AT28C256

Military Grade 256-Kbit (32,768 x 8) Paged Parallel EEPROM

Features

- Fast Read Access Time: 150 ns
- Automatic Page Write Operation:
  - Internally organized as 32,768 x 8 (256K)
  - Internal address and data latches for 64 bytes
  - Internal control timer
- Fast Write Cycle Time:
  - Page Write cycle time: 3 ms or 10 ms maximum
  - 1 to 64-byte Page Write operation
- Low-Power Dissipation:
  - 50 mA active current
  - 300 µA CMOS standby current
- Hardware and Software Data Protection
- $\overline{\text{DATA}}$ Polling for End of Write Detection
- High Reliability CMOS Technology:
  - Endurance: 10,000 or 100,000 cycles
  - Data retention: 10 years
- Single 5V ± 10% Supply
- CMOS and TTL Compatible Inputs and Outputs
- JEDEC® Approved Byte-Wide Pinout

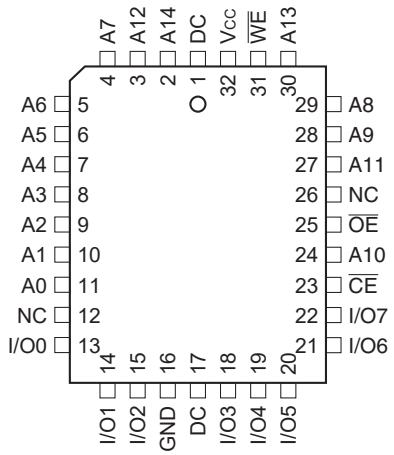
Packages

- 32-Lead CERDIP, 32-Lead Flatpack, 32-Lead CLCC and 30-Pin PGA

Table of Contents

1. Package Types (not to scale)

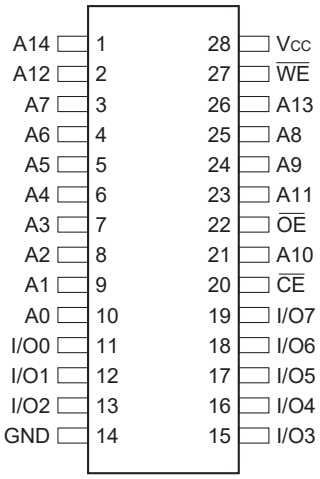
32-Pad CLCC[1]
Top View



28-Lead PGA
Top View

4 A6	3 A7	1 A14	27 $\overline{WE}$	26 A13
5 A5	2 A12	28 V_{CC}	24 A9	25 A8
7 A3	6 A4		22 $\overline{OE}$	23 A11
9 A1	8 A2		20 $\overline{CE}$	21 A10
11 I/O0	10 A0	14 GND	16 I/O4	19 I/O7
12 I/O1	13 I/O2	15 I/O3	17 I/O5	18 I/O6

28-Lead Cerdip/Flatpack
Top View



Note:

1. CLCC package pins 1 and 17 are “Don’t Connect”.

2. Pin Descriptions

The descriptions of the pins are listed in Table 2-1.

Table 2-1. Pin Function Table

Name	32-Lead CERDIP	32-Lead CLCC	32-Lead FLATPACK	30-Pin PGA	Function
DC	—	1	—	—	Don't Connect
A14	1	2	1	1	Address
A12	2	3	2	2	Address
A7	3	4	3	3	Address
A6	4	5	4	4	Address
A5	5	6	5	5	Address
A4	6	7	6	6	Address
A3	7	8	7	7	Address
A2	8	9	8	8	Address
A1	9	10	9	9	Address
A0	10	11	10	10	Address
NC	—	12	—	—	No Connect
I/O0	11	13	11	11	Data Input/Output
I/O1	12	14	12	12	Data Input/Output
I/O2	13	15	13	13	Data Input/Output
GND	14	16	14	14	Ground
DC	—	17	—	—	Don't Connect
I/O3	15	18	15	15	Data Input/Output
I/O4	16	19	16	16	Data Input/Output
I/O5	17	20	17	17	Data Input/Output
I/O6	18	21	18	18	Data Input/Output
I/O7	19	22	19	19	Data Input/Output
$\overline{CE}$	20	23	20	20	Chip Enable
A10	21	24	21	21	Address
$\overline{OE}$	22	25	22	22	Output Enable
NC	—	26	—	—	No Connect
A11	23	27	23	23	Address
A9	24	28	24	24	Address
A8	25	29	25	25	Address
A13	26	30	26	26	Address
$\overline{WE}$	27	31	27	27	Write Enable
V_{CC}	28	32	28	28	Device Power Supply

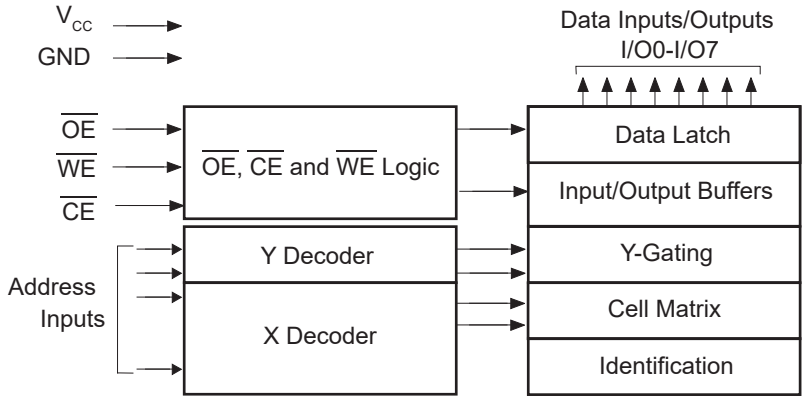
3. Description

The AT28C256 is a high-performance Electrically Erasable and Programmable Read-Only Memory (EEPROM). Its 256-Kb memory is organized as 32,768 words by 8 bits. Manufactured with Microchip's advanced nonvolatile CMOS technology, the device offers access times to 150 ns with power dissipation of just 440 mW. When the device is deselected, the CMOS standby current is less than 200 µA.

The AT28C256 is accessed like a Static RAM for the read or write cycle without the need for external components. The device contains a 64-byte page register to allow writing of up to 64 bytes simultaneously. During a write cycle, the address and 1 to 64 bytes of data are internally latched, freeing the address and data bus for other operations. Following the initiation of a write cycle, the device will automatically write the latched data using an internal control timer. The end of a write cycle can be detected by $\overline{DATA}$ Polling of I/O7. Once the end of a write cycle has been detected, a new access for a read or write can begin.

The AT28C256 has additional features to ensure high quality and manufacturability. The device utilizes internal error correction for extended endurance and improved data retention characteristics. An optional software data protection mechanism is available to guard against inadvertent writes. The device also includes an extra 64 bytes of EEPROM for device identification or tracking.

3.1 Block Diagram



4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Temperature under bias	-55°C to +125°C
Storage temperature	-65°C to +150°C
All input voltages (including NC pins) with respect to ground	-0.6V to +6.25V
All output voltages with respect to ground	-0.6V to V_{CC} + 0.6V
Voltage on $\overline{OE}$ and A9 with respect to ground	-0.6V to +13.5V

Note: Stresses above 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 listings of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

4.2 DC and AC Operating Range

Table 4-1. DC and AC Operating Range

		AT28C256-15	AT28C256-20	AT28C256-25
Operating Temperature (Case)	Military	-55°C to +125°C	-55°C to +125°C	-55°C to +125°C
V_{CC} Power Supply		5V ± 10%	5V ± 10%	5V ± 10%

4.3 DC Characteristics

Table 4-2. DC Characteristics

Parameter	Symbol	Minimum	Maximum	Units	Test Conditions
Input Load Current	I_{LI}	—	10	µA	V_{IN} = 0V to V_{CC} + 1V
Output Leakage Current	I_{LO}	—	10	µA	$V_{I/O}$ = 0V to V_{CC}
V_{CC} Standby Current CMOS	I_{SB1}	—	300	µA	$\overline{CE}$ = V_{CC} - 0.3V to V_{CC} + 1V
V_{CC} Standby Current TTL	I_{SB2}	—	3	mA	$\overline{CE}$ = 2.0V to V_{CC} + 1V
V_{CC} Active Current	I_{CC}	—	50	mA	f = 5 MHz; I_{OUT} = 0 mA
Input Low Voltage	V_{IL}	—	0.8	V	
Input High Voltage	V_{IH}	2.0	—	V	
Output Low Voltage	V_{OL}	—	0.45	V	I_{OL} = 2.1 mA
Output High Voltage	V_{OH1}	2.4	—	V	I_{OH} = -400 µA

