



Austin Semiconductor, Inc.

SRAM

MT5C1005

256K x 4 SRAM

SRAM MEMORY ARRAY

AVAILABLE AS MILITARY SPECIFICATIONS

•MIL-STD-883

FEATURES

- High Speed: 20, 25, 35, and 45
- Battery Backup: 2V data retention
- Low power standby
- High-performance, low-power CMOS double-metal process
- Single +5V ($\pm 10\%$) Power Supply
- Easy memory expansion with CE\ and OE\ options.
- All inputs and outputs are TTL compatible

OPTIONS

• Timing

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

MARKING

-20
-25
-35
-45
-55*
-70*

• Package(s)

Ceramic DIP (400 mil)	C	No. 109
Ceramic Quad LCC (contact factory)	ECW	No. 206
Ceramic LCC	EC	No. 207
Ceramic Flatpack	F	No. 303
Ceramic SOJ	DCJ	No. 501

• Operating Temperature Ranges

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

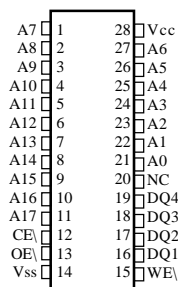
- 2V data retention/low power L

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

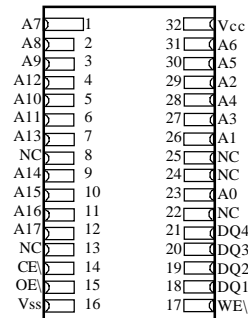
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PIN ASSIGNMENT (Top View)

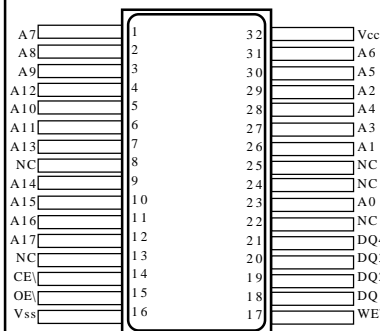
28-Pin DIP (C)
(400 MIL)



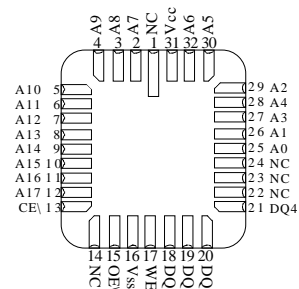
32-Pin LCC (EC)
32-Pin SOJ (DCJ)



32-Pin Flat Pack (F)



32-Pin LCC (ECW)



GENERAL DESCRIPTION

The Austin Semiconductor SRAM family employs high-speed, low power CMOS designs fabricated using double-layer metal, double-layer polysilicon technology.

For flexibility in high-speed memory applications, ASI offers chip enable (CE\) and output enable (OE\) capability. These enhancements 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 while CE\ and OE\ go LOW. The devices offer a reduced power standby mode when disabled. This allows system designs to achieve low standby power requirements.

