

MN54ABT16646-X REV 0A0

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16 Bit TRANSCEIVERS AND REGISTERS WITH 3-STATE OUTPUTS
General Description

The ABT16646 consists of bus transceiver circuits with TRI-STATE, D-type flip-flops, and control circuitry arranged for multiplexed transmission of data directly from the input bus or from the internal registers. Data on the A or B bus will be clocked into the registers as the appropriate clock pin goes to a high logic level. Control OE and direction pins are provided to control the transceiver function. In the transceiver mode, data present at the high impedance port may be stored in either the A or the B register or in both. The select controls can multiplex stored and real-time (transparent mode) data. The direction control determines which bus will receive data when the enable control OE is Active LOW. In the isolation mode (control OE HIGH), A data may be stored in the B register and/or B data may be stored in the A register.

Industry Part Number

54ABT16646

NS Part Numbers

54ABT16646W-QML

Prime Die

NB6646

Controlling Document

See Features Page

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Independent registers for A and B buses.
- Multiplexed real-time and stored data.
- A and B output sink capability of 48 mA, source capability of 24 mA
- Guaranteed latchup protection
- High impedance glitch free bus loading during entire power up and power down cycle.
- Non-Destructive hot insertion capability.
- SMD : 5962-9450202QXA

(Absolute Maximum Ratings)

(Note 1)

Vcc Pin Potential to Ground Potential	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30mA to +5.0mA
Voltage Applied To Any Output In the Disabled or Power-Off State In The High State	-0.5V to 5.5V -0.5V to Vcc
Current Applied To Output In The Low State (Max)	96mA
Junction Temperature (Tj) Ceramic	+175C
Thermal Resistance Junction-To-Case (Theta JC)	See Mil-Std 1835
Storage Temperature	-65C to +150C
Lead Temperature (Soldering, 10 seconds)	+300C
ESD Classification	Class 2
Maximum Power Dissipation	500 mW

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Supply Voltage (Vcc)	4.5V to 5.5V
Operating Temperature	-55C to +125C
Minimum Input Edge Rate (dV/dt)	
Data Input	50 mV/ns
Enable Input	20 mV/ns
Clock Input	100 mV/ns
Maximum Output Current	
High Level (Ioh)	-24 mA
Low Level (Iol)	48 mA

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: 4.5V to 5.5V Temp Range: -55C to 125C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ICCH	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 4	VCC		1.0	mA	1, 2, 3
ICCL	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 4	VCC		60.0	mA	1, 2, 3
ICCZ	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 4	VCC		1.0	mA	1, 2, 3
ICCT	Supply Current per Input	VCC=5.5V, Input under test=3.4V Other inputs=5.5V or 0.0V	1, 4	VCC		2.5	mA	1, 2, 3
IIH	High Level Input Current	VCC=5.5V, VINH=5.5V	1, 4	IN		2.0	uA	1, 2, 3
IIL	Low Level Input Current	VCC=5.5V, VINL=0.0V	1, 4	IN		-2.0	uA	1, 2, 3
IOZH	Maximum TRI-STATE Leakage Current HIGH	VCC=5.5V, VOUT=2.7V VINL=0.0V, VIH (OE)=2.0V	1, 4	OUT		50.0	uA	1, 2, 3
IOZL	Maximum TRI-STATE Leakage Current LOW	VCC=5.5V, VOUT=0.5V VINH=5.5V, VIH (OE)=2.0V	1, 4	OUT		-50.0	uA	1, 2, 3
ICEX	Output High Leakage Current	VCC=5.5V, VOUT=5.5V VINH=5.5V	1, 4	OUT		50.0	uA	1, 2, 3
IOS	Output Short Circuit Current	VCC=5.5V, VOUT=0.0V VINH=5.5V	1, 4, 10	OUT	-100	-275	mA	1, 2, 3
IOS1	Output Short Circuit Current	VCC=5.5V, VOUT=2.5V VINH=5.5V	1, 4, 10	OUT	-50	-180	mA	1, 2, 3
IBVI	Input High Current Breakdown Test	VCC=5.5V, VINH=7.0V	1, 4	IN		7.0	uA	1, 2, 3
IZZ	Bus Drainage Test	VCC=0.0V, VOUT=5.5V, VINL=0.0V	1, 4	IN/OUT	-100	100	uA	1, 2, 3
VOL	Low Level Output Voltage	VCC=4.5V, IOL=48.0mA, VINH=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT		0.55	V	1, 2, 3
VOH	High Level Output Voltage	VCC=4.5V, IOH=-24.0mA, VINH=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT	2.0		V	1, 2, 3
		VCC=4.5V, IOH=-3mA, VINH=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT	2.5		V	1, 2, 3
		VCC=5.0V, IOH=-3mA, VINH=5.0V, VINL=0.0V, VIH=2.0V, VIL=0.8V	1, 4	OUT	3.0		V	1, 2, 3
VID	Input Leakage Test	VCC=0.0V, IID=1.9uA, VINL=0.0V	1, 4	IN	4.75		V	1, 2, 3

