

# Am2912

Quad Bus Transceiver

## DISTINCTIVE CHARACTERISTICS

- Input to bus is inverting
- Quad high-speed open collector bus transceiver
- Driver outputs can sink 100mA at 0.8V maximum
- Bus compatible with Am2905, Am2906, Am2907
- Advanced Schottky processing
- PNP inputs to reduce input loading

## GENERAL DESCRIPTION

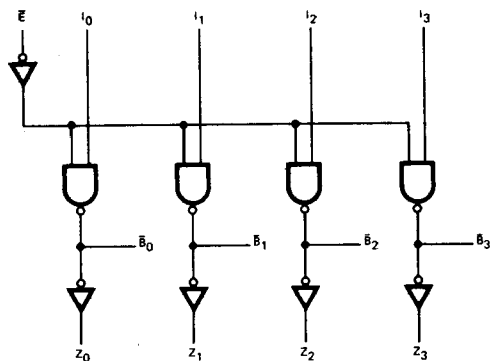
The Am2912 is a quad Bus Transceiver consisting of four high-speed bus drivers with open-collector outputs capable of sinking 100mA at 0.8 volts and four high-speed bus receivers. Each driver output is connected internally to the high-speed bus receiver in addition to being connected to the package pin. The receiver has a Schottky TTL output capable of driving 10 Schottky TTL unit loads.

An active LOW enable gate controls the four drivers so that outputs of different device drivers can be connected together for party-line operation. The enable input can be conveniently driven by active LOW decoders such as the Am25LS139.

The bus output high-drive capability in the LOW state allows party-line operation with a line impedance as low as  $100\Omega$ . The line can be terminated at both ends, and still give considerable noise margin at the receiver. The receiver typical switching point is 2.0 volts.

The Am2912 features advanced Schottky processing to minimize propagation delay. The device package also has two ground pins to improve ground current handling and allow close decoupling between  $V_{CC}$  and ground at the package. Both  $GND_1$  and  $GND_2$  should be tied to the ground bus external to the device package.

## BLOCK DIAGRAM

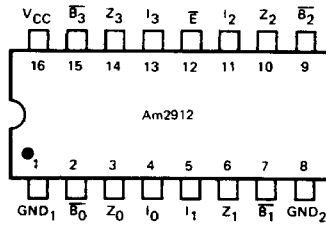


BD002130

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### CONNECTION DIAGRAM Top View

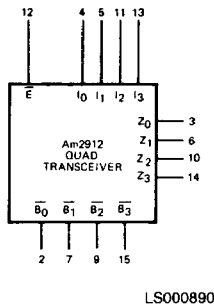
D-16-1



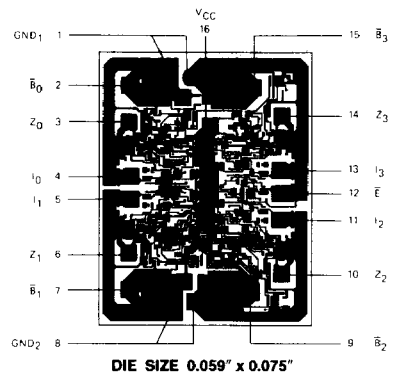
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Note: Pin 1 is marked for orientation

### LOGIC SYMBOL

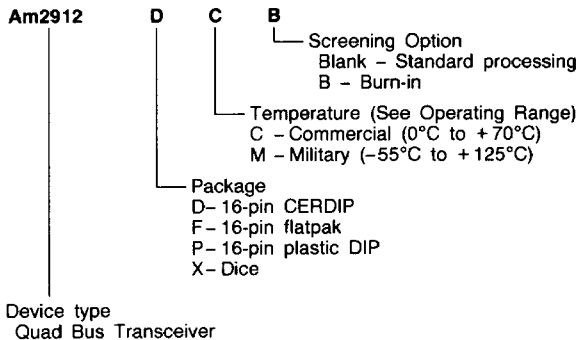


### METALLIZATION AND PAD LAYOUT



### ORDERING INFORMATION

AMD products are available in several packages and operating ranges. The order number is formed by a combination of the following: Device number, speed option (if applicable), package type, operating range and screening option (if desired).



