

### 128K x 8 SRAM

#### WITH DUAL CHIP ENABLE

#### AVAILABLE AS MILITARY SPECIFICATIONS

- SMD 5962-89598
- MIL-STD-883

#### FEATURES

- High Speed: 12, 15, 20, 25, 35, 45, 55 and 70 ns
- Battery Backup: 2V data retention
- Low power standby
- High-performance, low-power CMOS process
- Single +5V ( $\pm 10\%$ ) Power Supply
- Easy memory expansion with CE1\, CE2, and OE\ options.
- All inputs and outputs are TTL compatible
- ASI uses die type Cy7C109B from Cypress
- 6-T SRAM cell design

#### OPTIONS

- **Timing**

12ns access	-12 (contact factory)
15ns access	-15
20ns access	-20
25ns access	-25
35ns access	-35
45ns access	-45
55ns access	-55*
70ns access	-70*

#### MARKING

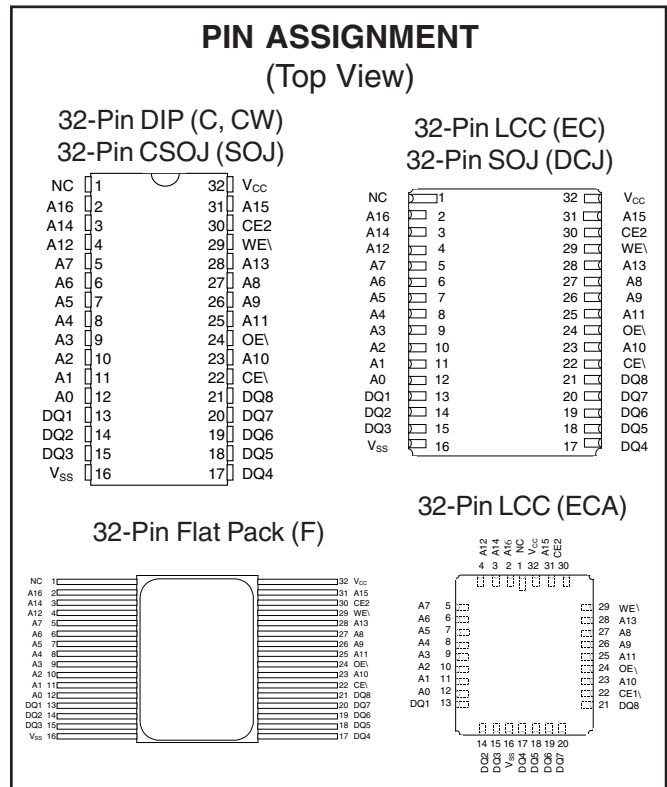
- **Package(s)**

Ceramic DIP (400 mil)	C	No. 111
Ceramic DIP (600 mil)	CW	No. 112
Ceramic LCC	EC	No. 207
Ceramic LCC	ECA	No. 208
Ceramic Flatpack	F	No. 303
Ceramic SOJ	DCJ	No. 501
Ceramic SOJ	SOJ	No. 507

- 2V data retention/low power L

\*Electrical characteristics identical to those provided for the 45ns access devices.

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#### GENERAL DESCRIPTION

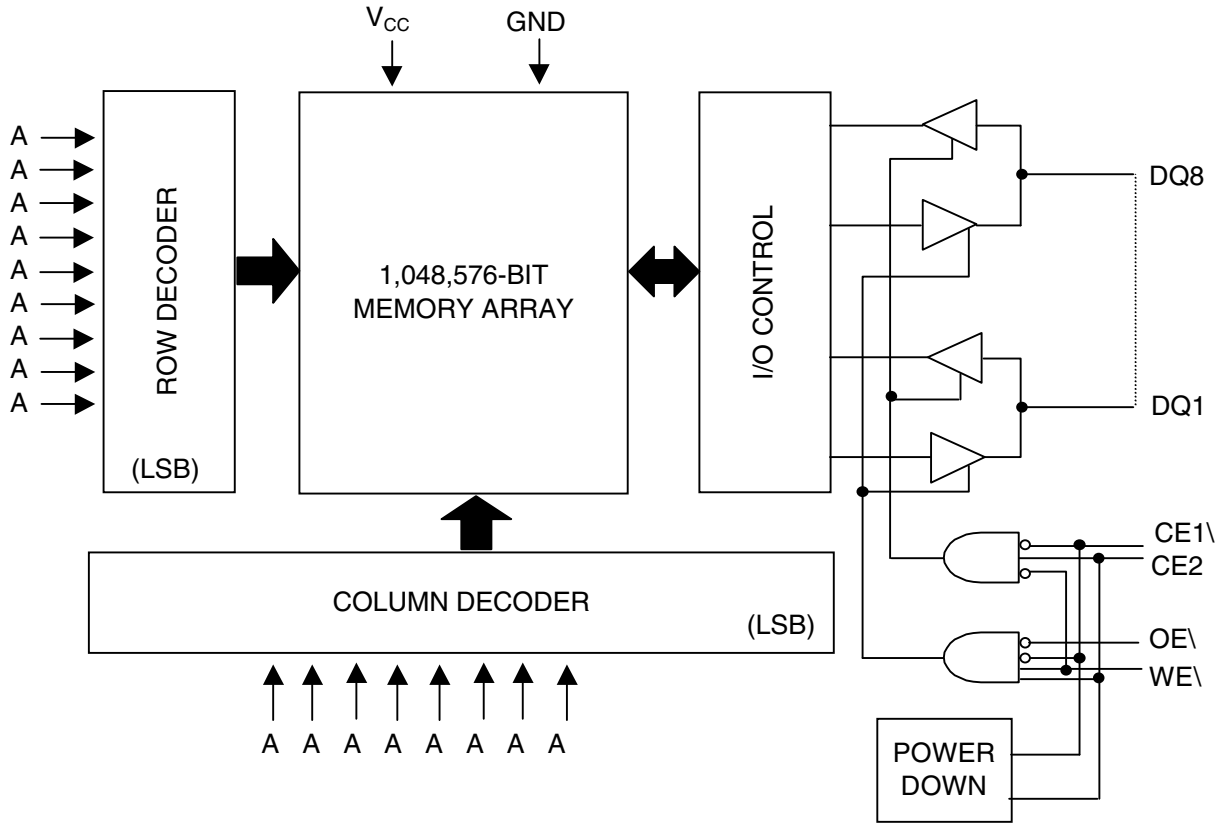
The MT5C1008 SRAM employs high-speed, low power CMOS designs using a four-transistor memory cell, and are fabricated using double-layer metal, double-layer polysilicon technology.

