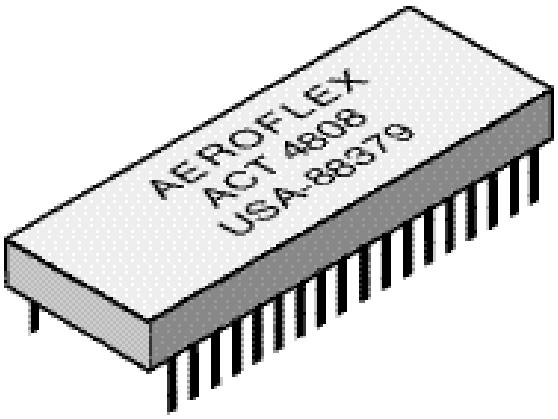
ACT4808 Dual Transceivers for MACAIR A3818, A5690, A5232, A4905 & MIL-STD-1553

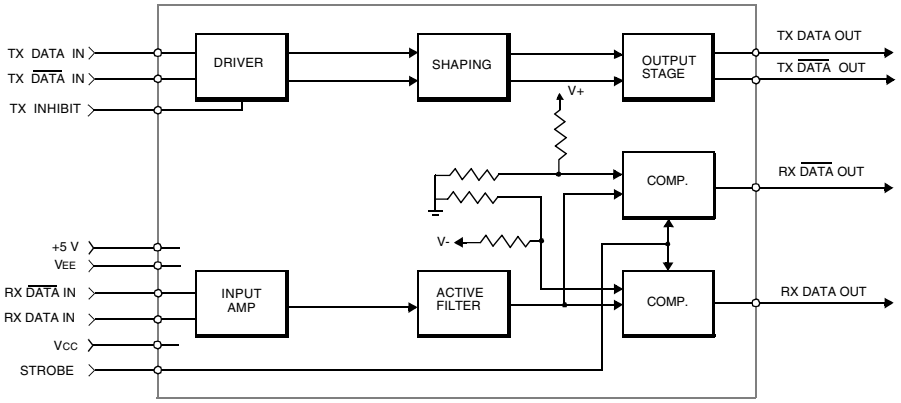
Features

- **ACT4808 Dual Transceiver meets MIL-STD-1553A & B, Macair A3818, A5690, A5232 and A4905 specs**
- ***New* Low Power Model –L Available**
- **Operates with ±12V to ±15V & +5V Power Supplies**
- **Voltage source output for higher bus drive power**
- **Plug-in or Flat Package**
- **Monolithic construction using linear ASICs**
- **Processed and Screened to MIL-STD-883 specs**

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ACT4808 Transceiver



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

General Description:

The Aeroflex Laboratories transceiver model ACT4808 is a new generation Dual monolithic transceiver which provides full compliance with Macair and MIL-STD-1553 data bus requirements

The model ACT4808 performs the front-end analog function of inputting and outputting data through a transformer to a MIL-STD-1553 or Macair data bus. The ACT4808 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 ACT4808 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 as per Figure 3 or 4 and by two 70 Ohm terminations (Z_O), the data bus signal produced is 6.5 Volts minimum P-P at A-A'. 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 (Pt. A-A').

