

DATA SHEET

OM4358BA

8-bit microcontroller family
4K/8K/16K/32K Flash

Product data
Supersedes data of 1999 Oct 27

2001 Jul 09

8-bit microcontroller family 4K/8K/16K/32K Flash

OM4358BA

DESCRIPTION

OM4358BA contain a non-volatile FLASH program memory that is parallel programmable. For devices that are serial programmable (In-System Programmable (ISP) and In-Application Programmable (IAP) with a boot loader), see the 89C51Rx2 or 89C66x datasheets.

All three families are Single-Chip 8-bit Microcontrollers manufactured in advanced CMOS process and are derivatives of the microcontroller family. All the devices have the same instruction set as the 51.

SELECTION TABLE FOR FLASH DEVICES

	MTP devices (this data sheet)		ISP/IAP devices (see separate data sheets)	
	89C51	OM4358BA	89C51Rx2	89C66x
ROM/EPROM memory size	4K	8K/16K/32K	16K–32K	16K–64K
RAM size (byte)	128	256	512–1K	512–8K
Parallel programming	yes	yes	yes	yes
In-System Programming (ISP)	no	no	yes	yes
In-Application Programming (IAP)	no	no	yes	yes
PWM	no	no	yes	yes
Programmable Timer/Counter (PCA)	no	no	yes	yes
Hardware Watchdog Timer	no	no	yes	yes
Serial Channels	UART	UART	UART	UART + I ² C

MTP = Multi-Time Programming (via parallel programmer)

ISP = In-System Programming (via serial interface)

IAP = In-Application Programming

Please note that the FLASH programming algorithm of these parts has been modified. Please see the Device Comparison table for details.

DEVICE COMPARISON TABLE

Item	Old devices	New devices	Reason for change
Type description	P89C5xUBxx / P89C5xUFxx	OM4358BA	Letter U dropped for shorter type descriptions (formerly designated speed (0–33 MHz))
Programming algorithm	When using parallel programmer, be sure to select P89C5xUxxx devices	When using a parallel programmer, be sure to select P89C5xxxx devices (no more letter U). IF DEVICES ARE NOT YET SELECTABLE, ASK YOUR VENDOR FOR A SOFTWARE UPDATE.	Programming algorithm modification required by process change!
Quad Flat Package type	PQFP package (P89C5xUxBB)	PQFP package replaced by LQFP package (P89C5xxBD). SEE NEW DIMENSIONS AT THE END OF THIS DATA SHEET.	Reduction in package height
Package identifiers	PLCC = AA PQFP = BB PDIP = PN	PLCC = A LQFP = BD PDIP = P	Shorter type descriptions
Flash memory program and erase cycles	100 program and erase cycles	10,000 program and erase cycles	Process change allows more program and erase cycles
Power consumption	Active mode: $I_{CC(MAX)} = (0.9 \times \text{FREQ.} + 20)\text{mA}$ Idle mode: $I_{CC(MAX)} = (0.37 \times \text{FREQ.} + 1.0)\text{mA}$	Active mode: $I_{CC(MAX)} = (0.55 \times \text{FREQ.} + 8.0)\text{mA}$ Idle mode: $I_{CC(MAX)} = (0.3 \times \text{FREQ.} + 2.0)\text{mA}$	Process change allows lower power consumption

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FEATURES

- 51 Central Processing Unit
 - Automatic address recognition
- On-chip FLASH Program Memory
- Speed up to 33 MHz
- Fully static operation
- RAM expandable externally to 64 k bytes
- 4 interrupt priority levels
- 6 interrupt sources
- Four 8-bit I/O ports
- Full-duplex enhanced UART
 - Framing error detection
- Power control modes
 - Clock can be stopped and resumed
 - Idle mode
 - Power down mode
- Programmable clock out
- Second DPTR register
- Asynchronous port reset
- Low EMI (inhibit ALE)
- 3 16-bit timers
- Wake up from power down by an external interrupt

