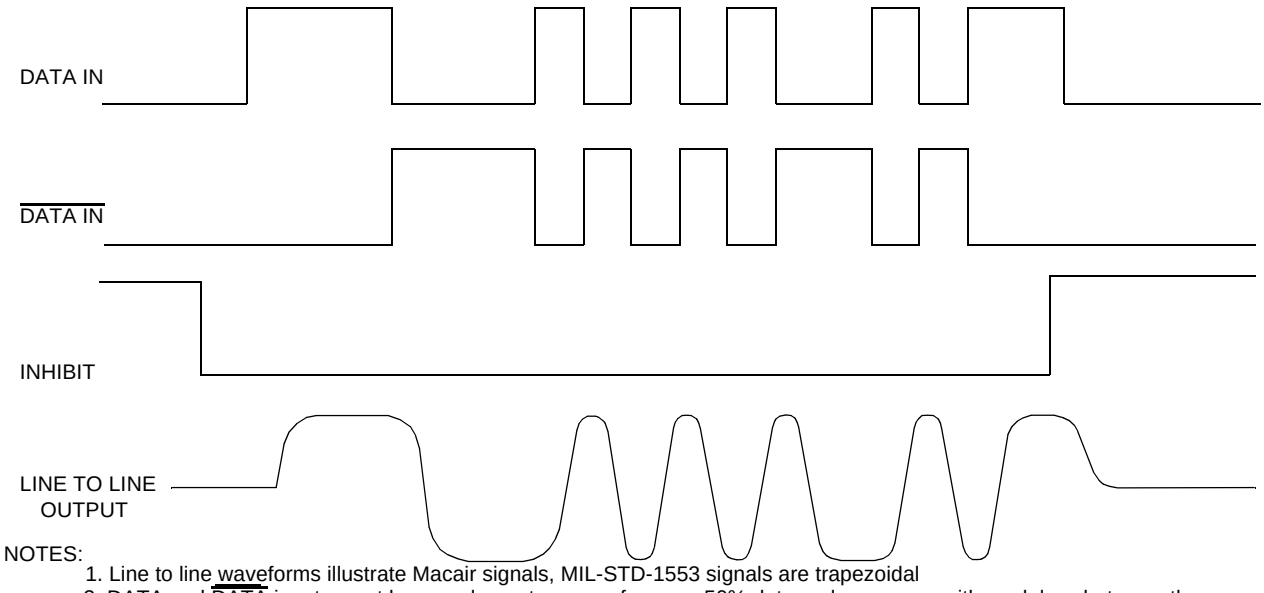
Receiver

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.)

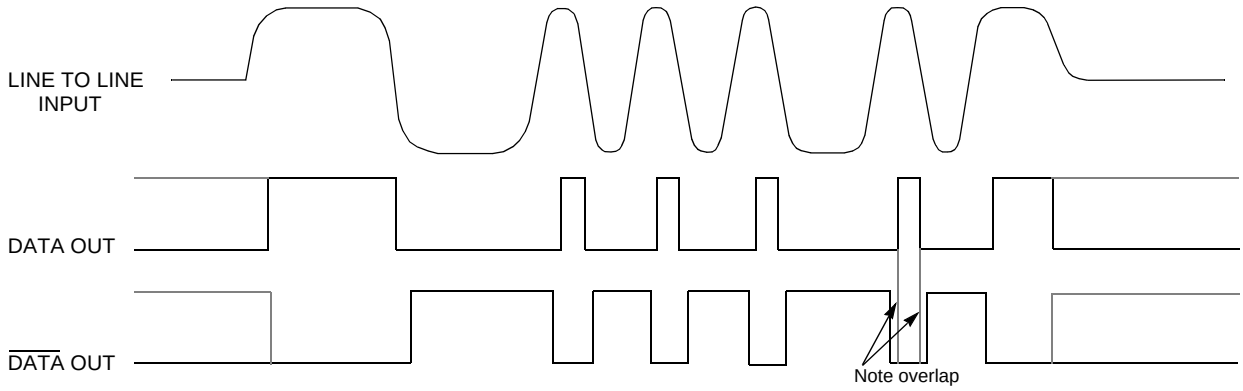
A low level at the Strobe input inhibits the DATA and $\overline{\text{DATA}}$ outputs. If unused, a 2K pull-up to +5 Volts is recommended

Figure 1 Transmitter Logic Waveforms



NOTES:
1. Line to line waveforms illustrate Macair signals, MIL-STD-1553 signals are trapezoidal
2. DATA and $\overline{\text{DATA}}$ inputs must be complementary waveforms or 50% duty cycle average, with no delays between them.
3. DATA and $\overline{\text{DATA}}$ must be in the same state during off time (both high or low).