4.4 Pin Capacitance

Table 4-3. Pin Capacitance(1,2)

Symbol	Typical	Maximum	Units	Conditions
C_{IN}	4	6	pF	V_{IN} = 0V
C_{OUT}	8	12	pF	V_{OUT} = 0V

Note:

1. This parameter is characterized but is not 100% tested in production.
2. f = 1 MHz, T_A = 25°C

5. Normalized I_{CC} Graphs

Figure 5-1. Normalized Supply Current vs. Temperature

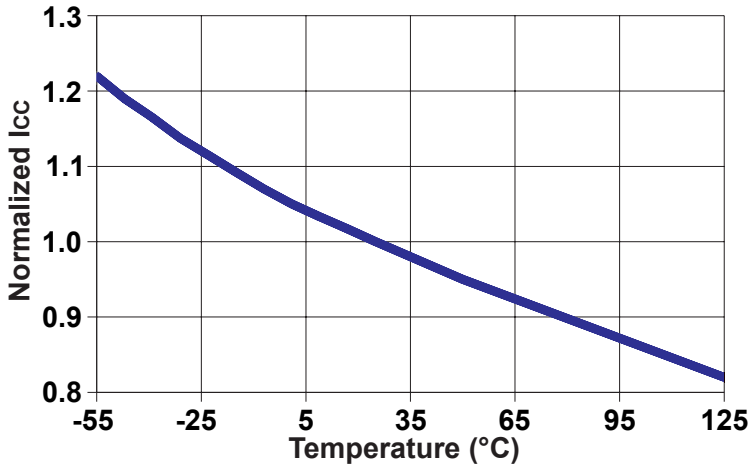


Figure 5-2. Normalized Supply Current vs. Address Frequency

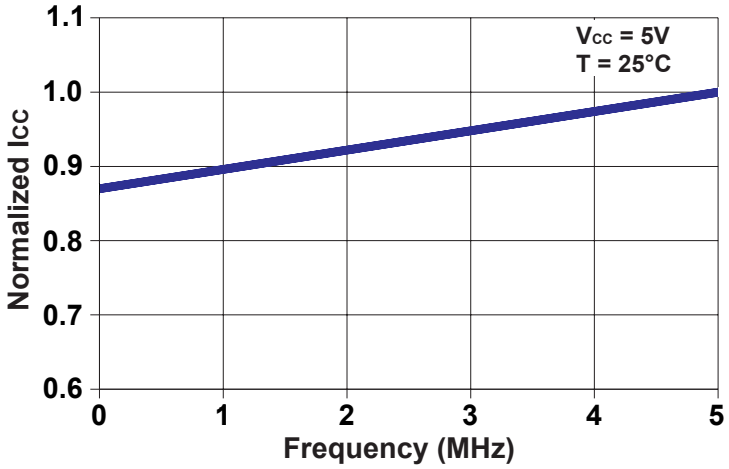
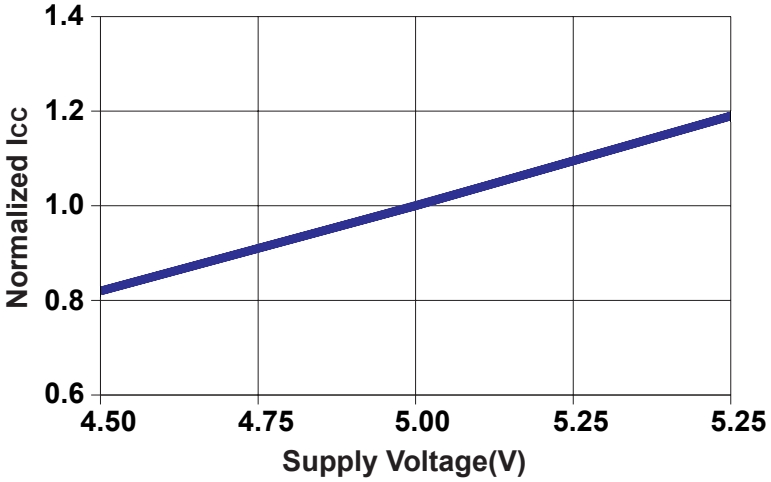


Figure 5-3. Normalized Supply Current vs. Supply Voltage



6. Device Operation

READ: The AT28C256 is accessed like a Static RAM. When $\overline{CE}$ and $\overline{OE}$ are low and $\overline{WE}$ is high, the data stored at the memory location determined by the address pins is asserted on the outputs. The outputs are put in the high-impedance state when either $\overline{CE}$ or $\overline{OE}$ is high. This dual-line control gives designers flexibility in preventing bus contention in their system.

BYTE WRITE: A low pulse on the $\overline{WE}$ or $\overline{CE}$ input with $\overline{CE}$ or $\overline{WE}$ low (respectively) and $\overline{OE}$ high initiates a write cycle. The address is latched on the falling edge of $\overline{CE}$ or $\overline{WE}$, whichever occurs last. The data is latched by the first rising edge of $\overline{CE}$ or $\overline{WE}$. Once a byte write is started, it will automatically time itself to completion. Once a programming operation is initiated and for the duration of t_{WC}, a read operation will effectively be a polling operation.

PAGE WRITE: The page write operation of the AT28C256 allows 1 to 64 bytes of data to be written into the device during a single internal programming period. A page write operation is initiated in the same manner as a byte write; the first byte written can then be followed by 1 to 63 additional bytes. Each successive byte must be written within 150 µs (t_{BLC}) of the previous byte. If the t_{BLC} limit is exceeded, the AT28C256 will cease accepting data and commence the internal programming operation. All bytes during a page write operation must reside on the same page as defined by the state of the A6-A14 inputs. For each $\overline{WE}$ high-to-low transition during the page write operation, A6-A14 must be the same. The A0 to A5 inputs are used to specify which bytes within the page are to be written. The bytes may be loaded in any order and may be altered within the same load period. Only bytes which are specified for writing will be written; unnecessary cycling of other bytes within the page does not occur.

DATA POLLING: The AT28C256 features $\overline{DATA}$ Polling to indicate the end of a write cycle. During a byte or page write cycle, an attempted read of the last byte written will result in the complement of the written data to be presented on I/O7. Once the write cycle has been completed, true data is valid on all outputs, and the next write cycle may begin. $\overline{DATA}$ Polling may begin at any time during the write cycle.

TOGGLE BIT: In addition to $\overline{DATA}$ Polling, the AT28C256 provides another method for determining the end of a write cycle. During the write operation, successive attempts to read data from the device will result in I/O6 toggling between one and zero. Once the write has completed, I/O6 will stop toggling and valid data will be read. Reading the toggle bit may begin at any time during the write cycle.

DATA PROTECTION: If precautions are not taken, inadvertent writes may occur during transitions of the host system power supply. Microchip incorporated both hardware and software features that will protect the memory against inadvertent writes.

HARDWARE PROTECTION: Hardware features protect against inadvertent writes to the AT28C256 in the following ways:

- V_{CC} sense – if V_{CC} is below 3.8V (typical), the write function is inhibited
- V_{CC} power-on delay – once V_{CC} has reached 3.8V, the device will automatically time out 5 ms (typical) before allowing a write
- write inhibit – holding any one of $\overline{OE}$ low, $\overline{CE}$ high or $\overline{WE}$ high inhibits write cycles
- noise filter – pulses of less than 15 ns (typical) on the $\overline{WE}$ or $\overline{CE}$ inputs will not initiate a write cycle

SOFTWARE DATA PROTECTION: A software-controlled data protection feature has been implemented on the AT28C256. When enabled, the software data protection (SDP) will prevent inadvertent writes. The SDP feature may be enabled or disabled by the user; the AT28C256 is shipped with SDP disabled.

SDP is enabled by the host system issuing a series of three write commands; three specific bytes of data are written to three specific addresses (refer to Software Data Protection Algorithm). After writing the 3-byte command sequence and after t_{WC}, the entire AT28C256 will be protected against inadvertent write operations. It should be noted that, once protected, the host may still perform a byte or page write to the AT28C256. This is done by preceding the data to be written by the same 3-byte command sequence used to enable SDP.

