

## Features

- Single 2.7V - 3.6V Supply
- RapidS<sup>®</sup> Serial Interface: 66 MHz Maximum Clock Frequency
  - SPI Compatible Modes 0 and 3
- User Configurable Page Size
  - 512 Bytes per Page
  - 528 Bytes per Page
  - Page Size Can Be Factory Pre-configured for 512 Bytes
- Page Program Operation
  - Intelligent Programming Operation
  - 8,192 Pages (512/528 Bytes/Page) Main Memory
- Flexible Erase Options
  - Page Erase (512 Bytes)
  - Block Erase (4 Kbytes)
  - Sector Erase (64 Kbytes)
  - Chip Erase (32 Mbits)
- Two SRAM Data Buffers (512/528 Bytes)
  - Allows Receiving of Data while Reprogramming the Flash Array
- Continuous Read Capability through Entire Array
  - Ideal for Code Shadowing Applications
- Low-power Dissipation
  - 7 mA Active Read Current Typical
  - 25  $\mu$ A Standby Current Typical
  - 15  $\mu$ A Deep Power Down Typical
- Hardware and Software Data Protection Features
  - Individual Sector
- Sector Lockdown for Secure Code and Data Storage
  - Individual Sector
- Security: 128-byte Security Register
  - 64-byte User Programmable Space
  - Unique 64-byte Device Identifier
- JEDEC Standard Manufacturer and Device ID Read
- 100,000 Program/Erase Cycles Per Page Minimum
- Data Retention – 20 Years
- Industrial Temperature Range
- Green (Pb/Halide-free/RoHS Compliant) Packaging Options

## 1. Description

The AT45DB321D is a 2.7-volt, serial-interface sequential access Flash memory ideally suited for a wide variety of digital voice-, image-, program code- and data-storage applications. The AT45DB321D supports RapidS serial interface for applications requiring very high speed operations. RapidS serial interface is SPI compatible for frequencies up to 66 MHz. Its 34,603,008 bits of memory are organized as 8,192 pages of 512 bytes or 528 bytes each. In addition to the main memory, the AT45DB321D also contains two SRAM buffers of 512/528 bytes each. The buffers allow the receiving of data while a page in the main Memory is being reprogrammed, as well as writing a continuous data stream. EEPROM emulation (bit or byte alterability) is easily handled with a self-contained three step read-modify-write operation. Unlike conventional Flash memories that are accessed randomly with multiple address lines and a parallel interface, the DataFlash uses a RapidS serial interface to



**32-megabit  
2.7-volt  
DataFlash<sup>®</sup>**

**AT45DB321D**

3597M-DFLASH-3/09





sequentially access its data. The simple sequential access dramatically reduces active pin count, facilitates hardware layout, increases system reliability, minimizes switching noise, and reduces package size. The device is optimized for use in many commercial and industrial applications where high-density, low-pin count, low-voltage and low-power are essential.

To allow for simple in-system reprogrammability, the AT45DB321D does not require high input voltages for programming. The device operates from a single power supply, 2.7V to 3.6V, for both the program and read operations. The AT45DB321D is enabled through the chip select pin ( $\overline{CS}$ ) and accessed via a three-wire interface consisting of the Serial Input (SI), Serial Output (SO), and the Serial Clock (SCK).

All programming and erase cycles are self-timed.

## 2. Pin Configurations and Pinouts

Figure 2-1. MLF<sup>(1)</sup> (VDFN) Top View

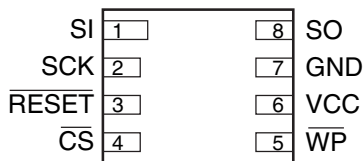
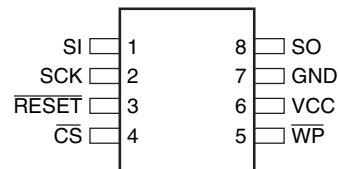
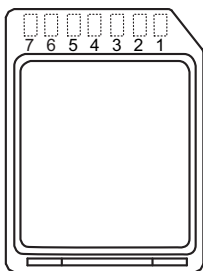