ORDERING INFORMATION

Type number				Package			Temperature Range ³ (°C)	Voltage Range (V)	Frequency (MHz)
4K Flash version	8K Flash version	16K Flash version	32K Flash version	Name	Description	Version			
P89C51BA	P89C52BA	P89C54BA	OM4358BA	PLCC44	plastic leaded chip carrier; 44 leads	SOT187-2	0 to +70	5	0 to 33
P89C51BP ¹ P89C51BN ²	P89C52BP ¹ P89C52BN ²	P89C54BP ¹ P89C54BN ²	P89C58BP ¹ P89C58BN ²	DIP40	plastic dual in-line package; 40 leads (600 ml)	SOT129-1	0 to +70	5	0 to 33
P89C51BBD	P89C52BBD	P89C54BBD	P89C58BBD	LQFP44	plastic low profile quad flat package; 44 leads; body 10 x 10 x 1.4 mm	SOT389-1	0 to +70	5	0 to 33

NOTES:

1. Philips (except North America) Part Order Number
2. Philips North America Part Order Number. Note that parts will be marked "P89C5xBP" or P89C5xFP", respectively (x = 1, 2, 4, 8)
3. Industrial temperatures will be released with P89C5xX2.

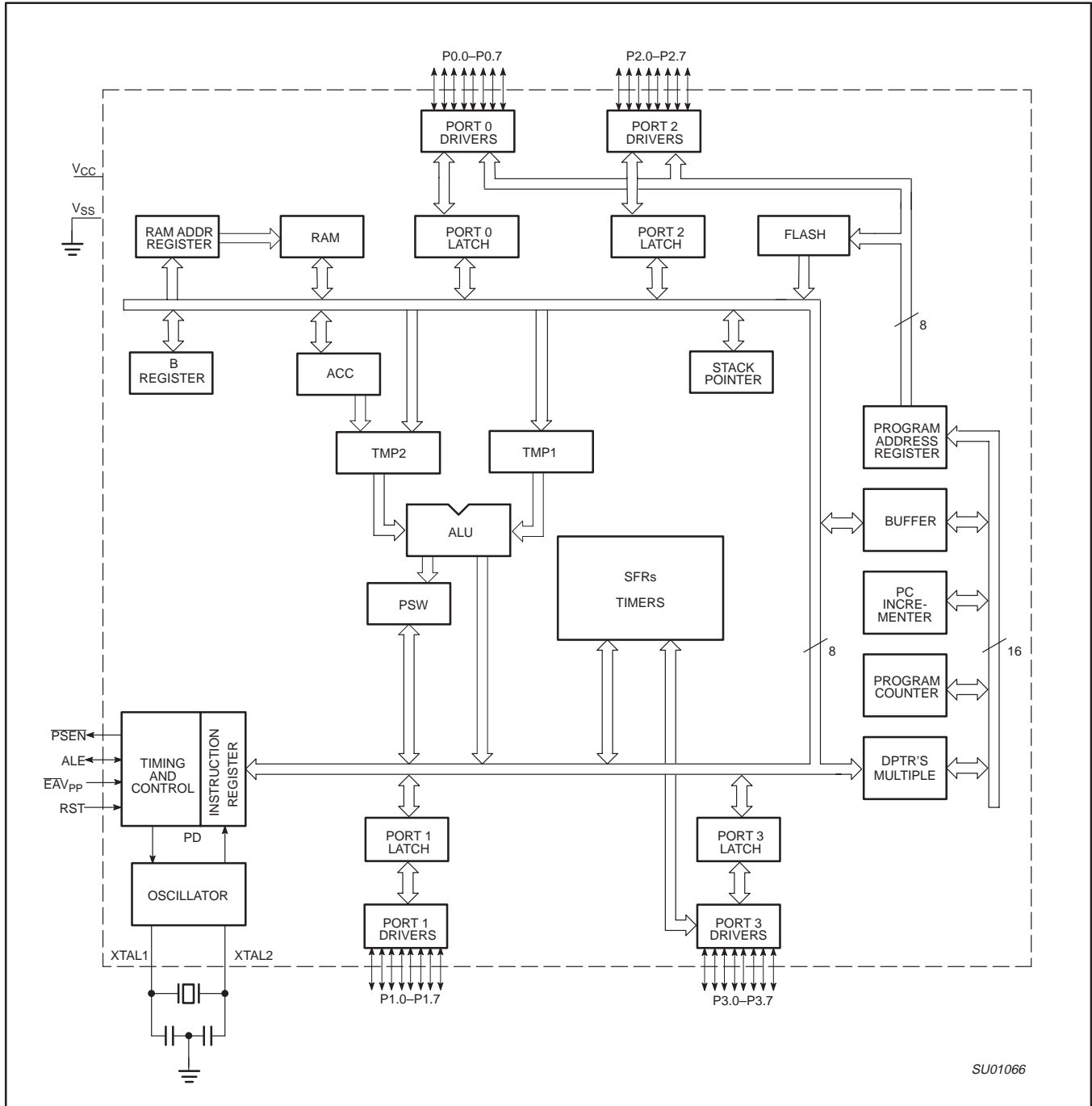
PART NUMBER DERIVATION

Device number (P89C5x)	Temperature range	Package
P89C51	B = 0 °C to 70 °C	BD = LQFP
P89C52	F = -40 °C to 85 °C	A = PLCC
P89C54		P = PDIP
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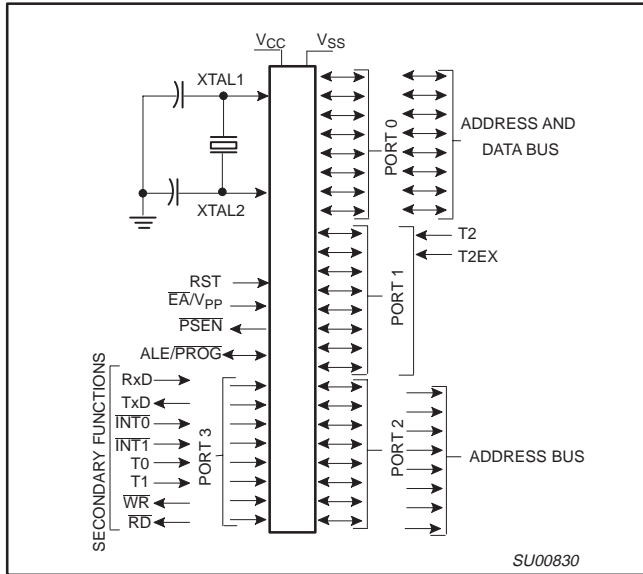
BLOCK DIAGRAM



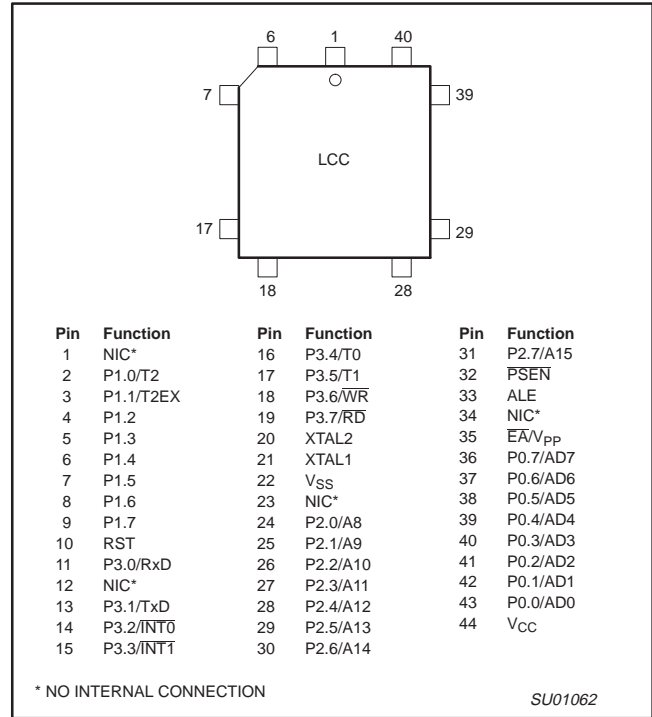
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LOGIC SYMBOL