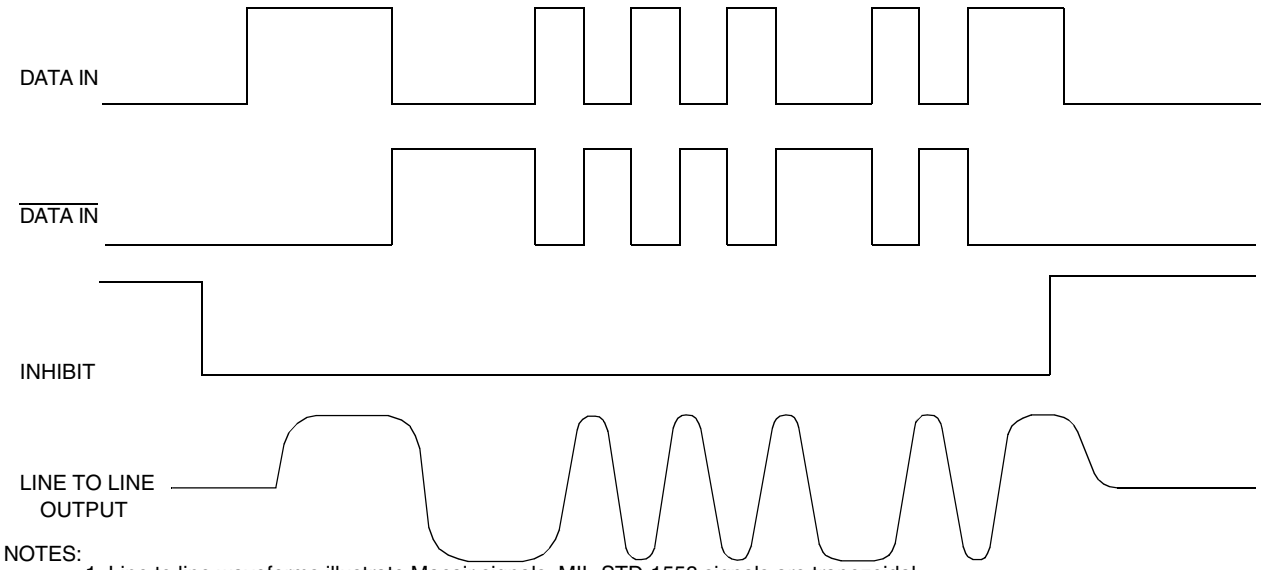
Receiver

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 1.10 Volts P-P and reject signals less than 0.6 Volts P-P when used with a 1:1 turns ratio transformer. (See Figure 4 for transformer data and typical connection.)

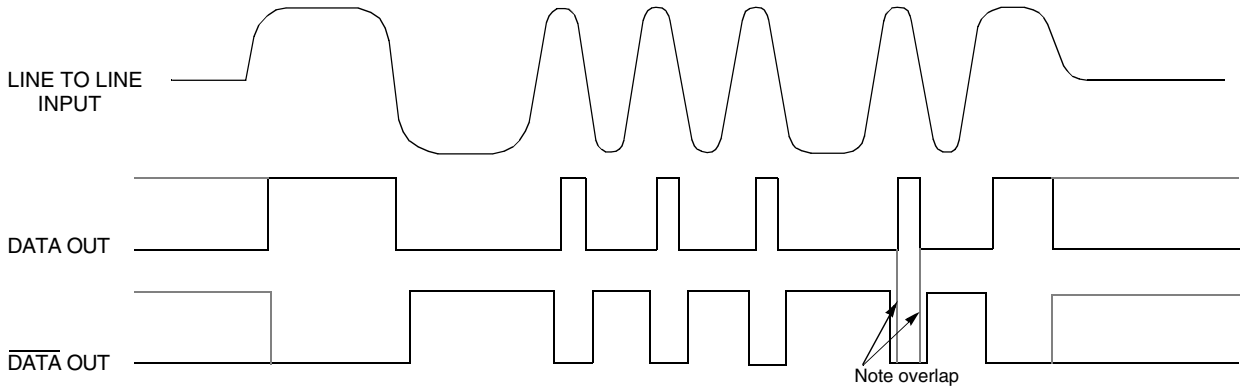
A low level at the Strobe input inhibits the DATA and $\overline{\text{DATA}}$ outputs.

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	±16 V	+7 V
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	3.6 Watts	
Maximum Junction to Case Temperature	18°C	
Junction-Case, Thermal Resistance	5°C/W	

Electrical Characteristics Per Channel, Transmitter Section 1/ 2/

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} = 0.4 V	I_{ILI}	-	-0.2	-0.4	mA
"1" Input Current	V_{IN} = 2.7 V	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	-	t_{DXOFF}	-	300	450	nS
Delay from TX inhibit, (1→0) to active output	-	t_{DXON}	-	300	450	nS
Differential output noise, inhibit mode	3/	V_{NOI}	-	0.8	10	mVp-p
Differential output impedance *	4/	Z_{OI}	2K	-	-	Ω

