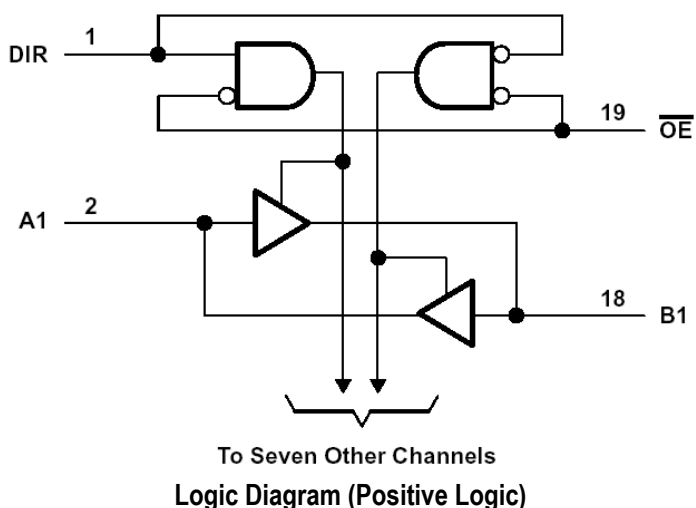
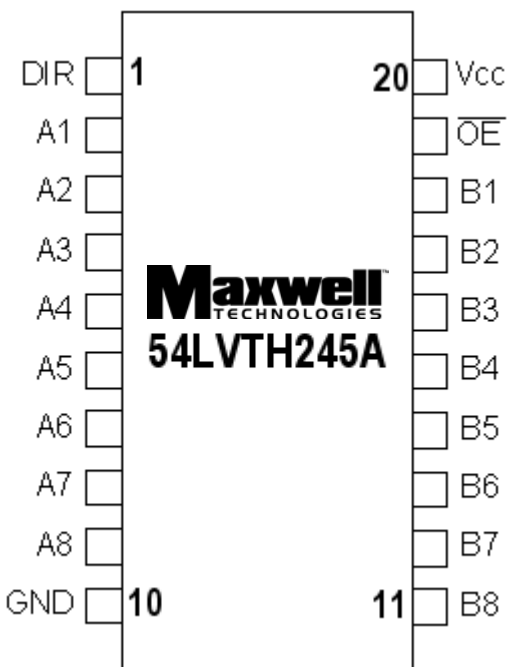




# 54LVTH245A

## 3.3V ABT Octal Bus Transceiver with 3-State Output



### FEATURES:

- 3.3V ABT octal bus transceiver with 3-state outputs
- RAD-PAK® radiation hardened against natural space radiation
- Total dose hardness:
  - >100 krad (Si), depending upon space mission
- Package:
  - 20 pin RAD-PAK® flat package
  - 20 pin RAD-PAK® DIP
- Operating temperature range:
  - 55 to 125°C
- Supports mixed-mode signal operation
  - 5V input and output voltages with 3.3V  $V_{CC}$
- Supports unregulated battery operation down to 2.7V.
- Typical VOLP (output ground bounce) < 0.8V at  $V_{CC}$ =3.3V,  $T_A$ = 25°C
- Latch-up performance exceeds 500mA per JEDEC standard
- Supports live insertion
- Bus-hold data inputs eliminate the need for external pullup resistors

### DESCRIPTION:

Maxwell Technologies' 54LVTH245A 8-bit octal transceiver micro-circuit features a greater than 100 krad (Si) total dose tolerance, depending upon space mission. The 54LVTH245A is designed specifically for low voltage (3.3V)  $V_{CC}$  operation, but with the capability to provide a TTL interface to a 5V system environment. It is designed for asynchronous communication between data buses. The device transmits data from the A bus to the B bus or from the B bus to the A bus depending upon the logic level at the direction control (DIR) input. The output enable (OE) input can be used to disable the device so the buses are effectively isolated. The 54LVTH245A active bus-hold circuitry is provided to prevent floating data inputs at a valid logic level and to eliminate the need for external pullup resistors.

Maxwell Technologies' patented RAD-PAK® packaging technology incorporates radiation shielding in the microcircuit package. It eliminates the need for box shielding while providing the required radiation shielding for a lifetime in orbit or space mission. In a GEO orbit, RAD-PAK provides greater than 100 krad (Si) radiation dose tolerance. This product is available with screening up to Class S.