Figure 2-2. SOIC Top View



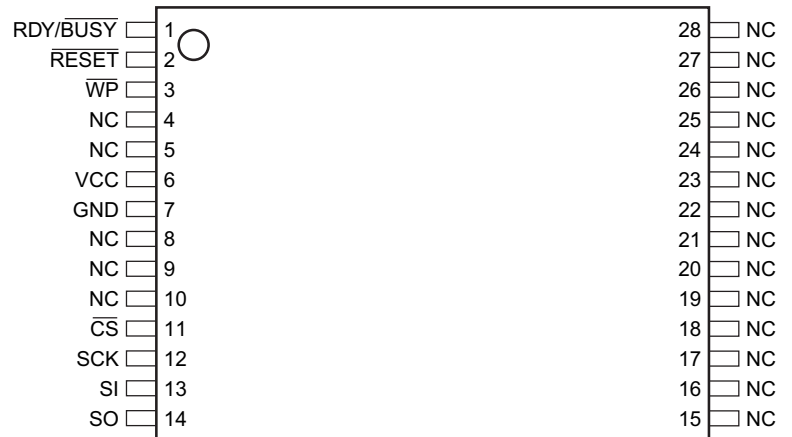
Note: 1. The metal pad on the bottom of the MLF package is floating. This pad can be a "No Connect" or connected to GND.

Figure 2-3. DataFlash Card<sup>(1)</sup>  
Top View through Package



Note: 1. See AT45DCB004D Datasheet.

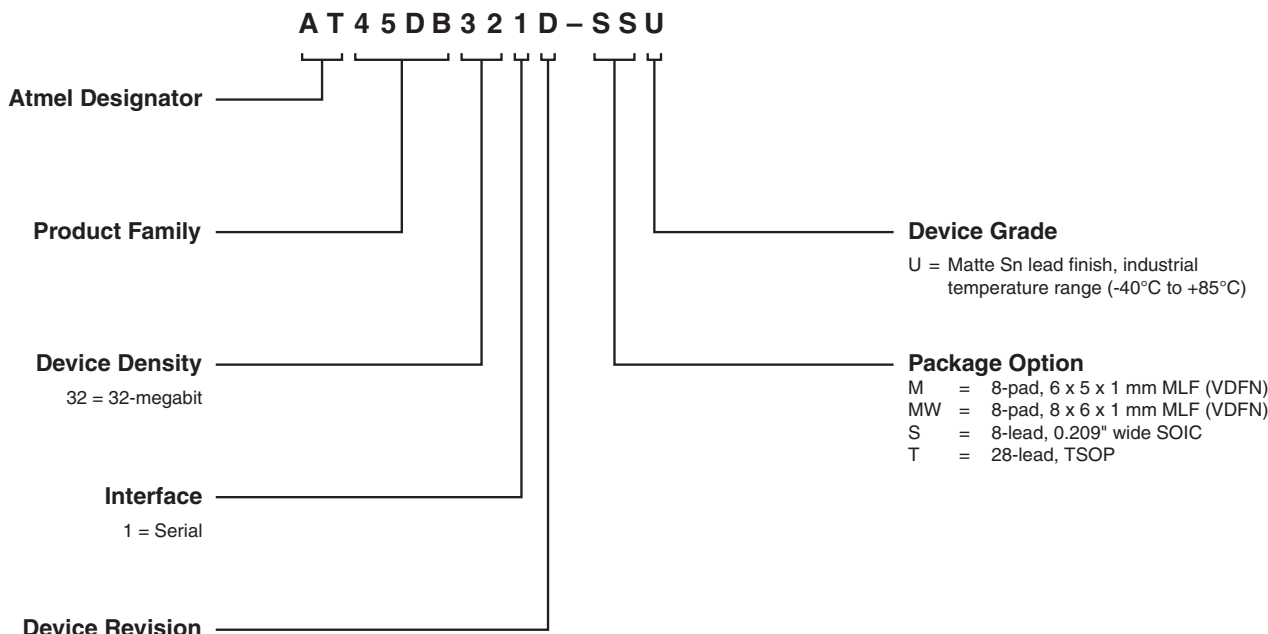
Figure 2-4. TSOP Top View: Type 1



Note: TSOP package is not recommended for new designs. Future die shrinks will support 8-pin packages only.

