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## Features

- 80C51 Core Architecture
- 256 Bytes of On-chip RAM
- 256 Bytes of On-chip XRAM
- 16K Bytes of On-chip Flash Memory
  - Data Retention: 10 Years at 85°C
  - Erase/Write Cycle: 100K
- Boot Code Section with Independent Lock Bits
- 2K Bytes of On-chip Flash for Bootloader
- In-System Programming by On-Chip Boot Program (CAN, UART) and IAP Capability
- 2K Bytes of On-chip EEPROM
  - Erase/Write Cycle: 100K
- 14-sources 4-level Interrupts
- Three 16-bit Timers/Counters
- Full Duplex UART Compatible 80C51
- Maximum Crystal Frequency 40 MHz. In X2 Mode, 20 MHz (CPU Core, 40 MHz)
- Three or Four Ports: 16 or 20 Digital I/O Lines
- Two-channel 16-bit PCA
  - PWM (8-bit)
  - High-speed Output
  - Timer and Edge Capture
- Double Data Pointer
- 21-bit Watchdog Timer (7 Programmable bits)
- A 10-bit Resolution Analog-to-Digital Converter (ADC) with 8 Multiplexed Inputs
- Full CAN Controller
  - Fully Compliant with CAN rev.# 2.0A and 2.0B
  - Optimized Structure for Communication Management (Via SFR)
  - 4 Independent Message Objects
    - Each Message Object Programmable on Transmission or Reception
    - Individual Tag and Mask Filters up to 29-bit Identifier/Channel
    - 8-byte Cyclic Data Register (FIFO)/Message Object
    - 16-bit Status and Control Register/Message Object
    - 16-bit Time-Stamping Register/Message Object
    - CAN Specification 2.0 Part A or 2.0 Part B Programmable for Each Message Object
    - Access to Message Object Control and Data Registers Via SFR
    - Programmable Reception Buffer Length up to 4 Message Objects
    - Priority Management of Reception of Hits on Several Message Objects Simultaneously (Basic CAN Feature)
    - Priority Management for Transmission
    - Message Object Overrun Interrupt
  - Supports
    - Time Triggered Communication
    - Autobaud and Listening Mode
    - Programmable Automatic Reply Mode
- 1-Mbit/s Maximum Transfer Rate at 8 MHz<sup>(1)</sup> Crystal Frequency In X2 Mode
- Readable Error Counters
- Programmable Link to On-chip Timer for Time Stamping and Network Synchronization
- Independent Baud Rate Prescaler
- Data, Remote, Error and Overload Frame Handling
- Power-saving Modes
  - Idle Mode
  - Power-down Mode
- Power Supply: 3 Volts to 5.5 Volts
- Temperature Range: Industrial (-40° to +85°C)
- Packages: SOIC28, SOIC24, PLCC28, VQFP32

Note: 1. At BRP = 1 sampling point will be fixed.



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## Enhanced 8-bit Microcontroller with CAN Controller and Flash

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**T89C51CC02**  
**AT89C51CC02**

