

ARX 3453, ARX 3443

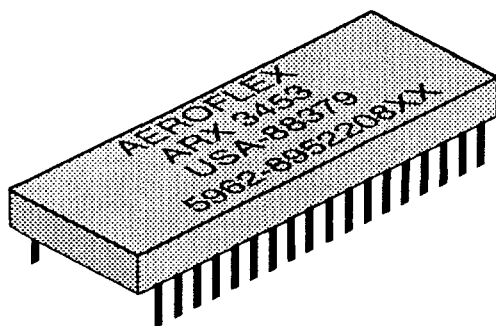
SINGLE SUPPLY TRANSCEIVERS

FOR MIL-STD-1553

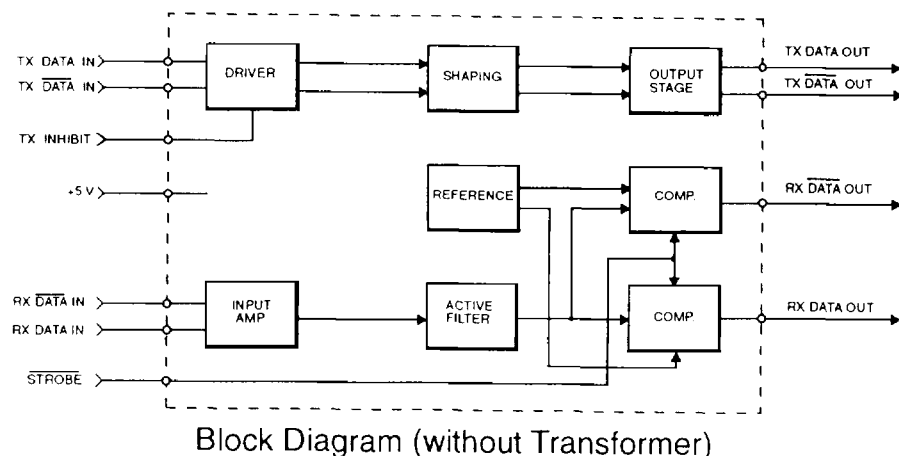


Features

- Single 5 volt supply operation
- Low power dissipation
- Small size, light weight
- Dual transceiver saves space, cost
- Outstanding MIL-STD-1553 performance
- Dual or single transceiver package options
- Quasi-monolithic construction using linear ASICs
- DESC SMD No. 5962-8952208



ARX 3453 Dual Transceiver for 5 Volt Power Supplies



General Description:

The Aeroflex Circuit Technology Models ARX 3443 and ARX 3453 are new generation quasi-monolithic transceiver designs which provide full compliance with MIL-STD-1553A and B requirements in the smallest packages with lowest power consumption and single power supply operation.

The single channel Model ARX 3443 and dual channel Model ARX 3453 perform the front-end analog function of inputting and outputting data through a transformer to the MIL-STD-1553 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 cross-over distortion. Efficient transmitter electrical and thermal design provides low internal power dissipation and heat rise at high as well as low duty cycles.

Each channel of the dual transceiver is completely separate from the other and fully independent. This includes power leads as well as signal lines. Hence, each channel may be connected to a different data bus with no interaction.

Transmitter:

The Transmitter section accepts bi-phase TTL data at the input and when coupled to the data bus with a 1:2.12 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 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 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 Waveform, Figure 1.) The Transmitter may be safely operated for an indefinite period with the output short circuited at 100% duty cycle.

