

ACT4469D

Dual Variable Amplitude Transceivers for H009



Features

- World's smallest and lowest standby power dual variable amplitude H009 transceiver 1.25" x 0.61" maximum ceramic package
- Dual transceiver with variable output amplitude control meets McDonnell Douglas H009 data bus specifications
- Lowest standby power
- Low power dissipation at full output power
- Operates with $\pm 12V$ to ± 15 and $+5V$ power supplies
- Voltage source output for transmitter
- Monolithic construction
- Processed to commercial or screened to MIL-STD-883 specs
- $+10V$ Control line for transmitter amplitude adjustment (See Figure 3)
- Packaging – Hermetic Ceramic
 - Non-conductive mounting surface
 - No package glass beads
 - Small size & light weight

General Description

The Aeroflex Circuit Technology model ACT4469D is a next generation monolithic transceiver which provides variable amplitude in compliance with H009 data bus requirements with the lowest standby power consumption available using three DC power supplies operation.

The dual channel model ACT4469D performs the front-end analog function of inputting and outputting data through a transformer to a H009 data bus.

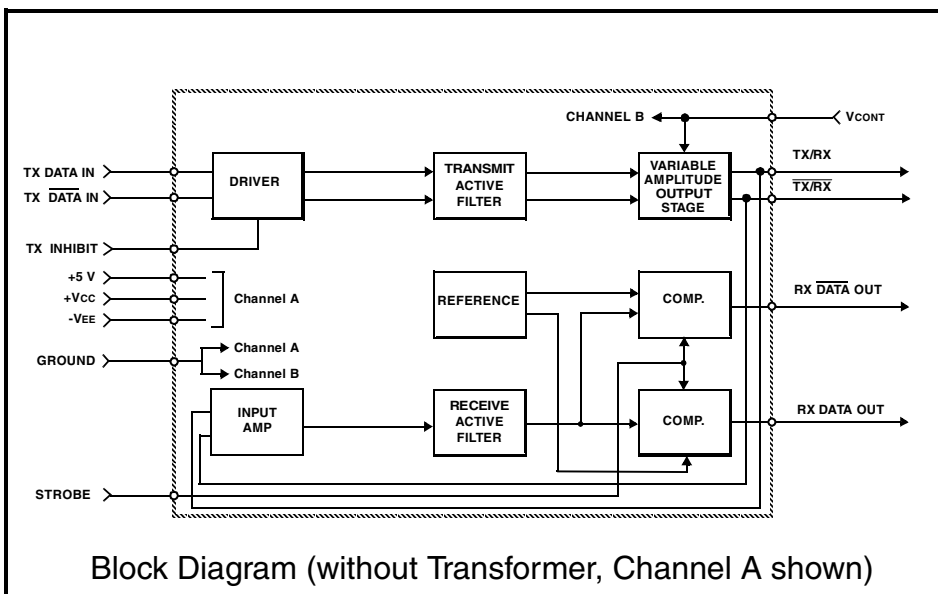
Design of this transceiver reflects particular attention to active filter performance. This results in low bit and word error rate with superior waveform purity and minimal zero crossover distortion. The ACT4469D series active filter design provides the required H009 low harmonic distortion waveform 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.

Variable amplitude is adjusted with factory preset 0–10Vdc control line at 2 mA maximum input current at 10 Volts.

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 34 ohm fault isolation resistors, and loaded by a 175 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 1MHz to meet H009 specification. 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).

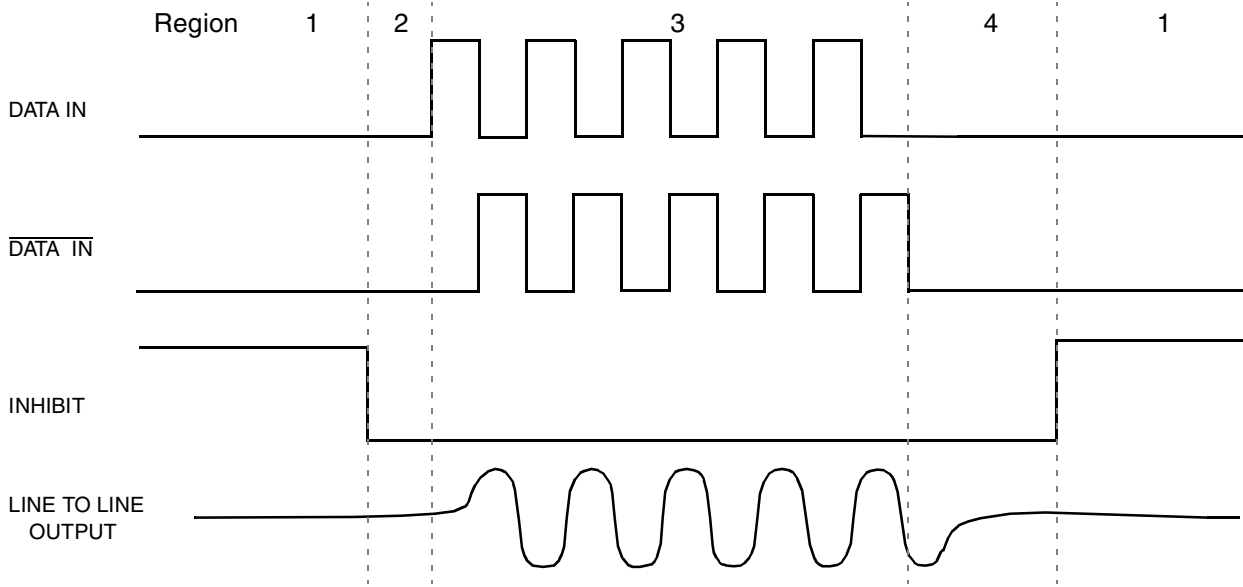
The internal threshold is nominally set to detect data bus signals exceeding 1.0 Volts P-P when used with a 1:1 turns ratio transformer (See Figure 5 for transformer data and typical connection).