Once set, SDP will remain active unless the disable command sequence is issued. Power transitions do not disable SDP and SDP will protect the AT28C256 during power-up and power-down conditions. All command sequences must conform to the page write timing specifications. The data in the enable and disable command sequences is not written to the device and the memory addresses used in the sequence may be written with data in either a byte or page write operation.

After setting SDP, any attempt to write to the device without the 3-byte command sequence will start the internal write timers. No data will be written to the device; however, for the duration of t_{WC}, read operations will effectively be polling operations.

DEVICE IDENTIFICATION: An extra 64 bytes of EEPROM memory are available to the user for device identification. By raising A9 to 12V ± 0.5V and using address locations 7FC0H to 7FFFH, the bytes may be written to or read from in the same manner as the regular memory array.

OPTIONAL CHIP ERASE MODE: The entire device can be erased using a 6-byte software code. See Software Chip Erase application note for details.

6.1 Operating Modes

Table 6-1. Operating Modes

Mode	$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	I/O
Read	V_{IL}	V_{IL}	V_{IH}	D_{OUT}
Write(1)	V_{IL}	V_{IH}	V_{IL}	D_{IN}
Standby/Write Inhibit	V_{IH}	X(2)	X	High-Z
Write Inhibit	X	X	V_{IH}	
Write Inhibit	X	V_{IL}	X	
Output Disable	X	V_{IH}	X	High-Z
Chip Erase	V_{IL}	V_H(3)	V_{IL}	High-Z

Note:

1. Refer to AC Programming Waveforms.
2. X can be V_{IL} or V_H.
3. V_H = 12.0 V ± 0.5V

6.2 AC Read Characteristics

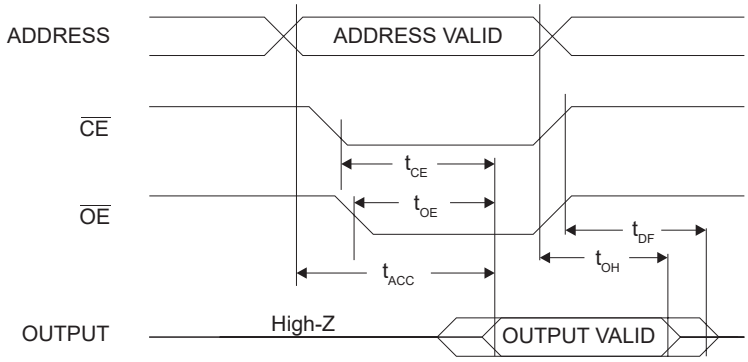
Table 6-2. AC Read Characteristics

Parameter	Symbol	AT28C256-15		AT28C256-20		AT28C256-25		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
Address to Output Delay	t_{ACC}	—	150	—	200	—	250	ns
$\overline{CE}$ to Output Delay	t_{CE}(1)	—	150	—	200	—	250	ns
$\overline{OE}$ to Output Delay	t_{OE}(2)	0	70	0	80	0	100	ns
$\overline{CE}$ or $\overline{OE}$ to Output Float	t_{DF}(3,4)	0	50	0	55	0	60	ns
Output Hold from $\overline{OE}$, $\overline{CE}$ or Address, whichever occurred first	t_{OH}	0	—	0	—	0	—	ns

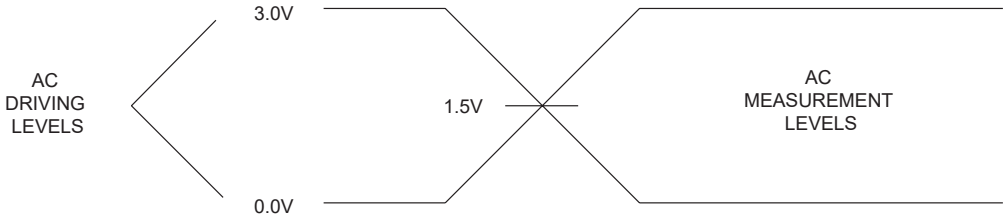
Note:

1. $\overline{CE}$ may be delayed up to t_{ACC}-t_{CE} after the address transition without impact on t_{ACC}.
2. $\overline{OE}$ may be delayed up to t_{CE}-t_{OE} after the falling edge of $\overline{CE}$ without impact on t_{CE} or by t_{ACC}-t_{OE} after an address change without impact in t_{ACC}.
3. t_{DF} is specified from $\overline{OE}$ or $\overline{CE}$, whichever occurs first (C_L = 5 pF).
4. This parameter is characterized and is not 100% tested.

6.3 AC Read Waveforms

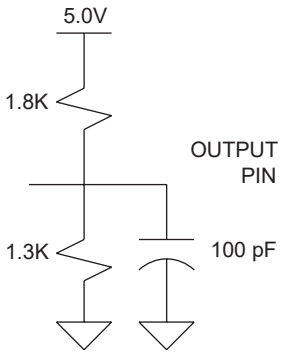


6.4 Input Test Waveforms and Measurement Level



Note: t_R, t_F < 5 ns.

6.5 Output Test Load



6.6 AC Write Characteristics

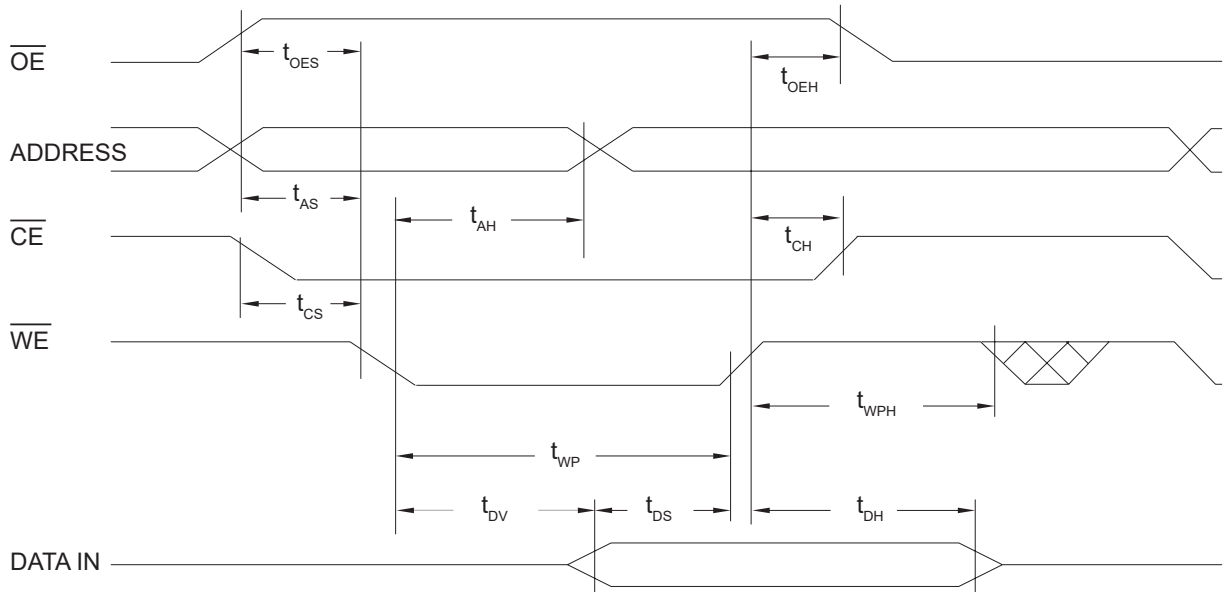
Table 6-3. AC Write Characteristics

Parameter	Symbol	Minimum	Maximum	Units
Address, $\overline{OE}$ Setup Time	t_{AS}, t_{OES}	0	—	ms
Address Hold Time	t_{AH}	50	—	ns
Chip Select Setup Time	t_{CS}	0	—	ns
Chip Select Hold Time	t_{CH}	0	—	ns
Write Pulse Width ($\overline{WE}$ or $\overline{CE}$)	t_{WP}	100	—	ns
Data Setup Time	t_{DS}	50	—	ns
Data, $\overline{OE}$ Hold Time	t_{DH}, t_{OEH}	0	—	µs
Time to Data Valid	t_{DV}	NR(1)	—	