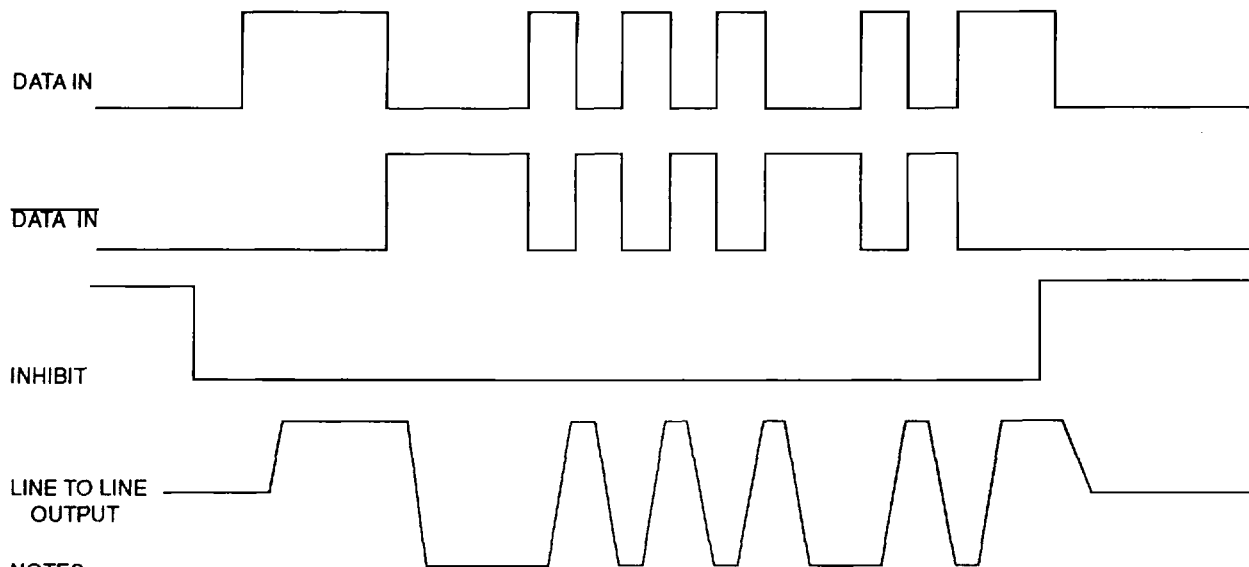
Receiver:

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 Waveform, Figure 2.)

The pre-set internal thresholds will detect data bus signals exceeding 1.20 Volts P-P and reject signals less than 0.6 volts P-P when used with a 1:2.12 turns ratio transformer. (See Figure 5 for transformer data and typical connection.)



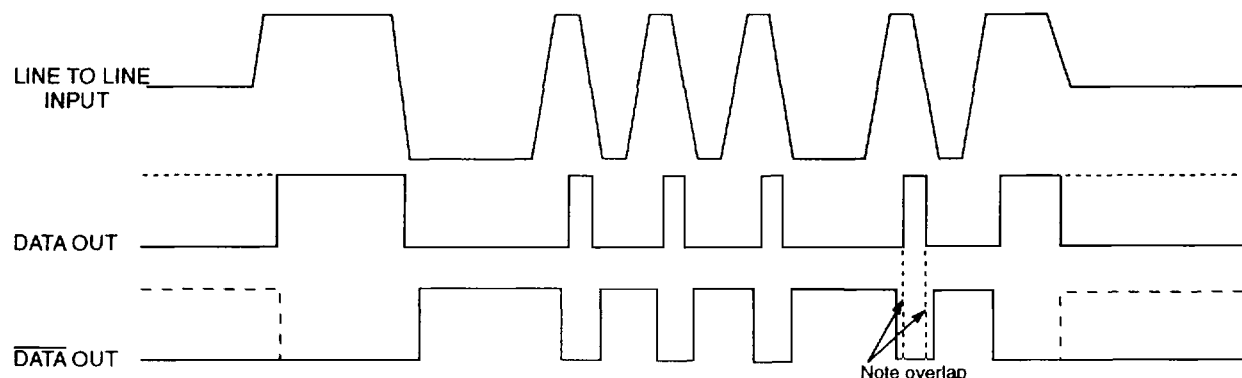
Figure 1. Transmitter Logic Waveforms



NOTES:

1. DATA and $\overline{\text{DATA}}$ inputs must be complementary waveforms or 50% duty cycle average, with no delays between them.
2. 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