# 3.3V ABT Octal Bus Transceiver with 3-State Output

# 54LVTH245A

TABLE 1. PINOUT DESCRIPTION

PIN	SYMBOL	DESCRIPTION
1	DIR	DirectionControl
2-9	A1-A8	Inputs
10	GND	Ground
11-18	B8-B1	Outputs
19	$\overline{\text{OE}}$	Output Enable
20	$V_{CC}$	Supply Voltage

TABLE 2. 54LVT245 ABSOLUTE MAXIMUM RATINGS <sup>1</sup>

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage Range	$V_{CC}$	-0.5	4.6	V
Input Voltage Range <sup>2</sup>	$V_I$	-0.5	7.0	V
Voltage Range Applied to Any Output in the High State or Power-Off State	$V_O$	-0.5	7.0	V
Current Into Any Output in the High State <sup>3</sup>	$I_O$	--	48	mA
Input Clamp Current ( $V_I < 0$ )	$I_{IK}$	--	-50	mA
Output Clamp Current ( $V_O < 0$ )	$I_{OK}$	--	-50	mA
Maximum Power Dissipation at $T_A = 55^\circ\text{C}$	$P_D$	--	1.6	mW
Operating Temperature	$T_A$	-55	125	$^\circ\text{C}$
Storage Temperature Range	$T_S$	-65	150	$^\circ\text{C}$

1. Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
3. This current flows only when the output is in the high state and  $V_O > V_{CC}$ .

TABLE 3. DELTA LIMITS

PARAMETER	VARIATION
$I_{CC(OL)}$	$\pm 10\%$ of specified value in Table 5
$I_{CC(OH)}$	$\pm 10\%$ of specified value in Table 5
$I_{CC(OD)}$	$\pm 10\%$ of specified value in Table 5

# 3.3V ABT Octal Bus Transceiver with 3-State Output

# 54LVTH245A

TABLE 4. 54LVTH245A RECOMMENDED OPERATING CONDITIONS <sup>1</sup>

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage	$V_{CC}$	2.7	3.6	V
High-level Input Voltage	$V_{IH}$	2.0	--	V
Low-level Input Voltage	$V_{IL}$	--	0.8	V
Input Voltage	$V_I$	--	5.5	V
High-level Output Current	$I_{OH}$	--	-24	mA
Low-level Output Current	$I_{OL}$	--	48	mA
Input Transition Rise or Fall Rate	Outputs enabled $\Delta t/\Delta v$	--	10	ns/V
Operating Temperature	$T_A$	-55	125	°C

1. Unused control inputs must be held high or low to prevent them from floating.

TABLE 5. 54LVTH245A ELECTRICAL CHARACTERISTICS

( $V_{CC} = 3.3V \pm 10\%$ ,  $T_A = -55$  to  $+125^\circ\text{C}$ , UNLESS OTHERWISE SPECIFIED)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	MAX	UNIT	
Input Clamp Voltage	$V_{IK}$	$V_{CC} = 2.7$ $I_I = -18\text{mA}$		--	-1.2	V	
High-Level Output Voltage	$V_{OH}$	$V_{CC} = 2.7\text{V to } 3.6\text{V}$ $I_{OH} = -100\mu\text{A}$		$V_{CC} - 0.2$	--	V	
		$V_{CC} = 2.7\text{V}$ $I_{OH} = -8\text{mA}$		2.4	--		
		$V_{CC} = 3\text{V}$ , $I_{OH} = -24\text{mA}$		2.0	--		
Low-Level Output Voltage	$V_{OL}$	$V_{CC} = 2.7\text{V}$	$I_{OL} = 100\mu\text{A}$	--	0.2	V	
			$I_{OL} = 24\text{mA}$	--	0.5		
		$V_{CC} = 3\text{V}$	$I_{OL} = 16\text{mA}$	--	0.4		
			$I_{OL} = 32\text{mA}$	--	0.5		
			$I_{OL} = 48\text{mA}$	--	0.55		
Input Current	$I_I$	$V_{CC} = 3.6\text{V}$ $V_I = V_{CC}$ or GND		Control inputs	--	$\pm 1$	$\mu\text{A}$
		$V_{CC} = 0$ or $3.6\text{V}$ $V_I = 5.5\text{V}$			--	10	
		$V_{CC} = 3.6\text{V}$	$V_I = 5.5\text{V}$	A or B Ports	--	20	
			$V_I = V_{CC}$			1	
			$V_I = 0$		--	-5	
Hold Current	$I_{I(\text{HOLD})}$	$V_{CC} = 3\text{V}$	$V_I = 0.8\text{V}$	A or B Ports	75	--	$\mu\text{A}$
			$V_I = 2\text{V}$		-75	--	
Power Up Current	$I_{OZPU}^2$	$V_{CC} = 0$ to $1.5\text{V}$ , $V_O = 0.5\text{V to } 3\text{V}$ , $\overline{\text{OE}}$ = don't care		--	$\pm 100$	$\mu\text{A}$	
Power Down Current	$I_{OZPD}^2$	$V_{CC} = 1.5\text{V to } 0$ , $V_O = 0.5\text{V to } 3\text{V}$ , $\overline{\text{OE}}$ = don't care		--	$\pm 100$	$\mu\text{A}$	