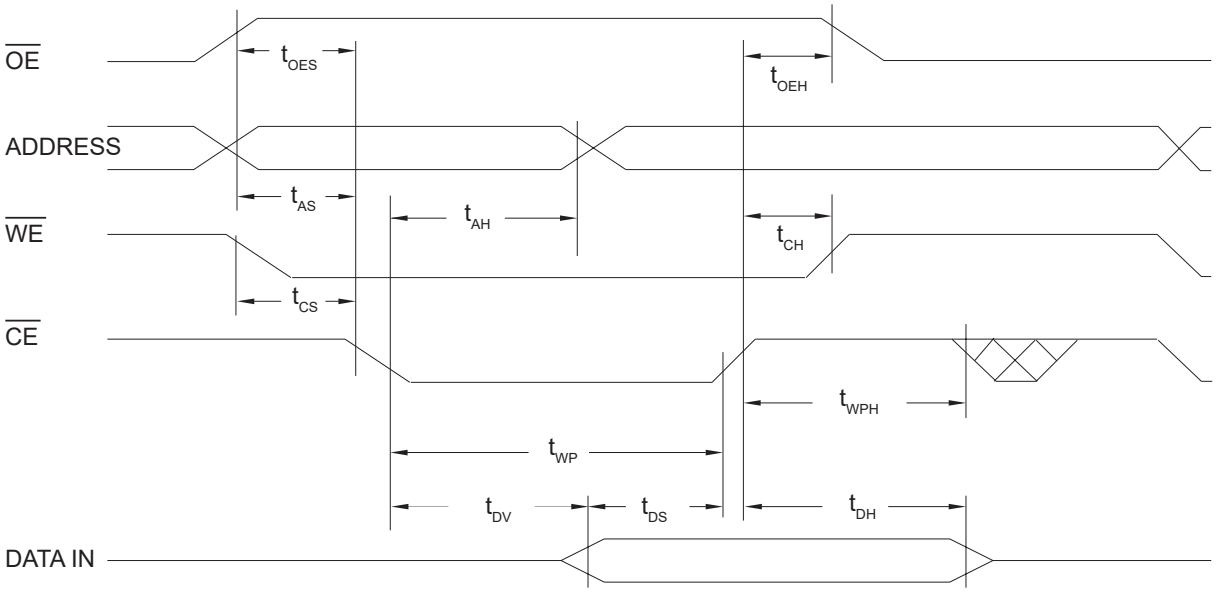
Note:
1. NR = No Restriction

6.7 AC Write Waveforms

6.7.1 $\overline{WE}$ Controlled



6.7.2 $\overline{CE}$ Controlled

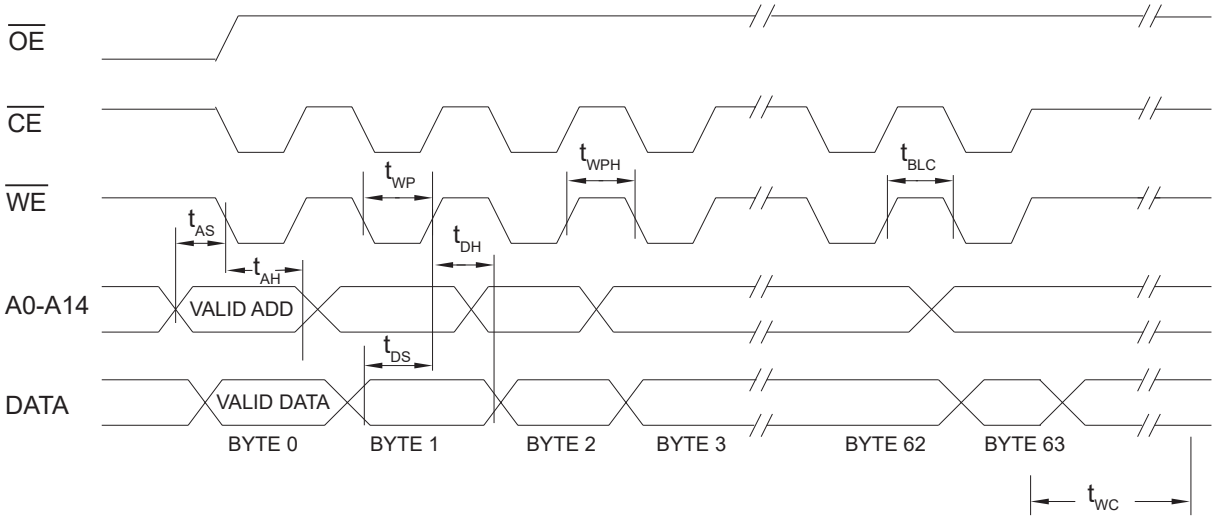


6.8 Page Mode Characteristics

Table 6-4. Page Mode Characteristics

Parameter		Symbol	Minimum	Maximum	Units
Write Cycle Time	AT28C256	t_{WC}	—	10	ms
	AT28C256F		—	3	ms
Address Setup Time		t_{AS}	0	—	ms
Address Hold Time		t_{AH}	50	—	ns
Data Setup Time		t_{DS}	50	—	ns
Data Hold Time		t_{DH}	0	—	ns
Write Pulse Width		t_{WP}	100	—	ns
Byte Load Cycle Time		t_{BLC}	—	150	µs
Write Pulse Width High		t_{WPH}	50	—	ns

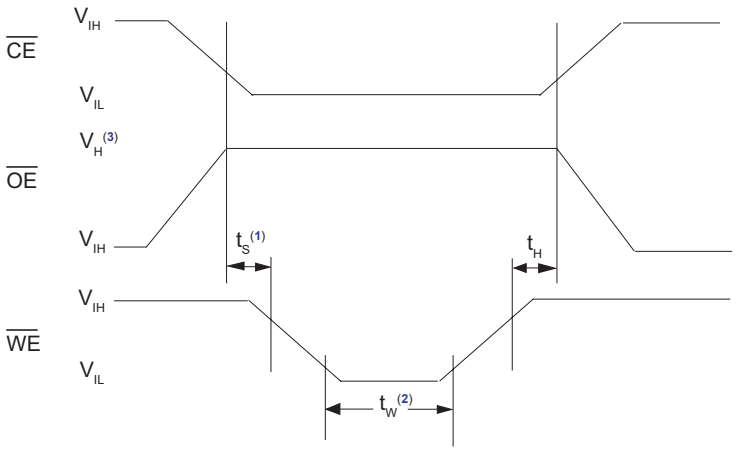
6.9 Page Mode Write Waveforms[1,2]



Note:

1. A6 through A14 must specify the page address during each high-to-low transition of $\overline{WE}$ (or $\overline{CE}$).
2. $\overline{OE}$ must be high only when $\overline{WE}$ and $\overline{CE}$ are both low.

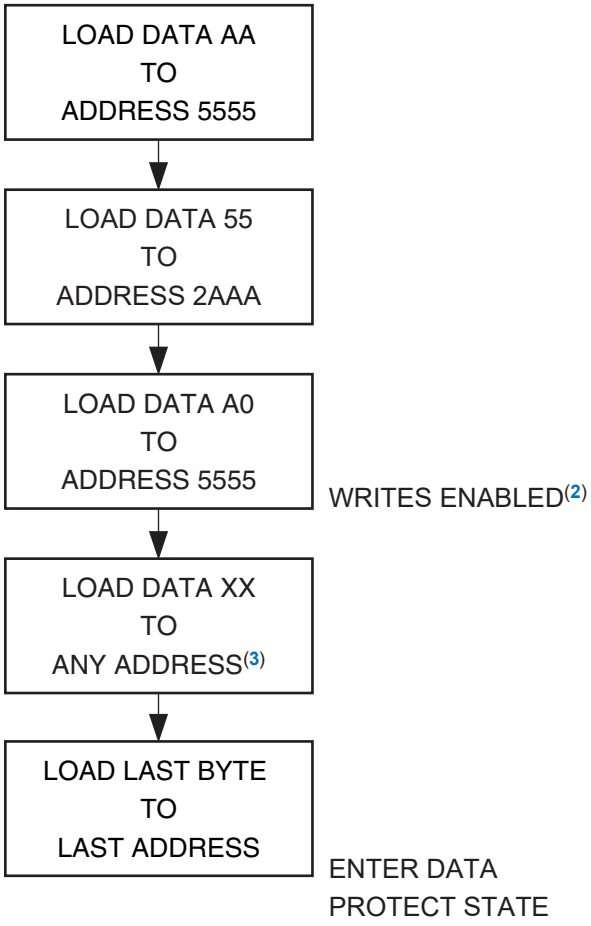
6.10 Chip Erase Waveforms



Note:

1. $t_S = t_H = 5$ µsec (minimum)
2. $t_W = 10$ msec (minimum)
3. $V_H = 12.0V \pm 0.5V$

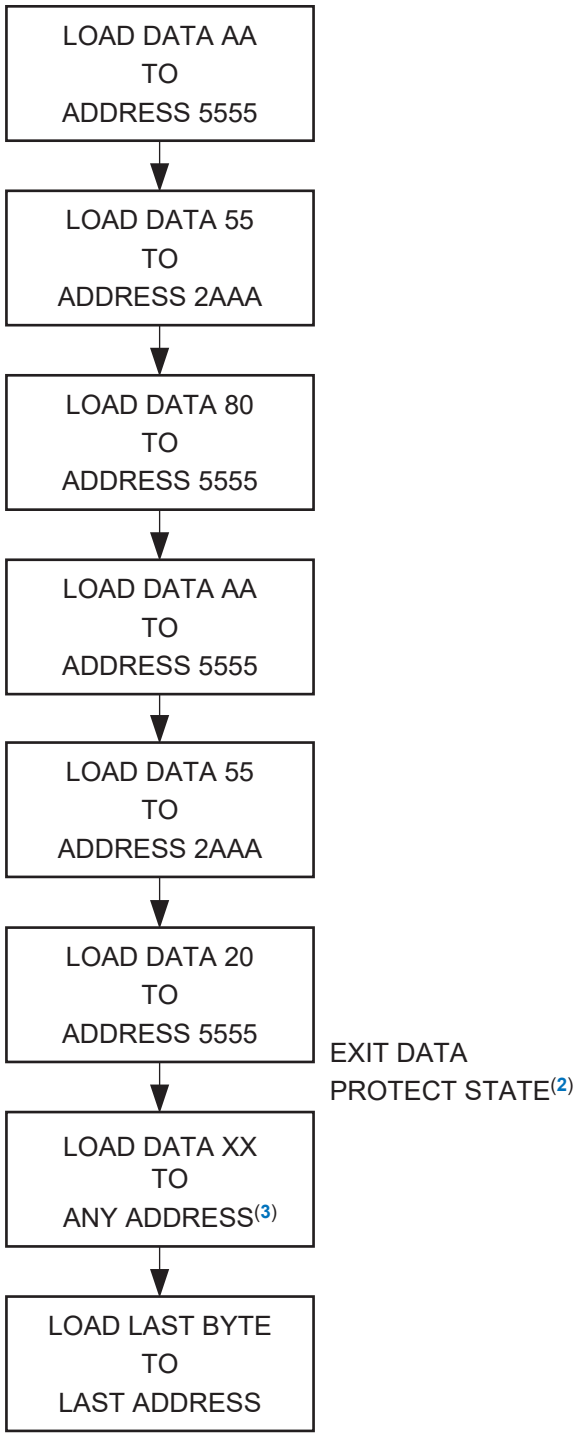
6.11 Software Data Protection Enable Algorithm[1]



Note:

1. Data format: I/O7-I/O0 (Hex); Address format: A14-A0 (Hex).
2. Write-Protect state will be activated at end of write even if no other data is loaded.
3. 1 to 64 bytes of data are loaded.

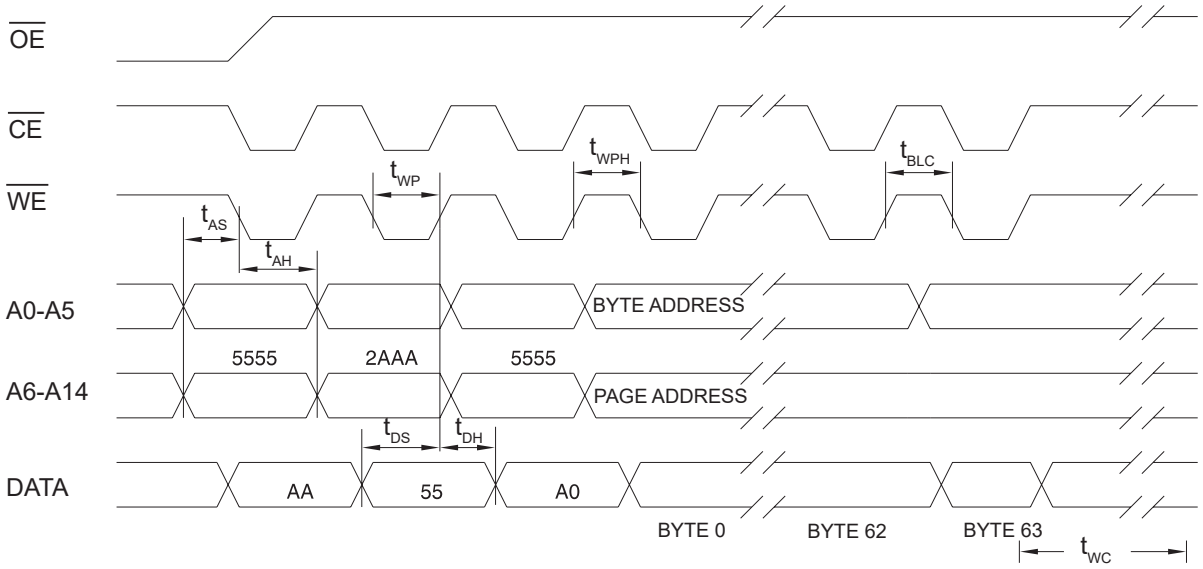
6.12 Software Data Protection Disable Algorithm[1]



Note:

1. Data format: I/O7-I/O0 (Hex); Address format: A14-A0 (Hex).
2. Write-Protect state will be deactivated at end of write period even if no other data is loaded.
3. 1 to 64 bytes of data are loaded.

6.13 Software Protected Program Cycle Waveform(1,2)



Note:

1. A6-A14 must specify the same page address during each high-to-low transition of $\overline{WE}$ (or $\overline{CE}$) after the software code has been entered.
2. $\overline{OE}$ must be high only when $\overline{WE}$ and $\overline{CE}$ are both low.

6.14 $\overline{Data}$ Polling Characteristics(1)

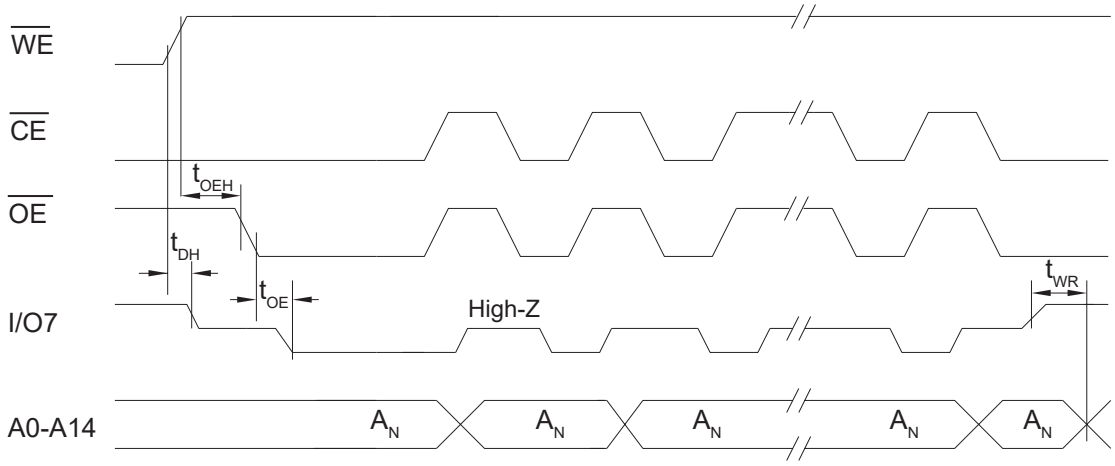
Table 6-5. Data Polling Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Units
Data Hold Time	t_{DH}	0	—	—	ns
$\overline{OE}$ Hold Time	t_{OEH}	0	—	—	ns
$\overline{OE}$ to Output Delay(2)	t_{OE}	—	—	—	ns
Write Recovery Time	t_{WR}	0	—	—	ns

