

## 16K x 4 SRAM

### SRAM MEMORY ARRAY

### AVAILABLE AS MILITARY SPECIFICATIONS

- SMD 5962-86859
- SMD 5962-89692
- MIL-STD-883

### FEATURES

- Speeds: 12, 15, 20, 25, 35, 45, 55, and 70ns
- Battery Backup: 2V data retention
- High-performance, low-power CMOS double-metal process
- Single +5V ( $\pm 10\%$ ) Power Supply
- Easy memory expansion with CE\
- All inputs and outputs are TTL compatible

### OPTIONS

#### • Timing

12ns access  
15ns access  
20ns access  
25ns access  
35ns access  
45ns access  
55ns access  
70ns access

### MARKING

-12  
-15  
-20  
-25  
-35  
-45\*  
-55\*  
-70\*

#### • Package(s)

Ceramic DIP (300 mil) C No. 105

#### • Operating Temperature Ranges

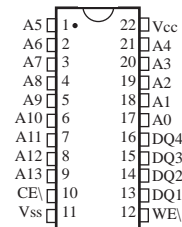
Industrial (-40°C to +85°C) IT  
Military (-55°C to +125°C) XT

- 2V data retention/low power L

\*Electrical characteristics identical to those provided for the 35ns access devices.

### PIN ASSIGNMENT (Top View)

22-Pin DIP (C)  
(300 MIL)



### GENERAL DESCRIPTION

The Micross Components SRAM family employs high-speed, low-power CMOS designs using a four-transistor memory cell. Austin Semiconductor SRAMs are fabricated using double-layer metal, double-layer polysilicon technology.

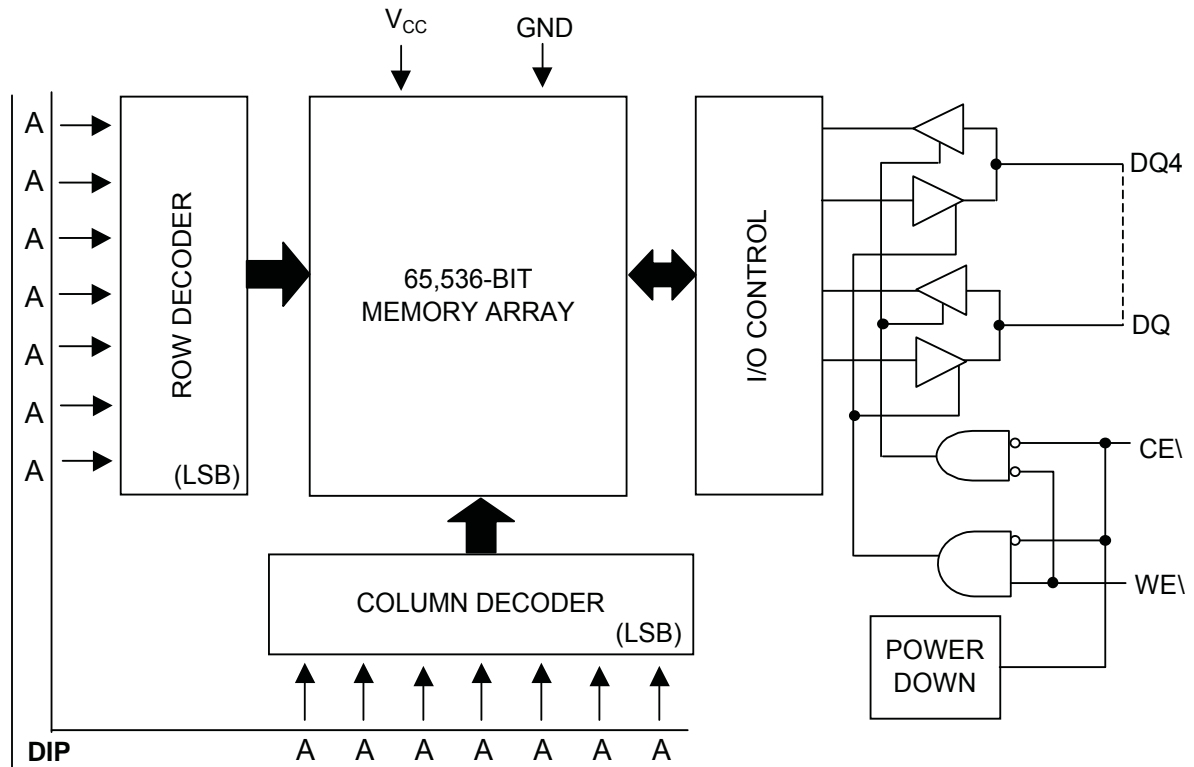
For flexibility in high-speed memory applications, Micross Components offers chip enable (CE\) on all organizations. This enhancement can place the outputs in High-Z for additional flexibility in system design.