For design flexibility in high-speed memory applications, this device offers dual chip enables (CE1\, CE2) and output enable (OE\). These control pins can place the outputs in High-Z for additional flexibility in system design. All devices operate from a single +5V power supply and all inputs and outputs are fully TTL compatible.

Writing to these devices is accomplished when write enable (WE\), and CE1\ inputs are both LOW and CE2 is HIGH. Reading is accomplished when WE\ and CE2 remain HIGH and CE1\ and OE\ go LOW. The devices offer a reduced power standby mode when disabled, allowing system designs to achieve low standby power requirements.

The "L" version offers a 2V data retention mode, reducing current consumption to 1mA maximum.

**FUNCTIONAL BLOCK DIAGRAM**



**NOTE:** The two least significant row address bits (A8 and A6) are encoded using gray code.

**TRUTHTABLE**

MODE	OE\	CE1\	CE2	WE\	DQ	POWER
STANDBY	X	H	X	X	HIGH-Z	STANDBY
STANDBY	X	X	L	X	HIGH-Z	STANDBY
READ	L	L	H	H	Q	ACTIVE
READ	H	L	H	H	HIGH-Z	ACTIVE
WRITE	X	L	H	L	D	ACTIVE



**ABSOLUTE MAXIMUM RATINGS\***

Supply Voltage Range (V <sub>CC</sub> ).....	-5V to +6.0V
Storage Temperature .....	-65°C to +150°C
Short Circuit Output Current (per I/O).....	20mA
Voltage on any Pin Relative to V <sub>SS</sub> .....	-5V to V <sub>CC</sub> +1 V
Max Junction Temperature**.....	+150°C
Power Dissipation .....	1 W

\*Stresses at or 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 operation section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods will affect reliability. Refer to page 17 of this datasheet for a technical note on this subject.

\*\* Junction temperature depends upon package type, cycle time, loading, ambient temperature and airflow, and humidity.

**ELECTRICAL CHARACTERISTICS AND RECOMMENDED DC OPERATING CONDITIONS**

(-55°C ≤ T<sub>C</sub> ≤ 125°C & -45°C to +85°C; V<sub>CC</sub> = 5.0V ±10%)

DESCRIPTION	CONDITIONS	SYM	MIN	MAX	UNITS	NOTES
Input High (Logic 1) Voltage		V <sub>IH</sub>	2.2	V <sub>CC</sub> +0.5	V	1
Input Low (Logic 0) Voltage		V <sub>IL</sub>	-0.5	0.8	V	1, 2
Input Leakage Current	0V ≤ V <sub>IN</sub> ≤ V <sub>CC</sub>	I <sub>LI</sub>	-10	10	μA	
Output Leakage Current	Output(s) disabled 0V ≤ V <sub>OUT</sub> ≤ V <sub>CC</sub>	I <sub>LO</sub>	-10	10	μA	
Output High Voltage	I <sub>OH</sub> = -4.0mA	V <sub>OH</sub>	2.4		V	1
Output Low Voltage	I <sub>OL</sub> = 8.0mA	V <sub>OL</sub>		0.4	V	1

PARAMETER	CONDITIONS	SYM	MAX						UNITS	NOTES
			-12	-15	-20	-25	-35	-45		
Power Supply Current: Operating	CE\ ≤ V <sub>IL</sub> ; OE\, WE\, and CE2 ≥ V <sub>IH</sub> V <sub>CC</sub> = MAX, f = MAX = 1/t <sub>RC</sub> (MIN) Output Open *L version only	I <sub>CCSP</sub>	250	180	150	140	135	125	mA	3
		I <sub>CCLP</sub> *	250	180	140	130	125	115	mA	
Power Supply Current: Standby	CE\ = V <sub>IH</sub> , CE2 = V <sub>IL</sub> ; Other Inputs at ≤ V <sub>IL</sub> , ≥ V <sub>IH</sub> , V <sub>CC</sub> = MAX f = 0 Hz	I <sub>SBT</sub>	25	25	25	25	25	25	mA	
	CE\ ≥ V <sub>CC</sub> - 0.2V; V <sub>CC</sub> = MAX V <sub>IL</sub> ≤ V <sub>SS</sub> - 0.2V V <sub>IH</sub> ≥ V <sub>CC</sub> - 0.2V; F = 0 Hz	I <sub>SBC</sub>	10	10	10	10	10	10	mA	

**CAPACITANCE**

DESCRIPTION	CONDITIONS	SYM	MAX	UNITS	NOTES
Input Capacitance (A0-A16)	T <sub>A</sub> = 25°C, f = 1MHz V <sub>CC</sub> = 5V	C <sub>I</sub>	12	pF	4
Output Capacitance		C <sub>O</sub>	14	pF	4
Input Capacitance (CE\, WE\, OE\)		C <sub>I</sub>	20	pF	4



**ELECTRICAL CHARACTERISTICS AND RECOMMENDED AC OPERATING CONDITIONS**

(Note 5) (-55°C ≤ T<sub>c</sub> ≤ 125°C & -40°C to +85°C; V<sub>cc</sub> = 5.0V ±10%)

