

MN54AC2708-X REV 2A0

Original Creation Date: 07/01/96

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Last Major Revision Date: 02/13/97

64 X 9 First-In, First-Out Memory
General Description

The AC2708 is an expandable first-In, first-out memory organized as 64 words by 9 bits. A 50 MHz shift-in and 40 MHz shift-out typical data rate makes it ideal for high-speed applications. It uses a dual port RAM architecture with pointer logic to achieve the high speed with negligible fall-through time.

Separate Shift-In (SI) and Shift-Out (SO) clocks control the use of synchronous or asynchronous write or read. Other controls include a Master Reset (MR) and Output Enable (OE) for initializing the internal registers and allowing the data outputs to be TRI-STATE. Input Ready (IR) and Output Ready (OR) signal when the FIFO is ready for I/O operations. The status flags HF and FULL indicated when the FIFO is full, empty or half full.

The FIFO can be expanded to provide different word lengths by tying off unused data inputs.

Industry Part Number

54AC2708

NS Part Numbers

 54AC2708DMQB
 54AC2708LMQB

Prime Die

Z2708

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

- 64-words by 9-bit dual port RAM organization
- 50 MHz shift-in, 40 MHz shift-out data rate, typical
- Expandable in word width only
- Asynchronous or synchronous operation
- Asynchronous master reset
- Outputs source/sink 8 mA
- TRI STATE Outputs
- Full ESD protection
- Input and output pins directly in line for easy board layout
- TRW 1030 work-alike operation

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik)	
Vi = -0.5V	-20 mA
Vi = Vcc +0.5V	+20 mA
DC Input Voltage (Vi)	-0.5V to Vcc +0.5V
DC Output Diode Current (Iok)	
Vo = -0.5V	-20 mA
Vo = Vcc +0.5V	+20 mA
DC Output Voltage (Vo)	-0.5V to Vcc +0.5V
DC Output Source or Sink Current (Io)	±32 mA
DC Vcc or Ground Current per Output Pin (Icc or Ignd)	±32 mA
Storage Temperature (Tstg)	-65 C to +150 C
Junction Temperature (Tj)	
CDIP	175 C

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

Recommended Operating Conditions

Supply Voltage (Vcc)	2.0V to 6.0V
Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Operating Temperature (Ta)	-55 C to +125 C
Minimum Input Edge Rate (Delta V/Delta t)	
AC Devices	
Vin from 30% to 70% of Vcc	
Vcc @ 3.0V, 4.5V, 5.5V	125 mV/ns

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC 3.0V to 5.5V, Temperature Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	High Level input Current	VCC=5.5V, VM=5.5V	1, 2	INPUTS		0.1	uA	1
			1, 2	INPUTS		1.0	uA	2, 3
IIL	Low Level Input Current	VCC=5.5V, VM=0.0V	1, 2	INPUTS		-0.1	uA	1
			1, 2	INPUTS		-1.0	uA	2, 3
VOL	Low level output Voltage	VCC=3.0V, VIL=0.9V, VIH=2.1V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=4.5V, VIL=1.35V, VIH=3.15V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=5.5V, VIL=1.65V, VIH=3.15V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=3.0V, VIL=0.9V, VIH=2.1V, IOL=4.0mA	1, 2	OUTPUTS		.36	V	1
			1, 2	OUTPUTS		.50	V	2, 3
		VCC=4.5V, VIL=1.35V, VIH=3.15V, IOL=8.0mA	1, 2	OUTPUTS		.36	V	1
			1, 2	OUTPUTS		.50	V	2, 3
		VCC=5.5V, VIL=1.65V, VIH=3.85V, IOL=8.0mA	1, 2	OUTPUTS		.36	V	1
			1, 2	OUTPUTS		.50	V	2, 3
VIOL	Dynamic Output Current LOW	VCC=5.5V, VIL=1.65V, VIH=3.85V, IOL=32.0mA	1, 2, 5	OUTPUTS		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=3.0V, VIL=0.9V, VIH=2.1V, IOH=50.0uA	1, 2	OUTPUTS	2.90		V	1, 2, 3
		VCC=5.5V, VIL=1.65V, VIH=3.85V, IOH=-50.0uA	1, 2	OUTPUTS	5.40		V	1, 2, 3
		VCC=4.5V, VIL=1.35V, VIH=3.15V, IOH=-50.0uA	1, 2	OUTPUTS	4.40		V	1, 2, 3
		VCC=3.0V, VIL=0.9V, VIH=2.1V, IOH=-4.0mA	1, 2	OUTPUTS	2.56		V	1
			1, 2	OUTPUTS	2.40		V	2, 3
		VCC=4.5V, VIL=1.35V, VIH=3.15V, IOH=-8.0mA	1, 2	OUTPUTS	3.86		V	1
			1, 2	OUTPUTS	3.70		V	2, 3
		VCC=5.5V, VIL=1.65V, VIH=3.85V, IOH=-8.0mA	1, 2	OUTPUTS	4.86		V	1
			1, 2	OUTPUTS	4.70		V	2, 3
VI0H	Dynamic Output Current HIGH	VCC=5.5V, VINH=5.5V, VIH=3.85V, VIL=1.65V, IOH=-32.0mA	1, 2, 5	OUTPUTS	3.85		V	1, 2, 3
ICCH	Supply Current Outputs HIGH	VCC=5.5V	1, 2	VCC		8.0	uA	1
			1, 2	VCC		160	uA	2, 3