A low level at the Strobe input inhibits the DATA and $\overline{\text{DATA}}$ outputs. The strobe is internally pulled up, therefore a pull resistor is not needed.

Figure 1A – Tx Output Truth Table

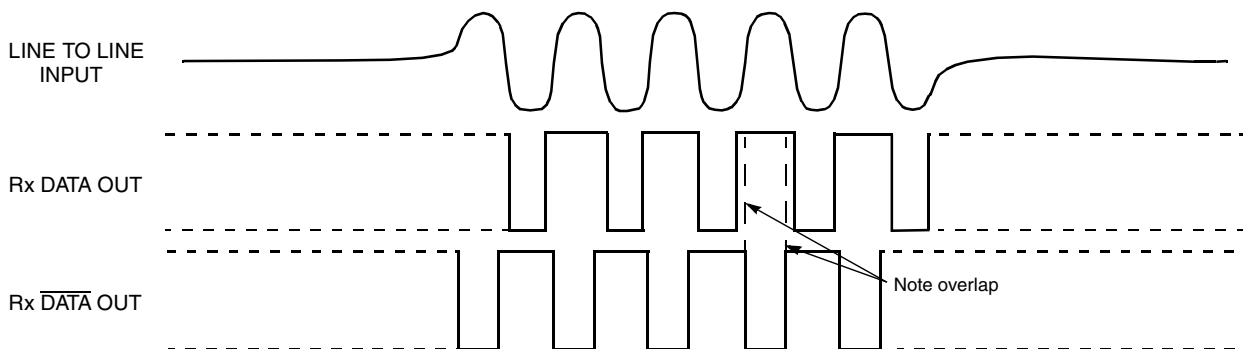
DATA	$\overline{\text{DATA}}$	INHIBIT	OUTPUT
X	X	H	High Z
H	H	L	Low Z (No signal)
L	L	L	
H	L	L	Low Z (Signal)
L	H	L	

Figure 1B - 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, 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, **Region 3**; Transmitter signal on, low Z (Transmitter mode), **Region 4**; No Output signal, Low Z state, (Terminate Mode).

Figure 2 - Receiver Logic Waveforms



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 – Driver 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	40	μA
"0" Input Voltage	-	V _{ILD}	-	-	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	-	t _{DXOFF}	-	300	500	nS
Delay from TX inhibit, (1→0) to active output	-	t _{DXON}	-	200	400	nS
Differential Output Noise, inhibit mode	-	V _{NOI}	-	2	10	mVp-p

Output Characteristics

Differential output level (175Ω)	Pt. A - A'	V _O	16	20	24	V p-p
Rise and Fall times	-	t _R & t _F	200	260	300	nS
Output Offset	Pt. A - A'	V _{OS}	-	-	±260	mV peak
Delay from 50% point of TX DATA or TX $\overline{\text{DATA}}$ input to zero crossing of differential signal	-	t _{DTX}	-	280	400	nS
Control Line Input Resistance 3/	-	R _{CONT}	5	-	-	KΩ

Electrical Characteristics – Receiver Section 1/ 2/

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Differential Voltage Range 3/	Pt. A - A'	V _{IDR}	-		20	V peak
Common Mode Rejection Ratio 3/	-	CMRR	45	-	-	dB

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

"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	+40	μA
"0" Input Voltage	-	V _{IL}	-	-	0.7	V
"1" Input Voltage	-	V _{IH}	2.0	-	-	V
Strobe Delay (turn-on)	-	t _{SD(ON)}	-	90	150	nS
Strobe Delay (turn-off)	-	t _{SD(OFF)}	-	90	150	nS

Threshold Characteristics (Sinewave input)