Electrical Characteristics

DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: 4.5V to 5.5V Temp Range: -55C to 125C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
VCD	Input Clamp Diode Voltage	VCC=4.5V, IKL=-18mA, VINH=4.5V, VINL=0.0V	1, 4	IN		-1.2	V	1, 2, 3
VOLP	Low Level Ground Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	OUT		1.0	V	4
VOLV	Low Level Ground Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	OUT		-1.5	V	4
VOHP	High Level VCC Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	OUT		1.5	V	4
VOHV	High Level VCC Bounce	VCC=5.0V, LOAD : 50pF / 500 OHMS	7, 8	OUT		-0.8	V	4
CIN	Input Capacitance	VCC=0.0V	7	IN		10	pF	4
C I/O	Input/Output Capacitance	VCC=5.0V	7	OUT		14.5	pF	4

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pF RL=500 OHMS TRISE/TFALL = 3.0ns

tpLH1	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	Clock to Bus	1.0	5.8	ns	9
			2, 5	Clock to Bus	1.0	6.9	ns	10, 11
tpHL1	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	Clock to Bus	1.0	6.5	ns	9
			2, 5	Clock to Bus	1.0	7.7	ns	10, 11
tpLH2	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	Bus to Bus	1.0	4.9	ns	9
			2, 5	Bus to Bus	1.0	5.8	ns	10, 11
tpHL2	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	Bus to Bus	1.0	5.9	ns	9
			2, 5	Bus to Bus	1.0	7.0	ns	10, 11
tpLH3	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	SAB/BA to Bn/An	1.0	5.8	ns	9
			2, 5	SAB/BA to Bn/An	1.0	7.1	ns	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pF RL=500 OHMS TRISE/TFALL = 3.0ns

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL3	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	SAB/BA to Bn/An	1.0	6.4	ns	9
			2, 5	SAB/BA to Bn/An	1.0	7.2	ns	10, 11
tpZL1	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OEX to An/Bn	1.0	6.0	ns	9
			2, 5	OEX to An/Bn	1.0	6.5	ns	10, 11
tpZL2	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	DIRx to An/Bn	1.0	6.2	ns	9
			2, 5	DIRx to An/Bn	1.0	6.7	ns	10, 11
tpZH1	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OEX to An/Bn	1.0	6.4	ns	9
			2, 5	OEX to An/Bn	1.0	6.4	ns	10, 11
tpZH2	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	DIRx to An/Bn	1.0	5.8	ns	9
			2, 5	DIRx to An/Bn	1.0	6.4	ns	10, 11
tpHZ1	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OEX to An/Bn	1.0	6.8	ns	9
			2, 5	OEX to An/Bn	1.0	7.6	ns	10, 11
tpHZ2	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	DIRx to An/Bn	1.0	7.3	ns	9
			2, 5	DIRx to An/Bn	1.0	8.1	ns	10, 11
tpLZ1	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	OEX to An/Bn	1.0	5.5	ns	9
			2, 5	OEX to An/Bn	1.0	6.5	ns	10, 11
tpLZ2	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	2, 5	DIRx to An/Bn	1.0	6.0	ns	9
			2, 5	DIRx to An/Bn	1.0	7.1	ns	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pF RL=500 OHMS TRISE/TFALL = 3.0ns

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ts (H/L)	Setup Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	7	BUS to Clock	3.5		ns	9
			7	BUS to Clock	4.0		ns	10, 11
th (H/L)	Hold Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	7	BUS to Clock	0.5		ns	9, 10, 11
tw (L)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	7	CPAB/CPBA	4.3		ns	9, 10, 11
Fmax	Max Clock Frequency	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55C/125C	7	CPAB/CPBA		125	ns	9, 10, 11

Note 1: Screen tested 100% on each device at -55C, +25C & +125C Temp., Subgroups 1,2,3,7 & 8.

Note 2: Screen tested 100% on each device at -55C, +25C, and +125C temp., subgroups A9, A10, and A11.

Note 3: Screen tested 100% on each device at +25C temp. only, subgroup A9.

Note 4: Sample tested (Method 5005, Table 1) on each mfg. lot at +25C, +125C, & -55C temp. subgroups A1, 2, 3, 7 & 8.

Note 5: Sample tested (Method 5005, Table 1) on each mfg. Lot at +25C, +125C & -55C temp., subgroups A9, 10 & 11.

Note 6: Sample tested (Method 5005, Table 1) on each mfg. Lot at 25C temp only, subgroup A9.

Note 7: Not tested (Guaranteed by Design Characterization Data).

Note 8: Max number of outputs defines as (N). N-1 data inputs are driven 0V to 3V. one output @Vol or @Voh.

Note 9: Max number of data inputs (N) switching. (N-1) inputs switching 0V to 3V.

Input-under-test switching : 3V to threshold (Vild), 0V to threshold (Vihd), Freq= 1 MHZ

Note 10: Maximum test duration not to exceed one second, not more than one output shorted at one time.

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
E28ARD	28L LEADLESS CHIP CARRIER TYPE C (P/P DWG)
J24FRG	24 LEAD CERDIP (J), .300 CENTERS (P/P DWG)
W24CRE	CERPAC (W), 24 LEAD (P/P DWG)

See attached graphics following this page.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0001543	07/08/97	Bill Petcher	Initial MDS Release