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, Per Channel

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	2.4 Watts	
Power Dissipation for hottest die, (100% duty cycle)	600 mW	
Maximum junction to case temperature rise for the hot-test device (100 % duty cycle)	36°C	
Junction-Case, Thermal resistance for hottest device	60°C/W	

Electrical Characteristics Per Channel, 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}		300	450	nS
Delay from TX inhibit, (1→0) to active output	Note 1	t_{DXON}		300	450	nS
Differential output noise, inhibit mode		V_{NOI}		0.8	10	mV p-p
Differential output impedance (inhibited)	Note 2	Z_{OI}	2K			Ω

Output Characteristics

Differential output level	R_L=35 Ω	V_O	7	7.5	9	V p-p
Rise and fall times (10% to 90% of p-p output)		t_r	200	250	300	nS
Output offset at point A-A'on Fig 5, 2.5 µS after midpoint crossing of the parity bit of the last word of a 660 µS message	R_L=35 Ω	V_{OS}			±90	mV peak
Delay from 50% point of TX DATA or TX $\overline{\text{DATA}}$ input to zero crossing of differential signal. (Note 1)		t_{DTX}		240	300	nS

Electrical Characteristics Per Channel, Receiver Section

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Differential Input Impedance	f = 1MHz	Z_{In}	20K	100K		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	Note 1	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 = 2.7V	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 grounded	100KHz-1 MHz	V_{TH}	0.60	0.8	1.15	V_{P-P}
External threshold control (pins 6&11 open, resistors from pin 5 and 12 to ground)	Max R = 8KΩ	R_{TH} /V_{TH}		4000		Ohms /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 DATA output 50% points	Note 1	t_{DRX}		300	450	nS

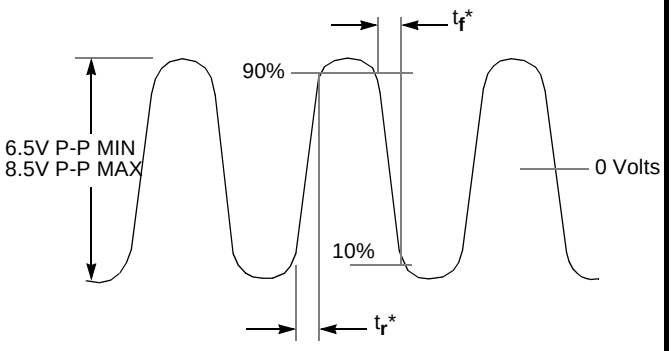
Power Supply Currents Per Channel
(Power supplies set at +15V, -15V, +5V)

Duty Cycle		+Vcc	-VEE	5V
Transmitter Standby or 1% Duty Cycle		60mA	75mA	35mA
25% duty cycle	Note 1	80mA	95mA	
50% duty cycle		105mA	120mA	
100% duty cycle	Note 1	160mA	180mA	

Recommended Power Supply Voltage Range

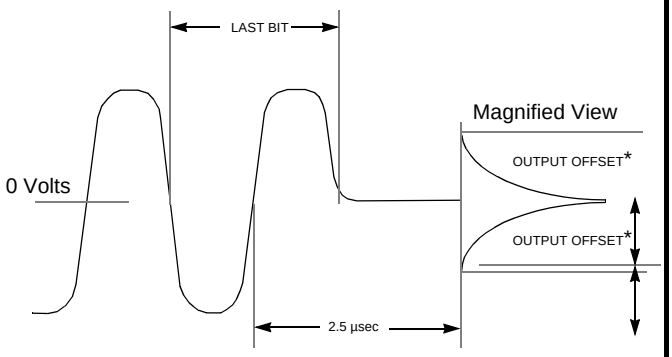
+V	+11.4 Volts to +15.75 Volts
-V	-11.4 Volts to -15.75 Volts
Logic	+4.5 Volts to + 5.5 Volts

Figure 3 Transmitter (TX) Output Wave form



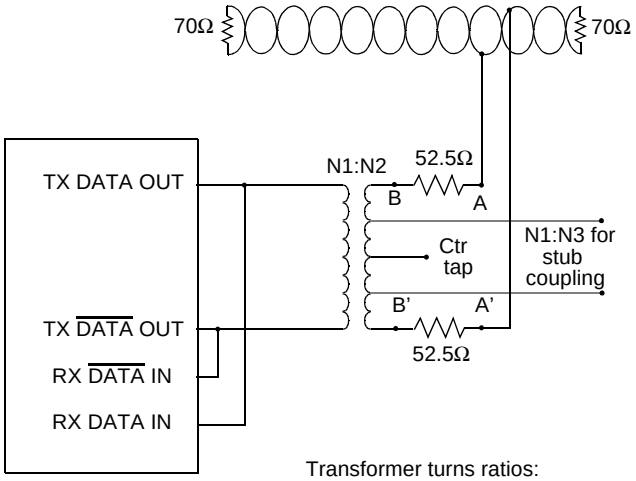
* Rise and fall times measured at point A-A' in Fig 5