Note:

1. These parameters are characterized and not 100% tested.
2. See AC Read Characteristics.

6.15 $\overline{\text{Data}}$ Polling Waveforms



6.16 Toggle Bit Characteristics[1]

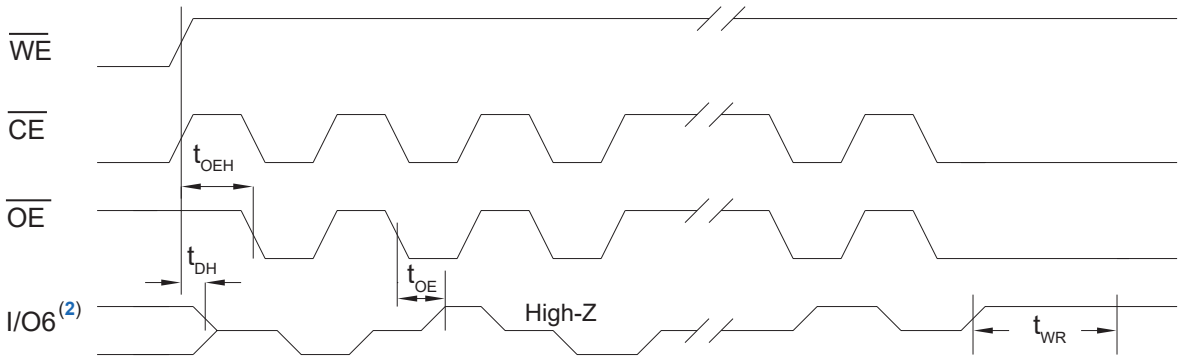
Table 6-6. Toggle Bit Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Units
Data Hold Time	t_{DH}	10	—	—	ns
$\overline{\text{OE}}$ Hold Time	t_{OEH}	10	—	—	ns
$\overline{\text{OE}}$ to Output Delay[2]	t_{OE}	—	—	—	ns
$\overline{\text{OE}}$ High Pulse[2]	t_{OEHP}	150	—	—	ns
Write Recovery Time	t_{WR}	0	—	—	ns

Note:

1. These parameters are characterized and not 100% tested.
2. See AC Read Characteristics.

6.17 Toggle Bit Waveforms



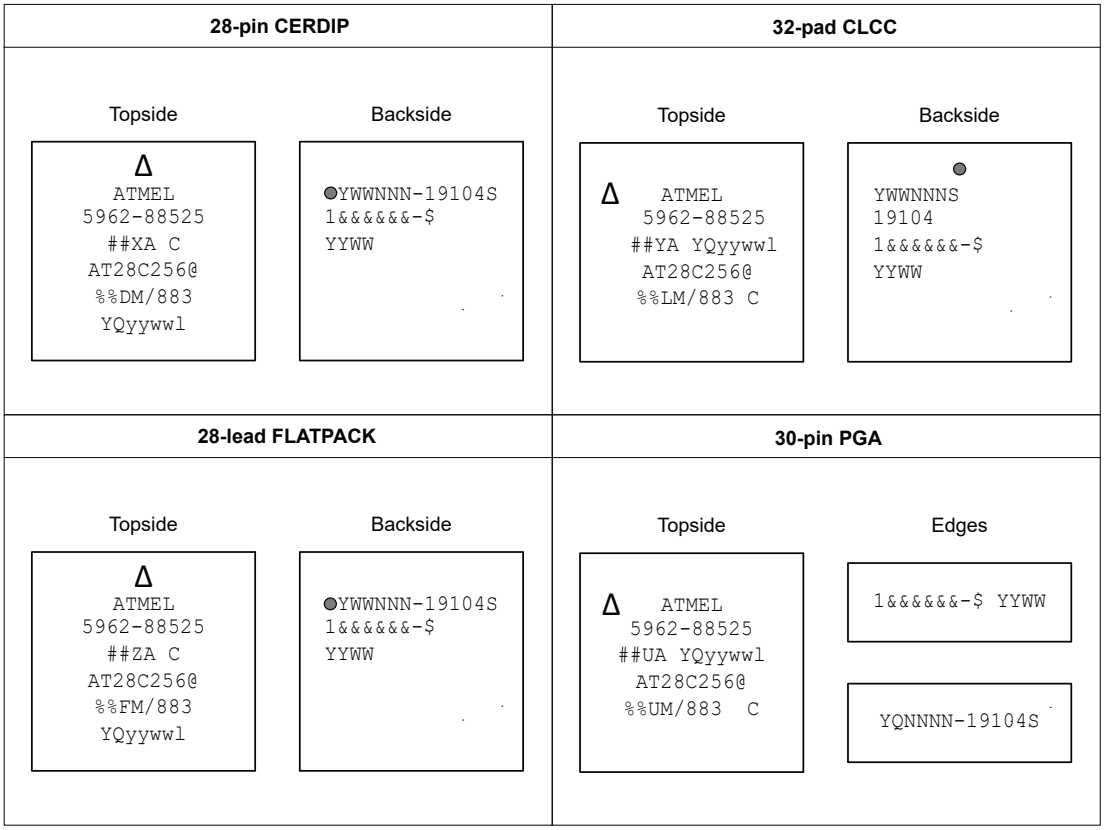
Note:

1. Toggling either $\overline{OE}$ or $\overline{CE}$ or both $\overline{OE}$ and $\overline{CE}$ will operate toggle bit.
2. Beginning and ending state of I/O6 will vary.
3. Any address location may be used but the address should not vary.

7. Packaging Information

7.1 Package Marking Information

AT28C256: Package Marking Information (SMD devices)

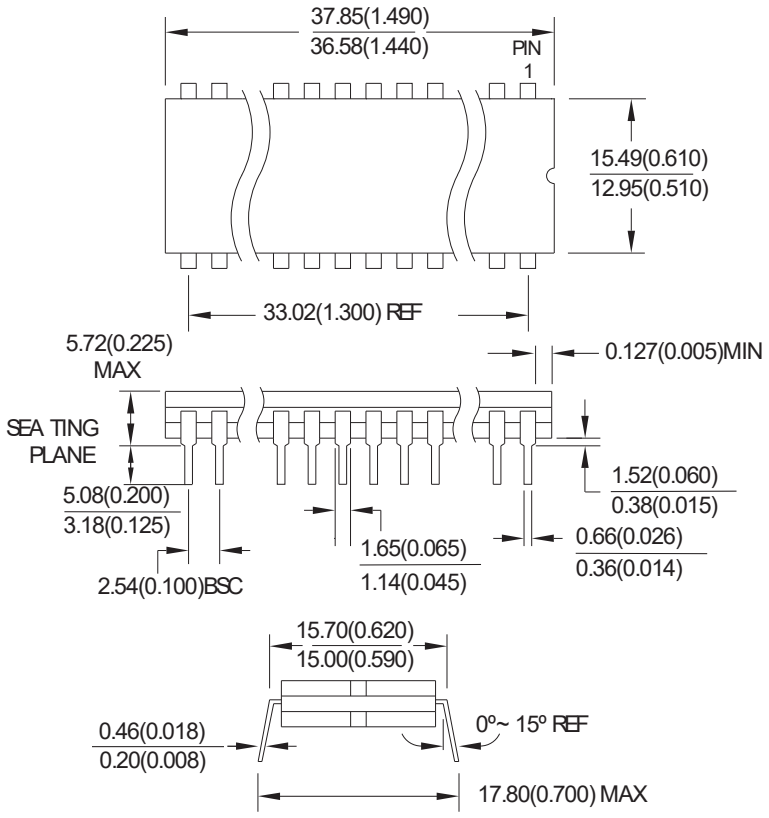


## = SMD Device	%% = Access Time	@ = Write Endurance Rating	$ = Assembly Location
03: 250 ns, SDP off 04: 200 ns, SDP off 06: 150 ns, SDP off 11: 250 ns, SDP on 12: 200 ns, SDP on 14: 150 ns, SDP on	25: 250 ns 20: 200 ns 15: 150 ns	Blank: Standard (10K at 10ms) E: Extended (100K at 10ms) F: Fast Write (10k at 3ms)	F: Philippines N: Thailand