Rev. 4126L-CAN-01/08



## Description

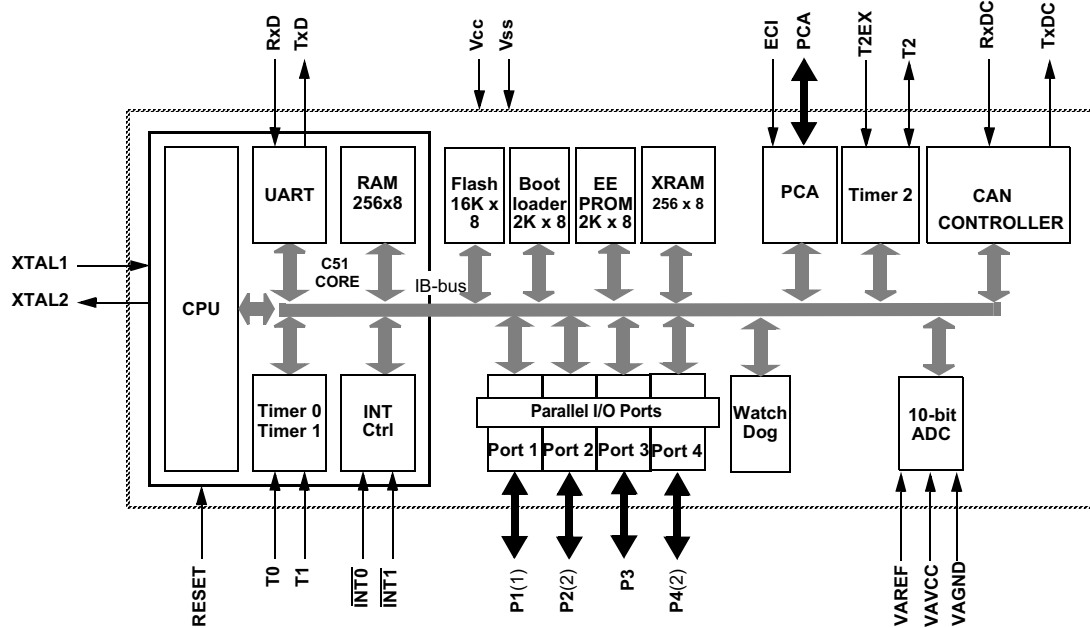
Part of the CANary™ family of 8-bit microcontrollers dedicated to CAN network applications, the T89C51CC02 is a low-pin count 8-bit Flash microcontroller.

In X2 Mode a maximum external clock rate of 20 MHz reaches a 300 ns cycle time.

Besides the full CAN controller T89C51CC02 provides 16K Bytes of Flash memory including In-System Programming (ISP), 2K Bytes Boot Flash Memory, 2K Bytes EEPROM and 512 Bytes RAM.

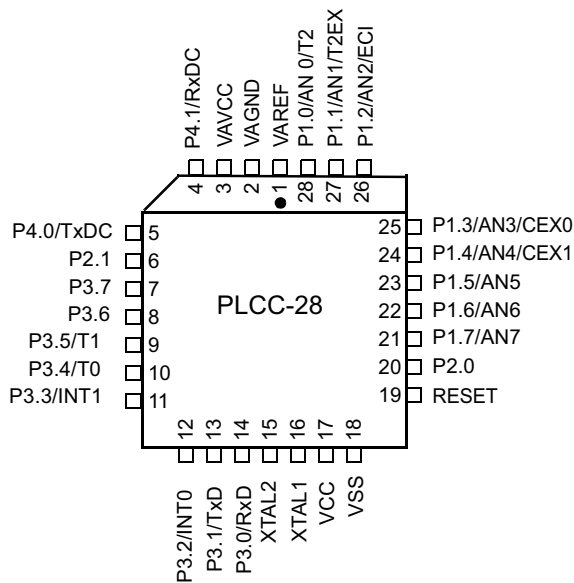
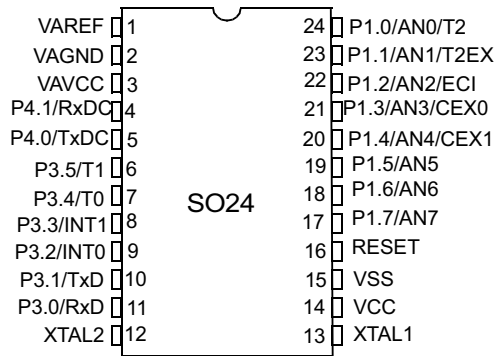
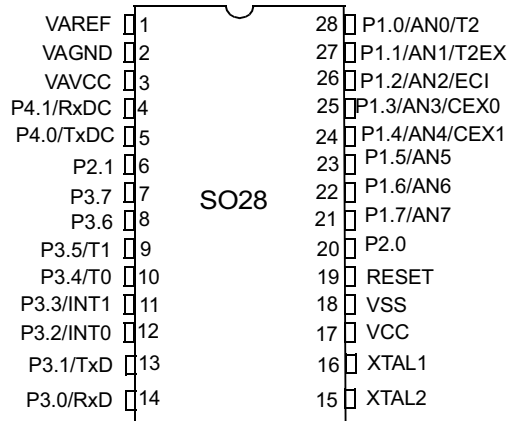
Special attention is paid to the reduction of the electro-magnetic emission of T89C51CC02.