**** See Aeroflex Application note# 113 for reference.***

Output Characteristics

Differential output - Direct coupled stub Differential output - Transformer coupled stub (see Fig. 3 and 4)	Pt. B - B' Z_O = 70Ω	V_O	26 18	29 21	32 25	Vp-p Vp-p
Differential output offset - Direct coupled stub Fig. 4 Differential output offset - Xformer coupled stub Fig. 3	5/	V_{OS}	- -	- -	±360 ±250	mVpk mVpk
Differential output rise / fall times (see Fig. 5)	10% - 90%	t_R & t_F	200	250	300	nS
Delay from 50% point of TX DATA or TX $\overline{\text{DATA}}$ input to zero crossing of differential output.	-	t_{DTX}		240	300	nS

Electrical Characteristics Per Channel, Receiver Section 1/ 2/

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Differential Input Impedance	f = 1MHz	Z_{IN}	10K	-	-	Ω
Differential Input Voltage Range	-	V_{IDR}	-	-	40	Vp-p
Input Common Mode Voltage Range	-	V_{ICR}	10	-	-	Vp-p
Common Mode Rejection Ratio	-	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)	-	t_{SD}	-	-	150	nS

Threshold Characteristics (Sinewave Input)

Internal Threshold Voltage Fig. 4	Pt. B - B' 1MHz	V_{TH}	0.60	0.80	1.10	Vp-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
Receiver Output Skew	6/	t_{RXSK}	-	-	10	nS
Delay (average), from differential input zero crossings to RX DATA and RX $\overline{DATA}$ output 50% points	7/	t_{DRX}	-	300	450	nS

Power Supply Currents Per Channel 1/ 2/

V_{CC} = +12V to +15V, V_{EE} = -12V to -15V, V_L = +5V

Duty Cycle	Condition	Symbol	Std Version		-L Version		Unit
			Typ	Max	Typ	Max	
Transmitter Standby	Pt. B - B' Z_O = 70 Ω, V_O = 29 V_{PK-PK} Bit Pattern = $FFFF_{HEX}$ Fig. 4	I_{CC}	30	60	*5*	*10*	mA
		I_{EE}	50	75	*25*	*35*	
		I_L	25	35	*18*	*30*	
25%		I_{CC}	50	85	*20*	*30*	
		I_{EE}	70	105	*40*	*60*	
		I_L	25	35	*18*	*30*	
50%		I_{CC}	75	110	*40*	*60*	
		I_{EE}	45	130	*60*	*80*	
		I_L	25	35	*18*	*30*	
100%		I_{CC}	120	160	*85*	*120*	
		I_{EE}	140	180	*105*	*140*	
		I_L	25	35	*18*	*30*	

Typical Hybrid Power Dissipation*, Per Channel

Power Supply Conditions	Condition	Std Version		-L Version		Unit
		Standby	100% Duty Cycle	Standby	100% Duty Cycle	
PSC1 V_{CC} = +15V V_{EE} = -15V V_L = +5V	Pt. B - B' Z_O = 70 Ω, V_O = 29 V_{PK-PK} Bit Pattern = $FFFF_{HEX}$ Fig. 4	1.325	3.250	0.540	2.167	Watts
PSC2 V_{CC} = +15V V_{EE} = -12V V_L = +5V		1.118	3.142	0.465	1.852	
PSC3 V_{CC} = +12V V_{EE} = -12V V_L = +5V		1.085	2.472	0.450	1.600	

**** See Aeroflex Application note# 112 for reference.***

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

Notes:

1. V_{CC} = +15Volts ±0.75V, V_{EE} = -15Volts ±0.75V, V_{IL} = +5Volts ±0.5V, T_C = -55°C to +125°C, unless otherwise specified.
2. All typical values are measured at +25°C.
3. Characteristics guaranteed by design, not production tested.
4. Power ON/OFF, measured from 75KHz to 1MHz at Point A-A' Figure 4, in accordance with MIL-STD-1553B paragraph 4.5.2.2.2.3.
5. At point A-A' on Figure 3 or 4, 2.5 µS after midpoint crossing of the parity bit of the last word of a 660 µS message.
6. Receiver skew is defined as the time from the rising edge of RX DATA OUT to the rising edge of $\overline{\text{RX DATA OUT}}$ minus 500 nS, with a sine wave input of 3 V_{PK-PK} at 1MHz driven into Pt. B-B' of Figure 4 or 2.1 V_{PK-PK} at 1MHz driven into Pt. B-B' of Figure 3. The specification maximum is guaranteed for T_A = 25°C only. Standard TTL loads applied to RX DATA Outputs.
7. This test is peformed while the Transceiver is reading its own transmission. This condition is called "Wraparound". Standard TTL loads applied to RX DATA Outputs.