Electrical Characteristics

DC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC 3.0V to 5.5V, Temperature Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ICCL	Supply Current Outputs LOW	VCC=5.5V	1, 2	VCC		8.0	uA	1
			1, 2	VCC		160	uA	2, 3
ICZ	Supply Current Outputs Tri-State	VCC=5.5V	1, 2	VCC		8.0	uA	1
			1, 2	VCC		160	uA	2, 3
IOZH	Maximum TRI-STATE Current	VCC=3.0V, VIH=2.1V, VM=3.0V	1, 2	OUTPUTS		10.0	uA	2, 3
			1, 2	OUTPUTS		0.5	uA	1
		VCC=4.5V, VIH=3.15V, VM=4.5V	1, 2	OUTPUTS		10.0	uA	2, 3
			1, 2	OUTPUTS		0.5	uA	1
		VCC=5.5V, VIH=3.85V, VM=5.5V	1, 2	OUTPUTS		10.0	uA	2, 3
			1, 2	OUTPUTS		0.5	uA	1
IOZL	Maximum TRI-STATE Current	VCC=3.0V, VIH=2.1V, VM=0.0V	1, 2	OUTPUTS		-10.0	uA	2, 3
			1, 2	OUTPUTS		-0.5	uA	1
		VCC=4.5V, VIH=3.15V, VM=0.0V	1, 2	OUTPUTS		-10.0	uA	2, 3
			1, 2	OUTPUTS		-0.5	uA	1
		VCC=5.5V, VIH=3.85V, VM=0.0V	1, 2	OUTPUTS		-10.0	uA	2, 3
			1, 2	OUTPUTS		-0.5	uA	1

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF, RL=500 OHMS, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