DESCRIPTION	SYMBOL	-12		-15		-20		-25		-35		-45		UNITS	NOTES
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
<b>READ CYCLE</b>															
READ cycle time	t <sub>RC</sub>	12		15		20		25		35		45		ns	
Address access time	t <sub>AA</sub>		12		15		20		25		35		45	ns	
Chip Enable access time	t <sub>ACE</sub>		12		15		20		25		35		45	ns	
Output hold from address change	t <sub>OH</sub>	3		3		3		3		3		3		ns	
Chip Enable to output in Low-Z	t <sub>LZCE</sub>	3		3		3		3		3		3		ns	4, 6, 7
Chip disable to output in High-Z	t <sub>HZOE</sub>		7		7		8		10		15		20	ns	4, 6, 7
Output Enable access time	t <sub>AOE</sub>		7		7		7		10		15		20	ns	4, 6, 7
Output Enable to output in Low-Z	t <sub>LZOE</sub>	0		0		0		0		0		0		ns	
Output disable to output in High-Z	t <sub>HZOE</sub>		7		7		8		10		15		20	ns	4, 6, 7
<b>WRITE CYCLE</b>															
WRITE cycle time	t <sub>WC</sub>	12		15		20		25		35		45		ns	
Chip Enable to end of write	t <sub>CW</sub>	11		12		15		20		25		35		ns	
Address valid to end of write	t <sub>AW</sub>	11		12		15		20		25		35		ns	
Address setup time	t <sub>AS</sub>	0		0		0		0		0		0		ns	
Address hold from end of write	t <sub>AH</sub>	0		0		0		0		0		5		ns	
WRITE pulse width	t <sub>WP</sub>	11		12		15		20		25		35		ns	
Data setup time	t <sub>DS</sub>	8		8		10		15		20		20		ns	
Data hold time	t <sub>DH</sub>	0		0		0		0		0		0		ns	
Write disable to output in Low-Z	t <sub>LZWE</sub>	5		5		5		5		5		5		ns	4, 6, 7
Write Enable to output in High-Z	t <sub>HZWE</sub>		7		7		9		10		15		20	ns	4, 6, 7

### ACTEST CONDITIONS

Input pulse levels .....	V <sub>ss</sub> to 3.0V
Input rise and fall times .....	5ns
Input timing reference levels .....	1.5V
Output reference levels .....	1.5V
Output load .....	See Figures 1 and 2

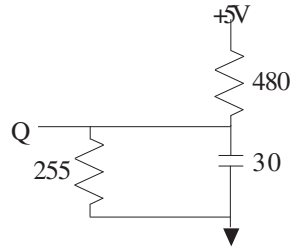


Fig. 1 Output Load Equivalent

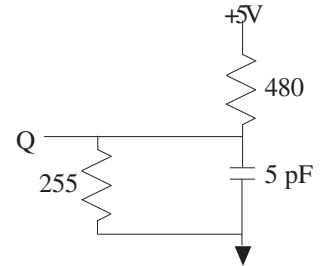


Fig. 2 Output Load Equivalent

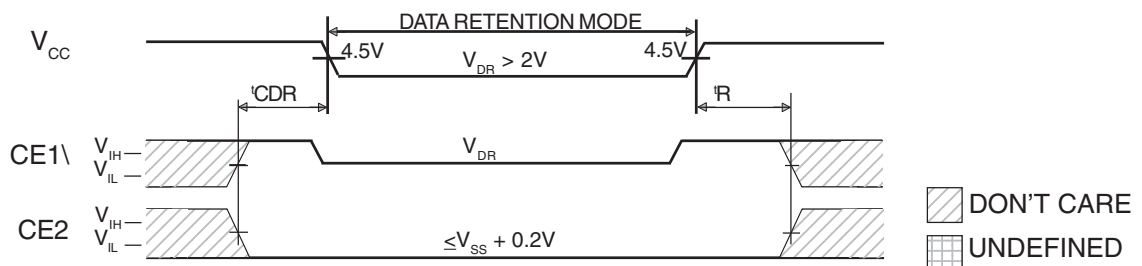
### NOTES

- All voltages referenced to V<sub>ss</sub> (GND).
- 2V for pulse width < 20ns
- I<sub>cc</sub> is dependent on output loading and cycle rates. The specified value applies with the outputs unloaded, and  $f = \frac{1}{RC(MIN)}$  Hz.
- This parameter is guaranteed but not tested.
- Test conditions as specified with the output loading as shown in Fig. 1 unless otherwise noted.
- 'LZCE, 'LZWE, 'LZOE, 'HZCE, 'HZOE and 'HZWE are specified with CL = 5pF as in Fig. 2. Transition is measured ±200mV typical from steady state voltage, allowing for actual tester RC time constant.
- At any given temperature and voltage condition, 'HZCE is less than 'LZCE, and 'HZWE is less than 'LZWE and 'HZOE is less than 'LZOE.
- WE is HIGH for READ cycle.
- Device is continuously selected. Chip enables and output enables are held in their active state.
- Address valid prior to, or coincident with, latest occurring chip enable.
- 'RC = Read Cycle Time.
- CE2 timing is the same as CE1 timing. The waveform is inverted.
- Chip enable (CE1, CE2) and write enable (WE) can initiate and terminate a WRITE cycle.

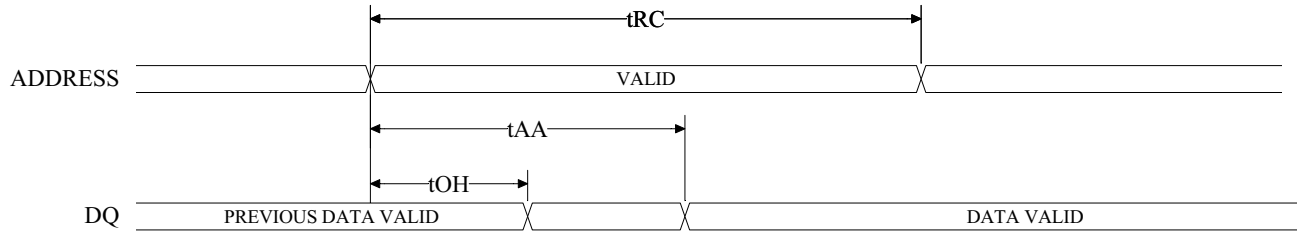
### DATA RETENTION ELECTRICAL CHARACTERISTICS (L Version Only)