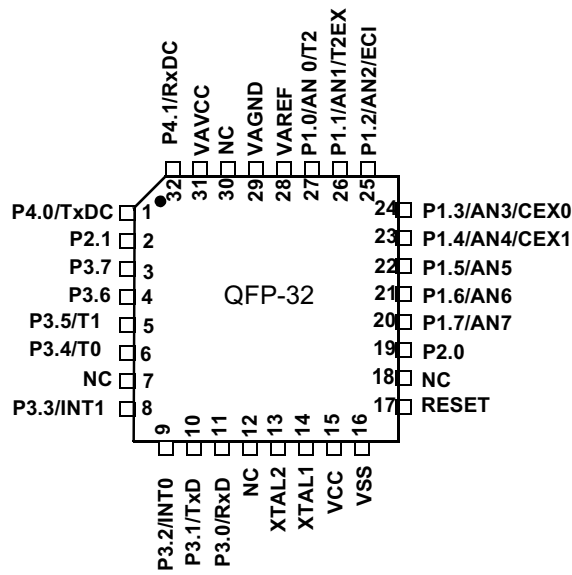
## Block Diagram



- Note:
1. 8 analog Inputs/8 Digital I/O.
  2. 2-bit I/O Port.

Pin Configurations







## Ordering Information

Part Number	Bootloader	Temperature Range	Package	Packing	Product Marking
T89C51CC02CA-RATIM	OBSOLETE				
T89C51CC02CA-SISIM					
T89C51CC02CA-TDSIM					
T89C51CC02CA-TISIM					
T89C51CC02UA-RATIM					
T89C51CC02UA-SISIM					
T89C51CC02UA-TDSIM					
T89C51CC02UA-TISIM					
AT89C51CC02CA-RATUM	CAN <sup>(2)</sup>	Industrial & Green	VQFP32	Tray	89C51CC02CA-UM
AT89C51CC02CA-SISUM	CAN <sup>(2)</sup>	Industrial & Green	PLCC28	Stick	89C51CC02CA-UM
AT89C51CC02CA-TDSUM	CAN <sup>(2)</sup>	Industrial & Green	SOIC24	Stick	89C51CC02CA-UM
AT89C51CC02CA-TISUM	CAN <sup>(2)</sup>	Industrial & Green	SOIC28	Stick	89C51CC02CA-UM
AT89C51CC02UA-RATUM	UART <sup>(2)</sup>	Industrial & Green	VQFP32	Tray	89C51CC02UA-UM
AT89C51CC02UA-SISUM	UART <sup>(2)</sup>	Industrial & Green	PLCC28	Stick	89C51CC02UA-UM
AT89C51CC02UA-TDSUM	UART <sup>(2)</sup>	Industrial & Green	SOIC24	Stick	89C51CC02UA-UM
AT89C51CC02UA-TISUM	UART <sup>(2)</sup>	Industrial & Green	SOIC28	Stick	89C51CC02UA-UM

Factory default programming for T89C51CC02CA-xxxx is Bootloader CAN and HSB = BBh:

- X1 mode
- BLJB = 0 : jump to Bootloader
- LB2 = 0 : Security Level 3.<sup>(1)</sup>

Factory default programming for T89C51CC02UA-xxxx is Bootloader UART and HSB = BBh:

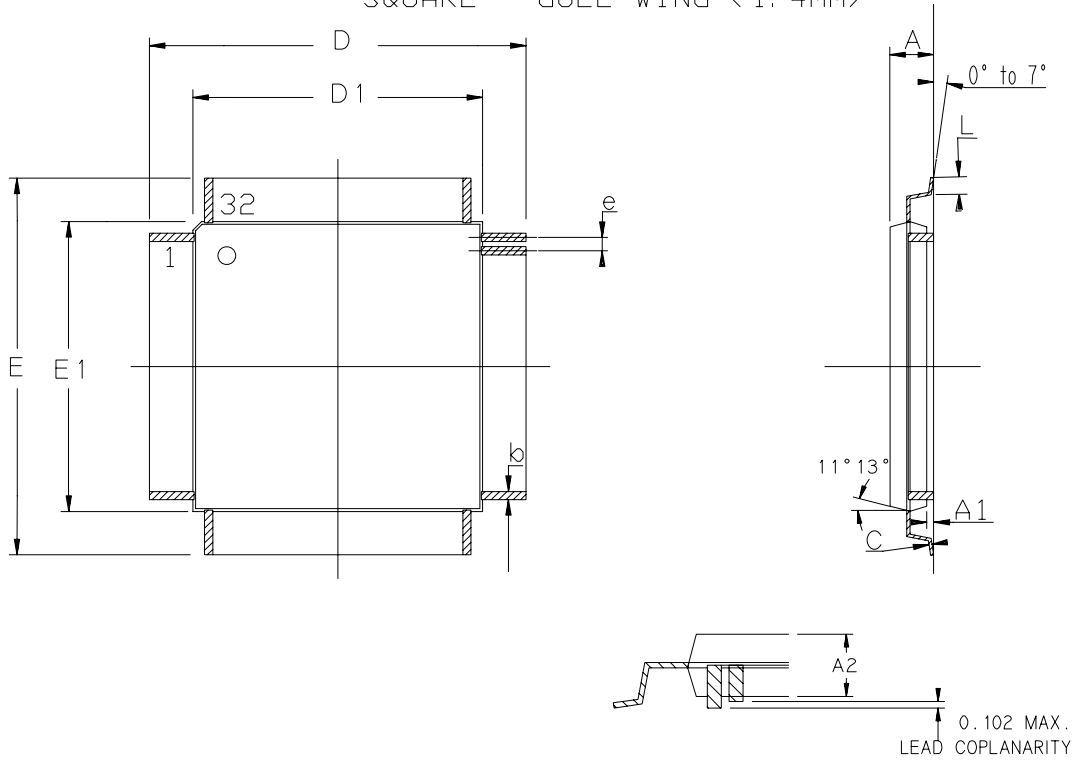
- X1 mode
- BLJB = 0 : jump to Bootloader
- LB2 = 0 : Security Level 3.<sup>(1)</sup>

- Notes:
1. LB2 = 0 is not described in Table 22 Program load bit. LB2 = 0 is equivalent to LB1 = 0: Security Level 3.
  2. Customer can change these modes by re-programming with a parallel programmer, this can be done by an Atmel distributor.

Package Drawings

VQFP32

32L SHRINK QUAD FLAT PACK  
SQUARE - GULL WING < 1.4mm



	MM		INCH	
	Min	Max	Min	Max
A	-	1.60	-	.063
A1	0.05	0.15	.002	.006
A2	1.35	1.45	.053	.057
C	0.09	0.20	.004	.008
D	9.00 BSC		.354 BSC	
D1	7.00 BSC		.276 BSC	
E	9.00 BSC		.354 BSC	
E1	7.00 BSC		.276 BSC	
L	0.45	0.75	.018	.030
e	0.80 BSC		.0315 BSC	
b	0.30	0.45	.012	.018



**STANDARD NOTES FOR PQFP/ VQFP / TQFP / DQFP**

**1/ CONTROLLING DIMENSIONS : INCHES**

**2/ ALL DIMENSIONING AND TOLERANCING CONFORM TO ANSI Y 14.5M - 1982.**

**3/ "D1 AND E1" DIMENSIONS DO NOT INCLUDE MOLD PROTUSIONS.**

**MOLD PROTUSIONS SHALL NOT EXCEED 0.25 mm (0.010 INCH).**

**THE TOP PACKAGE BODY SIZE MAY BE SMALLER THAN THE BOTTOM PACKAGE BODY SIZE BY AS MUCH AS 0.15 mm.**

**4/ DATUM PLANE "H" LOCATED AT MOLD PARTING LINE AND COINCIDENT WITH LEAD, WHERE LEAD EXITS PLASTIC BODY AT BOTTOM OF PARTING LINE.**