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

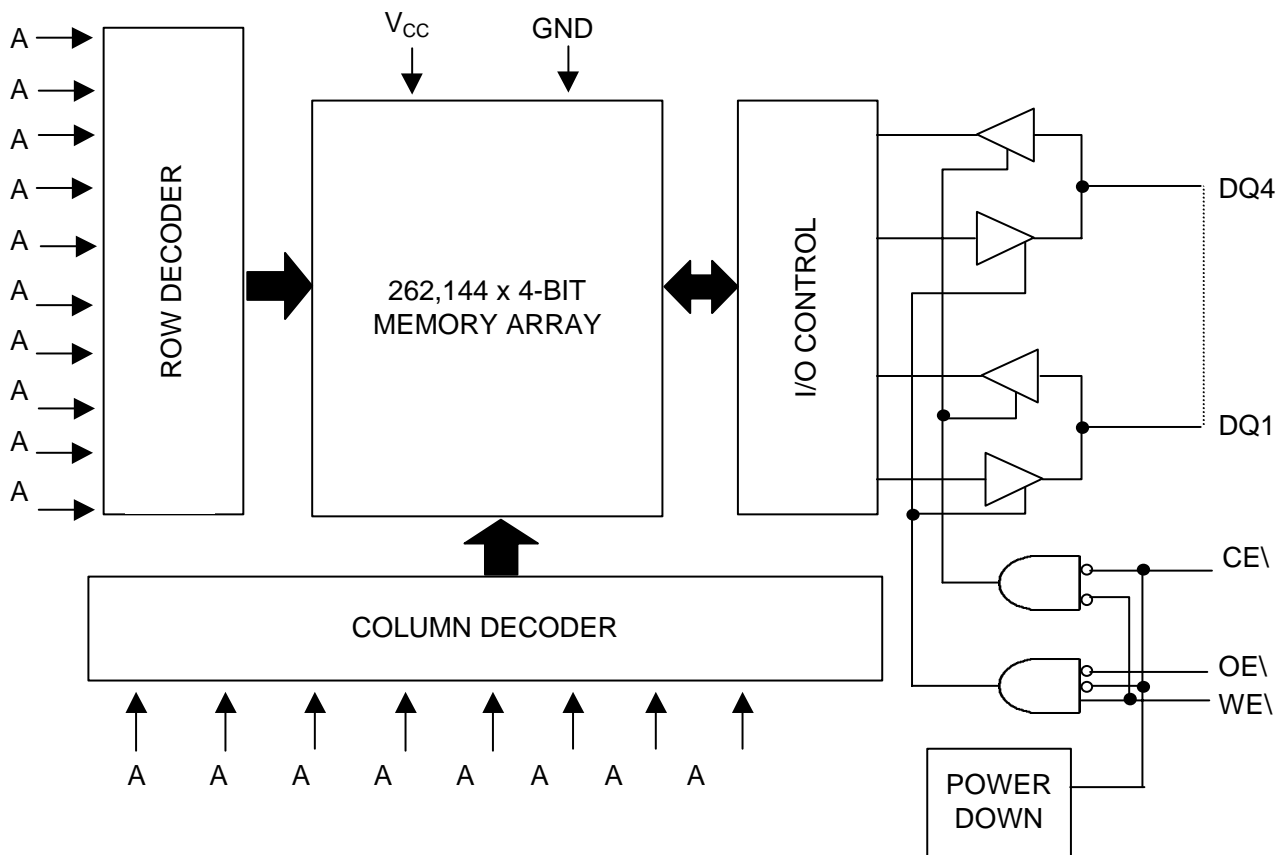


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FUNCTIONAL BLOCK DIAGRAM



TRUTH TABLE

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



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ABSOLUTE MAXIMUM RATINGS*

Supply Voltage Range (V _{CC}).....	-5V to +7.0V
Storage Temperature.....	-65°C to +150°C
Voltage on any Pin Relative to V _{SS}	-5V to V _{CC} +5V
Max Junction Temperature.....	+175°C
Lead Temperature (soldering 10 seconds).....	+260°C
Power Dissipation	1 W

*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_C ≤ 125°C; V_{CC} = 5V ±10%)

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

PARAMETER	CONDITIONS	SYM	MAX				UNITS	NOTES
			-20	-25	-35	-45		
Power Supply Current: Operating	WE\, CE\ ≤ V _{IL} ; V _{CC} = MAX Output Open	I _{CC}	180	180	180	180	mA	3
Power Supply Current: Standby	CE\ ≥ V _{IH} ; All Other Inputs ≤ V _{IL} or ≥ V _{IH} , V _{CC} = MAX	I _{SBT2}	25	25	25	25	mA	
	CE\ ≥ V _{CC} - 0.2V; V _{CC} = MAX V _{IL} ≤ V _{SS} + 0.2V V _{IH} ≥ V _{CC} - 0.2V; f = 0 Hz*	I _{SBC}	16	16	16	16	mA	

* "L" version only.

CAPACITANCE

PARAMETER	CONDITIONS	SYM	MAX	UNITS	NOTES
Input Capacitance	V _{IN} = 0V, T _A = 25°C, f = 1MHz	C _I	12	pF	4
Output Capacitance (DQ1-DQ4)	V _{CC} = 5V	C _O	14	pF	4