## 26. Ordering Information

### 26.1 Ordering Code Detail



### 26.2 Green Package Options (Pb/Halide-free/RoHS Compliant)

Ordering Code <sup>(1)(2)</sup>	Package	Lead Finish	Operating Voltage	f <sub>SCK</sub> (MHz)	Operation Range
AT45DB321D-MU AT45DB321D-MU-SL954 <sup>(3)</sup> AT45DB321D-MU-SL955 <sup>(4)</sup>	8M1-A	Matte Sn	2.7V to 3.6V	66	Industrial (-40°C to 85°C) 2.7V to 3.6V
AT45DB321D-MWU AT45DB321D-MWU-SL954 <sup>(3)</sup> AT45DB321D-MWU-SL955 <sup>(4)</sup>	8MW				
AT45DB321D-SU AT45DB321D-SU-SL954 <sup>(3)</sup> AT45DB321D-SU-SL955 <sup>(4)</sup>	8S2				
AT45DB321D-TU	28T				

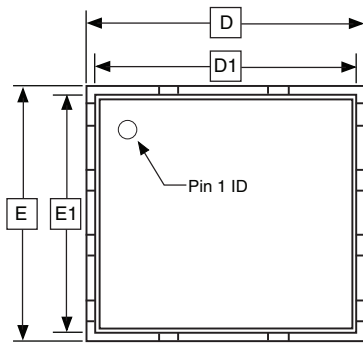
- Notes:
- The shipping carrier option is not marked on the devices.
  - Standard parts are shipped with the page size set to 528 bytes. The user is able to configure these parts to a 512-byte page size if desired.
  - Parts ordered with suffix SL954 are shipped in bulk with the page size set to 512 bytes. Parts will have a 954 or SL954 marked on them.
  - Parts ordered with suffix SL955 are shipped in tape and reel with the page size set to 512 bytes. Parts will have a 954 or SL954 marked on them.

Package Type	
<b>8M1-A</b>	8-pad, 6 x 5 x 1.0 mm, Very Thin Micro Lead-frame Package MLF™ (VDFN)
<b>8MW</b>	8-pad, 8 x 6 x 1.0 mm, Very Thin Micro Lead-frame Package MLF (VDFN)
<b>8S2</b>	8-lead, 0.209" wide, Plastic Gull Wing Small Outline Package (EIAJ SOIC)
<b>28T</b>	28-lead, 8 mm x 13.4 mm, Plastic Thin Small Outline Package, Type I (TSOP)

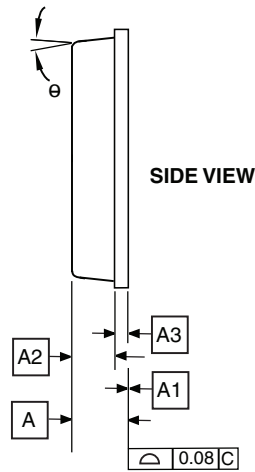


## 27. Packaging Information

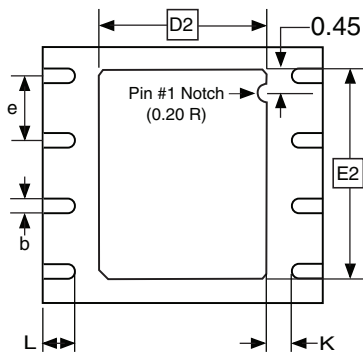
### 27.1 8M1-A – MLF (VDFN)



TOP VIEW



SIDE VIEW



BOTTOM VIEW

COMMON DIMENSIONS  
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	–	0.85	1.00	
A1	–	–	0.05	
A2	0.65 TYP			
A3	0.20 TYP			
b	0.35	0.40	0.48	
D	5.90	6.00	6.10	
D1	5.70	5.75	5.80	
D2	3.20	3.40	3.60	
E	4.90	5.00	5.10	
E1	4.70	4.75	4.80	
E2	3.80	4.00	4.20	
e	1.27			
L	0.50	0.60	0.75	
θ	–	–	12°	
K	0.25	–	–	

8/28/08



Package Drawing Contact:  
packagedrawings@atmel.com

**TITLE**

8M1-A, 8-pad, 6 x 5 x 1.00 mm Body, Thermally Enhanced Plastic Very Thin Dual Flat No Lead Package (VDFN)