**5/ DATUM "A" AND "D" TO BE DETERMINED AT DATUM PLANE H.**

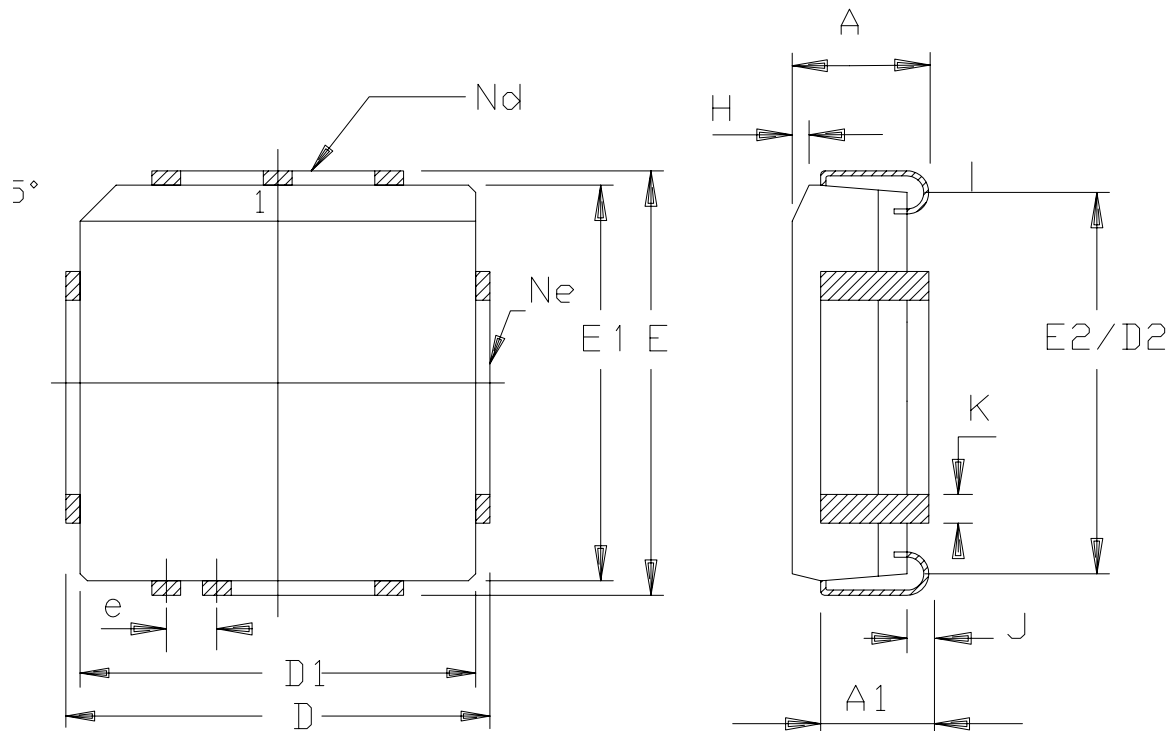
**6/ DIMENSION " f " DOES NOT INCLUDE DAMBAR PROTUSION ALLOWABLE**

**DAMBAR PROTUSION SHALL BE 0.08mm/.003" TOTAL IN EXCESS OF THE " f " DIMENSION AT MAXIMUM MATERIAL CONDITION .**

**DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.**

PLCC28

28 PINS PLCC



	MM		INCH	
A	4.20	4.57	.165	.180
A1	2.29	3.04	.090	.120
D	12.32	12.57	.485	.495
D1	11.43	11.58	.450	.456
D2	9.91	10.92	.390	.430
E	12.32	12.57	.485	.495
E1	11.43	11.58	.450	.456
E2	9.91	10.92	.390	.430
e	1.27	BSC	.050	BSC
H	1.07	1.42	.042	.056
J	0.51	-	.020	-
K	0.33	0.53	.013	.021
Nd	7		7	
Ne	7		7	
PKG STD	00			