Operating case temperature	-55°C to +125°C
Storage case temperature	-65°C to +150 °C
Power supply Voltage	-0.3 V to +7.0 V
Logic input Voltage	-0.3 V to +5.5 V
Receiver differential input	±10 V
Receiver input voltage (common mode)	±5 V
Driver peak output current	800 mA
Total package power dissipation over the full operating case temperature rise	3.1 Watts (Note. Normal operation conditions require one transceiver on and the other off at any given time, with a maximum dissipation of 1.6 Watts.)
Maximum junction to case temperature rise for the hottest device	20° C
Thermal resistance for the hottest device, junction to case	96° C/W

Electrical Characteristics, Driver Section

Input Characteristics, TX DATA in or TX DATA in

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

Inhibit Characteristics

"0" Input Current	$V_{IN}=0.4\text{V}$	I_{ILU}		-0.2	-0.4	mA
"1" Input Current	$V_{IN}=2.7\text{V}$	I_{IHI}		1.0	40	μA
"0" Input Voltage		V_{ILU}			0.7	V
"1" Input Voltage		V_{IHI}	2			V
Delay from TX inhibit,(0→1) to inhibited output	Note 1	t_{DXOFF}		250	450	nS
Delay from TX inhibit, (1→0) to active output	Note 1	t_{DXON}		210	250	nS
Differential output noise, inhibit mode		V_{NOI}		2	10	mV p-p
Differential output impedance (inhibited)	Note 2	Z_{OI}	10K			Ω

Note 1. Characteristics guaranteed by design, not production tested .

Output Characteristics

Differential output level	$R_L=35 \text{ } \Omega$	V_O	6	7.5	9	V p-p
Rise and fall times(10% to 90% of p-p output)		t_r	100		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	$R_L=35 \text{ } \Omega$	V_{OS}			± 90	mV peak
Delay from 50% point of TX DATA or TX DATA input to zero crossing of differential signal	Note 1	t_{DTX}		275	450	nS

Note 2. Measured at 1MHz from bus side of transformer after contribution from transformer is accounted for.

Electrical Characteristics, Receiver Section

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Differential Input Impedance	f= 1MHz	Z_{in}	10K	12K		Ω
Differential Voltage Range		V_{IDR}			± 4	V peak
Input Common Mode Voltage Range	Note 1	V_{ICR}	± 2.5			V peak
Common Mode Rejection Ratio Note 3	Note 1	CMRR	40			dB

Strobe Characteristics (Logic "0" inhibits output) if not used, a 1K pullup to 5 V is recommended

"0" Input Current	$V_S=0.4$ V	I_{IL}		-0.25	-0.8	mA
"1" Input Current	$V_S=2.7$ V	I_{IH}		-240	+40	μ A
"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}		10	78	nS

Threshold Characteristics (Sinewave input)

Input Threshold Voltage(referred to the bus)	10KHz-10MHz	V_{TH}	0.60	0.82	1.20	V_{P-P}
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Output Characteristics, RX DATA and RX \overline{DATA}

"1" State	$I_{OH}=-0.4$ mA	V_{OH}	2.5	3.3		V
"0" State	$I_{OL} = 4$ mA	V_{OL}		0.3	0.5	V
Delay, (average)from differential input zero crossings to RX DATA and RX \overline{DATA} output 50% points	Note 1	t_{DRX}		225	500	nS

Power Data

Currents, per channel

Transmitter Standby	$V_{CC}= 5.0$ Volts	I_{CC}		25	45	mA
25% duty cycle Note 1				130	167	
50% duty cycle				250	350	
100% duty cycle Note 1				450	670	

Power Supply Voltage

Operating power supply voltage range		V_{CC}	+4.75		+5.50	V
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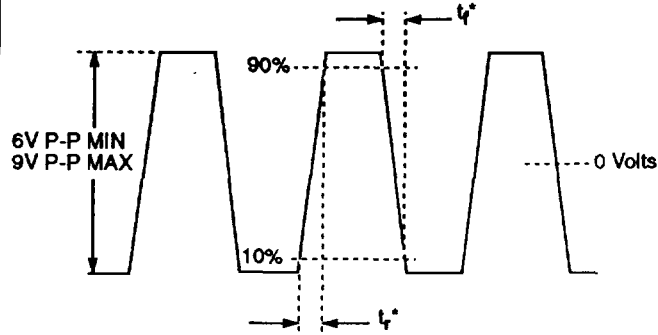
Note 3. Measured at the bus side of the transformer, including the contribution from the transformer.