DESCRIPTION	CONDITIONS	SYMBOL	MIN	MAX	UNITS	NOTES
V <sub>CC</sub> for Retention Data		V <sub>DR</sub>	2	---	V	
Data Retention Current	CE1 ≥ (V <sub>CC</sub> - 0.2V) V <sub>IN</sub> ≥ (V <sub>CC</sub> - 0.2V) or ≤ 0.2V, f=0	I <sub>CCDR</sub>		1.0	mA	
Chip Deselect to Data Retention Time		t <sub>CDR</sub>	0	---	ns	4
Operation Recovery Time		t <sub>R</sub>	t <sub>RC</sub>		ns	4, 11

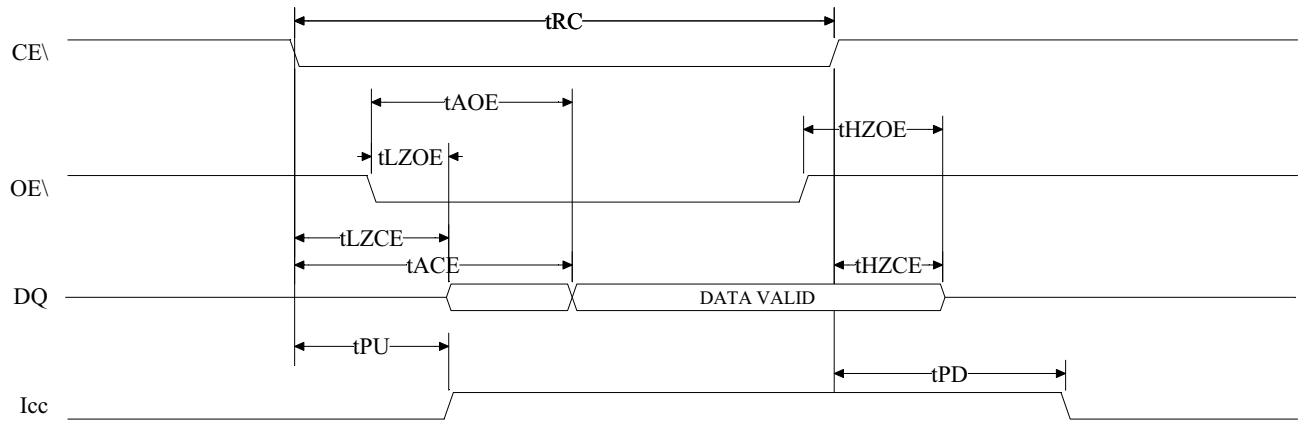
### LOW V<sub>CC</sub> DATA RETENTION WAVEFORM



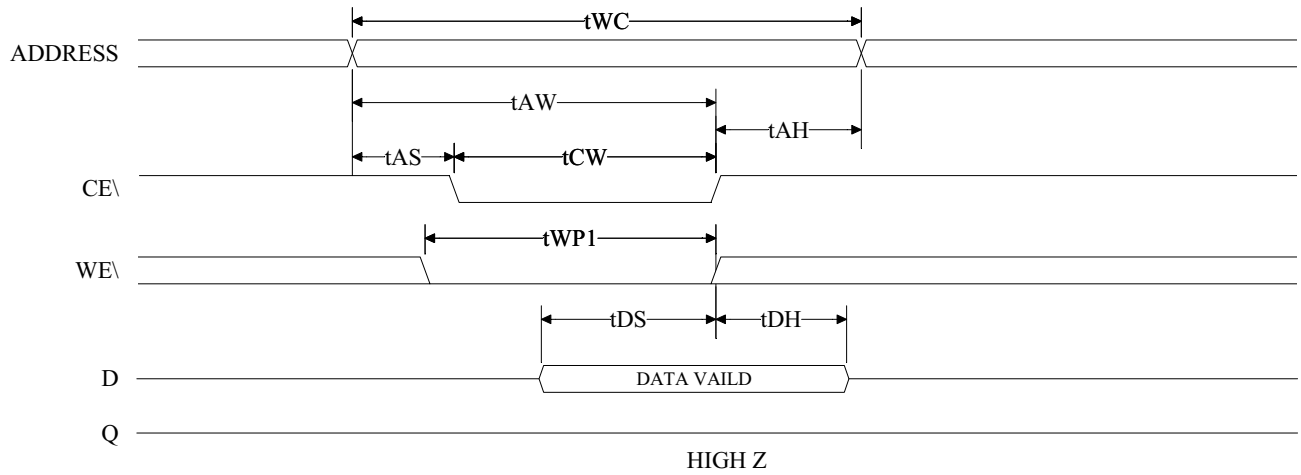
READ CYCLE NO. 1 <sup>8,9</sup>



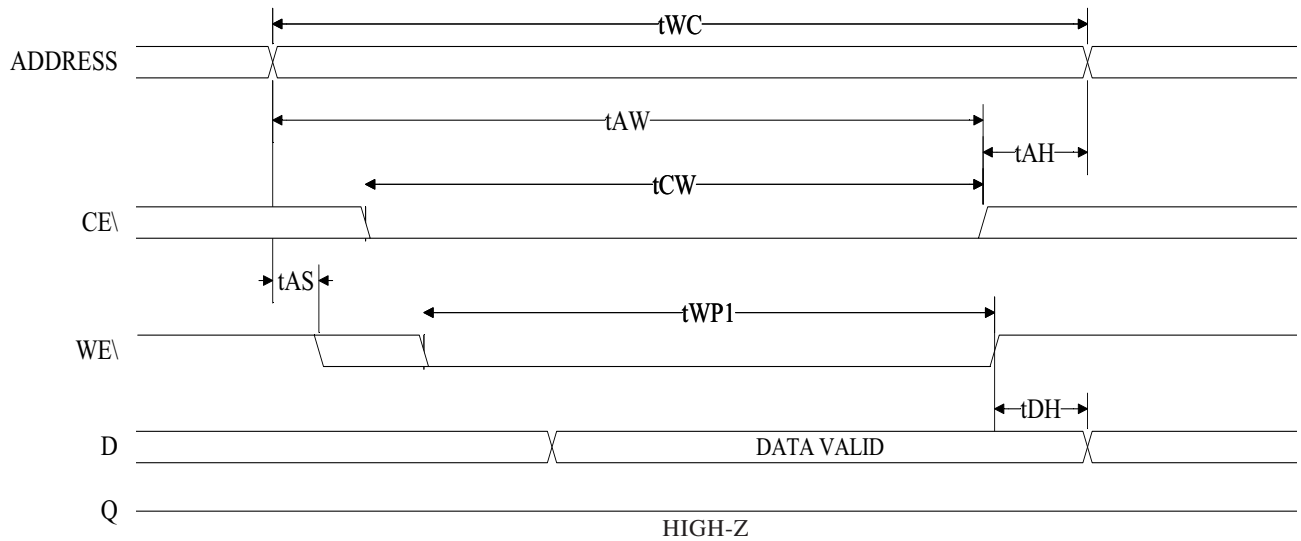
READ CYCLE NO. 2 <sup>7, 8, 10, 12</sup>



