



Integrated Device Technology, Inc.

128K x 8 CMOS STATIC RAM

IDT71M024
IDT71M025

FEATURES:

- High density 1 megabit (128K x 8) static RAM
- Dual Chip Select Version (IDT71M024)
Single Chip Select Version (IDT71M025)
- Fast access time:
 - commercial: 55ns (max.)
 - military: 60ns (max.)
- Low power consumption
 - active: 100mA (max.)
 - CMOS standby: 2mA (max.)
- Very low power version
 - data retention: 50µA (max.) Vcc = 3V
 - CMOS standby: 100µA (max.)
- 32-pin ceramic sidebraced DIP or ceramic leadless chip carrier (LCC)
- Single 5V (±10%) power supply
- Inputs/outputs directly TTL compatible

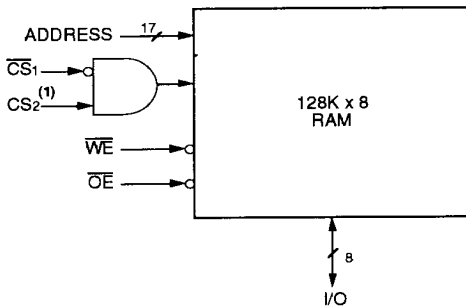
DESCRIPTION:

The IDT71M024/71M025 is a 1 megabit (128K x 8) static RAM packaged in a sidebraced ceramic dual in-line package (DIP) and a ceramic leadless chip carrier (LCC). The IDT71M024/71M025 is available with access times as fast as 55ns. For battery backup applications, a very low power version is available, offering a commercial temperature data retention current of 50µA with Vcc = 3V.

The IDT71M024/71M025 are packaged in JEDEC standard 600 mil 32-pin ceramic DIPs. The IDT71M024 as comes in a hermetic 400 mil by 820 mil LCC. For surface mount applications, the proposed JEDEC standard 400 mil by 820 mil LCC is ideal.

All inputs and outputs of the IDT71M024/71M025 are TTL compatible and operate from a single 5V supply. Fully asynchronous circuitry requires no clocks or refresh for operation and provides equal access and cycle times for ease of use. All IDT military semiconductor components are manufactured in compliance to the latest revision of MIL-STD-883 Class B, making them ideally suited for applications demanding the highest level of performance and reliability.

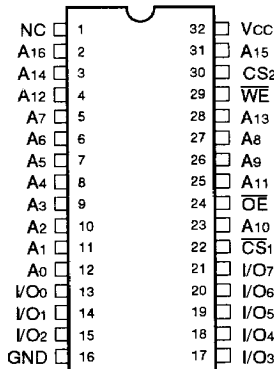
FUNCTIONAL BLOCK DIAGRAM



NOTE:
1. For the IDT71M024 version only.

2820 drw 01

PIN CONFIGURATION⁽¹⁾



2820 drw 02

**DIP, LCC
TOP VIEW**

NOTE:

1. For the IDT71M024 version Pin 30=CS2. For the IDT71M025 version Pin 30=N.C.

PIN NAMES

I/O0-7	Data Inputs/Outputs
A0-18	Addresses
CS1, CS2	Chip Selects
WE	Write Enable
OE	Output Enable
N.C.	No Connect
Vcc	Power
GND	Ground

2820 tbl 01

MILITARY AND COMMERCIAL TEMPERATURE RANGES

APRIL 1992

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TRUTH TABLE⁽¹⁾

Mode	CS ₁	CS ₂	OE	WE	Output	Power
Standby	H	X	X	X	High-Z	Standby
Standby	X	L	X	X	High-Z	Standby
Read	L	H	L	H	DOUT	Active
Read	L	H	H	H	High-Z	Active
Write	L	H	X	L	DIN	Active

NOTE: 2820 tbl 02
1. CS₂ is available for the IDT71M024 version only.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Commercial	Military	Unit
VTERM	Terminal Voltage with Respect to GND	-0.5 to +7.0	-0.5 to +7.0	V
TA	Operating Temperature	0 to +70	-55 to +125	°C
TBIAS	Temperature Under Bias	-55 to +125	-65 to +135	°C
TSTG	Storage Temperature	-55 to +125	-65 to +150	°C
IOUT	DC Output Current	50	50	mA

NOTE: 2820 tbl 05
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.

CAPACITANCE⁽¹⁾ (TA = +25°C, f = 1.0MHz)

Symbol	Parameter	Conditions	Typ.	Unit
CIN	Input Capacitance	VIN = 0V	6	pF
COUT	Output Capacitance	VOUT = 0V	8	pF

NOTE: 2820 tbl 03
1. This parameter is guaranteed by design, but not tested.