Valid Combinations	
Am2912	PC DC, DCB, DM, DMB FM, FMB XC, XM

### Valid Combinations

Consult the AMD sales office in your area to determine if a device is currently available in the combination you wish.

### PIN DESCRIPTION

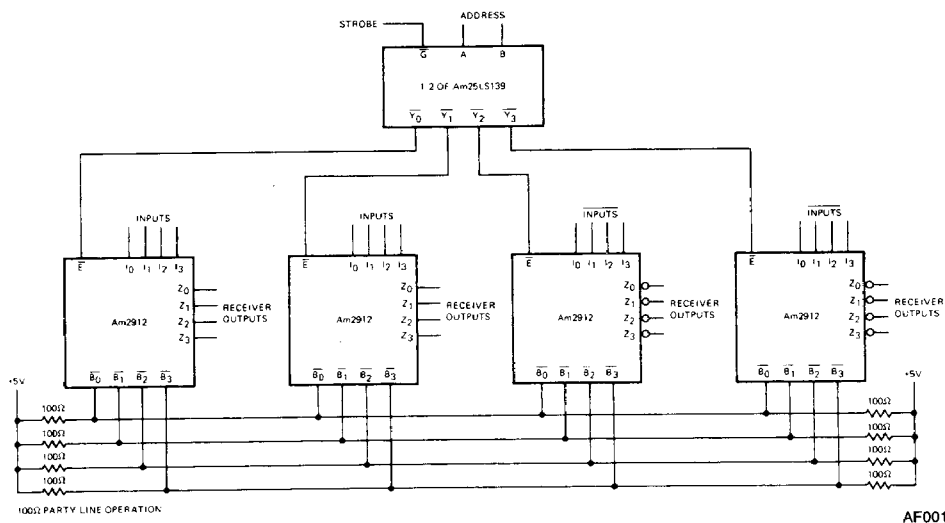
Pin No.	Name	I/O	Description
4, 5, 11, 13	I <sub>0</sub> , I <sub>1</sub> , I <sub>2</sub> , I <sub>3</sub>	I	The four driver inputs.
12	E	I	Enable. When the Enable is HIGH, the four drivers are disabled.
2, 7, 9, 15	B <sub>0</sub> , B <sub>1</sub> , B <sub>2</sub> , B <sub>3</sub>	I/O	The four driver outputs and receiver inputs (data is inverted).
3, 6, 10, 14	Z <sub>0</sub> , Z <sub>1</sub> , Z <sub>2</sub> , Z <sub>3</sub>	O	The four receiver outputs. Data from the bus is inverted while data from the I inputs is non-inverted.

### TRUTH TABLE

Inputs		Outputs	
$\bar{E}$	I	$\bar{B}$	Z
L	L	H	L
L	H	L	$\bar{H}$
H	X	Y	$\bar{Y}$

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Don't Care  
 Y = Voltage Level of Bus  
 (Assumes Control by Another Bus Transceiver)

### TYPICAL APPLICATION



AF001550

**ABSOLUTE MAXIMUM RATINGS**

Storage Temperature .....	-65°C to +150°C
(Ambient) Temperature Under Bias .....	-55°C to +125°C
Supply Voltage to Ground Potential	
Continuous .....	-0.5V to +7.0V
DC Voltage Applied to Outputs For	
High Output State .....	-0.5V to +V <sub>CC</sub> max
DC Input Voltage .....	-0.5V to +5.5V
DC Output Current, Into Bus .....	200mA
DC Output Current, Into Outputs	
(Except Bus) .....	30mA
DC Input Current .....	-30mA to +5.0mA

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

**OPERATING RANGES****Commercial (C) Devices**

Temperature .....	0°C to +70°C
Supply Voltage .....	+4.75V to +5.25V

**Military (M) Devices**

Temperature .....	-55°C to +125°C
Supply Voltage .....	+4.5V to +5.5V

Operating ranges define those limits over which the functionality of the device is guaranteed.