WRITE CYCLE NO. 1 <sup>12,13</sup>  
(Chip Enabled Controlled)



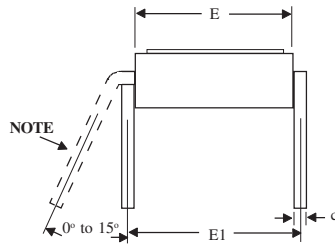
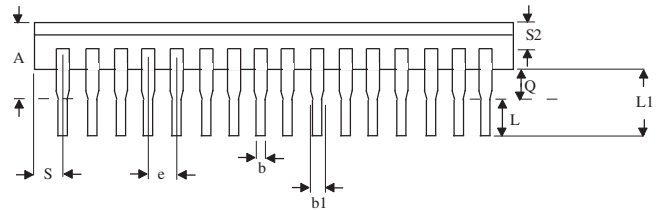
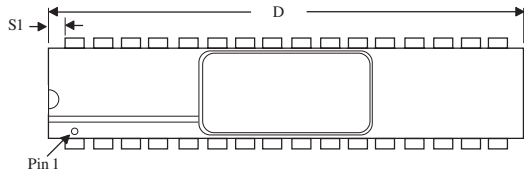
WRITE CYCLE NO. 2 <sup>7,12,13</sup>  
(Write Enabled Controlled)



**NOTE:** Output enable (OE) is inactive (HIGH).

**MECHANICAL DEFINITIONS\***

**ASI Case #111 (Package Designator C)  
SMD 5962-89598, Case Outline Z**



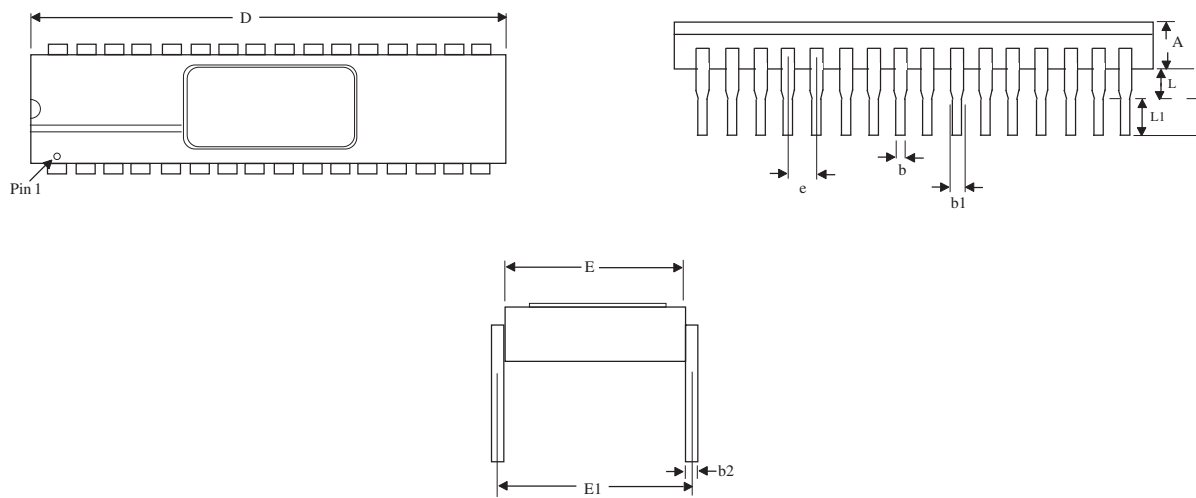
SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	---	0.232
b	0.014	0.023
b1	0.038	0.065
c	0.008	0.015
D	---	1.700
E	0.350	0.405
E1	0.390	0.420
e	0.100 BSC	
L	0.125	0.200
L1	0.150	---
Q	0.015	0.060
S	---	0.100
S1	0.005	---
S2	0.005	---
NOTE:	Either configuration in detail A is allowed on SMD.	

\*All measurements are in inches.