Country of Assembly	**Lot Trace Code**	**Seal Year and Work Week**
&&&&&&: Country of Assembly	YWWNNN: Lot Trace Code	YYWW: Seal Year and Work Week

Year, Quarter, Seal Year, Seal Week and Group D Coverage (Military Date Code)
YQyywwl: Year, Quarter, Seal Year, Seal Week and Group D Coverage (Military Date Code)

Dimensions in Millimeters and (Inches).
Controlling dimension: Inches.
MIL-STD 1835 D-10 Config A (Glass Sealed)

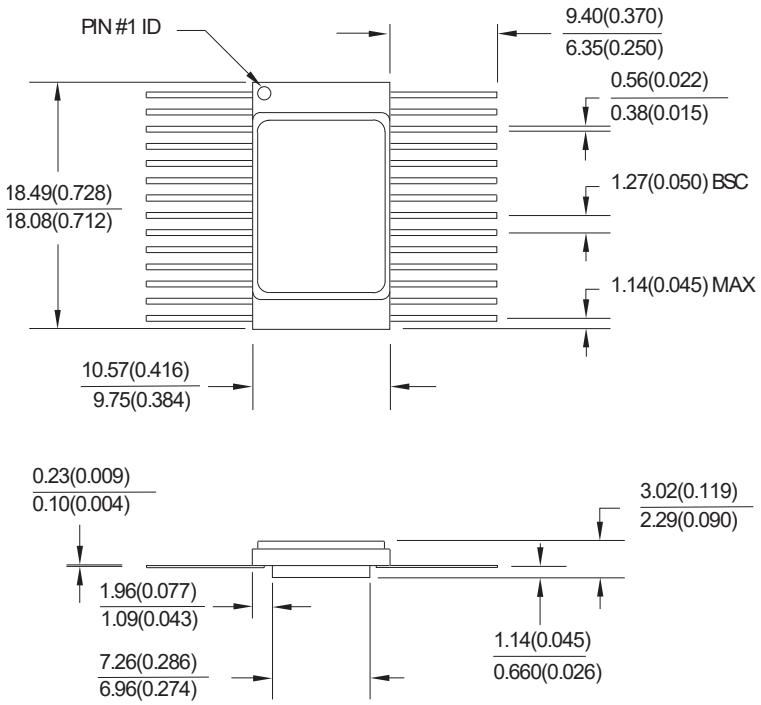


10/23/03

	TITLE	DRAWING NO.	REV.
	28D6, 28-lead, 0.600" Wide, Non-windowed, Ceramic Dual Inline Package (Cerdip)	28D6	B

Note:
For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

Dimensions in Millimeters and (Inches).
Controlling dimension: Inches.
MIL-STD 1835 F-12 Config B

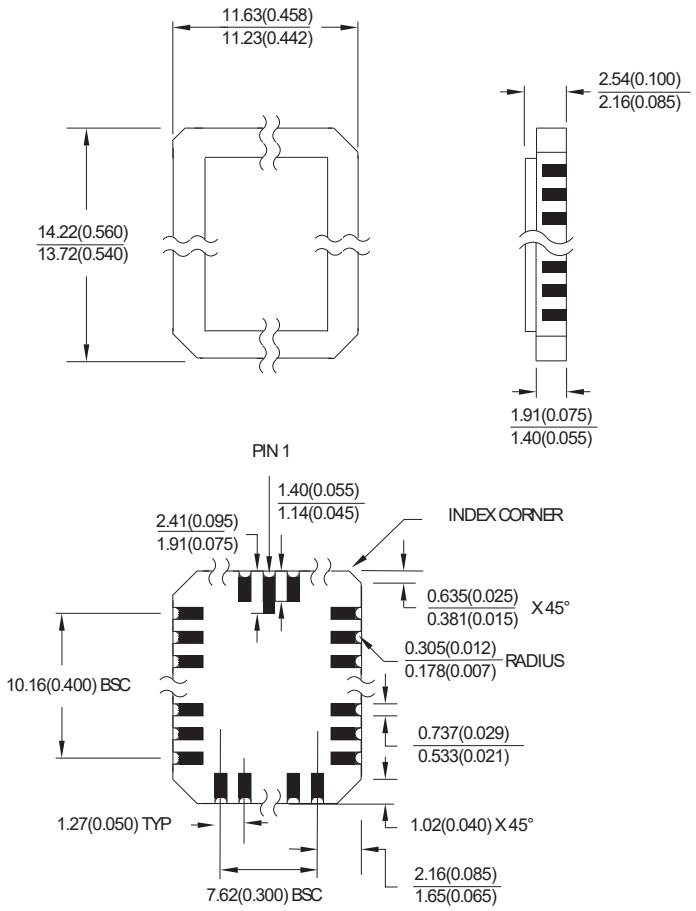


10/21/03

	TITLE	DRAWING NO.	REV.
	28F, 28-lead, Non-windowed, Ceramic Bottom-brazed Flat Package (FlatPack)	28F	B

Note:
For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

Dimensions in Millimeters and (Inches).
Controlling dimension: Inches.
MIL-STD 1835 C-12

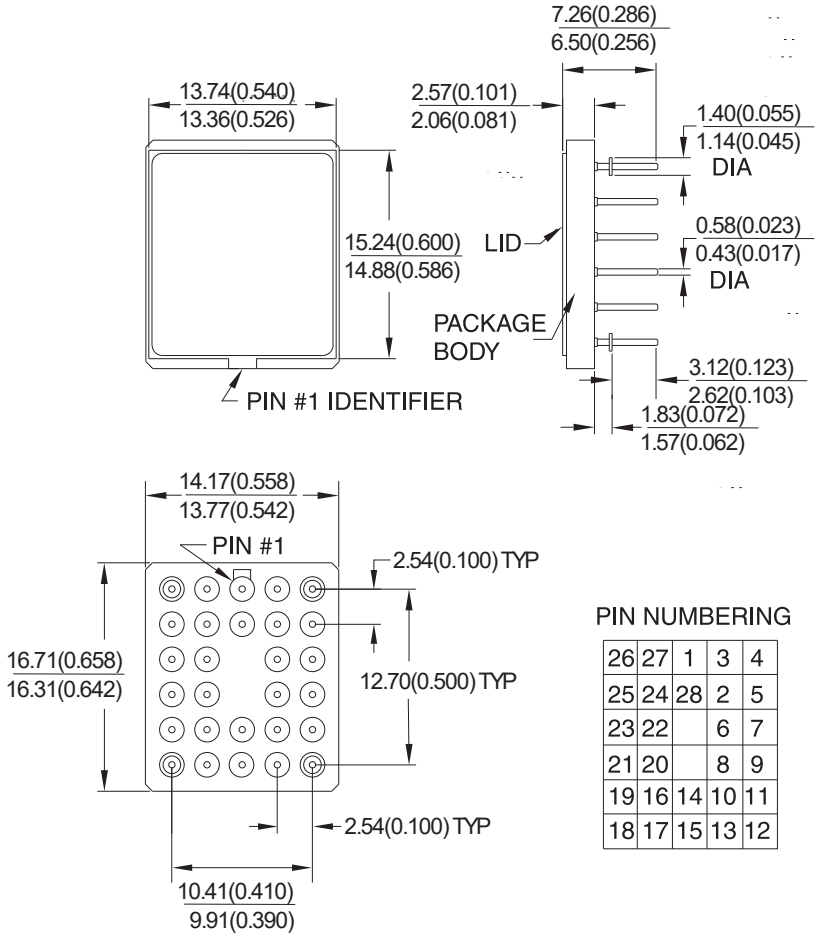


10/21/03

	TITLE	DRAWING NO.	REV.
	32L, 32-pad, Non-windowed, Ceramic Lid, Leadless Chip Carrier (LCC)	32L	B

Note:
For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

Dimensions in Millimeters and (Inches).
Controlling dimension: Inches.



PIN NUMBERING

26	27	1	3	4
25	24	28	2	5
23	22		6	7
21	20		8	9
19	16	14	10	11
18	17	15	13	12

10/21/03

	TITLE	DRAWING NO.	REV.
	28U, 28-pin, Ceramic Pin Grid Array (PGA)	28U	B

Note:
For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

8. Revision History

Revision A (April 2020)
Updated to the Microchip template. Microchip DS20006344 replaces Atmel document 0006. Added updated Part Markings to include new trace code format.