Writing to these devices is accomplished when write enable (WE\) and CE\ inputs are both LOW. Reading is accomplished when WE\ remains HIGH and CE\ goes LOW. The device offers a reduced power standby mode when disabled. This allows system designs to achieve low standby power requirements.

All devices operate from a single +5V power supply and all inputs and outputs are fully TTL compatible.

**For more products and information  
please visit our web site at  
[www.micross.com](http://www.micross.com)**

## FUNCTIONAL BLOCK DIAGRAM



## TRUTH TABLE

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

**ABSOLUTE MAXIMUM RATINGS\***

Voltage on any Input or DQ Relative to V<sub>SS</sub>...-2.0V to +7.0V  
 Voltage on V<sub>CC</sub> Supply Relative to V<sub>SS</sub>.....-1.0V to +7.0V  
 Storage Temperature.....-65°C to +150°C  
 Power Dissipation.....1W  
 Max Junction Temperature.....+175°C  
 Lead Temperature (soldering 10 seconds).....+260°C  
 Short Circuit Output Current.....50mA

\*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 operation section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

**ELECTRICAL CHARACTERISTICS AND RECOMMENDED DC OPERATING CONDITIONS**

(-55°C ≤ T<sub>C</sub> ≤ 125°C; V<sub>CC</sub> = 5V ±10%)

DESCRIPTION	CONDITIONS	SYM	MIN	MAX	UNITS	NOTES
Input High (Logic 1) Voltage		V <sub>IH</sub>	2.2	V <sub>CC</sub> +1.0V	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	Outputs 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		
Power Supply Current: Operating	CE\ ≤ V <sub>IL</sub> ; V <sub>CC</sub> = MAX Output Open	I <sub>CC</sub>	140	125	110	100	90	mA	3
Power Supply Current: Standby	CE\ ≥ V <sub>IH</sub> ; V <sub>CC</sub> = MAX f = 1/t <sub>RC</sub> (MIN) Hz	I <sub>SBT1</sub>	45	41	36	33	30	mA	
	CE\ ≥ V <sub>IH</sub> ; All Other Inputs ≤ V <sub>IL</sub> or ≥ V <sub>IH</sub> ; V <sub>CC</sub> = MAX f = 0 Hz	I <sub>SBT2</sub>	25	25	25	25	25	mA	
	CE\ ≥ (V <sub>CC</sub> - 0.2); V <sub>CC</sub> = MAX All Other Inputs ≤ 0.2V or ≥ (V <sub>CC</sub> - 0.2V), f = 0 Hz	I <sub>SBC2</sub>	5	5	5	5	5	mA	

**CAPACITANCE**

DESCRIPTION	CONDITIONS	SYM	MAX	UNITS	NOTES
Input Capacitance	T <sub>A</sub> = 25°C, f = 1MHz V <sub>CC</sub> = 5V	C <sub>I</sub>	6	pF	4
Output Capacitance		C <sub>O</sub>	7	pF	4

**ELECTRICAL CHARACTERISTICS AND RECOMMENDED AC OPERATING CONDITIONS**

 (Note 5) ( $-55^{\circ}\text{C} \leq T_c \leq 125^{\circ}\text{C}$ ;  $V_{CC} = 5\text{V} \pm 10\%$ )