TPLH(1)	Propagation Delay	VCC=3.0V	3, 4, 6	TIR SI-IR	1.0	17.0	ns	9
			3, 4, 6	TIR SI-IR	1.0	20.0	ns	10, 11
TPHL(1)	Propagation Delay	VCC=3.0V	3, 4, 6	TIR SI-IR	1.0	17.0	ns	9
			3, 4, 6	TIR SI-IR	1.0	20.0	ns	10, 11
TPLH(2)	Propagation Delay	VCC=3.0V	3, 4, 6	TIHF SI-FULL	1.0	23.0	ns	9
			3, 4, 6	TIHF SI-FULL	1.0	30.0	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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
TPHL(3)	Propagation Delay	VCC=3.0V	3, 4, 6	TIF SI-HF	1.0	23.0	ns	9
			3, 4, 6	TIF SI-HF	1.0	28.0	ns	10, 11
TPLH(4)	Propagation Delay	VCC=3.0V	3, 4, 6	TIE SI-HF	1.0	24.0	ns	9
			3, 4, 6	TIE SI-HF	1.0	29.0	ns	10, 11
TPLH(5)	Propagation Delay	VCC=3.0V	3, 4, 6	TIOR SI-OR	1.0	31.0	ns	9
			3, 4, 6	TIOR SI-OR	1.0	39.0	ns	10, 11
TPLH(6)	Propagation Delay	VCC=3.0V	3, 4, 6, 8	TMRIRH MR-IR	1.0	22.0	ns	9
			3, 4, 6, 8	TMRIRH MR-IR	1.0	26.0	ns	10, 11
TPHL(7)	Propagation Delay	VCC=3.0V	3, 4, 6, 8	TMRORL MR-OR	1.0	36.0	ns	9
			3, 4, 6, 8	TMRORL MR-OR	1.0	45.0	ns	10, 11
TPHL(8)	Propagation Delay	VCC=3.0V	3, 4, 6, 8	TMRO MR-FULL	1.0	19.0	ns	9
			3, 4, 6, 8	TMRO MR-FULL	1.0	24.0	ns	10, 11
TPHL(9)	Propagation Delay	VCC=3.0V	3, 4, 6, 8	TMRE MR-HF	1.0	39.0	ns	9
			3, 4, 6, 8	TMRE MR-HF	1.0	49.0	ns	10, 11
TPLH(10)	Propagation Delay	VCC=3.0V	3, 4, 6, 8	TFT S0 - IR	1.0	37.0	ns	9
			3, 4, 6, 8	TFT S0 - IR	1.0	47.0	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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
TPLH(11)	Propagation Delay	VCC=4.5V	3, 4, 6	TIR SI-IR	1.5	13.0	ns	9
			3, 4, 6	TIR SI-IR	1.5	15.0	ns	10, 11
TPHL(11)	Propagation Delay	VCC=4.5V	3, 4, 6	TIR SI-IR	1.5	13.0	ns	9
			3, 4, 6	TIR SI-IR	1.5	15.0	ns	10, 11
TPLH(12)	Propagation Delay	VCC=4.5V	3, 4, 6	TIHF SI-FULL	1.5	16.0	ns	9
			3, 4, 6	TIHF SI-FULL	1.5	20.0	ns	10, 11
TPHL(13)	Propagation Delay	VCC=4.5V	3, 4, 6	TIF SI - HF	2.0	16.0	ns	9
			3, 4, 6	TIF SI - HF	2.0	20.0	ns	10, 11
TPLH(14)	Propagation Delay	VCC=4.5V	3, 4, 6	TIE SI-HF	1.5	16.0	ns	9
			3, 4, 6	TIE SI-HF	1.5	20.0	ns	10, 11
tPLH(15)	Propagation Delay	VCC=4.5V	3, 4, 6	TIOR SI-OR	1.5	21.0	ns	9
			3, 4, 6	TIOR SI-OR	1.5	26.0	ns	10, 11
TPLH(16)	Propagation Delay	VCC=4.5V	3, 4, 6, 8	TMRIRH MR-IR	1.5	15.0	ns	9
			3, 4, 6, 8	TMRIRH MR-IR	1.5	18.0	ns	10, 11
TPHL(17)	Propagation Delay	VCC=4.5V	3, 4, 6, 8	TMRORL MR-OR	3.0	24.0	ns	9
			3, 4, 6, 8	TMRORL MR-OR	3.0	31.0	ns	10, 11
TPHL(18)	Propagation Delay	VCC=4.5V	3, 4, 6, 8	TMRO MR-FULL	1.5	14.0	ns	9
			3, 4, 6, 8	TMRO MR-FULL	1.5	17.0	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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