RECOMMENDED DC OPERATING CONDITIONS

Symbol	Parameter	Min.	Typ.	Max.	Unit
VCC	Supply Voltage	4.5	5	5.5	V
GND	Supply Voltage	0	0	0	V
VIH	Input High Voltage	2.2	—	6	V
VIL	Input Low Voltage	-0.5 ⁽¹⁾	—	0.8	V

NOTE: 2820 tbl 04
1. VIL = -3.0V for pulse width less than 20ns.

RECOMMENDED OPERATING TEMPERATURE AND SUPPLY VOLTAGE

Grade	Ambient Temperature	GND	Vcc
Commercial	0°C to +70°C	0V	5V ± 10%
Military	-55°C to +125°C	0V	5V ± 10%

2820 tbl 05

DC ELECTRICAL CHARACTERISTICS

(VCC = 5V ± 10%, TA = 0°C to +70°C and -55°C to +125°C)

Symbol	Parameter	Test Conditions	Commercial		Military		Unit
			Min.	Max.	Min.	Max.	
ILI	Input Leakage	VCC = Max., VIN = GND to VCC	—	2.5	—	5	µA
ILO	Output Leakage	VCC = Max., CS ₁ = VIH and CS ₂ = VIL, VOUT = GND to VCC	—	2.5	—	5	µA
VOL	Output Low Voltage	VCC = Min., IOL = 2mA	—	0.4	—	0.4	V
VOH	Output High Voltage	VCC = Min., IOH = -1mA	2.4	—	2.4	—	V
Icc	Dynamic Operating Current	VCC = Max., CS ₁ ≤ VIL and CS ₂ ≥ VIH, f = fMAX, Outputs Open	—	100	—	100	mA
ISB	Standby Supply Current (TTL Levels)	CS ₁ ≥ VIH and CS ₂ ≤ VIL, VCC = Max., f = fMAX, Outputs Open	—	2.5	—	2.5	mA
ISB1	Full Standby Supply Current (CMOS Levels)	CS ₁ ≥ VCC - 0.2V and CS ₂ ≤ 0.2V VIN ≥ VCC - 0.2V or ≤ 0.2V Very Low Power Version ⁽¹⁾	—	2	—	2	mA
			—	100	—	350	µA

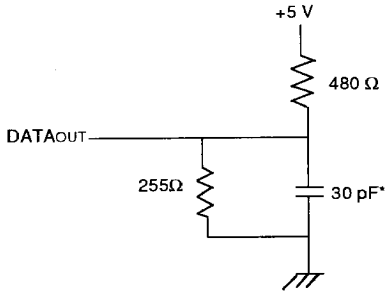
NOTE: 2820 tbl 07
1. For data retention version, please specify L power when ordering.

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AC TEST CONDITIONS

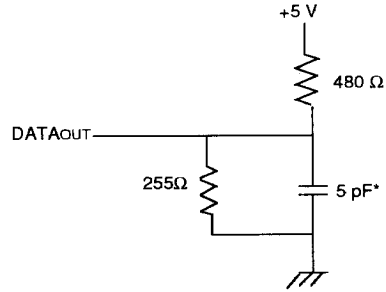
Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	5ns
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
Output Load	See Figures 1 and 2

2820 tbl 08



2820 drw 03

Figure 1. Output Load



2820 drw 04

Figure 2. Output Load
(for tOLZ, tCHZ, tOHZ, tWHZ, tOW and tCLZ)

* Including scope and jig

DATA RETENTION CHARACTERISTICS⁽¹⁾

(TA = 0°C to +70°C and -55°C to +125°C)

Symbol	Parameter	Test Condition	Min.	Comm. Military		Unit
				Max.		
V _{DR}	V _{CC} for Data Retention	—	2.0	—	—	V
V _{CS1}	\overline{CS}_1 Input Voltage	V _{DR} ≥ 2.2V	2.2	—	—	V
V _{CS2}	CS ₂ Input Voltage	V _{DR} ≥ 4.5V	—	0.8	0.8	V
		V _{DR} < 4.5V	—	0.2	0.2	V
I _{CCDR1}	Data Retention Current	V _{CC} = 3.0V, CS ₂ ≤ 0.2V or \overline{CS}_1 , CS ₂ ≥ V _{CC} - 0.2V, VIN ≤ V _{CC} - 0.2V or VIN ≥ 0.2V	—	50	300	μA
I _{CCDR2}	Data Retention Current	V _{CC} = 2.0V, CS ₂ ≤ 0.2V or \overline{CS}_1 , CS ₂ ≥ V _{CC} - 0.2V, VIN ≤ V _{CC} - 0.2V or VIN ≥ 0.2V	—	50	200	μA
t _{PDS} ⁽²⁾	Power Down Set Up Time		0	—	—	ns
t _{PDR} ⁽²⁾	Power Down Recovery Time		t _{RC} ⁽³⁾	—	—	ns

