Integrated Device Technology, Inc.

1M x 32 CMOS STATIC RAM MODULE

PRELIMINARY
IDT7MP4104

FEATURES:

- High density 4 megabyte static RAM module
- Low profile 80 pin ZIP (Zig-zag In-line vertical Package) or 80 pin SIMM (Single In-line Memory Module)
- Fast access time: 20ns (max.)
- Surface mounted plastic components on an epoxy laminate (FR-4) substrate
- Single 5V (±10%) power supply
- Multiple GND pins and decoupling capacitors for maximum noise immunity
- Inputs/outputs directly TTL compatible

PIN CONFIGURATION[1]

PD_0	2	1	GND	PD_0 - NC
PD_2	4	3	PD_1	PD_1 - GND
I/O_0	6	5	I/O_4	PD_2 - NC
I/O_1	8	7	V_{CC}	
I/O_2	10	9	I/O_5	
I/O_3	12	11	I/O_6	
GND	14	13	I/O_7	
A_5	16	15	A_0	
A_6	18	17	A_1	
A_7	20	19	A_2	
A_8	22	21	A_3	
A_9	24	23	V_{CC}	
A_{10}	26	25	A_4	
I/O_8	28	27	GND	
I/O_9	30	29	I/O_{12}	
I/O_{10}	32	31	I/O_{13}	
I/O_{11}	34	33	I/O_{14}	
$\overline{WE_0}$	36	35	I/O_{15}	
$\overline{OE_0}$	38	37	$\overline{WE_1}$	
$\overline{CS}$	40	39	V_{CC}	
		41	GND	
NC	42	43	$\overline{OE_1}$	
$\overline{WE_2}$	44	45	$\overline{WE_3}$	
I/O_{16}	46	47	I/O_{20}	
I/O_{17}	48	49	I/O_{21}	
I/O_{18}	50	51	I/O_{22}	
I/O_{19}	52	53	I/O_{23}	
GND	54	55	A_{11}	
A_{17}	56	57	A_{12}	
A_{18}	58	59	A_{13}	
A_{19}	60	61	A_{14}	
NC	62	63	V_{CC}	
NC	64	65	A_{15}	
NC	66	67	GND	
NC	68	69	A_{16}	
NC	70	71	I/O_{28}	
I/O_{24}	72	73	V_{CC}	
I/O_{25}	74	75	I/O_{29}	
I/O_{26}	76	77	I/O_{30}	
I/O_{27}	78	79	I/O_{31}	
GND	80			

ZIP, SIMM
TOP VIEW

2769 drw 01

NOTE:

1. Pins 2, 3 and 4 (PD_0, PD_1 and PD_2) are read by the user to determine the density of the module. If PD_0 reads NC, PD_1 reads GND and PD_2 reads NC, then the module has a 1M depth.

DESCRIPTION:

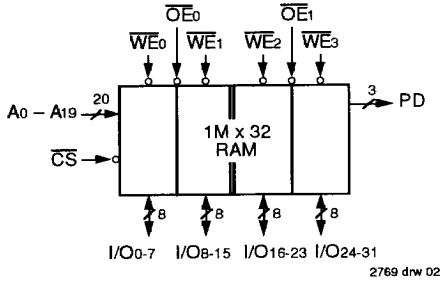
The IDT7MP4104 is a 1M x 32 static RAM module constructed on an epoxy laminate (FR-4) substrate using 8 1M x 4 static RAMs in plastic packages. Availability of four write enable lines (one for each group of two RAMs) provides byte access. The IDT7MP4104 is available with access time as fast as 20ns with minimal power consumption.

The IDT7MP4104 is packaged in a 80 pin FR-4 ZIP (Zig-zag In-line vertical Package)or a 80 pin SIMM (Single In-line Memory Module). The ZIP configuration allows 80 pins to be placed on a package 4.45 inches long and 0.35 inches wide. At only 0.60 inches high, this low profile package is ideal for systems with minimum board spacing while the SIMM configuration allows use of edge mounted sockets to secure the module.

All inputs and outputs of the IDT7MP4104 are TTL compatible and operate from a single 5V supply. Full asynchronous circuitry requires no clocks or refresh for operation and provides equal access and cycle times for ease of use.

Three identification pins (PD0, PD1 and PD2) are provided for applications in which different density versions of the module are used. In this way, the target system can read the respective levels of PD0, PD1 and PD1 to determine a 1M depth.