Input Threshold Voltage, Pt. A - A' Figure 5	1MHz	V _{TH}	1.5	2.0	3.0	Vp-p
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Output Characteristics, RX DATA and RX 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	6/	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	Typ	Max	Unit		
Transmitter Standby	Pt. A - A' Z _O = 175 Ω, V _O = 21 VPK-PK Figure 5	I _{CC}	6	10	mA		
25% 3/		I _{EE}	16	25			
		I _L	19	25			
		I _{CC}	26	35			
50%		I _{EE}	35	45			
		I _L	19	25			
		I _{CC}	45	55			
100%		I _{EE}	54	65			
		I _L	19	25			
		I _{CC}	84	120			
			I _{EE}	92		130	
			I _L	20		25	

Notes:

- 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.
- All typical values are measured at +25°C.
- Characteristics guaranteed by design, not production tested.
- Power ON/OFF, measured 1MHz at Point A-A' Figure 4.
- At point A-A' on Figure 4 or 5, 2.5 μS after midpoint crossing of the parity bit of the last word.
- This test is performed while the Transceiver is reading its own transmission. This condition is called "Wraparound". Standard TTL loads applied to RX DATA Outputs.

Figure 3 – Typical Transmitter Output Amplitude (Vo) vs Vcont Voltage

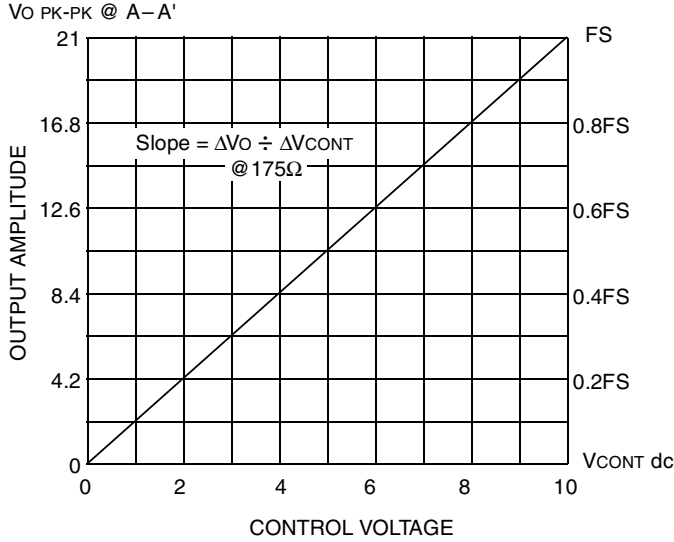
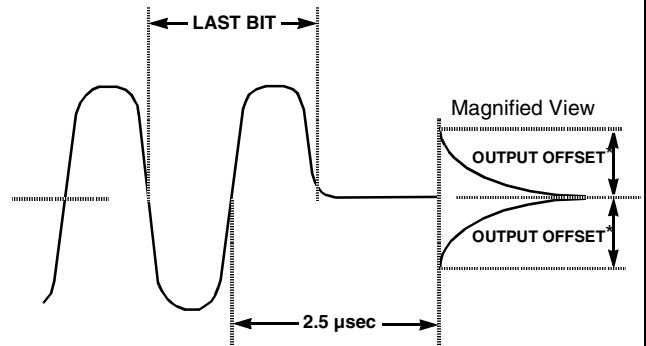
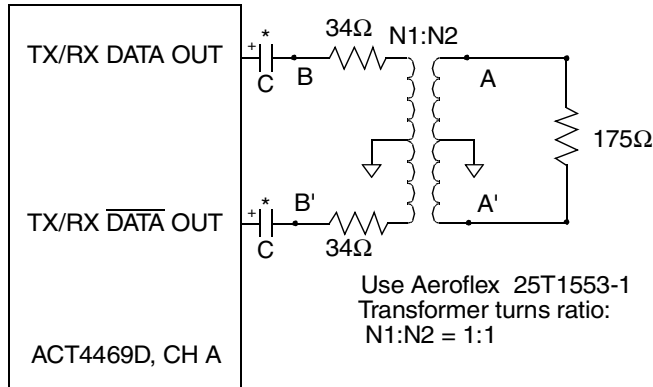


Figure 4 – Transmitter (TX) Output Offset



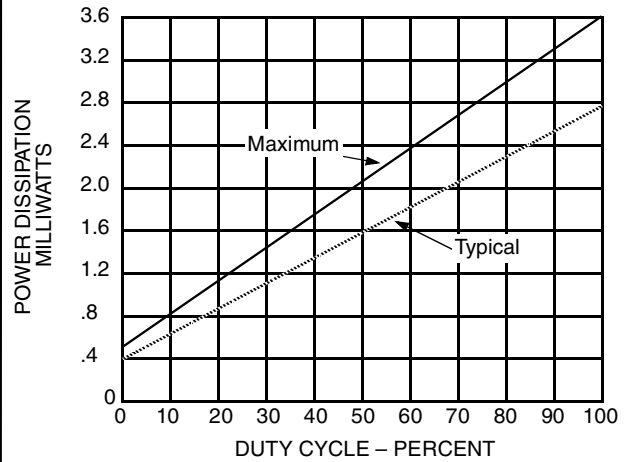
*Offset measured at point A-A' in Figure 5

Figure 5 – Typical Transformer connection



* External Coupling Capacitors are required for each output. Recommended 1μF ceramic 25V/50V or can use Tantalum (15WVDC min) with 0.1μF ceramic in parallel for each output.