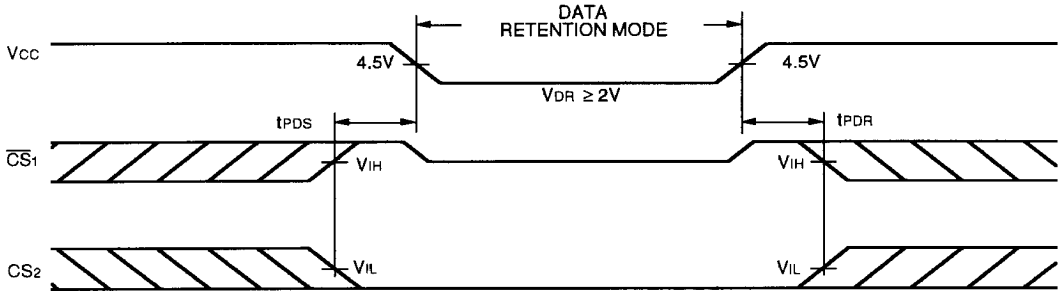
NOTES:

1. This option is only offered when ordering L power version.
2. This parameter is guaranteed by design, but not tested.
3. t_{RC} = Read Cycle Time.

2820 tbl 09

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DATA RETENTION WAVEFORM



2820 drw 05

AC ELECTRICAL CHARACTERISTICS

(VCC = 5V ± 10%, TA = 0°C to +70°C and -55°C to +125°C)

Symbol	Parameter	71M024 or 71M025								Unit
		-55 ^(2,3)		-60 ⁽²⁾		-65 ⁽²⁾		-70		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle										
tRC	Read Cycle Time	60	—	65	—	70	—	70	—	ns
tAA	Address Access Time	—	55	—	60	—	65	—	70	ns
tACS1	Chip Select ($\overline{CS1}$) Access Time	—	55	—	60	—	65	—	70	ns
tACS2	Chip Select ($CS2$) Access Time	—	60	—	65	—	70	—	70	ns
tOE	Output Enable to Output Valid	—	25	—	30	—	35	—	35	ns
tOHZ ⁽¹⁾	Output Disable to Output in High Z	—	20	—	25	—	25	—	25	ns
tOLZ ⁽¹⁾	Output Enable to Output in Low Z	3	—	3	—	5	—	5	—	ns
tGLZ1,2 ⁽¹⁾	Chip Select to Output in Low Z	5	—	5	—	5	—	5	—	ns
tCHZ1,2 ⁽¹⁾	Chip Deselect to Output in High Z	—	20	—	25	—	25	—	25	ns
tOH	Output Hold from Address Change	10	—	10	—	10	—	10	—	ns
tpU ⁽¹⁾	Chip Select to Power-Up Time	0	—	0	—	0	—	0	—	ns
tpD ⁽¹⁾	Chip Deselect to Power-Down Time	—	60	—	65	—	70	—	70	ns
Write Cycle										
tWC	Write Cycle Time	60	—	65	—	70	—	70	—	ns
tWP	Write Pulse Width	45	—	50	—	55	—	55	—	ns
tAS	Address Set-up Time	0	—	0	—	0	—	0	—	ns
tAW	Address Valid to End of Write	55	—	60	—	65	—	65	—	ns
tCW1	Chip Select ($\overline{CS1}$) to End of Write	55	—	60	—	65	—	65	—	ns
tCW2	Chip Select ($CS2$) to End of Write	55	—	60	—	65	—	65	—	ns
tDW	Data to Write Time Overlap	25	—	30	—	30	—	30	—	ns
tDH	Data Hold Time	0	—	0	—	0	—	0	—	ns
tWR	Write Recovery Time	0	—	0	—	0	—	0	—	ns
tWHZ ⁽¹⁾	Write Enable to Output in High Z	—	20	—	25	—	25	—	25	ns
tOW ⁽¹⁾	Output Active from End of Write	0	—	0	—	0	—	0	—	ns

NOTES:

1. This parameter is guaranteed by design, but not tested.
2. Preliminary specification only.
3. Commercial temperature only.