Note 4. $V_{CC}= 5$ volts ± 0.1 V for all measurements unless otherwise specified.

Note 5. Specifications apply over the temperature range of -55°C to +125°C (case temperature) unless otherwise specified.

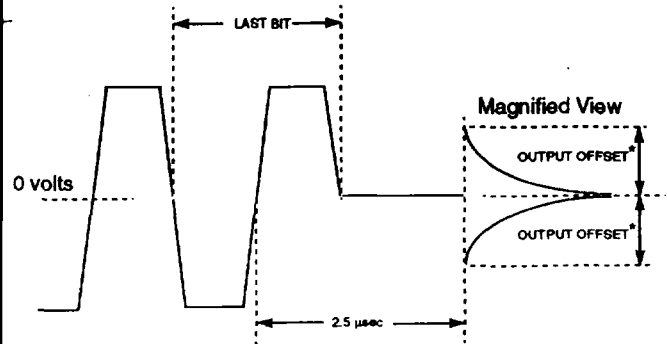
Note 6. All typical values are measured at +25°C

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

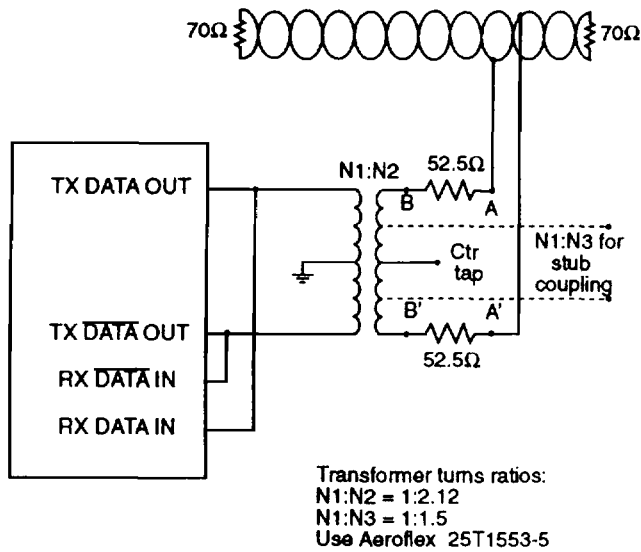
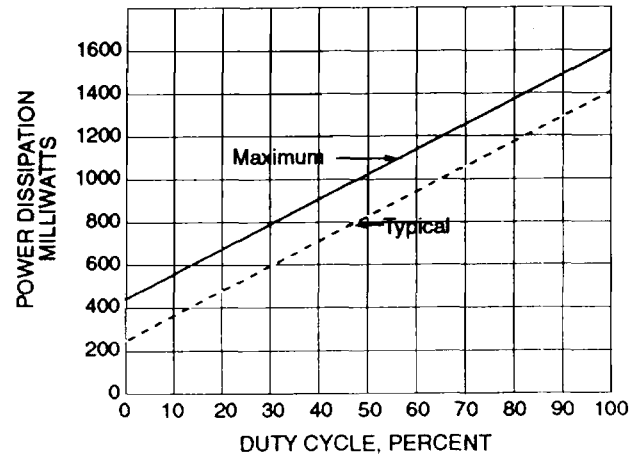


Figure 6. Power Dissipation vs. Duty Cycle (Total hybrid with one channel transmitting and the other receiving)