TPHL(19)	Propagation Delay	VCC=4.5V	3, 4, 6, 8	TMRE MR-HF	4.0	26.0	ns	9
			3, 4, 6, 8	TMRE MR-HF	4.0	33.0	ns	10, 11
TPLH(20)	Propagation Delay	VCC=4.5V	3, 4, 6, 8	TFT SO-IR	4.0	25.0	ns	9
			3, 4, 6, 8	TFT SO-IR	4.0	31.0	ns	10, 11
TPLH(21)	Propagation Delay	VCC=3.0V	3, 4, 6	TOR SO-OR	1.0	18.0	ns	9
			3, 4, 6	TOR SO-OR	1.0	22.0	ns	10, 11
TPHL(21)	Propagation Delay	VCC=3.0V	3, 4, 6	TOR SO-OR	1.0	18.0	ns	9
			3, 4, 6	TOR SO-OR	1.0	22.0	ns	10, 11
TPLH(22)	Propagation Delay	VCC=3.0V	3, 4, 6	TD SO-On	1.0	43.0	ns	9
			3, 4, 6	TD SO-On	1.0	55.0	ns	10, 11
TPHL(22)	Propagation Delay	VCC=3.0V	3, 4, 6	TD SO-On	1.0	43.0	ns	9
			3, 4, 6	TD SO-On	1.0	55.0	ns	10, 11
TPLH(23)	Propagation Delay	VCC=3.0V	3, 4, 6	TOD5 SI-On	1.0	44.0	ns	9
			3, 4, 6	TOD5 SI-On	1.0	60.0	ns	10, 11
TPHL(23)	Propagation Delay	VCC=3.0V	3, 4, 6	TOD5 SI-On	1.0	44.0	ns	9
			3, 4, 6	TOD5 SI-On	1.0	60.0	ns	10, 11
TPHL(24)	Propagation Delay	VCC=3.0V	3, 4, 6	TMRONL MR-On	1.0	20.0	ns	9
			3, 4, 6	TMRONL MR-On	1.0	25.0	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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
TPHL(25)	Propagation Delay	VCC=3.0V	3, 4, 6	TOHF SO-FULL	1.0	18.0	ns	9
			3, 4, 6	TOHF SO-FULL	1.0	23.0	ns	10, 11
TPLH(26)	Propagation Delay	VCC=3.0V	3, 4, 6	TOF SO-HF	1.0	29.0	ns	9
			3, 4, 6	TOF SO-HF	1.0	36.0	ns	10, 11
TPHL(27)	Propagation Delay	VCC=3.0V	3, 4, 6	TOE SO-HF	1.0	21.0	ns	9
			3, 4, 6	TOE SO-HF	1.0	26.0	ns	10, 11
TPLH(28)	Propagation Delay	VCC=3.0V	3, 4, 6	TFTO SI-OR	1.0	31.0	ns	9
			3, 4, 6	TFTO SI-OR	1.0	39.0	ns	10, 11
TPLH(29)	Propagation Delay	VCC=3.0V	3, 4, 6	TX1 SI-HF	1.0	24.0	ns	9
			3, 4, 6	TX1 SI-HF	1.0	29.0	ns	10, 11
TPZL(1)	Output Enable	VCC=3.0V	3, 4, 6	OE - On	1.0	17.0	ns	9
			3, 4, 6	OE - On	1.0	21.0	ns	10, 11
TPZH(1)	Output Enable	VCC=3.0V	3, 4, 6	OE - On	1.0	17.0	ns	9
			3, 4, 6	OE - On	1.0	21.0	ns	10, 11
TPLH(30)	Propagation Delay	VCC=4.5V	3, 4, 6	TOR SO-OR	1.5	14.0	ns	9
			3, 4, 6	TOR SO-OR	1.5	18.0	ns	10, 11
TPHL(30)	Propagation Delay	VCC=4.5V	3, 4, 6	TOR SO-OR	1.5	14.0	ns	9
			3, 4, 6	TOR SO-OR	1.5	18.0	ns	10, 11
TPLH(31)	Propagation Delay	VCC=4.5V	3, 4, 6	TD SO-On	3.5	29.0	ns	9
			3, 4, 6	TD SO-On	3.5	37.0	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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
TPHL(31)	Propagation Delay	VCC=4.5V	3, 4, 6	TD SO-On	3.5	29.0	ns	9
			3, 4, 6	TD SO-On	3.5	37.0	ns	10, 11
TPLH(32)	Propagation Delay	VCC=4.5V	3, 4, 6	TOD5 SI-On	4.5	31.0	ns	9
			3, 4, 6	TOD5 SI-On	4.5	39.0	ns	10, 11