DESCRIPTION	SYMBOL	-12		-15		-20		-25		-35		UNITS	NOTES
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
<b>READ CYCLE</b>													
READ cycle time	$t_{RC}$	12		15		20		25		35		ns	
Address access time	$t_{AA}$		12		15		20		25		35	ns	
Chip Enable access time	$t_{ACE}$		10		13		15		20		25	ns	
Output hold from address change	$t_{OH}$	2		2		2		2		2		ns	
Chip Enable to output in Low-Z	$t_{LZCE}$	2		2		2		2		2		ns	7
Chip disable to output in High-Z	$t_{HZCE}$		7		8		10		12		15	ns	6, 7
Chip Enable to power-up time	$t_{PU}$	0		0		0		0		0		ns	
Chip disable to power-down time	$t_{PD}$		12		15		20		25		35	ns	
<b>WRITE CYCLE</b>													
WRITE cycle time	$t_{WC}$	12		15		20		25		35		ns	
Chip Enable to end of write	$t_{CW}$	10		12		15		20		25		ns	
Address valid to end of write	$t_{AW}$	10		12		15		20		25		ns	
Address setup time	$t_{AS}$	0		0		0		0		0		ns	
Address hold from end of write	$t_{AH}$	0		0		0		0		0		ns	
WRITE pulse width	$t_{WP}$	10		12		15		20		25		ns	
Data setup time	$t_{DS}$	7		8		10		12		15		ns	
Data hold time	$t_{DH}$	0		0		0		0		0		ns	
Write disable to output in Low-Z	$t_{LZWE}$	2		2		2		2		2		ns	7
Write Enable to output in High-Z	$t_{HZWE}$	0	6	0	7	0	8	0	10	0	15	ns	6, 7

**AC TEST 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

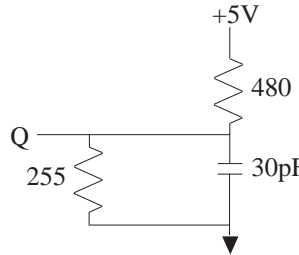


Fig. 1 Output Load Equivalent

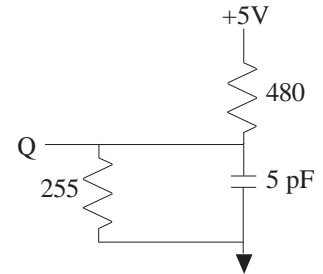


Fig. 2 Output Load Equivalent

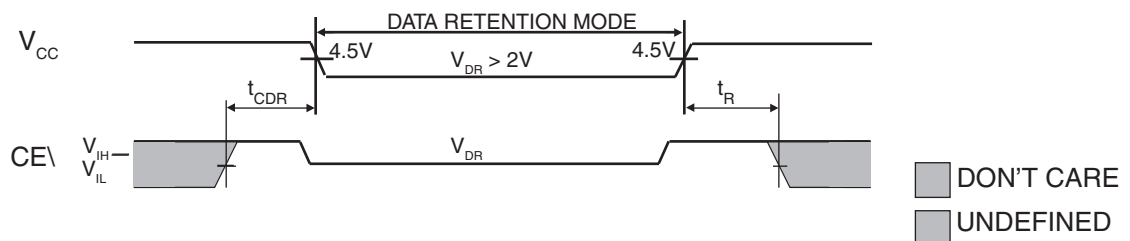
**NOTES**

- All voltages referenced to V<sub>SS</sub> (GND).
- 3V 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 sampled.
- Test conditions as specified with the output loading as shown in Fig. 1 unless otherwise noted.
- t<sub>HZCE</sub> and t<sub>HZWE</sub> are specified with CL = 5pF as in Fig. 2.
- Transition is measured ±500mV typical from steady state voltage, allowing for actual tester RC time constant.
- At any given temperature and voltage condition, t<sub>HZCE</sub> is less than t<sub>LZCE</sub>, and t<sub>HZWE</sub> is less than t<sub>LZWE</sub>.
- WE\ is HIGH for READ cycle.
- Device is continuously selected. Chip enable is held in its active state.
- Address valid prior to, or coincident with, latest occurring chip enable.
- RC = READ Cycle Time.
- Chip enable (CE\ ) and write enable (WE\ ) can initiate and terminate a WRITE cycle.