**MECHANICAL DEFINITIONS\***

**ASI Case #112 (Package Designator CW)  
SMD 5962-89598, Case Outline X**

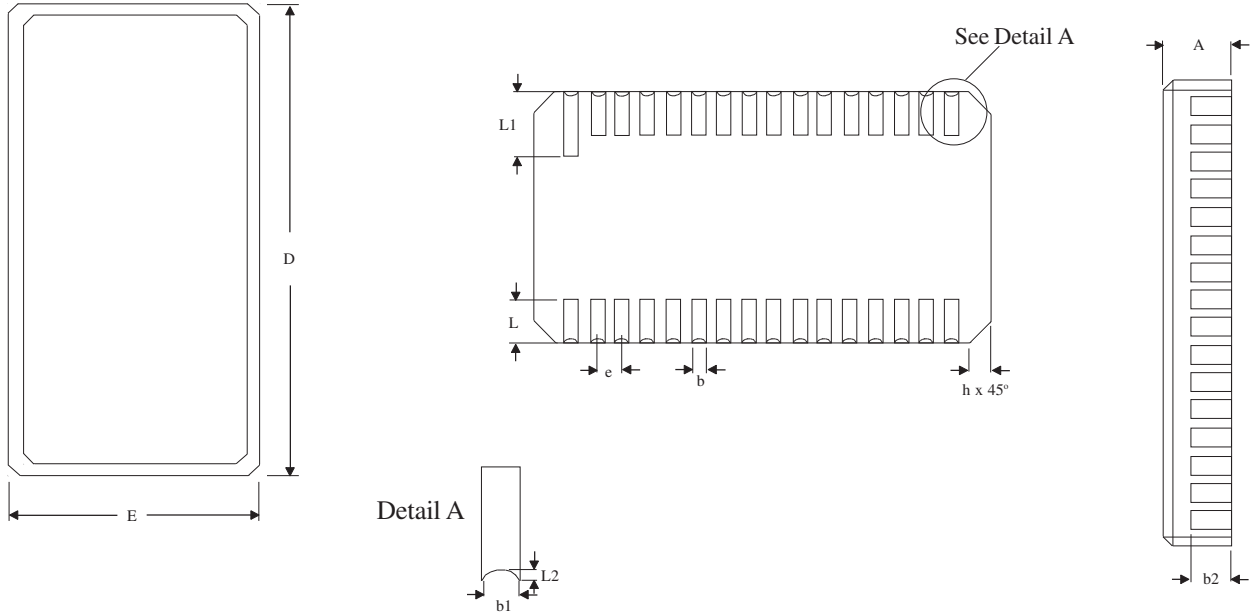


SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	0.089	0.111
b	0.016	0.020
b1	0.045	0.055
b2	0.009	0.011
D	1.585	1.615
E	0.585	0.605
E1	0.595	0.610
e	0.090	0.110
L	0.040	0.060
L1	0.125	0.175

\*All measurements are in inches.

**MECHANICAL DEFINITIONS\***

ASI Case #207 (Package Designator EC)  
SMD 5962-89598, Case Outline U

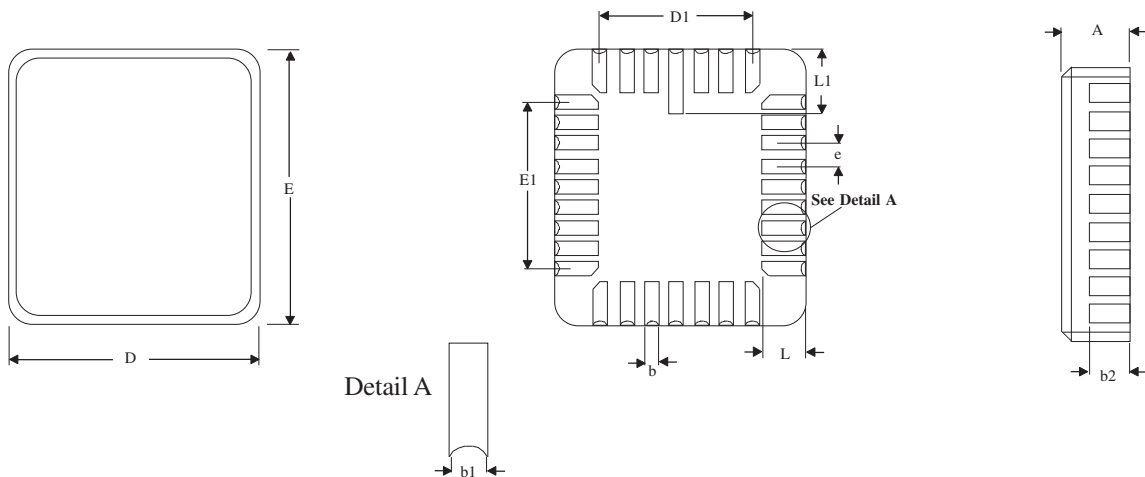


SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	0.080	0.100
b	0.022	0.028
b1	0.006	0.022
b2	0.040	---
D	0.800	0.840
E	0.392	0.408
e	0.050 BSC	
h	0.012 REF	
L	0.070	0.080
L1	0.090	0.110
L2	0.003	0.015

\*All measurements are in inches.

**MECHANICAL DEFINITIONS\***

**ASI Case #208 (Package Designator ECA)  
SMD 5962-89598, Case Outline M**

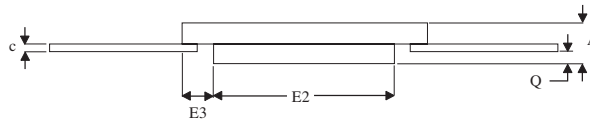
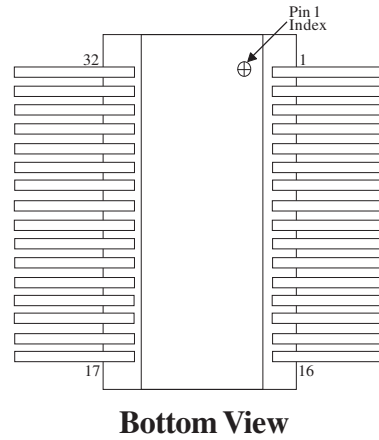
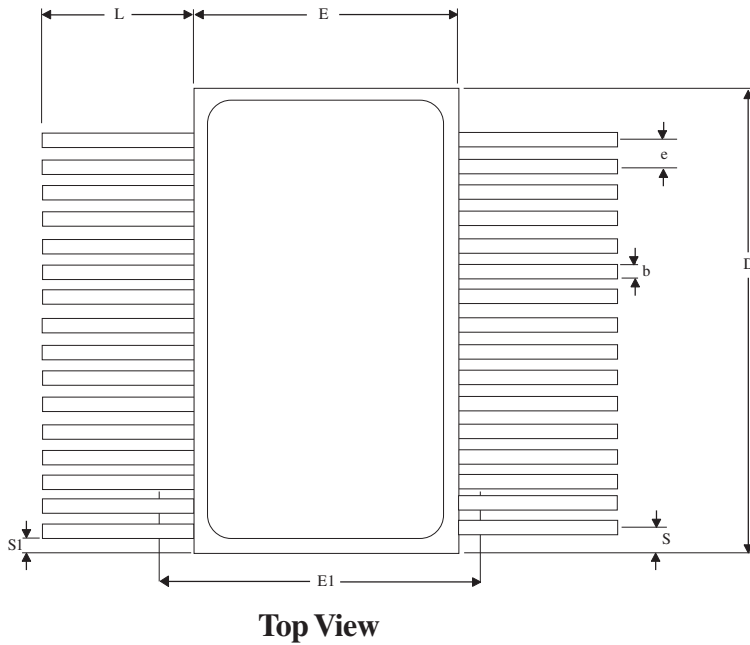


SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	0.060	0.120
b	0.022	0.028
b1	0.004	0.014
b2	0.040	---
D	0.442	0.458
D1	0.300 BSC	
E	0.540	0.560
E1	0.400 BSC	
e	0.050 BSC	
L	0.045	0.055
L1	0.075	0.095

\*All measurements are in inches.

**MECHANICAL DEFINITIONS\***

ASI Case #303 (Package Designator F)  
SMD 5962-89598, Case Outline T

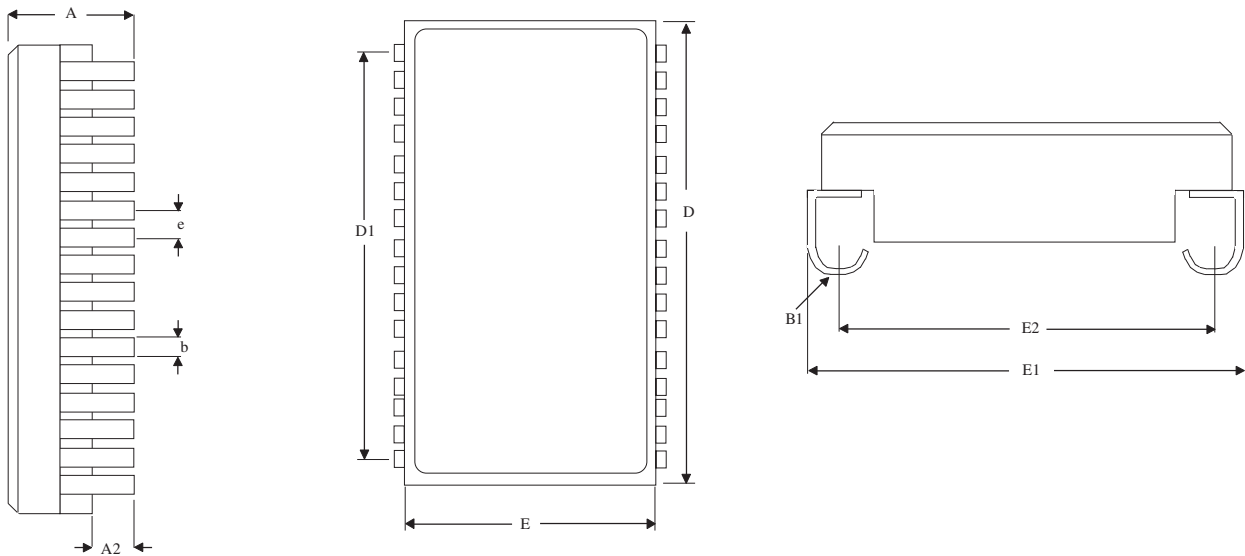


SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	0.097	0.125
b	0.015	0.019
c	0.003	0.009
D	---	0.830
E	0.400	0.420
E1	---	0.450
E2	0.180	---
E3	0.030	---
e	0.050 BSC	
L	0.250	0.370
Q	0.026	0.045
S	---	0.045
S1	0.000	---

\*All measurements are in inches.

**MECHANICAL DEFINITIONS\***

ASI Case #501 (Package Designator DCJ)  
SMD 5962-89598, Case Outline 7

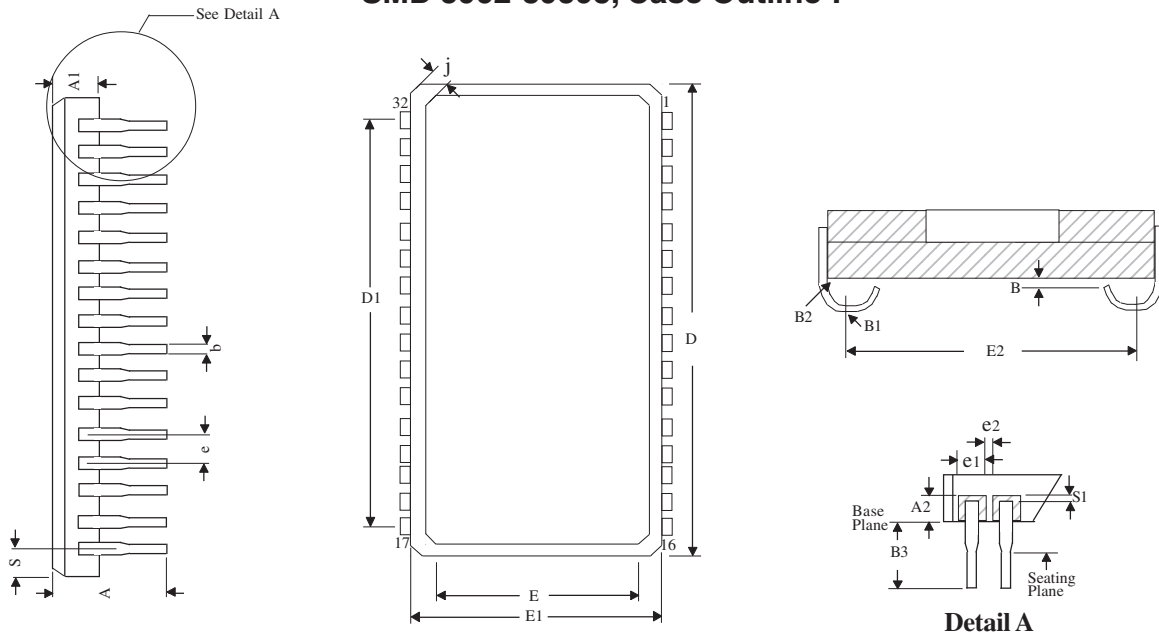


SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	0.132	0.144
A2	0.026	0.036
B1	0.030	0.040
b	0.015	0.019
D	0.812	0.828
D1	0.740	0.760
E	0.405	0.415
E1	0.435	0.445
E2	0.360	0.380
e	0.050 BSC	

\*All measurements are in inches.