Figure 4 Transmitter (TX) Output offset



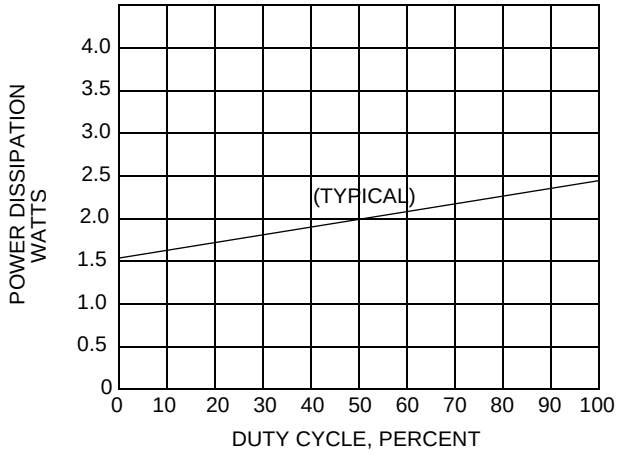
*Offset measured at point A-A' in Fig 5

Figure 5 Typical Transformer connection



Transformer turns ratios:
N1:N2 = 1:1
N1:N3 = 1:0.71
Use Aeroflex 25T1553-1

Figure 6 Power Dissipation vs. Duty Cycle (Per Channel)



NOTES

1. Characteristics guaranteed by design, not production tested.
2. Measured from 75kHz to 1MHz at point A-A' with transformer self impedance of 3KΩ minimum, power on or off

Configurations and Ordering Information

Model No.	DESC No.	Receiver Data level	Case
ARX4808	TBA	Normally High	Plug In
ARX4808-2	TBA	Normally High	Flat Pack
ARX4868	TBA	Normally Low	Plug In
ARX4868-2	TBA	Normally Low	Flat Pack

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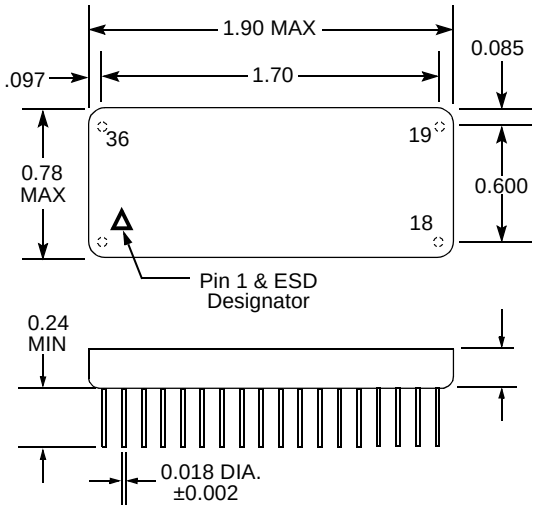
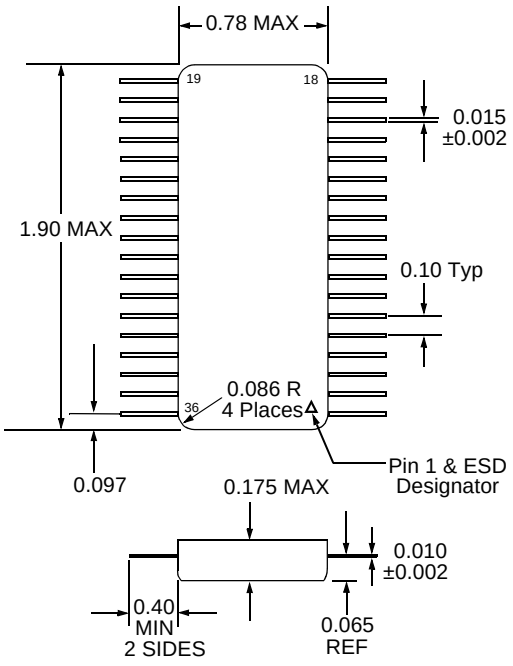
Dual In Line



Flat Package



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

Specifications subject to change without notice.

Pin Numbers & Functions

Pin #	Function	Channel
1	TX DATA OUT	A
2	TX $\overline{\text{DATA}}$ OUT	A
3	GROUND	A
4	NC	
5	RX DATA OUT	A
6	STROBE	A
7	GROUND	A
8	RX $\overline{\text{DATA}}$ OUT	A
9	CASE	
10	TX DATA OUT	B
11	TX $\overline{\text{DATA}}$ OUT	B
12	GROUND	B
13	NC	
14	RX DATA OUT	B
15	STROBE	B
16	GROUND	B
17	RX $\overline{\text{DATA}}$ OUT	B
18	NC	
19	VCC	B
20	RX DATA IN	B
21	RX $\overline{\text{DATA}}$ IN	B
22	GROUND 3	B
23	VEE	B
24	+5V	B
25	INHIBIT	B
26	TX DATA IN	B
27	TX $\overline{\text{DATA}}$ IN	B
28	VCC	A
29	RX DATA IN	A
30	RX $\overline{\text{DATA}}$ IN	A
31	GROUND	A
32	VEE	A
33	+5 V	A
34	INHIBIT	A
35	TX DATA IN	A
36	TX $\overline{\text{DATA}}$ IN	A

Aeroflex Circuit Technology **Telephone: (516) 694-6700**
35 South Service Road **FAX: (516) 694-6715**
Plainview New York 11803 **Toll Free Inquiries: 1-(800) THE-1553**