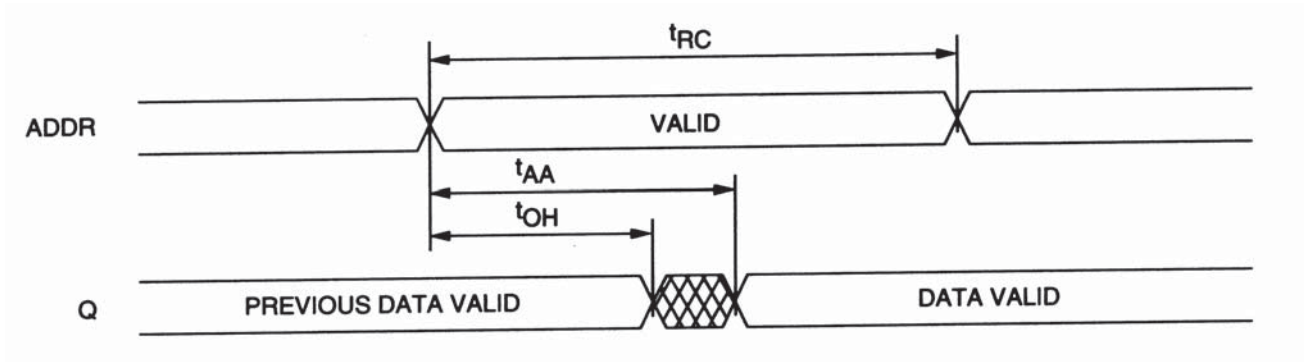
**DATA RETENTION ELECTRICAL CHARACTERISTICS (L Version Only)**

DESCRIPTION	CONDITIONS	SYM	MIN	MAX	UNITS	NOTES
V <sub>CC</sub> for Retention Data		V <sub>DR</sub>	2	---	V	
Data Retention Current	CE\ ≥ (V <sub>CC</sub> - 0.2V) V <sub>IN</sub> ≥ (V <sub>CC</sub> - 0.2V) or ≤ 0.2V	V <sub>CC</sub> = 2V	I <sub>CCDR</sub>	---	300	μA
		V <sub>CC</sub> = 3V	I <sub>CCDR</sub>	---	500	μA
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

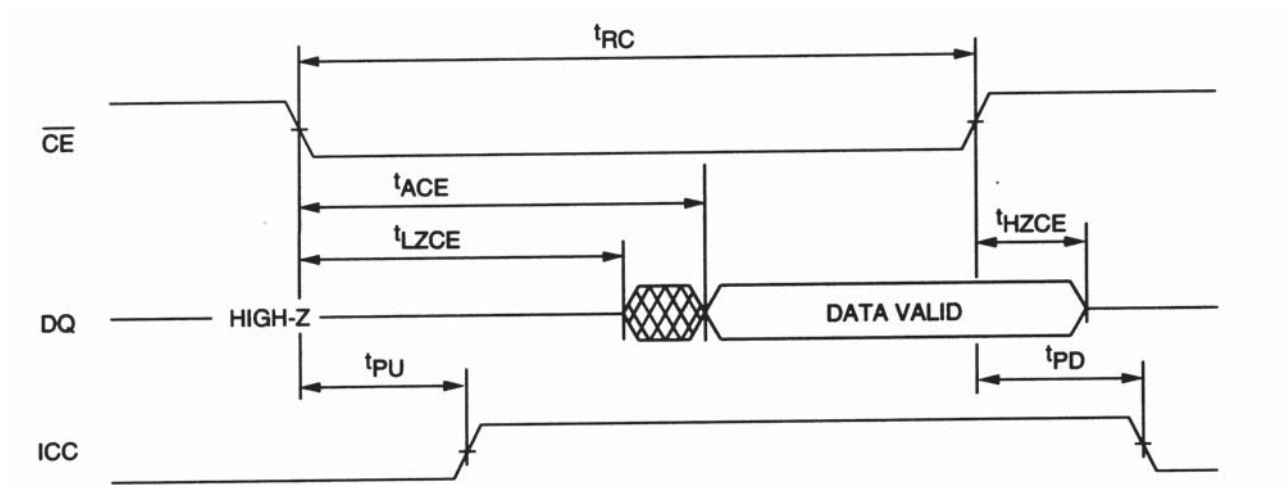
**LOW V<sub>CC</sub> DATA RETENTION WAVEFORM**