# 3.3V ABT Octal Bus Transceiver with 3-State Output

# 54LVTH245A

TABLE 5. 54LVTH245A ELECTRICAL CHARACTERISTICS

( $V_{CC} = 3.3V \pm 10\%$ ,  $T_A = -55$  to  $+125^\circ\text{C}$ , UNLESS OTHERWISE SPECIFIED)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	MAX	UNIT
Supply Current	$I_{CC}$	$V_{CC} = 3.6V$	Outputs high	--	0.39	mA
		$I_O = 0$	Outputs low	--	14	
		$V_I = V_{CC}$ or GND	Outputs disabled	--	0.39	
Delta Supply Current	$\Delta I_{CC}^1$	$V_{CC} = 3V$ to $3.6V$ , One input at $V_{CC} - 0.6V$ , Other inputs at $V_{CC}$ or GND		--	0.2	mA
Input Capacitance	$C_I^2$	$V_I = 3V$ or 0		--	8	pF
Input Output Capacitance	$C_O^2$	$V_O = 3V$ or 0		--	15	pF

1. This is the increase in supply current for each input that is at the specified TTL voltage level rather than  $V_{CC}$  or GND.
2. Guaranteed by design.

TABLE 6. 54LVTH245A AC ELECTRICAL CHARACTERISTICS

( $V_{CC} = 3.3V \pm 10\%$ ,  $T_A = -55$  to  $125^\circ\text{C}$ , UNLESS OTHERWISE NOTED)

PARAMETER	SYMBOL	$V_{CC} = 3.3V \pm 0.3V$		$V_{CC} = 2.7V$		UNIT
		MIN	MAX	MIN	MAX	
Propagation Delay Time A or B to B or A	$t_{PLH}$	0.7	3.7	--	4.2	ns
	$t_{PHL}$	0.7	3.7	--	4.2	
Output Enable Time $\overline{OE}$ to A or B	$t_{PZH}$	1.2	5.7	--	7.4	ns
	$t_{PZL}$	1.6	5.7	--	6.8	
Output Disable Time $\overline{OE}$ to A or B	$t_{PHZ}$	1.8	6.2	--	6.8	ns
	$t_{PLZ}$	1.8	5.3	--	5.5	

TABLE 7. FUNCTION TABLE

INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	B data to A bus
I	H	A data to B bus
H	X	Isolation

3.3V ABT Octal Bus Transceiver

54LVTH245A

with 3-State Output

FIGURE 1. LOAD CIRCUIT

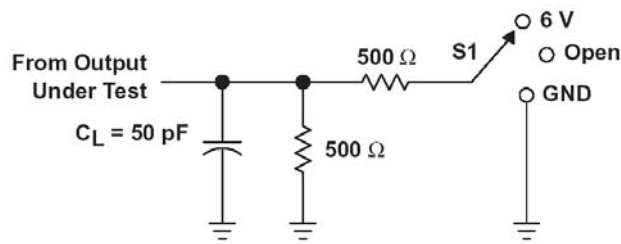


Figure Note:

1.  $C_L$  includes probe and jig capacitance.

PARAMETER MEASUREMENT INFORMATION

TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	6V
$t_{PHZ}/t_{PZH}$	GND

FIGURE 2. PULSE DURATION

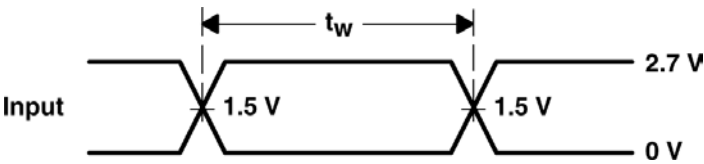
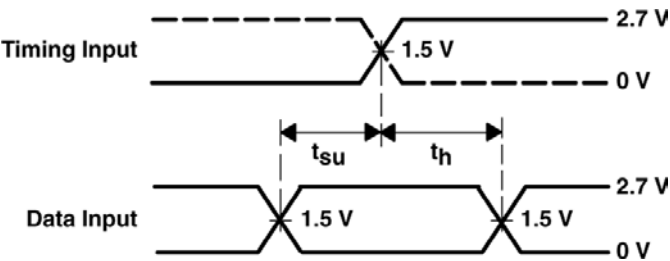