Atmel Document 0006 Revision M (December 2009)
Updated AC Characteristics and ordering information.

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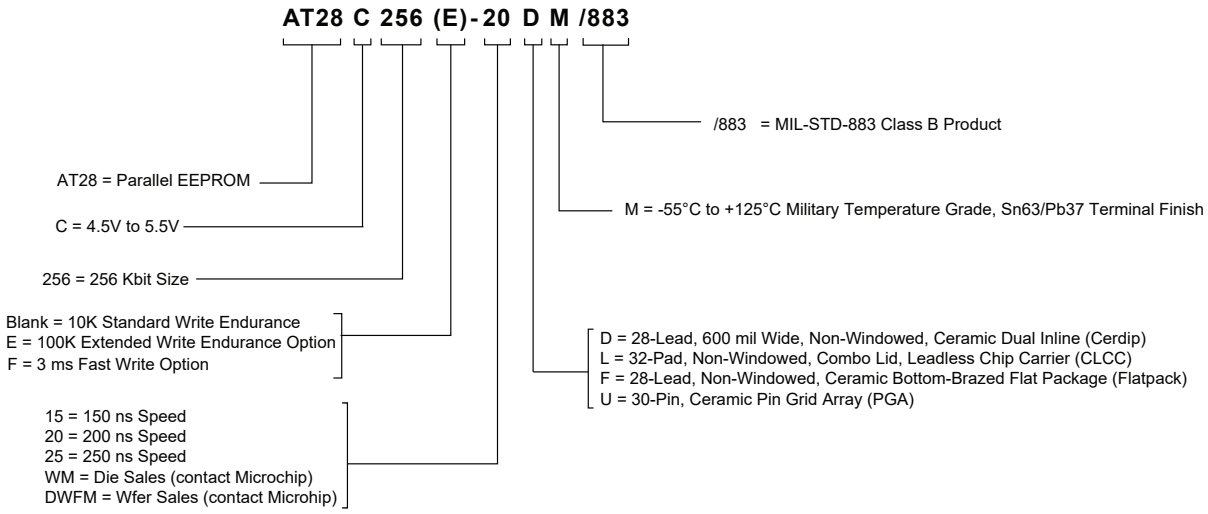

Examples

Table 12-1. AT28C256 Ordering Information

Ordering Code	Standard Military Drawing Number (SMD#)	Package Number	t_{ACC}(ns)	Operating Range
AT28C256-15DM/883	5962-88525 06 XA	28D6	150	Military/883C Class B, Fully Compliant (-55°C to 125°C)
AT28C256-15DM/883-815	5962-88525 14 XA(1)			
AT28C256-15FM/883	5962-88525 06 ZA	28F		
AT28C256-15FM/883-815	5962-88525 14 ZA(1)			
AT28C256-15LM/883	5962-88525 06 YA	32L		
AT28C256-15LM/883-815	5962-88525 14 YA(1)			
AT28C256-15UM/883	5962-88525 06 UA	28U		
AT28C256-15UM/883-815	5962-88525 14 UA(1)			
AT28C256-20DM/883	5962-88525 04 XA	28D6	200	
AT28C256-20DM/883-815	5962-88525 12 XA(1)			
AT28C256-20FM/883	5962-88525 04 ZA	28F		
AT28C256-20FM/883-815	5962-88525 12 ZA(1)			
AT28C256-20LM/883	5962-88525 04 YA	32L		
AT28C256-20LM/883-815	5962-88525 12 YA(1)			
AT28C256-20UM/883	5962-88525 04 UA	28U		
AT28C256-20UM/883-815	5962-88525 12 UA(1)			
AT28C256-25DM/883	5962-88525 03 XA	28D6	250	
AT28C256-25DM/883-815	5962-88525 11 XA(1)			
AT28C256-25FM/883	5962-88525 03 ZA	28F		
AT28C256-25FM/883-815	5962-88525 11 ZA(1)			
AT28C256-25LM/883	5962-88525 03 YA	32L		
AT28C256-25LM/883-815	5962-88525 11 YA(1)			
AT28C256-25UM/883	5962-88525 03 UA	28U		
AT28C256-25UM/883-815	5962-88525 11 UA(1)			
AT28C256-WM	None	Die Sales	Note 2	
AT28C256-DWFM	None	Wafer Sales	Note 2	

Note:

1. Where two DESC numbers apply to the ordering code, utilize SL815 to receive devices marked with the noted DESC dual marked and the AT28C256 number.
2. Contact Microchip Sales for Die and Wafer sales

Table 12-2. AT28C256E Ordering Information

Ordering Code	Standard Military Drawing Number (SMD#)	Package Number	t_{ACC}(ns)	Operating Range
AT28C256E-15DM/883	5962-88525 08 XA	28D6	150	Military/883C Class B, Fully Compliant (-55°C to 125°C)
AT28C256E-15DM/883-815	5962-88525 16 XA(1)			
AT28C256E-15FM/883	5962-88525 08 ZA	28F		
AT28C256E-15FM/883-815	5962-88525 16 ZA(1)			
AT28C256E-15LM/883	5962-88525 08 YA	32L		
AT28C256E-15LM/883-815	5962-88525 16 YA(1)			
AT28C256E-15UM/883	5962-88525 08 UA	28U		
AT28C256E-15UM/883-815	5962-88525 16 UA(1)			
AT28C256E-20DM/883	None	28D6	200	
AT28C256E-20FM/883	None	28F		
AT28C256E-20LM/883	None	32L		
AT28C256E-20UM/883	None	28U		
AT28C256E-25DM/883	5962-88525 05 XA	28D6	250	
AT28C256E-25DM/883-815	5962-88525 13 XA(1)			
AT28C256E-25FM/883	5962-88525 05 ZA	28F		
AT28C256E-25FM/883-815	5962-88525 13 ZA(1)			
AT28C256E-25LM/883	5962-88525 05 YA	32L		
AT28C256E-25LM/883-815	5962-88525 13 YA(1)			
AT28C256E-25UM/883	5962-88525 05 UA	28U		
AT28C256E-25UM/883-815	5962-88525 13 UA(1)			

Note:

1. Where two DESC numbers apply to the ordering code, utilize SL815 to receive devices marked with the noted DESC dual marked and the AT28C256 number.

Table 12-3. AT28C256F Ordering Information

Ordering Code	Standard Military Drawing Number (SMD#)	Package Number	t_{ACC}(ns)	Operating Range
AT28C256F-15DM/883	5962-88525 07 XA	28D6	150	Military/883C Class B, Fully Compliant (-55°C to 125°C)
AT28C256F-15DM/883-815	5962-88525 15 XA(3)			
AT28C256F-15FM/883	5962-88525 07 ZA	28F		
AT28C256F-15FM/883-815	5962-88525 15 ZA(3)			
AT28C256F-15LM/883	5962-88525 07 YA	32L		
AT28C256F-15LM/883-815	5962-88525 15 YA(3)			
AT28C256F-15UM/883	5962-88525 07 UA	28U		
AT28C256F-15UM/883-815	5962-88525 15 UA(3)			

Note:

1. Electrical specifications for these speeds are defined by Standard Microcircuit Drawing 5962-88525.
2. SMD specifies Software Data Protection feature for device type, although Microchip product supplied to every device type in the SMD is 100% tested to this feature.
3. Where two DESC numbers apply to the ordering code, utilize SL815 to receive devices marked with the noted DESC dual marked and the AT28C256 number.

Package Types	
28D6	28-Lead, 0.600" Wide, Non-Windowed, Ceramic Dual Inline (Cerdip)
28F	28-Lead, Non-Windowed, Ceramic Bottom-Brazed Flat Package (Flatpack)
32L	32-Pad, Non-Windowed, Ceramic Leadless Chip Carrier (LCC)
28U	28-Pin, Ceramic Pin Grid Array (PGA)
WM	Diced Die Military
DWFM	Die in Wafer Form Military
Options	
Blank	Standard Device: Endurance = 10K Write Cycles; Write Time 10 ms
E	High Endurance Option: Endurance = 100K Write Cycles
F	Fast Write Option: Write Time = 3 ms

Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip’s Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

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