FUNCTIONAL BLOCK DIAGRAM



2769 drw 02

PIN NAMES

I/O_{0-31}	Data Inputs/Outputs
A_{0-19}	Addresses
$\overline{CS}$	Chip Select
$\overline{WE_0}$-$\overline{WE_3}$	Write Enables
$\overline{OE_0}$	Output Enable for Lower Word
$\overline{OE_1}$	Output Enable for Upper Word
PD_0-PD_2	Depth Identification
V_{CC}	Power
GND	Ground
NC	No Connect

2769 tbl 01

7-14-1

CAPACITANCE (T_A = +25°C, F = 1.0MHz)

Symbol	Parameter[1]	Conditions	Max.	Unit
$C_{IN(D)}$	Input Capacitance (Data)	$V_{(IN)}$ = 0V	15	pF
C_{IN1}	Input Capacitance (Address, $\overline{CS}$)	$V_{(IN)}$ = 0V	60	pF
C_{IN2}	Input Capacitance ($\overline{WE}$)	$V_{(IN)}$ = 0V	15	pF
C_{IN3}	Input Capacitance ($\overline{OE}$)	$V_{(IN)}$ = 0V	30	pF
C_{OUT}	Output Capacitance	$V_{(OUT)}$ = 0V	15	pF

2769 tbl 02

NOTE:
1. This parameter is guaranteed by design but not tested.

RECOMMENDED DC OPERATING CONDITIONS

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage	4.5	5.0	5.5	V
GND	Supply Voltage	0	0	0	V
V_{IH}	Input High Voltage	2.2	—	6.0	V
V_{IL}	Input Low Voltage	–0.5[1]	—	0.8	V

2769 tbl 03

NOTE:
1. V_{IL} (min) = –1.5V for pulse width less than 10ns.

RECOMMENDED OPERATING TEMPERATURE AND SUPPLY VOLTAGE

Grade	Ambient Temperature	GND	Vcc
Commercial	0°C to +70°C	0V	5.0V ± 10%

2769 tbl 04

TRUTH TABLE

Mode	$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Output	Power
Standby	H	X	X	High Z	Standby
Read	L	L	H	$DATA_{OUT}$	Active
Write	L	X	L	$DATA_{IN}$	Active
Read	L	H	H	High-Z	Active

2769 tbl 05

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Rating	Value	Unit
V_{TERM}	Terminal Voltage with Respect to GND	–0.5 to +7.0	V
T_A	Operating Temperature	0 to +70	°C
T_{BIAS}	Temperature Under Bias	–10 to +85	°C
T_{STG}	Storage Temperature	–55 to +125	°C
I_{OUT}	DC Output Current	50	mA

2769 tbl 06

NOTE:
1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

DC ELECTRICAL CHARACTERISTICS

(V_{CC} = 5.0V ±10%, T_A = 0°C to +70°C)

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
$\|I_{LI}\|$	Input Leakage (Address and Control)	V_{CC} = Max.; V_{IN} = GND to V_{CC}	—	80	µA
$\|I_{LI}\|$	Input Leakage (Data)	V_{CC} = Max.; V_{IN} = GND to V_{CC}	—	10	µA
$\|I_{LO}\|$	Output Leakage	V_{CC} = Max.; $\overline{CS}$ = V_{IH}, V_{OUT} = GND to V_{CC}	—	10	µA
V_{OL}	Output Low	V_{CC} = Min., I_{OL} = 8mA	—	0.4	V
V_{OH}	Output High	V_{CC} = Min., I_{OH} = –4mA	2.4	—	V

2769 tbl 07

Symbol	Parameter	Test Conditions	7MP4104 Max.	Unit
I_{CC}	Dynamic Operating Current	f = f_{MAX}; $\overline{CS}$ = V_{IL} V_{CC} = Max.; Output Open	1200	mA
I_{SB}	Standby Supply Current	$\overline{CS}$ ≥ V_{IH}, V_{CC} = Max. Outputs Open, f = f_{MAX}	480	mA
I_{SB1}	Full Standby Supply Current	$\overline{CS}$ ≥ V_{CC} – 0.2V; f = 0 V_{IN} > V_{CC} – 0.2V or < 0.2V	80	mA