READ CYCLE NO. 1 8,9



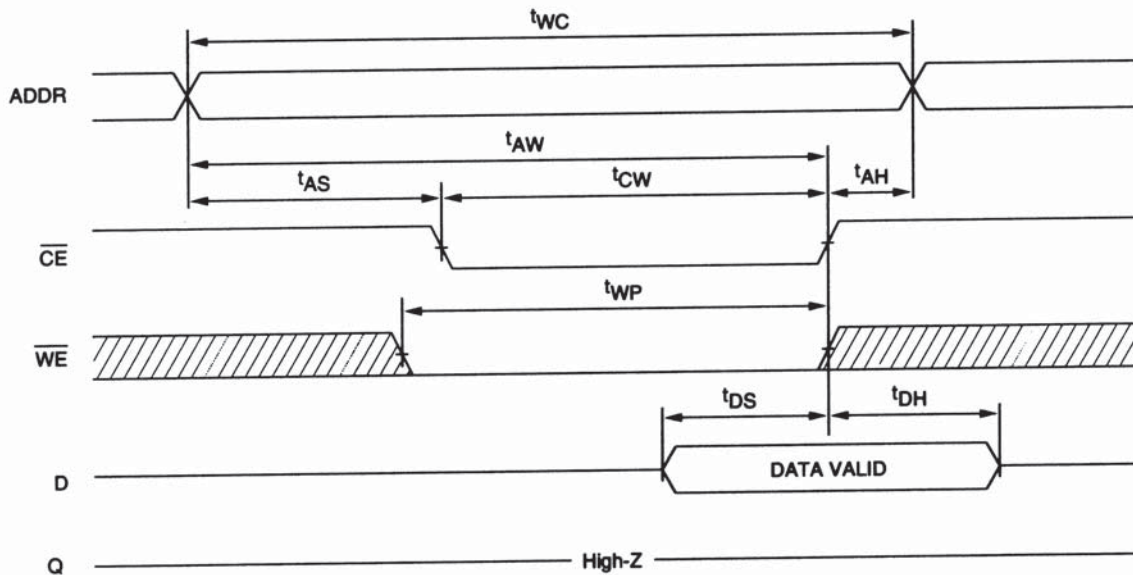
READ CYCLE NO. 2 7, 8, 10



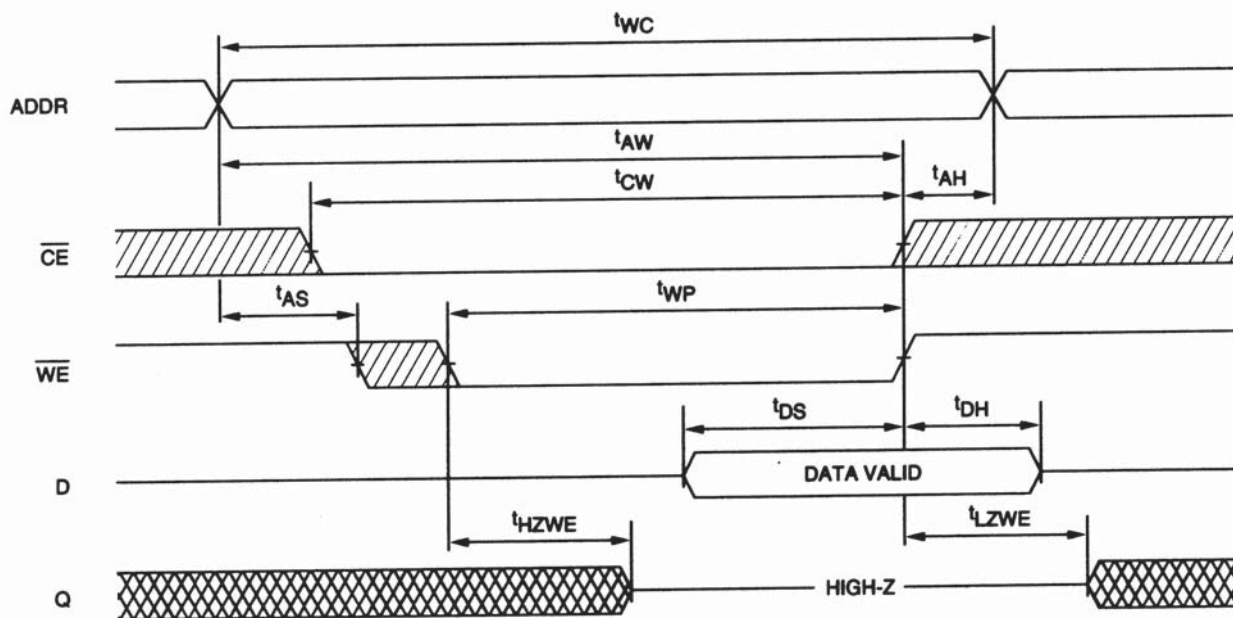
■ DON'T CARE  
■ UNDEFINED





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



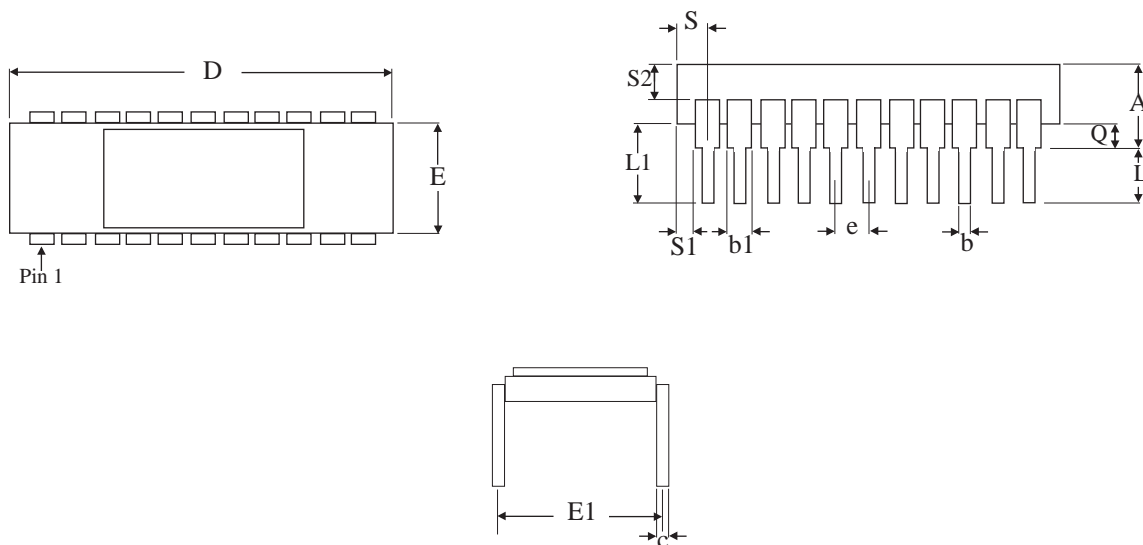
**WRITE CYCLE NO. 2** <sup>7, 12, 13</sup>  
(Write Enabled Controlled)



 DON'T CARE  
 UNDEFINED

## MECHANICAL DEFINITIONS\*

Micross Case #105 (Package Designator C)  
SMD 5962-86859, Case Outline T  
SMD 5962-89692, Case Outline X



SYMBOL	SMD SPECIFICATIONS	
	MIN	MAX
A	0.100	0.200
b	0.014	0.023
b1	0.030	0.060
c	0.008	0.015
D	1.050	1.260
E	0.260	0.310
E1	0.280	0.320
e	0.100 BSC	
L	0.125	0.200
L1	0.150	---
Q	0.015	0.060
S	0.030	0.065
S1	0.005	---
S2	0.005	---

**NOTE:** These dimensions are per the SMD. Micross' package dimensional limits may differ, but they will be within the SMD limits.

\* All measurements are in inches.

## ORDERING INFORMATION

EXAMPLE: MT5C6404C-25L/XT

Device Number	Package Type	Speed ns	Options**	Process