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ELECTRICAL CHARACTERISTICS AND RECOMMENDED AC OPERATING CONDITIONS

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

DESCRIPTION	SYMBOL	-20		-25		-35		-45		UNITS	NOTES
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
READ CYCLE											
READ cycle time	t_{RC}	20		25		35		45		ns	
Address access time	t_{AA}		20		25		35		45	ns	
Chip Enable access time	t_{ACE}		20		25		35		45	ns	
Output hold from address change	t_{OH}	3		3		3		3		ns	
Chip Enable to output in Low-Z	t_{LZCE}	3		3		3		3		ns	4, 6, 7
Chip disable to output in High-Z	t_{HZCE}		10		12		20		25	ns	4, 6, 7
Chip Enable to power-up time	t_{PU}	0		0		0		0		ns	4
Chip disable to power-down time	t_{PD}		20		25		35		45	ns	4
Output Enable access time	t_{AOE}		8		10		20		25	ns	
Output Enable to output in Low-Z	t_{LZOE}	0		0		0		0		ns	4, 6, 7
Output disable to output in High-Z	t_{HZOE}		8		10		20		25	ns	4, 6, 7
WRITE CYCLE											
WRITE cycle time	t_{WC}	20		25		35		45		ns	
Chip Enable to end of write	t_{CW}	15		20		30		35		ns	
Address valid to end of write	t_{AW}	15		20		30		35		ns	
Address setup time	t_{AS}	0		0		0		0		ns	
Address hold from end of write	t_{AH}	0		0		0		0		ns	
WRITE pulse width	t_{WP}	15		20		30		35		ns	
Data setup time	t_{DS}	12		15		20		25		ns	
Data hold time	t_{DH}	0		0		0		0		ns	
Write disable to output in Low-Z	t_{LZWE}	3		3		3		3		ns	4, 6, 7
Write Enable to output in High-Z	t_{HZWE}	0	8	0	10	0	15	0	20	ns	4, 6, 7



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ACTEST CONDITIONS

Input pulse levels	V_{SS} 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

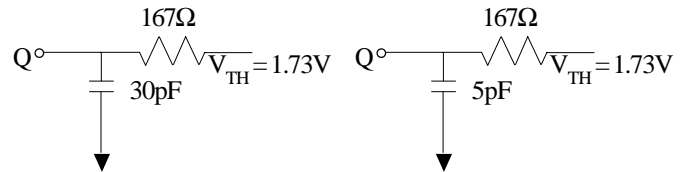


Fig. 1 Output Load Equivalent

Fig. 2 Output Load Equivalent

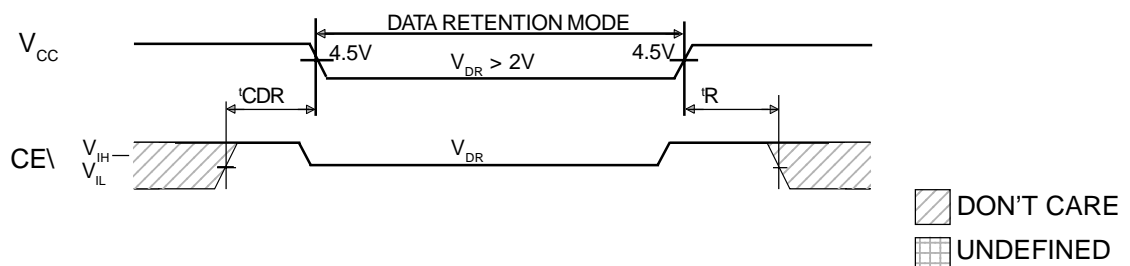
NOTES

- All voltages referenced to V_{SS} (GND).
- 3V for pulse width < 20ns
- I_{CC} is dependent on output loading and cycle rates. The specified value applies with the outputs unloaded, and $f = \frac{1}{RC}$ Hz.
- This parameter is guaranteed but not tested.
- Test conditions as specified with the output loading as shown in Fig. 1 unless otherwise noted.
- Minimum of 5pF for t_{EHQZ} , t_{OHQZ} , t_{ELQX} , t_{OLQX} , and t_{WHQX} .
- At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} , and t_{HZWE} is less than t_{LZWE} and t_{HZOE} is less than t_{LZOE} .
- $WE\backslash$ 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.
- t_{RC} = Read Cycle Time.
- Chip enable ($CE\backslash$) and write enable ($WE\backslash$) can initiate and terminate a WRITE cycle.

DATA RETENTION ELECTRICAL CHARACTERISTICS (L Version Only)

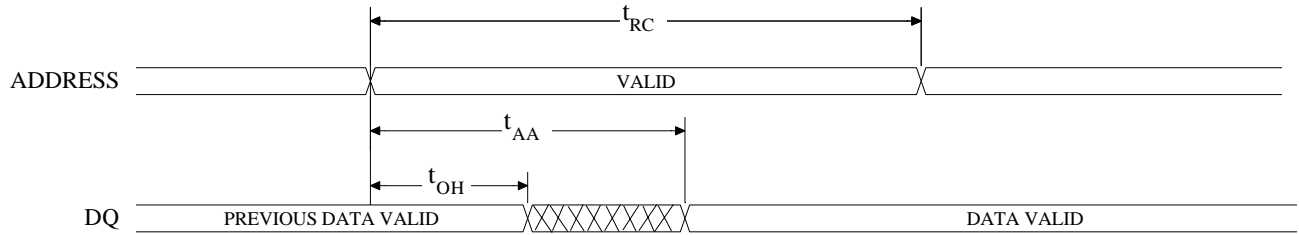
DESCRIPTION	CONDITIONS		SYM	MIN	MAX	UNITS	NOTES
V_{CC} for Retention Data			V_{DR}	2		V	
Data Retention Current	$CE\backslash \geq (V_{CC}-0.2V)$ and $V_{IN} \geq (V_{CC}-0.2V)$ or $\leq 0.2V$	$V_{CC} = 2V$	I_{CCDR}		5	mA	
Chip Deselect to Data Retention Time			t_{CDR}	0	--	ns	4
Operation Recovery Time			t_R	t_{RC}		ns	4, 11