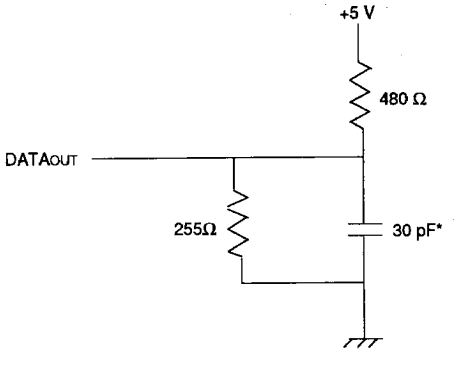
2769 tbl 08

7-14-2

AC TEST CONDITIONS

Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	5ns
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
Output Load	See Figures 1-4

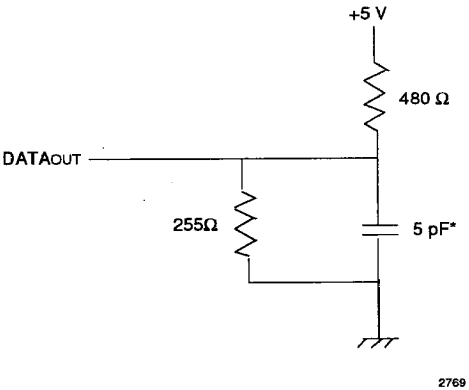
2769 tbl 09



2769 drw 03

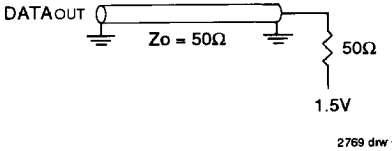
*Includes scope and jig.

Figure 1. Output Load



2769 drw 04

Figure 2. Output Load
(for t_{OLZ}, t_{OHZ}, t_{CHZ}, t_{CLZ}, t_{WHZ}, t_{OW})



2769 drw 05

Figure 3. Alternate Output Load

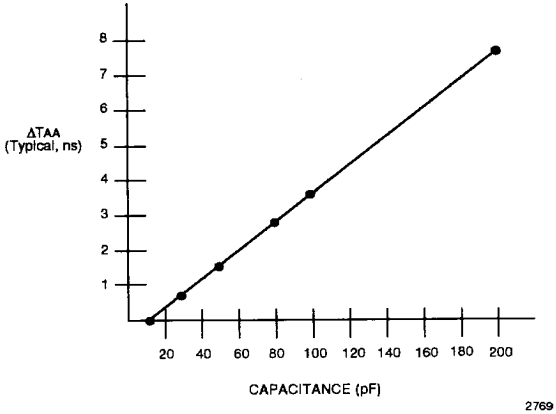


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Figure 4. Alternate Lumped Capacitive Load, Typical Derating

7-14-3

AC ELECTRICAL CHARACTERISTICS

(V_{CC} = 5V ±10%, T_A = 0°C to +70°C)