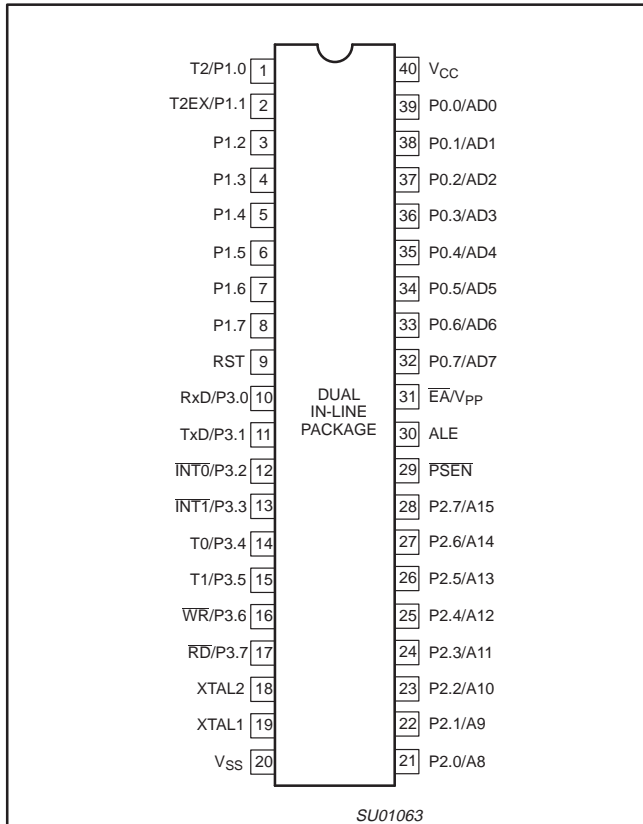


Ceramic and Plastic Leaded Chip Carrier Pin Functions

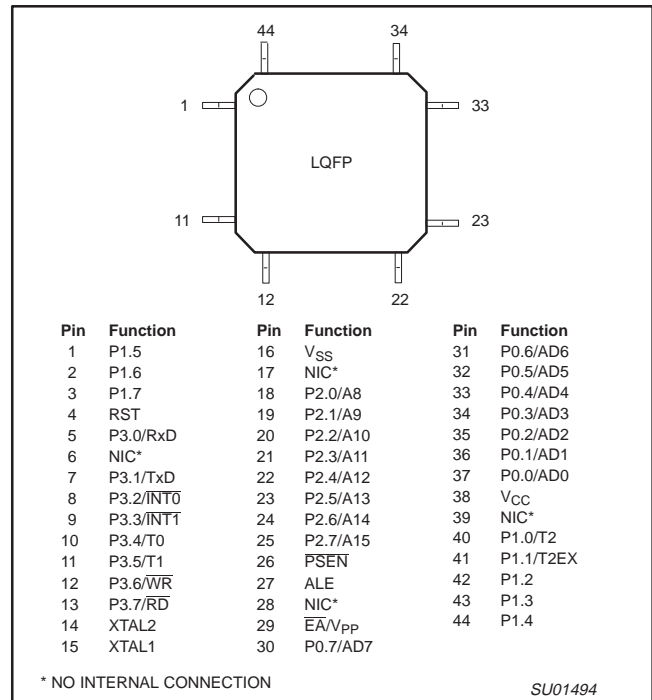


PIN CONFIGURATIONS

Dual In-Line Package Pin Functions



Low Profile Quad Flat Pack Pin Functions

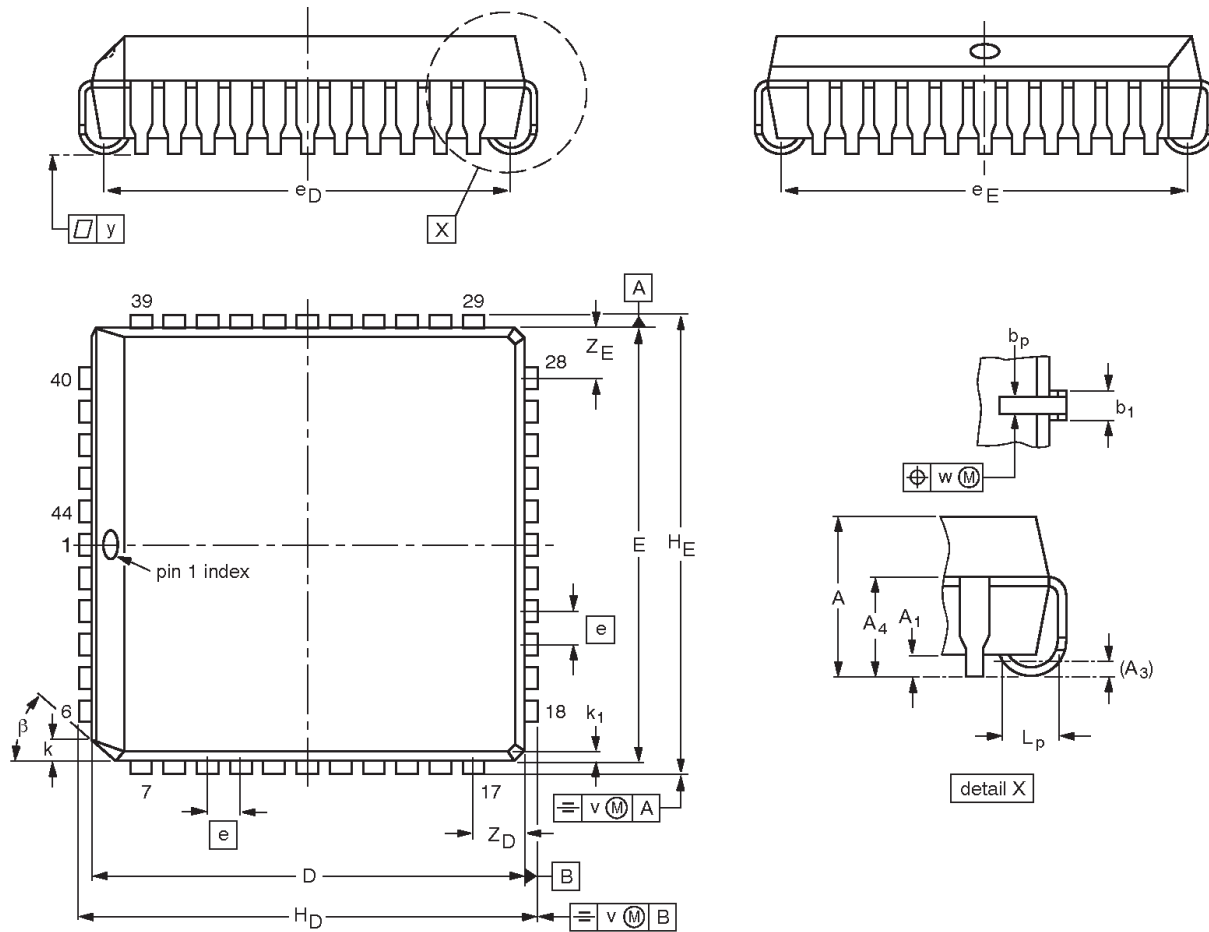


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PLCC44: plastic leaded chip carrier; 44 leads

SOT187-2



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	A ₁ min.	A ₃	A ₄ max.	b _p	b ₁	D ⁽¹⁾	E ⁽¹⁾	e	e _D	e _E	H _D	H _E	k	k ₁ max.	L _p	v	w	y	Z _D ⁽¹⁾ max.	Z _E ⁽¹⁾ max.	β
mm	4.57 4.19	0.51	0.25	3.05	0.53 0.33	0.81 0.66	16.66 16.51	16.66 16.51	1.27	16.00 14.99	16.00 14.99	17.65 17.40	17.65 17.40	1.22 1.07	0.51	1.44 1.02	0.18	0.18	0.10	2.16	2.16	45°
inches	0.180 0.165	0.020	0.01	0.12	0.021 0.013	0.032 0.026	0.656 0.650	0.656 0.650	0.05	0.630 0.590	0.630 0.590	0.695 0.685	0.695 0.685	0.048 0.042	0.020	0.057 0.040	0.007	0.007	0.004	0.085	0.085	