LOW V_{CC} DATA RETENTION WAVEFORM

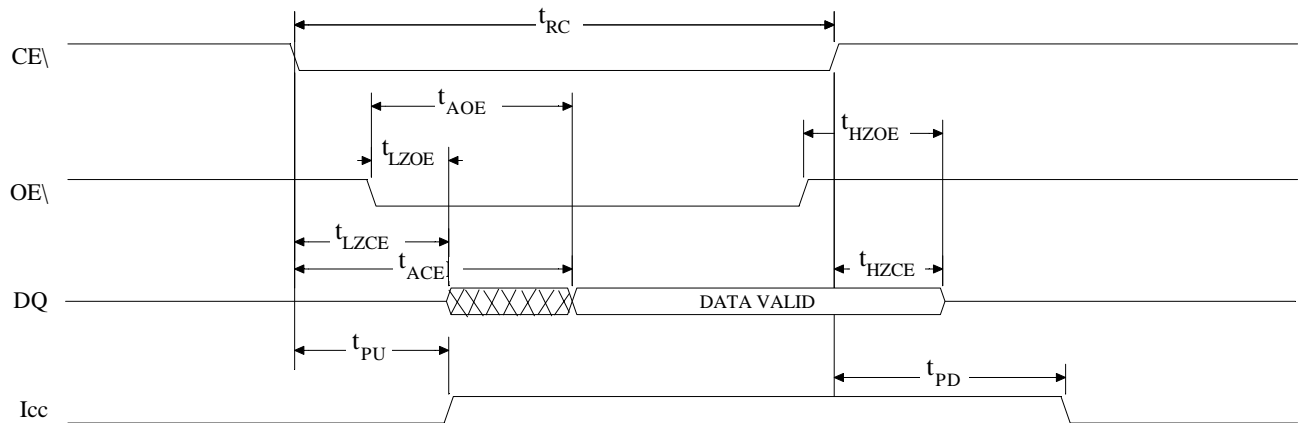




READ CYCLE NO. 1 ^{8,9}



READ CYCLE NO. 2 ^{7,8,10}



DON'T CARE
 UNDEFINED

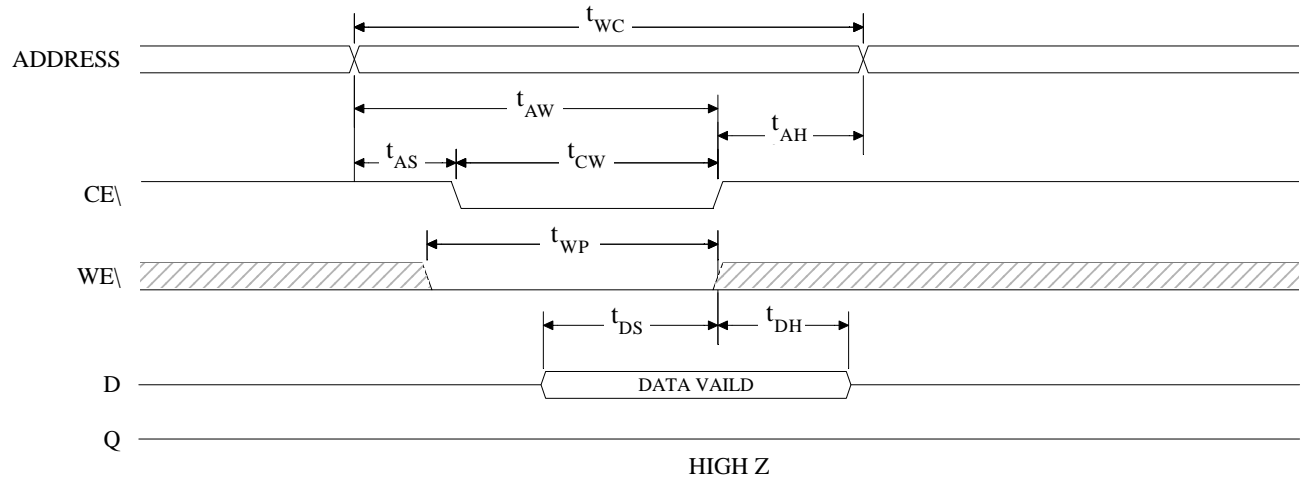


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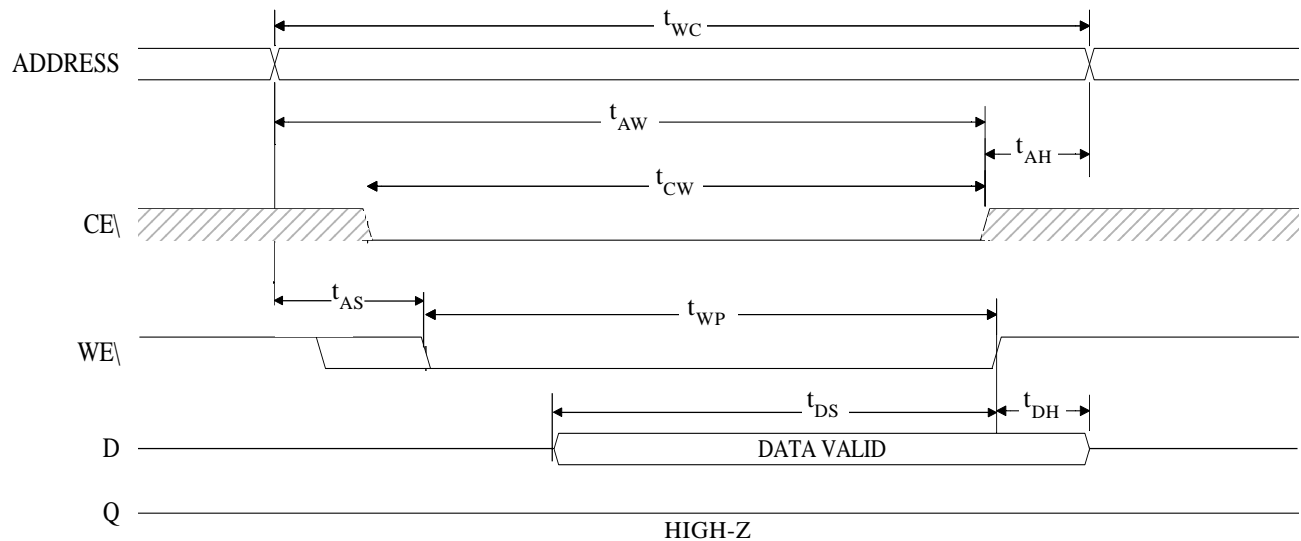