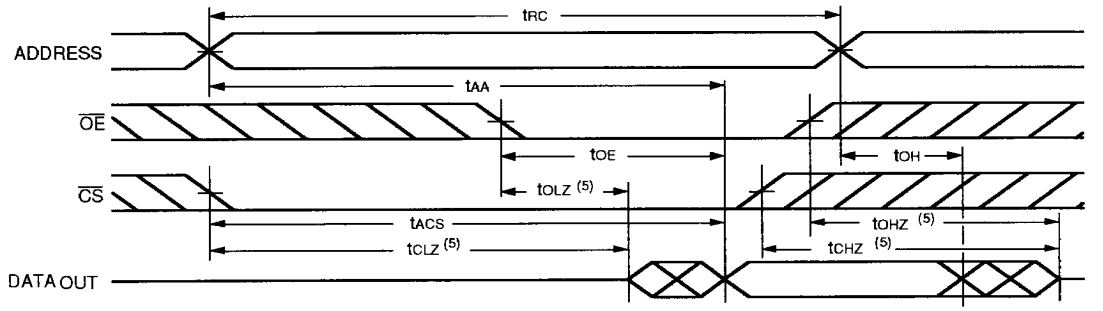
Symbol	Parameter	7MP4104SxxZ, 7MP4104SxxM						Unit
		-20		-25		-35		
		Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle								
t_{RC}	Read Cycle Time	20	—	25	—	35	—	ns
t_{AA}	Address Access Time	—	20	—	25	—	35	ns
t_{ACS}	Chip Select Access Time	—	20	—	25	—	35	ns
t_{CLZ}(1)	Chip Select to Output in Low Z	3	—	3	—	3	—	ns
t_{OE}	Output Enable to Output Valid	—	12	—	15	—	18	ns
t_{OLZ}(1)	Output Enable to Output in Low Z	0	—	0	—	0	—	ns
t_{CHZ}(1)	Chip Deselect to Output in High Z	—	10	—	12	—	18	ns
t_{OHZ}(1)	Output Disable to Output in High Z	—	10	—	12	—	18	ns
t_{OH}	Output Hold from Address Change	3	—	3	—	3	—	ns
t_{PU}(1)	Chip Select to Power-Up Time	0	—	0	—	0	—	ns
t_{PD}(1)	Chip Deselect to Power-Down Time	—	20	—	25	—	35	ns
Write Cycle								
t_{WC}	Write Cycle Time	20	—	25	—	35	—	ns
t_{CW}	Chip Select to End of Write	15	—	20	—	30	—	ns
t_{AW}	Address Valid to End of Write	15	—	20	—	30	—	ns
t_{AS}	Address Set-up Time	0	—	0	—	0	—	ns
t_{WP}	Write Pulse Width	15	—	20	—	30	—	ns
t_{WR}	Write Recovery Time	3	—	3	—	3	—	ns
t_{WHZ}(1)	Write Enable to Output in High Z	—	10	—	15	—	20	ns
t_{DW}	Data to Write Time Overlap	12	—	15	—	20	—	ns
t_{DH}	Data Hold from Write Time	0	—	0	—	0	—	ns
t_{OW}(1)	Output Active from End of Write	0	—	0	—	0	—	ns

2769 tbl 10

NOTE:
1. This parameter is guaranteed by design, but not tested.

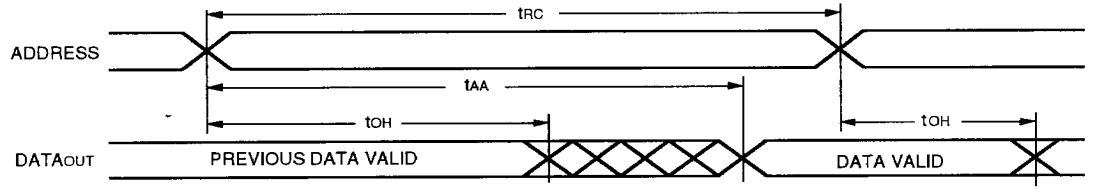
7

TIMING WAVEFORM OF READ CYCLE NO. 1(1)



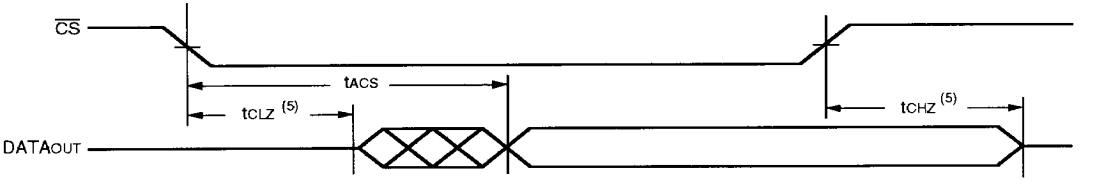
2769 drw 07

TIMING WAVEFORM OF READ CYCLE NO. 2(1,2,4)



2769 drw 08

TIMING WAVEFORM OF READ CYCLE NO. 3(1,3,4)