Configurations and Ordering Information

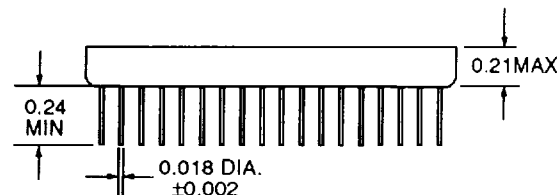
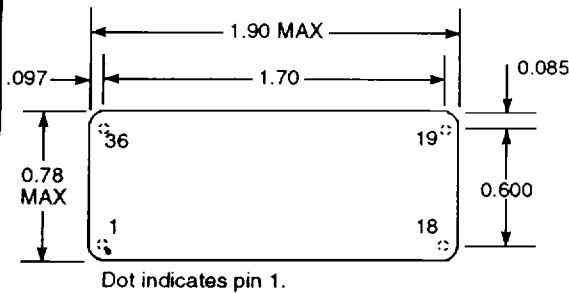
Model No.	DESC No.	Receiver Data level	Case	Configuration
ARX 3443	To Be Assigned	Normally Low	Plug In	Single
ARX 3445	To Be Assigned	Normally High	Plug In	Single
ARX 3453	5962-8952208XX	Normally Low	Plug In	Dual
ARX 3453FP	5962-8952208YX	Normally Low	Flat Package	Dual
ARX 3455	To Be Assigned	Normally High	Plug In	Dual
ARX 3455FP	To Be Assigned	Normally High	Flat Package	Dual



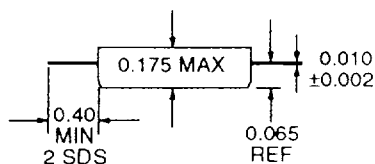
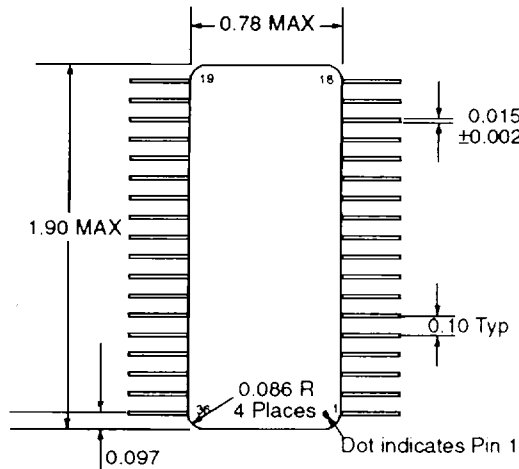
AEROFLEX

An ARX Company

Model ARX 3453 Dual In Line



Model ARX 3453 FP FLAT PACK



Notes

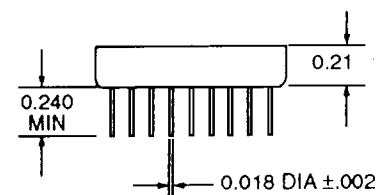
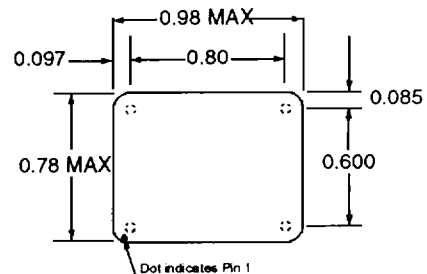
- Dimensions shown are in inches
- Pins are equally spaced at 0.100 ± 0.002 tolerance, non-cumulative, each row

Model 3453 Pin Connection Table

1. TX DATA OUT A
2. TX DATA OUT A
3. GROUND
4. NC
5. RX DATA OUT A
6. STROBE A
7. GROUND
8. RX DATA OUT A
9. CASE
10. TX DATA OUT B
11. TX DATA OUT B
12. GROUND
13. NC
14. RX DATA OUT B
15. STROBE B
16. GROUND
17. RX DATA OUT B
18. NC
19. NC
20. RX DATA IN B
21. RX DATA IN B
22. GROUND
23. NC
24. +5 V B
25. INHIBIT B
26. TX DATA IN B
27. TX DATA IN B
28. NC
29. RX DATA IN A
30. RX DATA IN A
31. GROUND
32. NC
33. +5 V A
34. INHIBIT A
35. TX DATA IN A
36. TX DATA IN A

Note: A and B denotes separate channels

Model ARX 3443 Dual In Line



Model ARX 3443 Pin Connection Table

1. TX DATA OUT
2. TX DATA OUT
3. GROUND
4. NC
5. RX DATA OUT
6. STROBE
7. GROUND
8. RX DATA OUT
9. CASE
10. NC
11. RX DATA IN
12. RX DATA IN
13. GROUND
14. NC
15. +5 V
16. INHIBIT
17. TX DATA IN
18. TX DATA IN

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