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WRITE CYCLE NO. 1 ¹² (Chip Enabled Controlled)



WRITE CYCLE NO. 2 ^{7,12} (Write Enabled Controlled)

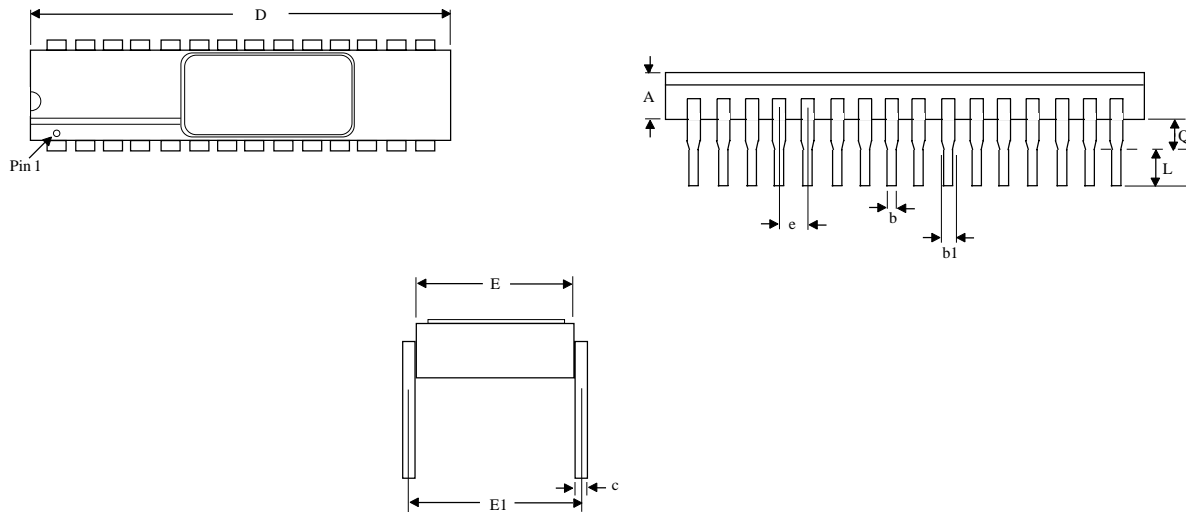


NOTE: Output enable (OE\) is inactive (HIGH).