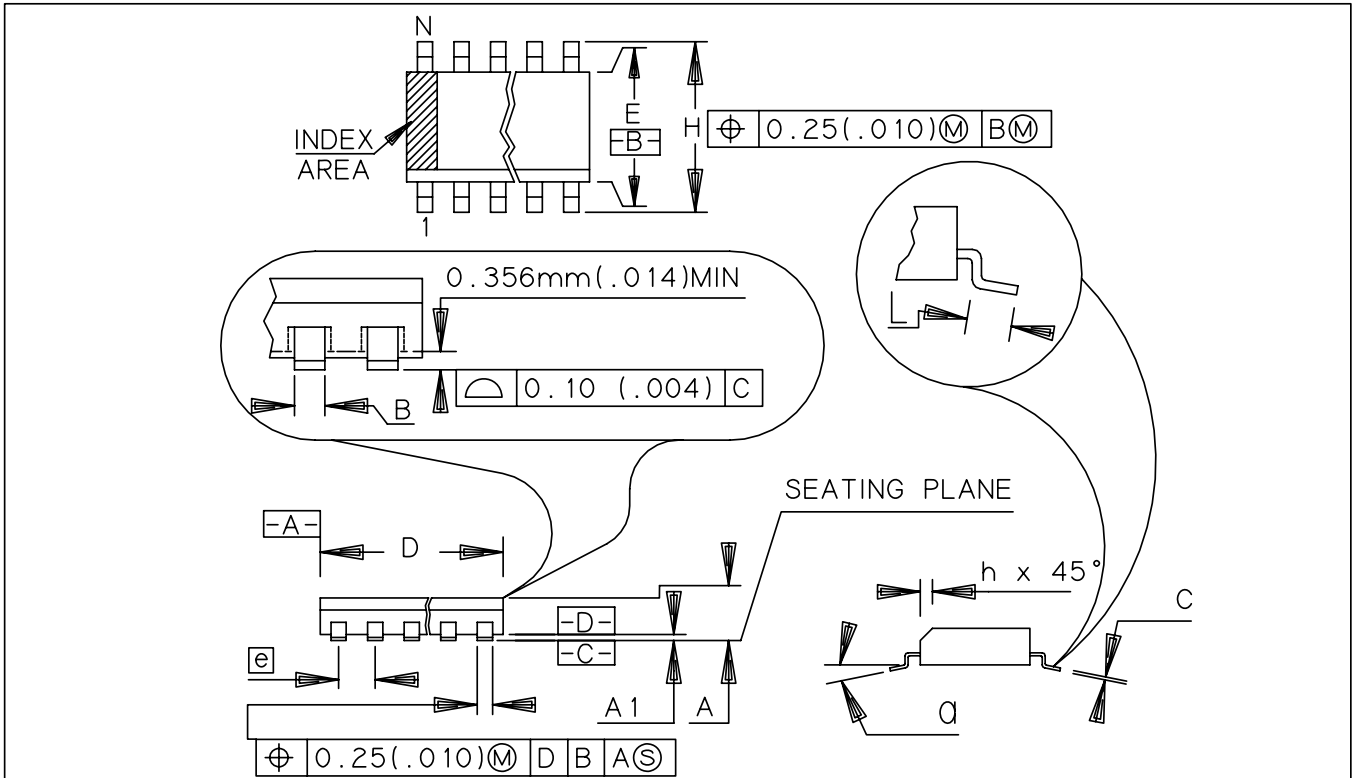
**STANDARD NOTES FOR PLCC**

**1/ CONTROLLING DIMENSIONS : INCHES**

**2/ DIMENSIONING AND TOLERANCING PER ANSI Y 14.5M - 1982.**

**3/ "D" AND "E1" DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTUSIONS.  
MOLD FLASH OR PROTUSIONS SHALL NOT EXCEED 0.20 mm (.008 INCH) PER  
SIDE.**

SOIC24



	MM		INCH	
A	2.35	2.65	.093	.104
A1	0.10	0.30	.004	.012
B	0.35	0.49	.014	.019
C	0.23	0.32	.009	.013
D	15.20	15.60	.599	.614
E	7.40	7.60	.291	.299
e	1.27	BSC	.050	BSC
H	10.00	10.65	.394	.419
h	0.25	0.75	.010	.029
L	0.40	1.27	.016	.050
N	24		24	
$\alpha$	0°		8°	