Note

1. Plastic or metal protrusions of 0.01 inches maximum per side are not included.

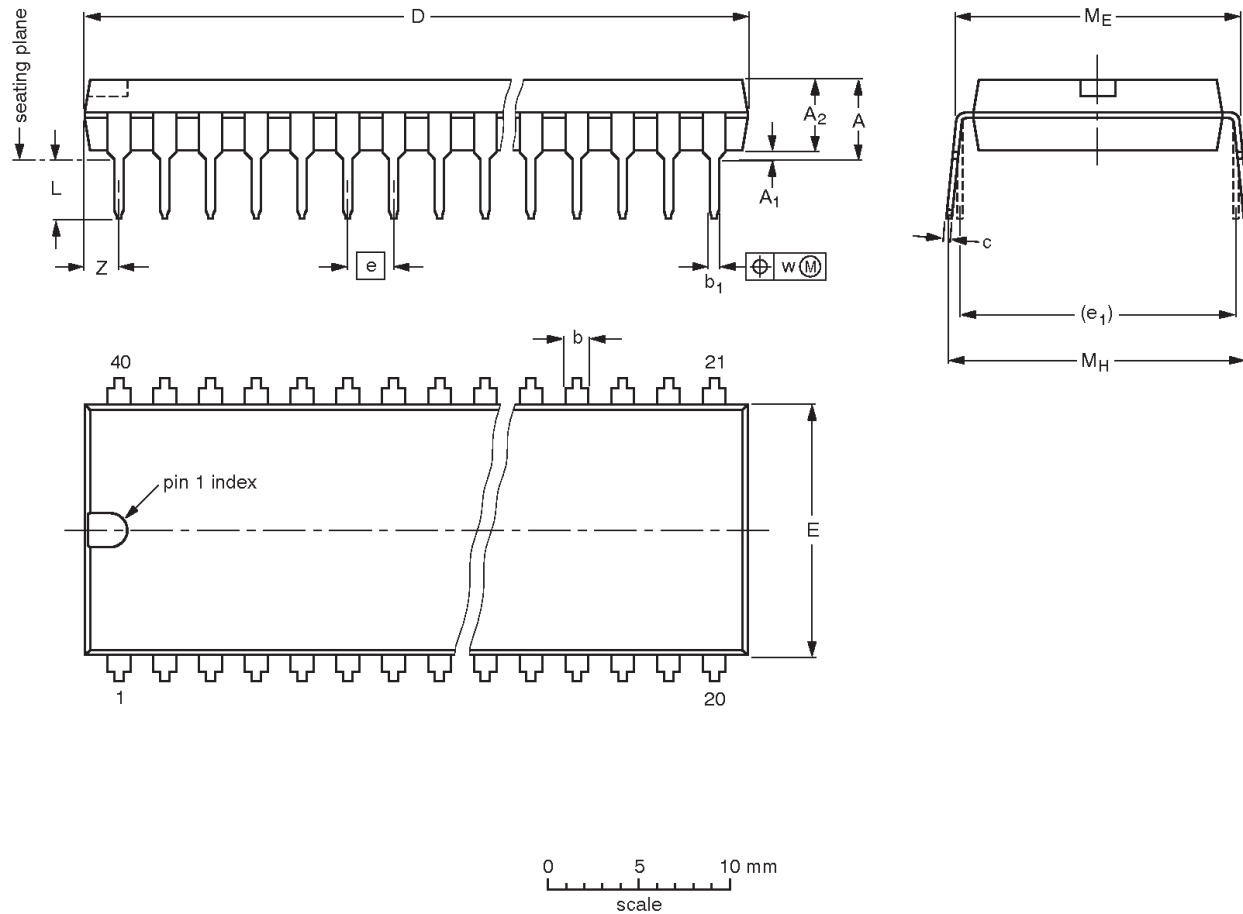
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT187-2	112E10	MO-047				97-12-16 99-12-27

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DIP40: plastic dual in-line package; 40 leads (600 mil)

SOT129-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	L	M _E	M _H	w	Z ⁽¹⁾ max.
mm	4.7	0.51	4.0	1.70 1.14	0.53 0.38	0.36 0.23	52.50 51.50	14.1 13.7	2.54	15.24	3.60 3.05	15.80 15.24	17.42 15.90	0.254	2.25
inches	0.19	0.020	0.16	0.067 0.045	0.021 0.015	0.014 0.009	2.067 2.028	0.56 0.54	0.10	0.60	0.14 0.12	0.62 0.60	0.69 0.63	0.01	0.089