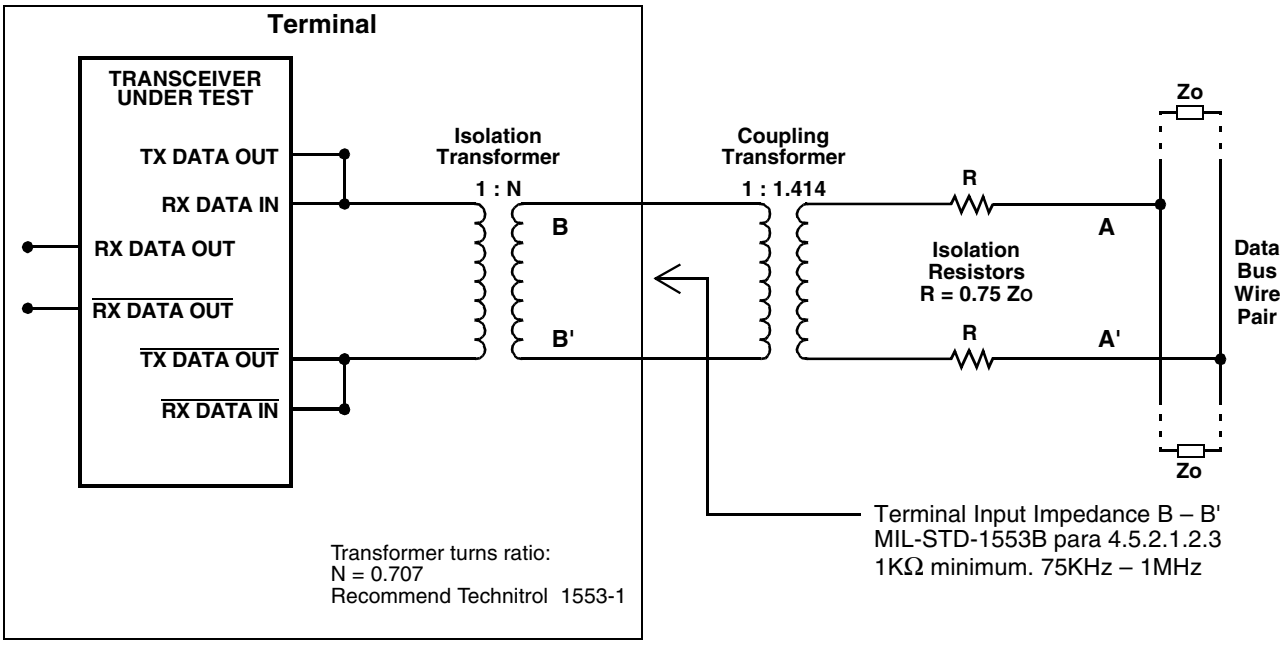


Figure 3 – Databus Interface Using Transformer Coupling (*Figure 9, MIL-STD-1553B*)