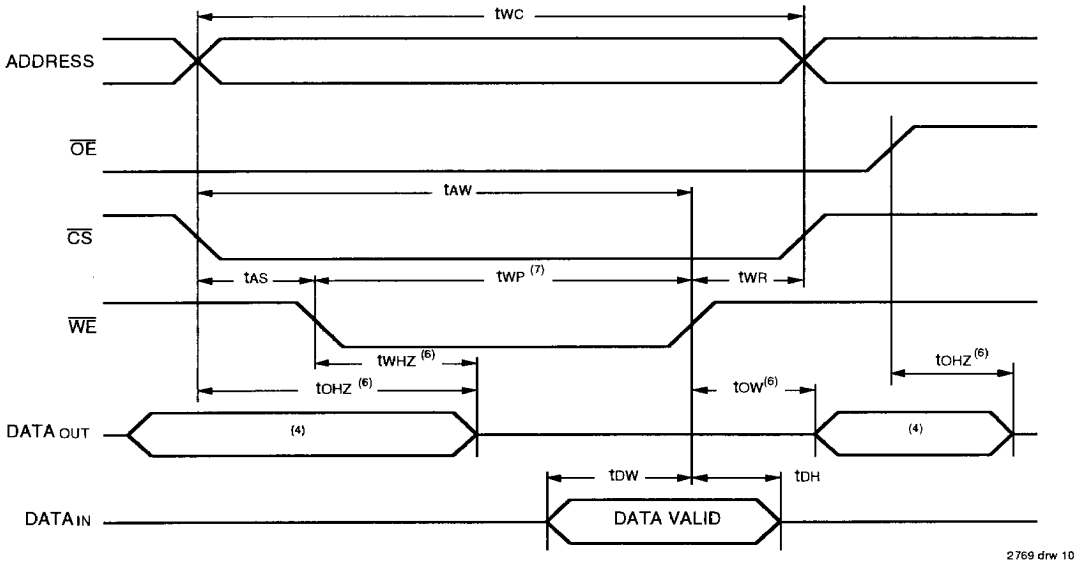


2769 drw 09

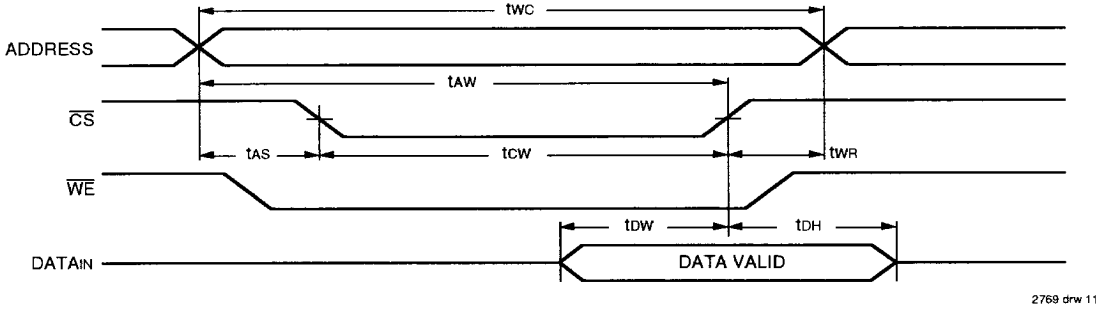
NOTES:
1. $\overline{WE}$ is High for Read Cycle.
2. Device is continuously selected. $\overline{CS}$ = VIL.
3. Address valid prior to or coincident with $\overline{CS}$ transition low.
4. $\overline{OE}$ = VIL.
5. Transition is measured ±200mV from steady state. This parameter is guaranteed by design, but not tested.

7-14-5

TIMING WAVEFORM OF WRITE CYCLE NO. 1 ($\overline{WE}$ CONTROLLED) (1, 2, 3, 7)



TIMING WAVEFORM OF WRITE CYCLE NO. 2 ($\overline{CS}$ CONTROLLED) (1, 2, 3, 5)



NOTES:
1. $\overline{WE}$ or $\overline{CS}$ must be high during all address transitions.
2. A write occurs during the overlap (tWP) of a low $\overline{CS}$ and a low $\overline{WE}$.
3. tWR is measured from the earlier of $\overline{CS}$ or $\overline{WE}$ going high to the end of write cycle.
4. During this period, I/O pins are in the output state, and input signals must not be applied.
5. If the $\overline{CS}$ low transition occurs simultaneously with or after the $\overline{WE}$ low transition, the outputs remain in a high impedance state.
6. Transition is measured ±200mV from steady state with a 5pF load (including scope and jig). This parameter is guaranteed by design, but not tested.
7. If $\overline{OE}$ is low during a $\overline{WE}$ controlled write cycle, the write pulse width must be the larger of tWP or (tWHZ + tDW) to allow the I/O drivers to turn off and data to be placed on the bus for the required tDW. If $\overline{OE}$ is high during a $\overline{WE}$ controlled write cycle, this requirement does not apply and the write pulse can be as short as the specified tWP.

PACKAGE DIMENSIONS - PLEASE CONSULT FACTORY FOR DETAILS

7-14-6