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

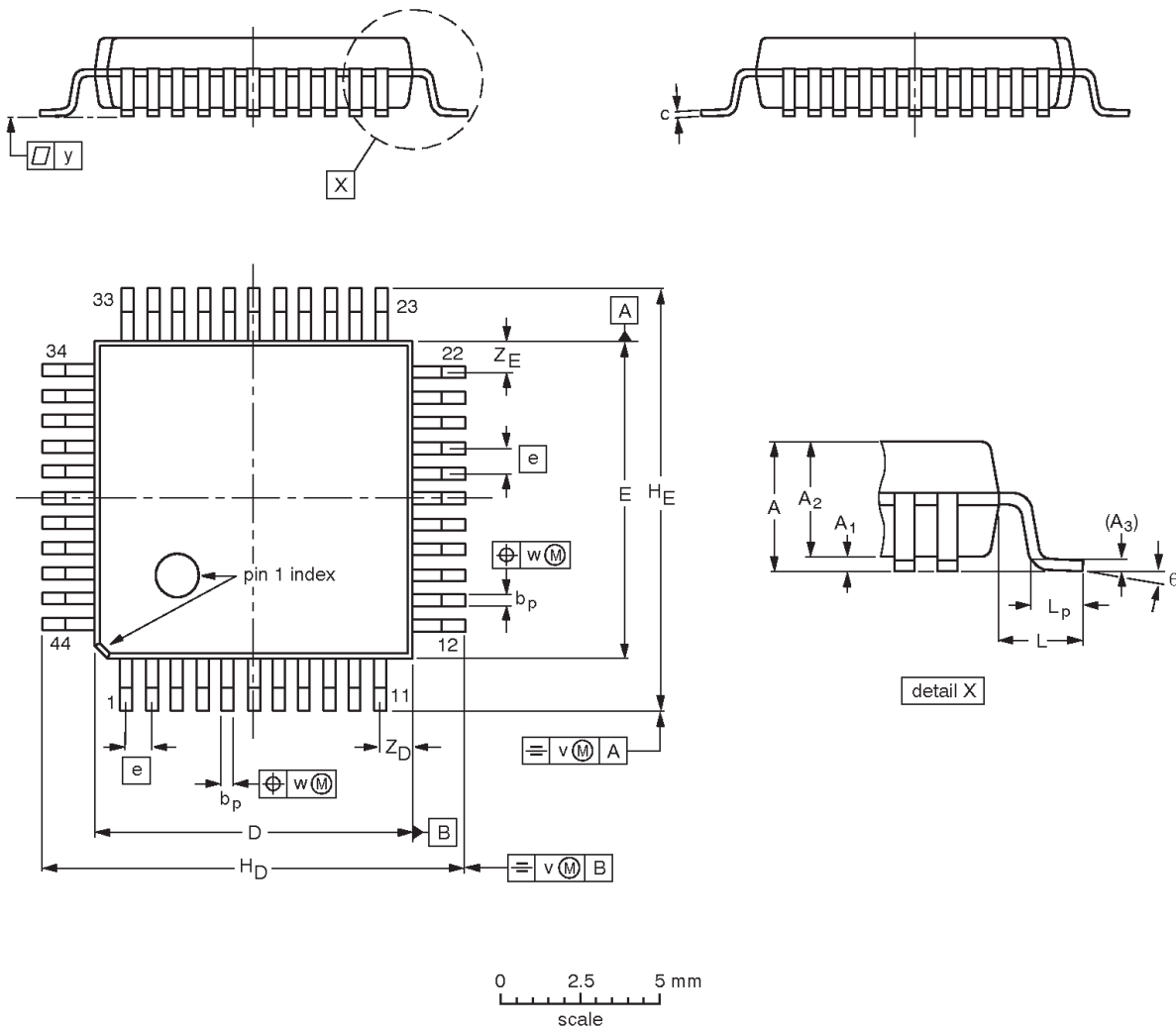
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT129-1	051G08	MO-015	SC-511-40			95-01-14 99-12-27

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LQFP44: plastic low profile quad flat package; 44 leads; body 10 x 10 x 1.4 mm

SOT389-1



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	H _D	H _E	L	L _p	v	w	y	Z _D ⁽¹⁾	Z _E ⁽¹⁾	θ
mm	1.60	0.15 0.05	1.45 1.35	0.25	0.45 0.30	0.20 0.12	10.10 9.90	10.10 9.90	0.80	12.15 11.85	12.15 11.85	1.0	0.75 0.45	0.20	0.20	0.10	1.14 0.85	1.14 0.85	7° 0°

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT389-1	136E08	MS-026				99-12-17 00-01-19

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OM4358BA**REVISION HISTORY**

Release date	Modifications to previous release
2001 Jul TBD	PROGRAMMING ALGORITHM MODIFIED due to process change (see device comparison table).
	PQFP package replaced by LQFP package (dimensions see page 31).
	Lower power consumption due to process change.
	DEVICE COMPARISON TABLE inserted.
	Selection Table for Flash devices updated and extended.
	Ordering information table updated.
	Erase and program cycles increased from 100 to 10,000.
1999 Oct 27	Combined data sheet for all four parts (89C51/52/54/58).

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Data sheet status

Data sheet status ^[1]	Product status ^[2]	Definitions
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

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