2820 tbi 10

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AC ELECTRICAL CHARACTERISTICS

(V_{CC} = 5V ± 10%, T_A = 0°C to +70°C and -55°C to +125°C)

Symbol	Parameter	71M024 or 71M025						Unit
		-85		-100		-120		
		Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle								
t _{RC}	Read Cycle Time	85	—	100	—	120	—	ns
t _{AA}	Address Access Time	—	85	—	100	—	120	ns
t _{ACS1}	Chip Select (\overline{CS}_1) Access Time	—	85	—	100	—	120	ns
t _{ACS2}	Chip Select (CS ₂) Access Time	—	85	—	100	—	120	ns
t _{OE}	Output Enable to Output Valid	—	40	—	45	—	45	ns
t _{OHZ} ⁽¹⁾	Output Disable to Output in High Z	—	30	—	35	—	35	ns
t _{OLZ} ⁽¹⁾	Output Enable to Output in Low Z	5	—	5	—	5	—	ns
t _{CLZ1,2} ⁽¹⁾	Chip Select to Output in Low Z	5	—	5	—	5	—	ns
t _{CHZ1,2} ⁽¹⁾	Chip Deselect to Output in High Z	—	30	—	35	—	35	ns
t _{OH}	Output Hold from Address Change	10	—	10	—	10	—	ns
t _{PU} ⁽¹⁾	Chip Select to Power-Up Time	0	—	0	—	0	—	ns
t _{PD} ⁽¹⁾	Chip Deselect to Power-Down Time	—	85	—	100	—	120	ns
Write Cycle								
t _{WC}	Write Cycle Time	85	—	100	—	120	—	ns
t _{WP}	Write Pulse Width	60	—	65	—	65	—	ns
t _{AS}	Address Set-up Time	0	—	0	—	0	—	ns
t _{AW}	Address Valid to End of Write	70	—	75	—	75	—	ns
t _{CW1}	Chip Select (\overline{CS}_1) to End of Write	70	—	75	—	75	—	ns
t _{CW2}	Chip Select (CS ₂) to End of Write	70	—	75	—	75	—	ns
t _{DW}	Data to Write Time Overlap	35	—	40	—	40	—	ns
t _{DH}	Data Hold Time	0	—	0	—	0	—	ns
t _{WR}	Write Recovery Time	0	—	0	—	0	—	ns
t _{WHZ} ⁽¹⁾	Write Enable to Output in High Z	—	30	—	35	—	35	ns
t _{OW} ⁽¹⁾	Output Active from End of Write	0	—	0	—	0	—	ns

NOTE:

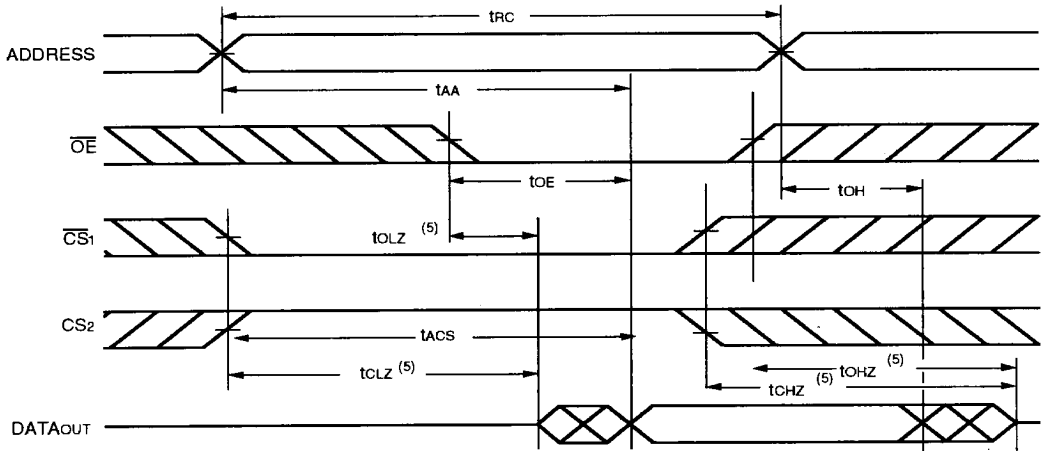
1. This parameter is guaranteed by design, but not tested.