MT5C6404	C	-12	L	/*
MT5C6404	C	-15	L	/*
MT5C6404	C	-20	L	/*
MT5C6404	C	-25	L	/*
MT5C6404	C	-35	L	/*
MT5C6404	C	-45	L	/*
MT5C6404	C	-55	L	/*
MT5C6404	C	-70	L	/*

### \*AVAILABLE PROCESSES

IT = Industrial Temperature Range                      -40°C to +85°C  
XT = Extended Temperature Range                      -55°C to +125°C  
883C = Full Military Processing                      -55°C to +125°C

### \*\* OPTIONS

L = 2V Data Retention/Low Power

## MICROSS TO DSCC PART NUMBER CROSS REFERENCE\*

### Micross Package Designator C

#### SMD 5962-86859

<b>Micross Part #</b>	<b>SMD Part #</b>
MT5C6804C-35/883C	5962-8685924TA
MT5C6804C-35L/883C	5962-8685923TA
MT5C6804C-45/883C	5962-8685922TA
MT5C6804C-45L/883C	5962-8685921TA
MT5C6804C-55/883C	5962-8685920TA
MT5C6804C-55L/883C	5962-8685919TA

#### SMD 5962-89692

<b>Micross Part #</b>	<b>SMD Part#</b>
MT5C6804C-15/883C	5962-8969202XA
MT5C6804C-20/883C	5962-8969204XA
MT5C6804C-25/883C	5962-8969206XA

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