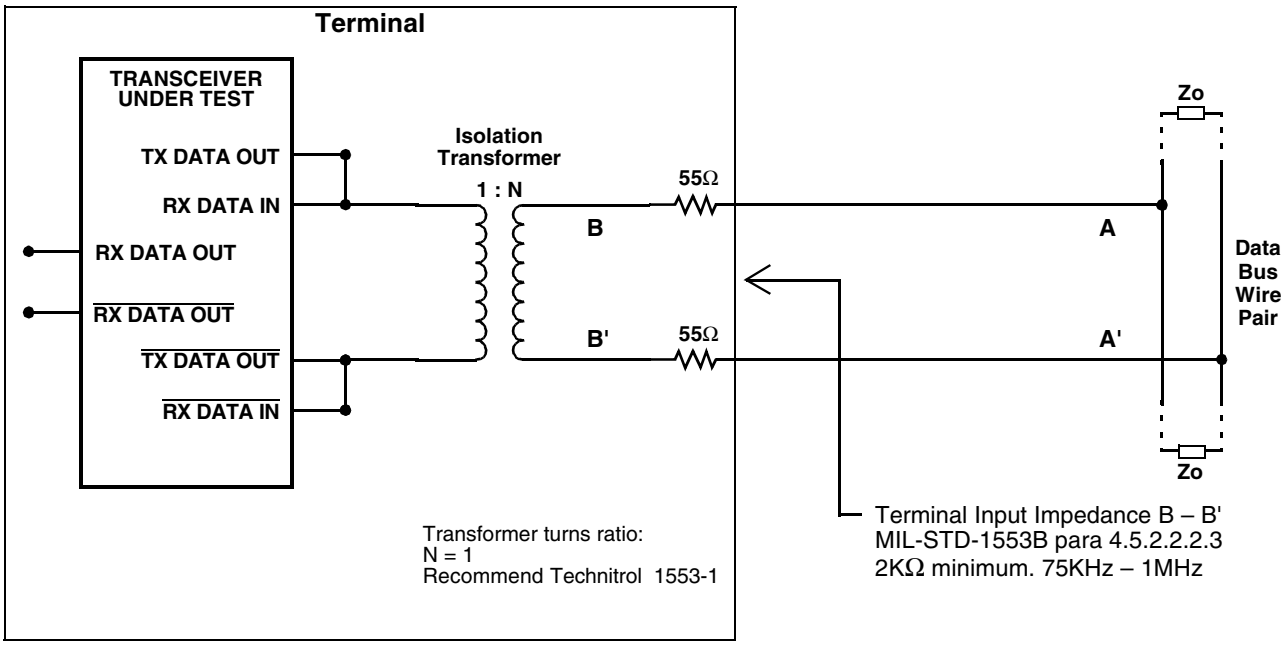
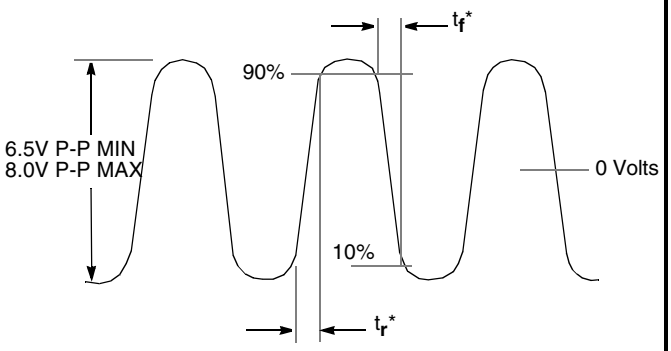


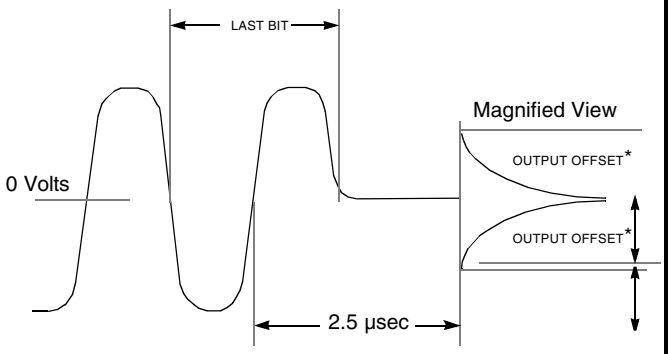
Figure 4 – Databus Interface Using Direct Coupling (*Figure 10, MIL-STD-1553B*)

Figure 5 – Transmitter (TX) Output Wave form



* Rise and fall times measured at point A-A' in Figure 3 or 4

Figure 6 – Transmitter (TX) Output offset



*Offset measured at point A-A' in Figure 3 or 4

Figure 7 – Typical Hybrid Power Dissipation vs. Duty Cycle (Per Channel)