 DON'T CARE
 UNDEFINED



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MECHANICAL DEFINITIONS*
ASI Case #109 (Package Designator C)


SYMBOL	ASI PACKAGE SPECIFICATIONS	
	MIN	MAX
A	0.090	0.110
b	0.016	0.020
b1	0.040	0.060
c	0.008	0.012
D	1.386	1.414
E	0.385	0.405
E1	0.390	0.410
e	0.090	0.110
L	0.125	0.175
Q	0.040	0.060

*All measurements are in inches.

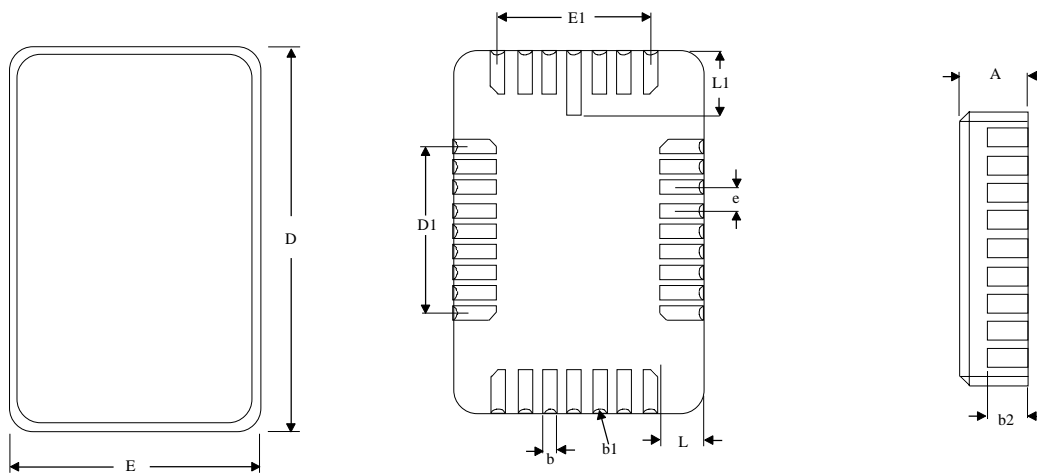


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MECHANICAL DEFINITIONS*

ASI Case #206 (Package Designator ECW)



SYMBOL	ASI PACKAGE SPECIFICATIONS	
	MIN	MAX
A	0.077	0.093
b	0.022	0.028
b1	0.004	0.014
b2	0.054	0.066
D	0.742	0.758
D1	0.395	0.405
E	0.442	0.458
E1	0.295	0.305
e	0.045	0.055
L	0.045	0.055
L1	0.077	0.093

*All measurements are in inches.

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Rev. 3.1 1/01

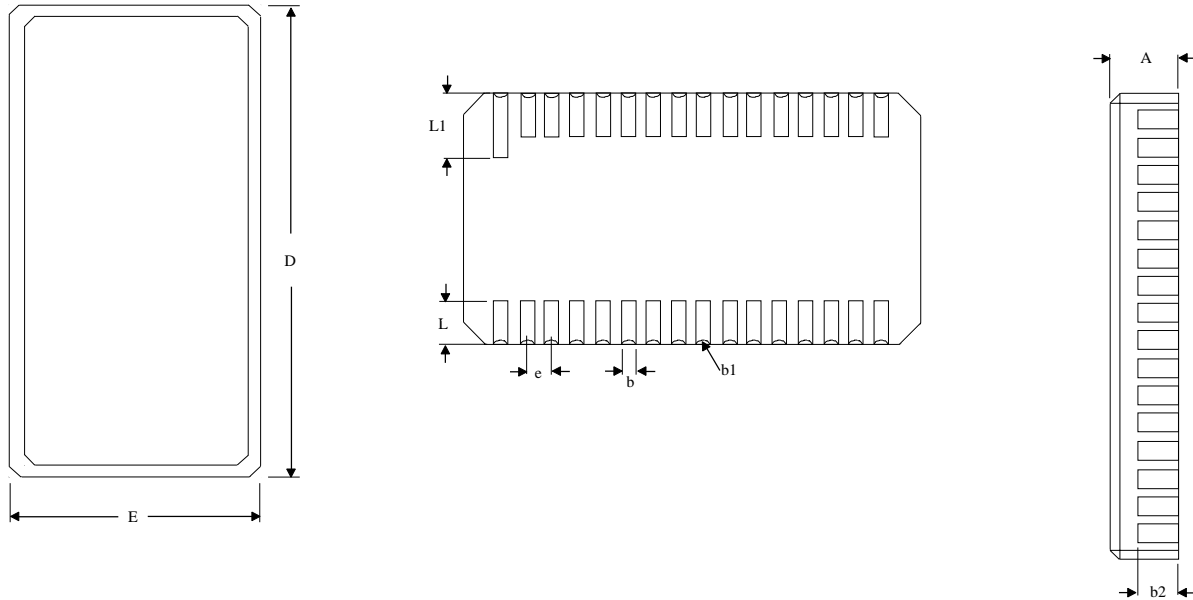
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MECHANICAL DEFINITIONS*