07/27/07

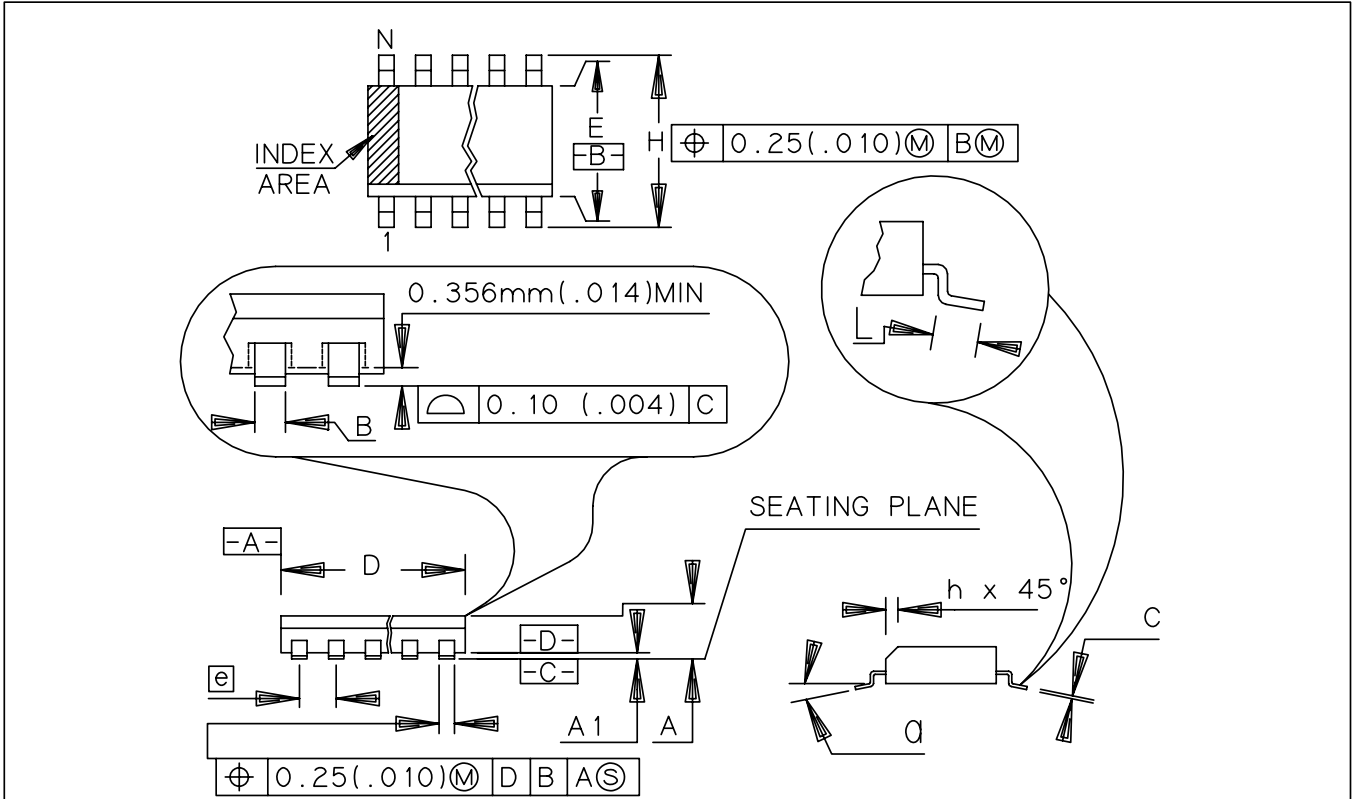
 Atmel Nantes S.A.  
La Chantrerie - BP 70602  
44306 Nantes Cedex 3 - France

TITLE  
TD, 24 - Lead, 0.300" Body Width  
Plastic Gull Wing Small Outline Package (SOIC)

DRAWING No.	REV.
TD	A



SOIC28



	MM		INCH	
A	2.35	2.65	.093	.104
A1	0.10	0.30	.004	.012
B	0.35	0.49	.014	.019
C	0.23	0.32	.009	.013
D	17.70	18.10	.697	.713
E	7.40	7.60	.291	.299
e	1.27	BSC	.050	BSC
H	10.00	10.65	.394	.419
h	0.25	0.75	.010	.029
L	0.40	1.27	.016	.050
N	28		28	
$\alpha$	0°		8°	

07/27/07

**Atmel** Nantes S.A.  
La Chantrerie - BP 70602  
44306 Nantes Cedex 3 - France

TITLE  
TI, 28 - Lead, 0.300" Body Width  
Plastic Gull Wing Small Outline Package (SOIC)

DRAWING No.	REV.
TI	N

AT/T89C51CC02

NOTES: SOIC STANDARD NOTES

1. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M. – 1982.
2. "D" AND "E" DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTUSIONS.  
MOLD FLASH OR PROTUSIONS SHALL NOT EXCEED 0.15mm (0.006 INCH) PER SIDE.
3. THE CHAMFER "h" IS OPTIONAL.