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

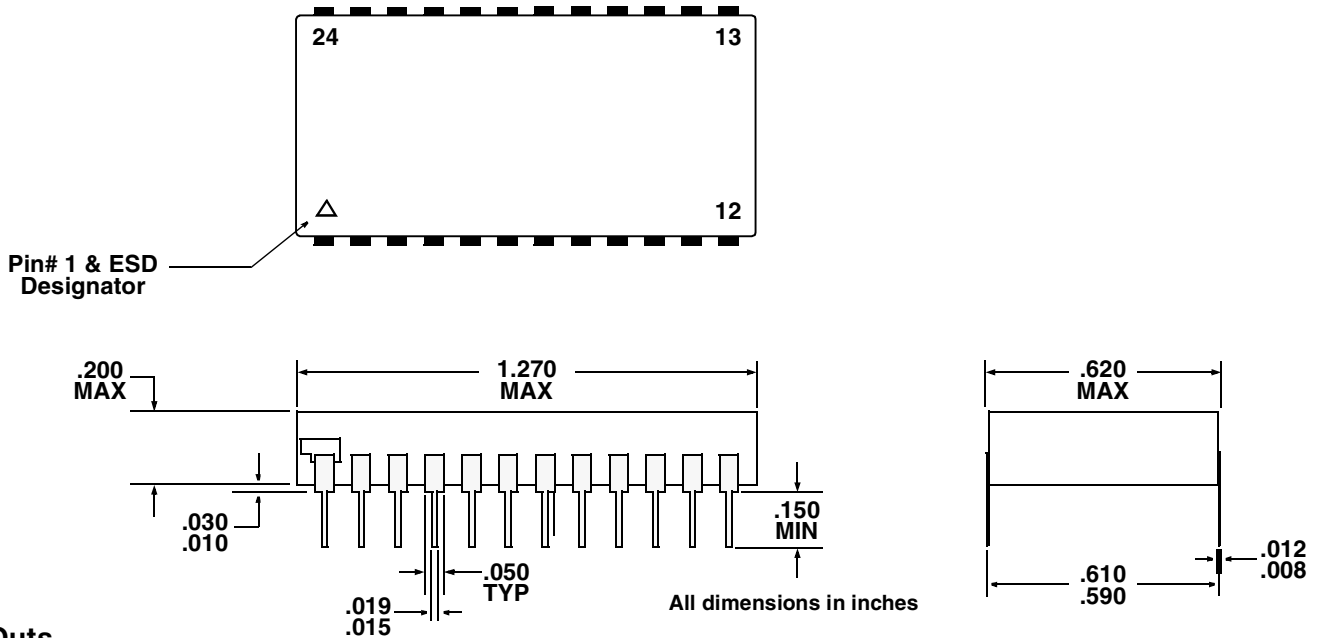


Note: Vcc = ±15V Volts, Vbus (Pt. A-A') at 21 Volts P-P

Configurations and Ordering Information

Model No.	Receiver Data level	Case	Specs.	Configuration
ACT4469D	Normally Low	DIP	H009	Dual
ACT4469DI	Normally High			

Package Dimensions



Pin Outs

ACT4469D			
Pin #	Function	Pin #	Function
1	TX DATA OUT A / RX DATA IN A	13	+5V B
2	TX $\overline{\text{DATA}}$ OUT A / RX $\overline{\text{DATA}}$ IN A	14	-15V B
3	GROUND	15	+15V B
4	STROBE A	16	INHIBIT B
5	RX DATA OUT A	17	TX $\overline{\text{DATA}}$ IN B
6	RX $\overline{\text{DATA}}$ OUT A	18	TX DATA IN B
7	10V CONTROL IN	19	+5V A
8	TX DATA OUT B / RX DATA IN B	20	-15V A
9	TX $\overline{\text{DATA}}$ OUT B / RX $\overline{\text{DATA}}$ IN B	21	+15V A
10	STROBE B	22	INHIBIT A
11	RX DATA OUT B	23	TX $\overline{\text{DATA}}$ IN A
12	RX $\overline{\text{DATA}}$ OUT B	24	TX DATA IN A

Specifications subject to change without notice.

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