FIGURE 3. SETUP AND HOLD TIMES



## 3.3V ABT Octal Bus Transceiver with 3-State Output

# 54LVTH245A

FIGURE 4. PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS

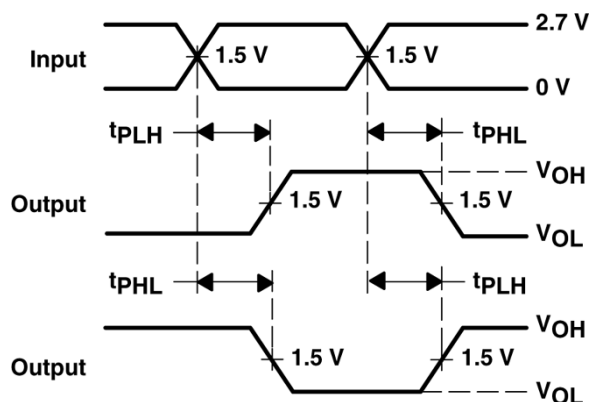


FIGURE 5. ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

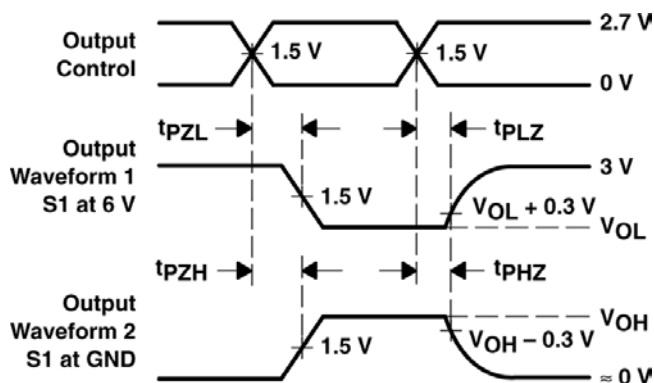


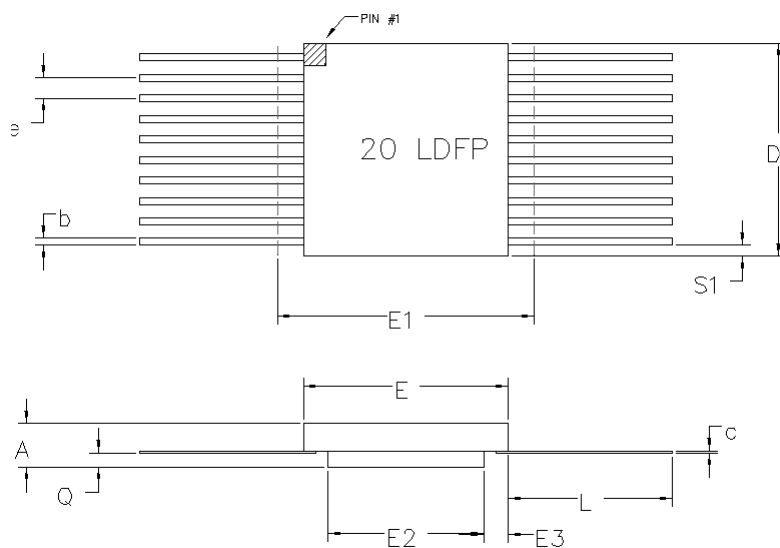
Figure Note:

- Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.

Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

# 3.3V ABT Octal Bus Transceiver with 3-State Output

# 54LVTH245A



## 20 PIN RAD-PAK® FLAT PACKAGE

SYMBOL	DIMENSION		
	Min	Nom	Max
A	0.128	0.141	0.154
b	0.015	0.017	0.022
c	0.003	0.005	0.009
D	0.470	0.480	0.490
E	0.287	0.295	0.303
E1	--	--	0.333
E2	0.155	0.160	--
E3	0.030	0.068	--
e	0.050 BSC		
L	0.370	0.380	0.390
Q	0.035	0.039	0.042
S1	0.005	0.007	--
N	20		

F20-01

Note: All dimensions in inches

## 3.3V ABT Octal Bus Transceiver with 3-State Output

# 54LVTH245A

### Important Notice:

These data sheets are created using the chip manufacturer's published specifications. Maxwell Technologies verifies functionality by testing key parameters either by 100% testing, sample testing or characterization.

The specifications presented within these data sheets represent the latest and most accurate information available to date. However, these specifications are subject to change without notice and Maxwell Technologies assumes no responsibility for the use of this information.

Maxwell Technologies' products are not authorized for use as critical components in life support devices or systems without express written approval from Maxwell Technologies.

Any claim against Maxwell Technologies must be made within 90 days from the date of shipment from Maxwell Technologies. Maxwell Technologies' liability shall be limited to replacement of defective parts.



3.3V ABT Octal Bus Transceiver  
with 3-State Output  
Product Ordering Options

54LVTH245A