ASI Case #207 (Package Designator EC)


SYMBOL	ASI PACKAGE SPECIFICATIONS	
	MIN	MAX
A	0.080	0.100
b	0.022	0.028
b1	0.004	0.014
b2	0.054	0.066
D	0.815	0.835
E	0.392	0.408
e	0.045	0.055
L	0.070	0.080
L1	0.090	0.110

*All measurements are in inches.



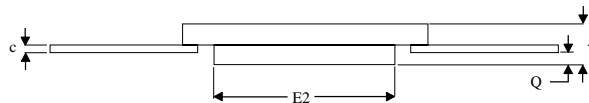
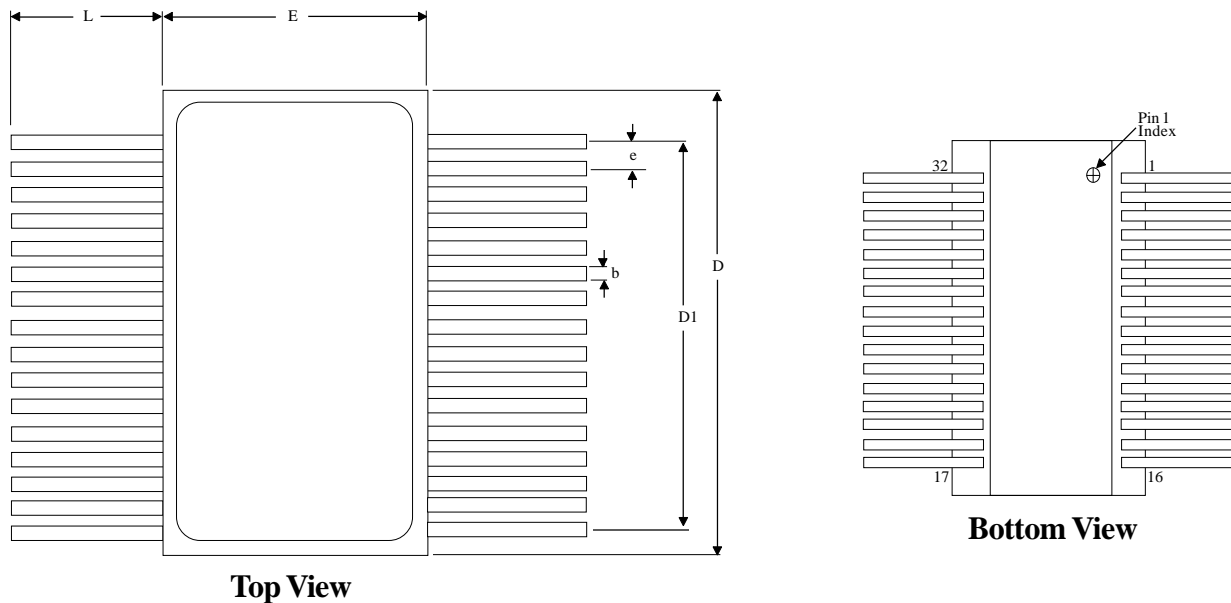
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MECHANICAL DEFINITIONS*

ASI Case #303 (Package Designator F)



SYMBOL	ASI PACKAGE SPECIFICATIONS	
	MIN	MAX
A	---	0.125
b	0.015	0.019
c	0.004	0.006
D	0.812	0.828
D1	0.745	0.755
E	0.405	0.415
E2	0.324	0.336
e	0.045	0.055
L	0.290	0.310
Q	0.027	0.033

*All measurements are in inches.