TPHL(32)	Propagation Delay	VCC=4.5V	3, 4, 6	TOD5 SI-On	4.5	31.0	ns	9
			3, 4, 6	TOD5 SI-On	4.5	39.0	ns	10, 11
TPHL(33)	Propagation Delay	VCC=4.5V	3, 4, 6	TMRONL MR-On	1.5	15.0	ns	9
			3, 4, 6	TMRONL MR-On	1.5	18.0	ns	10, 11
TPHL(34)	Propagation Delay	VCC=4.5V	3, 4, 6	TOHF SO-FULL	1.5	13.0	ns	9
			3, 4, 6	TOHF SO-FULL	1.5	16.0	ns	10, 11
TPLH(35)	Propagation Delay	VCC=4.5V	3, 4, 6	TOF SO-HF	2.5	20.0	ns	9
			3, 4, 6	TOF SO-HF	2.5	24.0	ns	10, 11
TPHL(36)	Propagation Delay	VCC=4.5V	3, 4, 6	TOE SO-HF	1.5	15.0	ns	9
			3, 4, 6	TOE SO-HF	1.5	19.0	ns	10, 11
TPLH(37)	Propagation Delay	VCC=4.5V	3, 4, 6	TFTO SI-OR	2.5	21.0	ns	9
			3, 4, 6	TFTO SI-OR	2.5	26.0	ns	10, 11
TPLH(38)	Propagation Delay	VCC=4.5V	3, 4, 6	TX1 SI-HF	1.5	16.0	ns	9
			3, 4, 6	TX1 SI-HF	1.5	20.0	ns	10, 11
TPZL(2)	Output Enable	VCC=4.5V	3, 4, 6	OE - On	1.5	13.0	ns	9
			3, 4, 6	OE - On	1.5	15.0	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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
TPZH(2)	Output Enable	VCC=4.5V	3, 4, 6	$\overline{OE}$ - On	1.5	13.0	ns	9
			3, 4, 6	$\overline{OE}$ - On	1.5	15.0	ns	10, 11
TPHZ(1)	Output Disable	VCC=3.0V	3, 4, 6	$\overline{OE}$ - On	1.0	14.0	ns	9
			3, 4, 6	$\overline{OE}$ - On	1.0	17.0	ns	10, 11
TPLZ(1)	Output Disable	VCC=3.0V	3, 4, 6	$\overline{OE}$ - On	1.0	14.0	ns	9
			3, 4, 6	$\overline{OE}$ - On	1.0	17.0	ns	10, 11
Tw(H)(1)	Pulse Width	VCC=3.0V	3, 4, 6	TSIH	9.0		ns	9
			3, 4, 6	TSIH	11.0		ns	10, 11
Tw(L)(2)	Pulse Width	VCC=3.0V	3, 4, 6	TSIL	14.0		ns	9
			3, 4, 6	TSIL	26.0		ns	10, 11
Tw(H)(3)	Pulse Width	VCC=3.0V	3, 4, 6	TSOH	17.0		ns	9
			3, 4, 6	TSOH	24.0		ns	10, 11
Tw(L)(4)	Pulse Width	VCC=3.0V	3, 4, 6	TSOL	19.0		ns	9
			3, 4, 6	TSOL	23.0		ns	10, 11
Tw (L)(1)	Pulse Width	VCC=3.0V	3, 4, 6	TMRW MR	25.0		ns	9
			3, 4, 6	TMRW MR	34.0		ns	10, 11
T(w) (1)	Pulse Width	VCC=3.0V	3, 4, 6	TOP SI-OR	42.0		ns	9
			3, 4, 6	TOP SI-OR	54.0		ns	10, 11
T(w)(2)	Pulse Width	VCC=3.0V	3, 4, 6	TX3 SI-HF	49.0		ns	9
			3, 4, 6	TX3 SI-HF	63.0		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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
T(w)(3)	Pulse Width	VCC=3.0V	3, 4, 6	TIP SO-IR	67.0		ns	9
			3, 4, 6	TIP SO-IR	87.0		ns	10, 11
T(w)(4)	Pulse Width	VCC=3.0V	3, 4, 6	T3F SO-HF	70.0		ns	9
			3, 4, 6	T3F SO-HF	92.0		ns	10, 11
Ts(H/L)(1)	Setup Time HIGH or LOW	VCC=3.0V	3, 4, 6	DN-SI	2.0		ns	9, 10, 11
Th(H/L)(1)	Setup Time HIGH or LOW	VCC=3.0V	3, 4, 6	DN-SI	7.0		ns	9, 10, 11
TPHZ(2)	Output Disable	VCC=4.5V	3, 4, 6	OE - On	1.5	11.0	ns	9
			3, 4, 6	OE - On	1.5	13.0	ns	10, 11