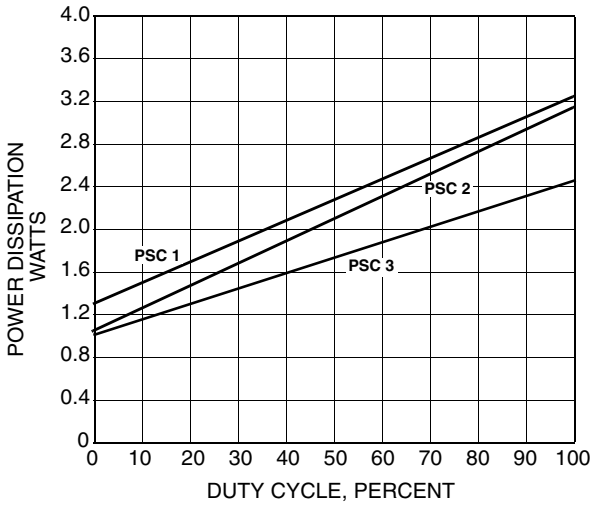
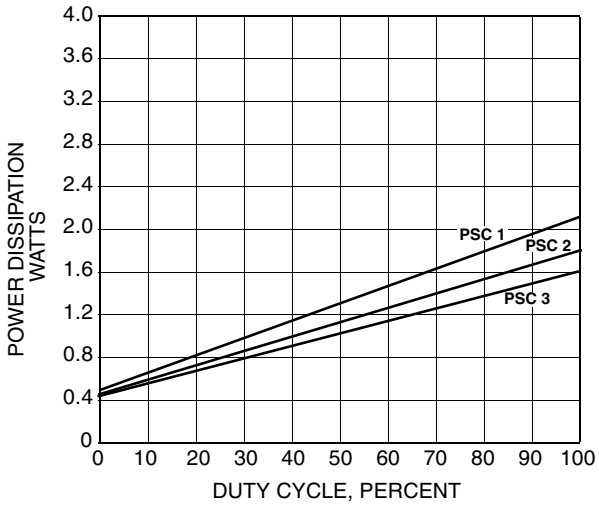


Figure 8 – Typical Hybrid Power Dissipation vs. Duty Cycle (Per Channel) -L Version

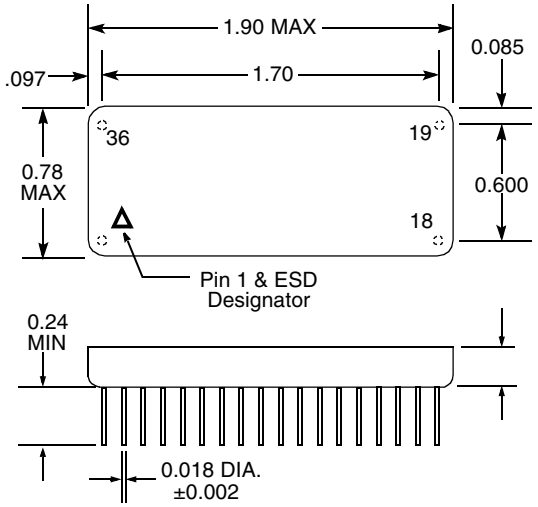


Configurations and Ordering Information

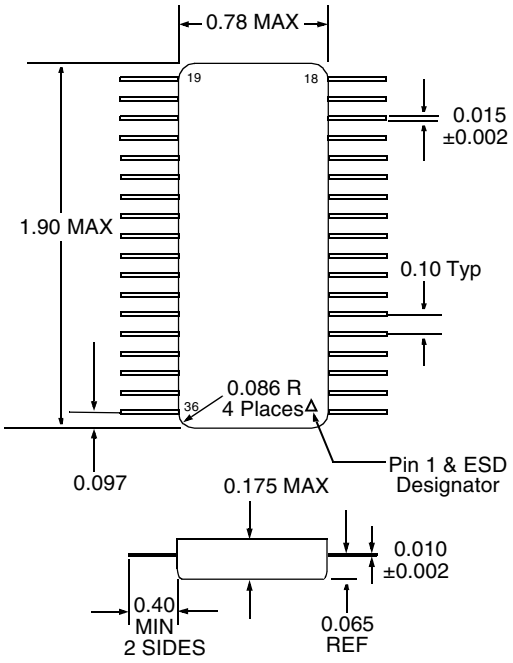
Model Number's.	DESC No.	Receiver Data level	Case
ACT4808D ACT4808LD	TBA	Normally Low	Plug In
ACT4808DF ACT4808LDF	TBA	Normally Low	Flat Pack
ACT4808DI ACT4808LDI	TBA	Normally High	Plug In
ACT4808DFI ACT4808LDFI	TBA	Normally High	Flat Pack

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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

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

Specifications subject to change without notice.

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