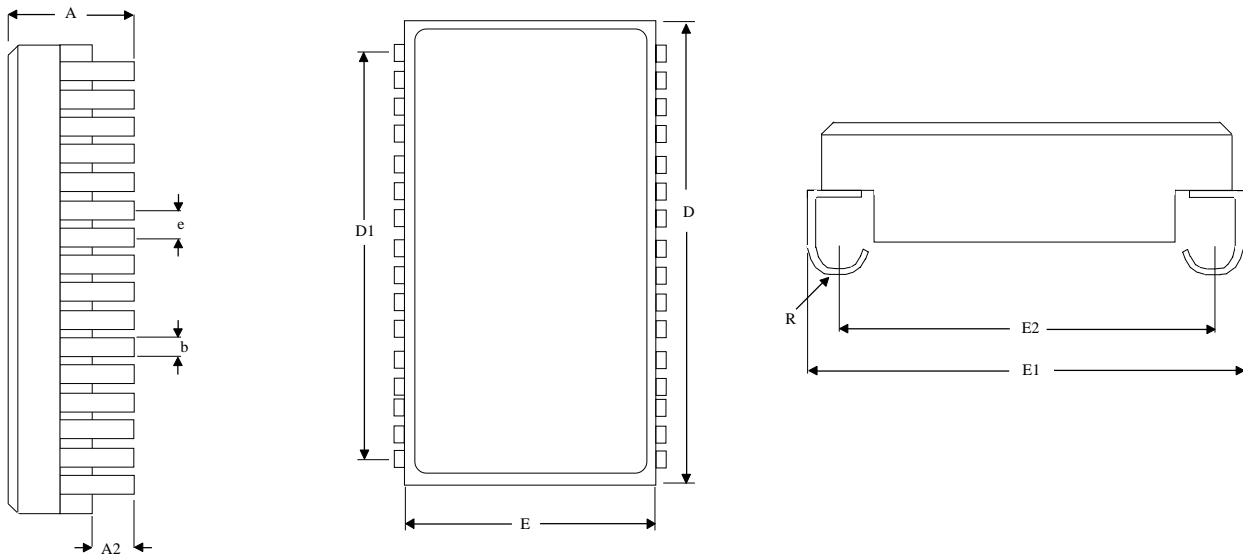


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MECHANICAL DEFINITIONS*

ASI Case #501 (Package Designator DCJ)



SYMBOL	ASI PACKAGE SPECIFICATIONS	
	MIN	MAX
A	0.135	0.153
A2	0.026	0.036
b	0.015	0.019
D	0.812	0.828
D1	0.740	0.755
E	0.405	0.415
e	0.045	0.055
E1	0.435	0.445
E2	0.360	0.380
R	0.030	0.040

*All measurements are in inches.



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ORDERING INFORMATION

EXAMPLE: MT5C1005C-20L/IT

Device Number	Package Type	Speed ns	Options**	Process
MT5C1005	C	-20	L	/*
MT5C1005	C	-25	L	/*
MT5C1005	C	-35	L	/*
MT5C1005	C	-40	L	/*
MT5C1005	C	-55	L	/*
MT5C1005	C	-70	L	/*

EXAMPLE: MT5C1005EC-45/XT

Device Number	Package Type	Speed ns	Options**	Process
MT5C1005	EC ECW	-20	L	/*
MT5C1005	EC ECW	-25	L	/*
MT5C1005	EC ECW	-35	L	/*
MT5C1005	EC ECW	-40	L	/*
MT5C1005	EC ECW	-55	L	/*
MT5C1005	EC ECW	-70	L	/*

EXAMPLE: MT5C1005F-25L/883C

Device Number	Package Type	Speed ns	Options**	Process
MT5C1005	F	-20	L	/*
MT5C1005	F	-25	L	/*
MT5C1005	F	-35	L	/*
MT5C1005	F	-40	L	/*
MT5C1005	F	-55	L	/*
MT5C1005	F	-70	L	/*

EXAMPLE: MT5C1005DCJ-70/XT

Device Number	Package Type	Speed ns	Options**	Process
MT5C1005	DCJ	-20	L	/*
MT5C1005	DCJ	-25	L	/*
MT5C1005	DCJ	-35	L	/*
MT5C1005	DCJ	-40	L	/*
MT5C1005	DCJ	-55	L	/*
MT5C1005	DCJ	-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