**GPC**

YBR

**DRAWING NO.**

8M1-A

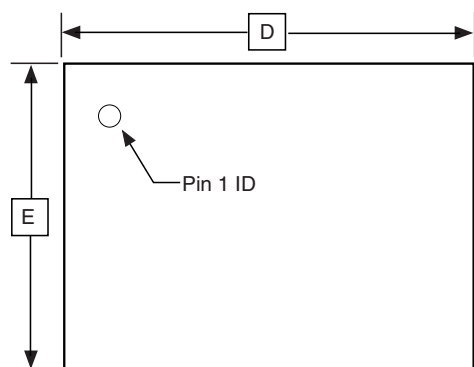
**REV.**

D

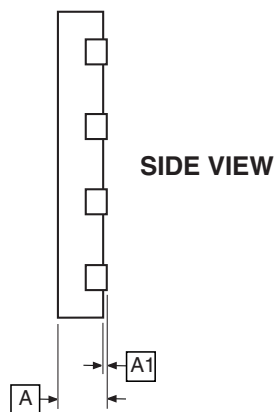
AT45DB321D

3597M–DFLASH–3/09

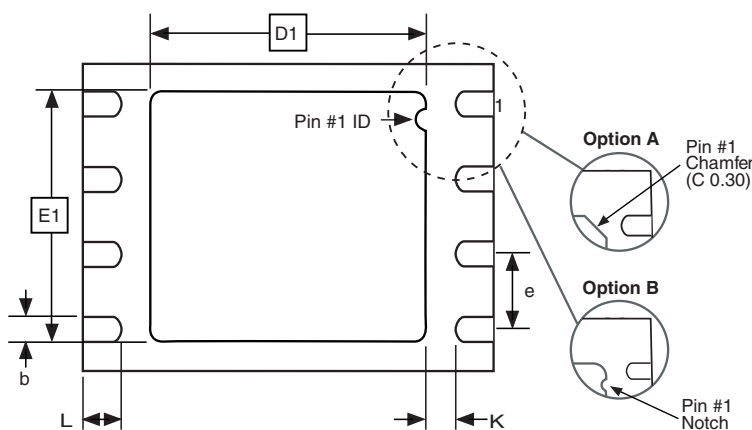
## 27.2 8MW – MLF (VDFN)



TOP VIEW



SIDE VIEW



BOTTOM VIEW

COMMON DIMENSIONS  
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	-	-	1.00	
A1	-	-	0.05	
b	0.35	0.40	0.48	
D	7.90	8.00	8.10	
D1	6.30	6.40	6.50	
E	5.90	6.00	6.10	
E1	4.70	4.80	4.90	
e	1.27			
L	0.45	0.50	0.55	
K	0.30 REF			

5/25/06



2325 Orchard Parkway  
San Jose, CA 95131

**TITLE**  
8MW, 8-pad, 8 x 6 x 1.0 mm Body, Very Thin Dual Flat Package  
No Lead (MLF)

**DRAWING NO.**

8MW

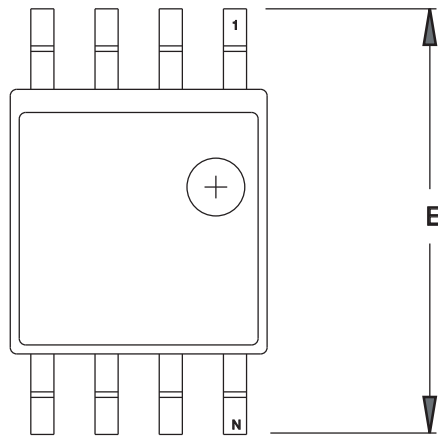
**REV.**

B

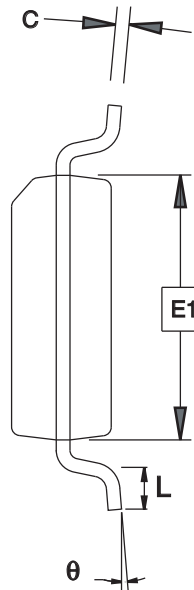




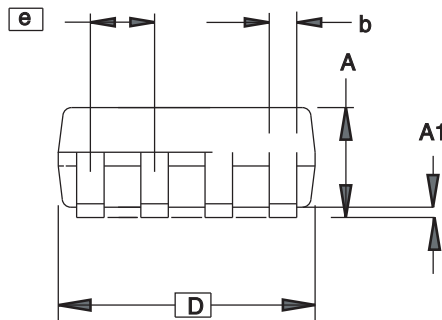
### 27.3 8S2 – EIAJ SOIC



**TOP VIEW**



**END VIEW**



**SIDE VIEW**

**COMMON DIMENSIONS**  
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	1.70		2.16	
A1	0.05		0.25	
b	0.35		0.48	4
C	0.15		0.35	4
D	5.13		5.35	
E1	5.18		5.40	2
E	7.70		8.26	
L	0.51		0.85	
$\theta$	0°		8°	
e	1.27 BSC			3

- Notes: 1. This drawing is for general information only; refer to EIAJ Drawing EDR-7320 for additional information.  
 2. Mismatch of the upper and lower dies and resin burrs aren't included.  
 3. Determines the true geometric position.  
 4. Values b,C apply to plated terminal. The standard thickness of the plating layer shall measure between 0.007 to .021 mm.