**DC CHARACTERISTICS** over operating range unless otherwise specified

Parameters	Description	Test Conditions (Note 2)		Min	Typ (Note 1)	Max	Units
V <sub>OH</sub>	Output HIGH Voltage (Receiver Outputs)	V <sub>CC</sub> = MIN, I <sub>OH</sub> = -1.0mA V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>	MIL	2.5	3.4		Volts
			COM'L	2.7	3.4		
V <sub>OL</sub>	Output LOW Voltage (Receiver Outputs)	V <sub>CC</sub> = MIN, I <sub>OL</sub> = 20mA V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>				0.5	Volts
V <sub>IH</sub>	Input HIGH Level (Except Bus)	Guaranteed input logical HIGH for all inputs		2.0			Volts
V <sub>IL</sub>	Input LOW Level (Except Bus)	Guaranteed input logical LOW for all inputs				0.8	Volts
V <sub>I</sub>	Input Clamp Voltage (Except Bus)	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18mA				-1.2	Volts
I <sub>IL</sub>	Input LOW Current (Except Bus)	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4V	Enable			-0.36	mA
			Data			-0.54	
I <sub>IH</sub>	Input HIGH Current (Except Bus)	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7V	Enable			20	μA
			Data			30	
I <sub>I</sub>	Input HIGH Current (Except Bus)	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 5.5V				100	μA
I <sub>SC</sub>	Output Short Circuit Current (Except Bus)	V <sub>CC</sub> = MAX (Note 3)	MIL	-20		-55	mA
			COM'L		-18		
I <sub>OCL</sub>	Power Supply Current (All Bus Outputs LOW)	V <sub>CC</sub> = MAX Enable = GND			45	70	mA

- Notes: 1. Typical limits are at V<sub>CC</sub> = 5.0V, 25°C ambient and maximum loading.  
 2. For conditions shown as MIN or MAX, use the appropriate value specified under Operating Ranges for the applicable device type.  
 3. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.

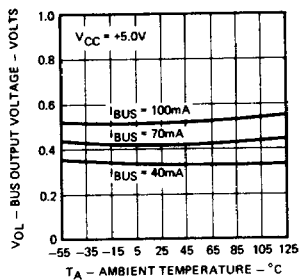
**BUS INPUT/OUTPUT CHARACTERISTICS** over operating temperature range

Parameters	Description	Test Conditions (Note 2)		Min	Typ (Note 1)	Max	Units
VOL	Output LOW Voltage	VCC = MIN	MIL	IOL = 40mA	0.33	0.5	Volts
				IOL = 70mA	0.42	0.7	
				IOL = 100mA	0.51	0.8	
			COM'L	IOL = 40mA	0.39	0.5	
				IOL = 70mA	0.42	0.7	
				IOL = 100mA	0.51	0.8	
tO	Bus Leakage Current	VCC = MAX	MIL	VO = 0.8V		-50	µA
				VO = 4.5V		200	
				COM'L	VO = 4.5V		
I <sub>OFF</sub>	Bus Leakage Current (Power Off)	VO = 4.5V				100	µA
VTH	Receiver Input HIGH Threshold	Bus Enable = 2.4V VCC = MAX	MIL	2.4	2.0		Volts
			COM'L	2.25	2.0		
VTL	Receiver Input LOW Threshold	Bus Enable = 2.4V VCC = MIN	MIL		2.0	1.6	Volts
			COM'L		2.0	1.75	

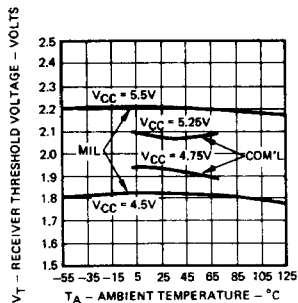
- Notes: 1. Typical limits are at VCC = 5.0V, 25°C ambient and maximum loading.  
 2. For conditions shown as MIN or MAX, use the appropriate value specified under Operating Ranges for the applicable device type.  
 3. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.