2820 tcl 11



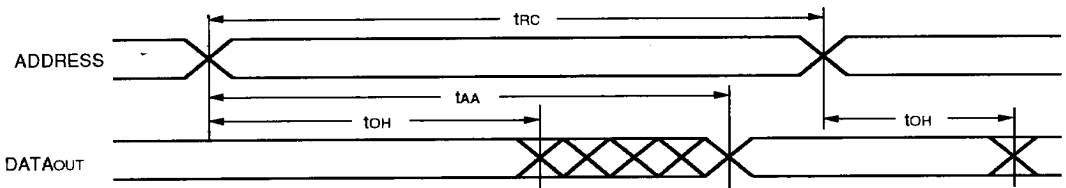
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TIMING WAVEFORM OF READ CYCLE NO. 1⁽¹⁾



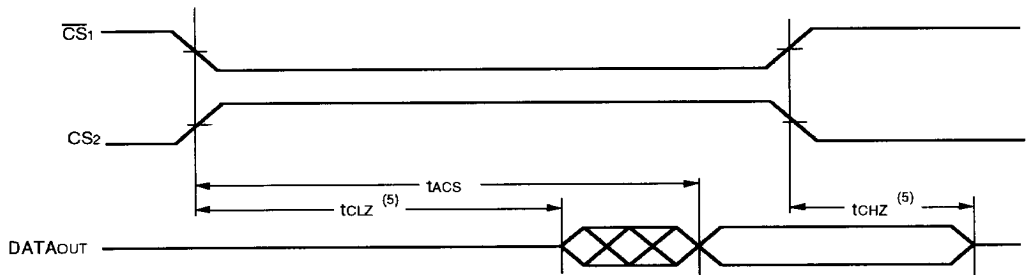
2820 drw 06

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



2820 drw 07

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



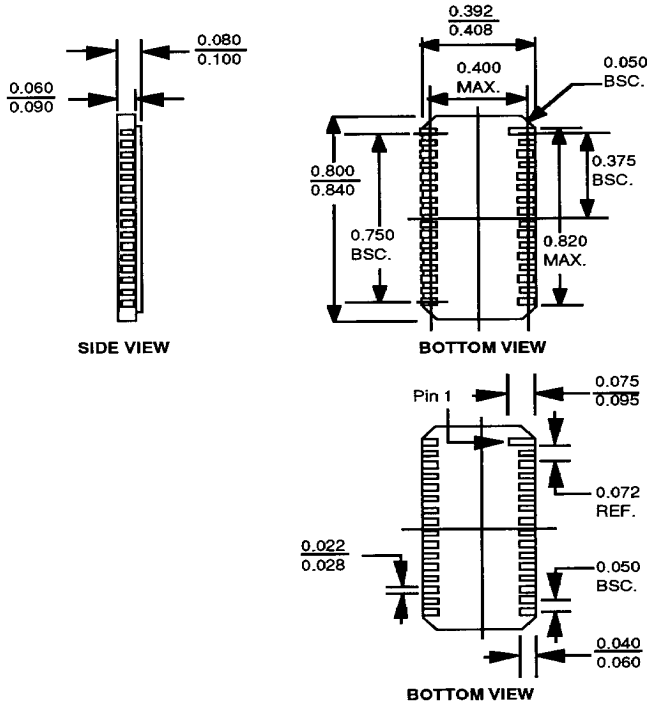
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NOTES:

1. WE is High for Read Cycle.
2. Device is continuously selected, $\overline{CS1} = V_{IL}$, $CS2 = V_{IH}$.
3. Address valid prior to or coincident with $\overline{CS1}$ transition low, $CS2$ transition high.
4. $\overline{OE} = V_{IL}$.
5. Transition is measured $\pm 200mV$ from steady state. This parameter is guaranteed by design, but not tested.

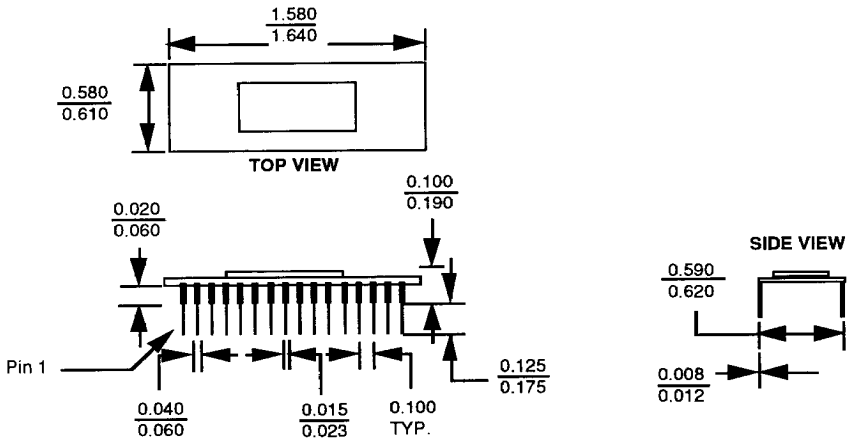
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PACKAGE DIMENSIONS 400 MIL BY 820 MIL LCC PACKAGE



600 MIL DUAL IN-LINE PACKAGE

2820 drw 11



2820 drw 12

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