TPLZ(2)	Output Disable	VCC=4.5V	3, 4, 6	OE - On	1.5	11.0	ns	9
			3, 4, 6	OE - On	1.5	13.0	ns	10, 11
Tw(H)(5)	Pulse Width	VCC=4.5V	3, 4, 6	TSIH	7.0		ns	9
			3, 4, 6	TSIH	9.0		ns	10, 11
Tw(L)(6)	Pulse Width	VCC=4.5V	3, 4, 6	TSIL	11.0		ns	9
			3, 4, 6	TSIL	14.0		ns	10, 11
Tw(H)(7)	Pulse Width	VCC=4.5V	3, 4, 6	TSOH	12.0		ns	9
			3, 4, 6	TSOH	15.0		ns	10, 11
Tw(L)(8)	Pulse Width	VCC=4.5V	3, 4, 6	TSOL	13.0		ns	9
			3, 4, 6	TSOL	16.0		ns	10, 11
T(w)L(2)	Pulse Width	VCC=4.5V	3, 4, 6	TMRW MR	20.0		ns	9
			3, 4, 6	TMRW MR	22.0		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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
T(w)(5)	Pulse Width	VCC=4.5V	3, 4, 6	TOP SI-OR	26.0		ns	9
			3, 4, 6	TOP SI-OR	34.0		ns	10, 11
T(w)(6)	Pulse Width	VCC=4.5V	3, 4, 6	TX3 SI-HF	30.0		ns	9
			3, 4, 6	TX3 SI-HF	40.0		ns	10, 11
T(w)(7)	Pulse Width	VCC=4.5V	3, 4, 6	TIP SO-IR	40.0		ns	9
			3, 4, 6	TIP SO-IR	53.0		ns	10, 11
T(w)(8)	Pulse Width	VCC=4.5V	3, 4, 6	T3F SO-HF	42.0		ns	9
			3, 4, 6	T3F SO-HF	56.0		ns	10, 11
Ts(H/L)(2)	Setup Time HIGH or LOW	VCC=4.5V	3, 4, 6	DN-SI	0.0		ns	9, 10, 11
Th(H/L)(2)	Hold Time HIGH or LOW	VCC=4.5V	3, 4, 6	DN-SI	6.0		ns	9
			3, 4, 6	DN-SI	7.0		ns	10, 11
Trec(1)	Recovery Time	VCC=3.0V	3, 4, 6	TMRSIH MR to SI	10.0		ns	9
			3, 4, 6	TMRSIH MR to SI	11.0		ns	10, 11
Fmax(1)	Maximum Clock Frequency	VCC=3.0V	3, 4, 6	SO	20.0		Mhz	9
			3, 4, 6	SO	15.0		Mhz	10, 11
Fmax(2)	Maximum Clock Frequency	VCC=3.0V	3, 4, 6	SI	30.0		Mhz	9
			3, 4, 6	SI	20.0		Mhz	10, 11
Trec(2)	Recovery Time	VCC=4.5V	3, 4, 6	TMRSIH MR-SI	7.0		ns	9
			3, 4, 6	TMRSIH MR-SI	8.0		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, TR=3.0ns, TF=3.0ns, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Fmax(3)	Maximum Clock Frequency	VCC=4.5V	3, 4, 6	SO	40.0		ns	9
			3, 4, 6	SO	30.0		ns	10, 11
Fmax(4)	Maximum Clock Frequency	VCC=4.5V	3, 4, 6	SI	50.0		ns	9
			3, 4, 6	SI	45.0		ns	10, 11

Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C & 125C TEMPERATURE, SUBGROUPS 1, 2, 7, & 8.

Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A1, 2, 7, & 8.

Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A9.

Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A9 & 10.

Note 5: TRANSMISSION LINE DRIVING TEST, GUARDBAND LIMITS SET FOR +25C, 2 MSEC DURATION MAX.

Note 6: +25C & +125C MIN. LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MIN. LIMITS.

Note 7: NOT TESTED AT +25C, +125C OR -55C TEMP. (GUARANTEED BY DESIGN CHARACTERIZATION DATA).

Note 8: WHEN MR IS LOW WITH SO HIGH, ICC > 1.5mA.