4/15/08



Package Drawing Contact:  
packagedrawings@atmel.com

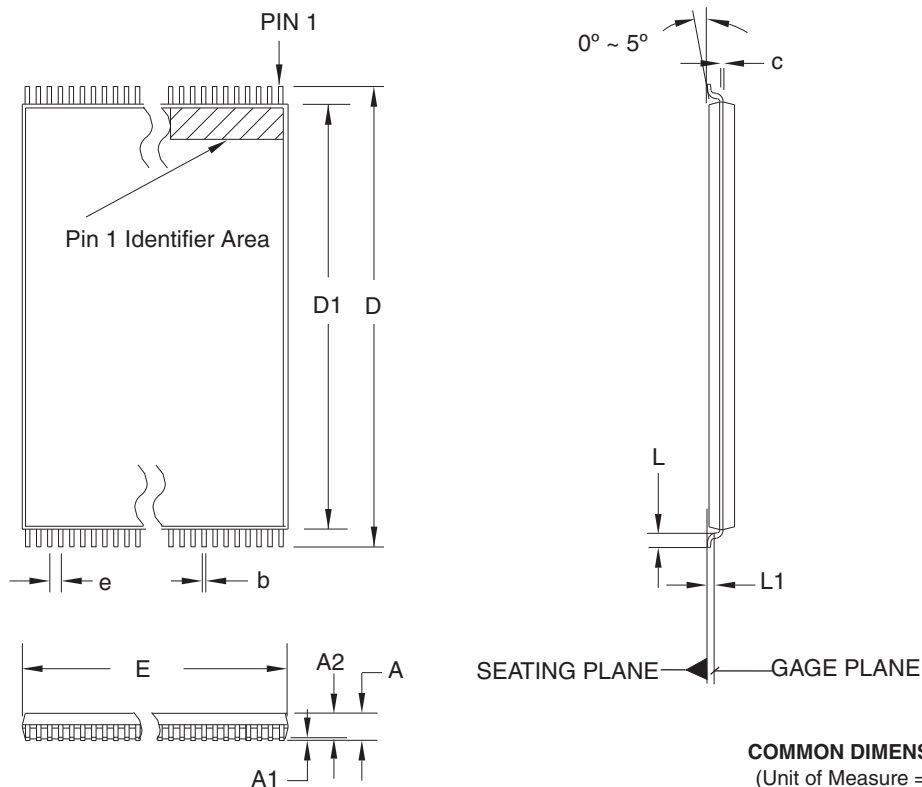
**TITLE**  
8S2, 8-lead, 0.208" Body, Plastic Small  
Outline Package (EIAJ)

**GPC**  
STN

**DRAWING NO.**  
8S2

**REV.**  
F

## 27.4 28T – TSOP, Type 1



**COMMON DIMENSIONS**  
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	–	–	1.20	
A1	0.05	–	0.15	
A2	0.90	1.00	1.05	
D	13.20	13.40	13.60	
D1	11.70	11.80	11.90	Note 2
E	7.90	8.00	8.10	Note 2
L	0.50	0.60	0.70	
L1	0.25 BASIC			
b	0.17	0.22	0.27	
c	0.10	–	0.21	
e	0.55 BASIC			

- Notes:
1. This package conforms to JEDEC reference MO-183.
  2. Dimensions D1 and E do not include mold protrusion. Allowable protrusion on E is 0.15 mm per side and on D1 is 0.25 mm per side.
  3. Lead coplanarity is 0.10 mm maximum.

12/06/02



2325 Orchard Parkway  
San Jose, CA 95131

**TITLE**

**28T**, 28-lead (8 x 13.4 mm) Plastic Thin Small Outline  
Package, Type I (TSOP)

**DRAWING NO.**

28T

**REV.**

C