**MECHANICAL DEFINITIONS\***

**ASI Case #507 (Package Designator SOJ)  
SMD 5962-89598, Case Outline Y**



SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	0.120	0.165
A1	0.088	0.120
A2	0.070 REF	
B	0.010 REF	
B1	0.030R TYP	
B2	0.020 REF	
B3	0.025	0.045
b	0.015	0.019
D	0.816	0.838
D1	0.750 REF	
E	0.419	0.431
E1	0.430	0.445
E2	0.360	0.380
e	0.050 BSC	
e1	0.038 TYP	
e2	0.005	---
j	0.005 TYP	
S	0.030	0.040
S1	0.020 TYP	

\*All measurements are in inches.

**ORDERING INFORMATION**

**EXAMPLE:** MT5C1008CW-45/883C

Device Number	Package Type	Speed ns	Options**	Process
MT5C1008	C	-12	L	/*
MT5C1008	CW	-12	L	/*
MT5C1008	C	-15	L	/*
MT5C1008	CW	-15	L	/*
MT5C1008	C	-20	L	/*
MT5C1008	CW	-20	L	/*
MT5C1008	C	-25	L	/*
MT5C1008	CW	-25	L	/*
MT5C1008	C	-35	L	/*
MT5C1008	CW	-35	L	/*
MT5C1008	C	-45	L	/*
MT5C1008	CW	-45	L	/*
MT5C1008	C	-55	L	/*
MT5C1008	CW	-55	L	/*
MT5C1008	C	-70	L	/*
MT5C1008	CW	-70	L	/*

**EXAMPLE:** MT5C1008ECA-25L/XT

Device Number	Package Type	Speed ns	Options**	Process
MT5C1008	EC	-12	L	/*
MT5C1008	ECA	-12	L	/*
MT5C1008	EC	-15	L	/*
MT5C1008	ECA	-15	L	/*
MT5C1008	EC	-20	L	/*
MT5C1008	ECA	-20	L	/*
MT5C1008	EC	-25	L	/*
MT5C1008	ECA	-25	L	/*
MT5C1008	EC	-35	L	/*
MT5C1008	ECA	-35	L	/*
MT5C1008	EC	-45	L	/*
MT5C1008	ECA	-45	L	/*
MT5C1008	EC	-55	L	/*
MT5C1008	ECA	-55	L	/*
MT5C1008	EC	-70	L	/*
MT5C1008	ECA	-70	L	/*

**EXAMPLE:** MT5C1008F-25L/883C

Device Number	Package Type	Speed ns	Options**	Process
MT5C1008	F	-12	L	/*
MT5C1008	F	-15	L	/*
MT5C1008	F	-20	L	/*
MT5C1008	F	-25	L	/*
MT5C1008	F	-35	L	/*
MT5C1008	F	-45	L	/*
MT5C1008	F	-55	L	/*
MT5C1008	F	-70	L	/*

**EXAMPLE:** MT5C1008DCJ-35/IT

Device Number	Package Type	Speed ns	Options**	Process
MT5C1008	DCJ	-12	L	/*
MT5C1008	SOJ	-12	L	/*
MT5C1008	DCJ	-15	L	/*
MT5C1008	SOJ	-15	L	/*
MT5C1008	DCJ	-20	L	/*
MT5C1008	SOJ	-20	L	/*
MT5C1008	DCJ	-25	L	/*
MT5C1008	SOJ	-25	L	/*
MT5C1008	DCJ	-35	L	/*
MT5C1008	SOJ	-35	L	/*
MT5C1008	DCJ	-45	L	/*
MT5C1008	SOJ	-45	L	/*
MT5C1008	DCJ	-55	L	/*
MT5C1008	SOJ	-55	L	/*
MT5C1008	DCJ	-70	L	/*
MT5C1008	SOJ	-70	L	/*

**\*AVAILABLE PROCESSES**

IT = Industrial Temperature Range  
 XT = Extended Temperature Range  
 883C = Full Military Processing

-40°C to +85°C  
 -55°C to +125°C  
 -55°C to +125°C

**\*\* OPTIONS**

L = 2V Data Retention/Low Power



Austin Semiconductor, Inc.

SRAM
MT5C1008

ASITO DSCC PART NUMBER
CROSS REFERENCE

ASI Package Designator C & CW

ASI Package Designator EC & ECA

Table with 2 columns: ASI Part # and SMD Part #. Lists part numbers for packages C, CW, EC, and ECA.

Table with 2 columns: ASI Part # and SMD Part #. Lists part numbers for packages EC and ECA.

ASI Package Designator F

ASI Package Designator DCJ & SOJ

Table with 2 columns: ASI Part # and SMD Part #. Lists part numbers for packages F, DCJ, and SOJ.

Table with 2 columns: ASI Part # and SMD Part #. Lists part numbers for packages DCJ and SOJ.

\* ASI part number is for reference only. Orders received referencing the SMD part number will be processed per the SMD.





Austin Semiconductor, Inc.

**SRAM**  
**MT5C1008**

**DOCUMENT TITLE**  
**128K x 8 SRAM**

**REVISION HISTORY**

<u>Rev #</u>	<u>History</u>	<u>Release Date</u>	<u>Status</u>
6.7	Removed Page 17 Technical Note	March 2009	Release