**TYPICAL PERFORMANCE CURVES**

**Typical Bus Output Low Voltage Versus Ambient Temperature**



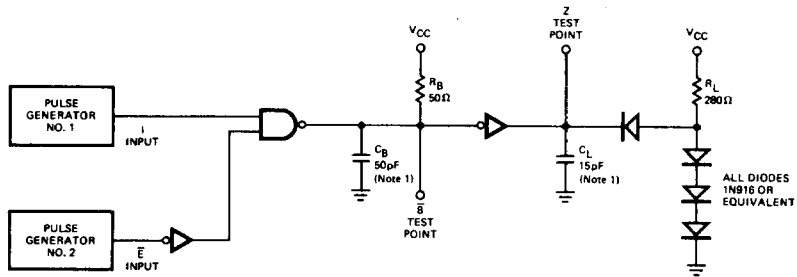
**Receiver Threshold Variation Versus Ambient Temperature**



**SWITCHING CHARACTERISTICS** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V}$ )

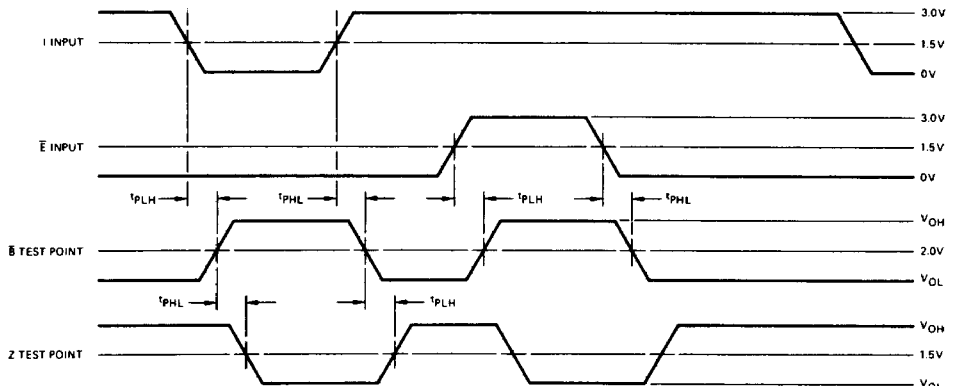
Parameters	Description	Test Conditions	Min	Typ	Max	Units
$t_{PLH}$	Data Input to Bus	$R_B = 50\ \Omega$ $C_B = 50\ \text{pF}$ (Note 1)		10	15	ns
$t_{PHL}$				10	15	
$t_{PLH}$	Enable Input to Bus	$R_B = 50\ \Omega$ $C_B = 50\ \text{pF}$ (Note 1)		14	18	ns
$t_{PHL}$				13	18	
$t_{PLH}$	Bus to Receiver Out	$R_B = 50\ \Omega$ , $R_L = 280\ \Omega$ $C_B = 50\ \text{pF}$ (Note 1), $C_L = 15\ \text{pF}$		10	15	ns
$t_{PHL}$				10	15	
$t_r$	Bus	$R_B = 50\ \Omega$	4.0	10		ns
$t_f$	Bus	$C_B = 50\ \text{pF}$ (Note 1)	2.0	4.0		ns

Note 1. Includes probe and jig capacitance.

**SWITCHING TEST CIRCUIT**


TC001180

Note 1. Include Probe and Jig Capacitance.

**SWITCHING WAVEFORMS**


WF002610