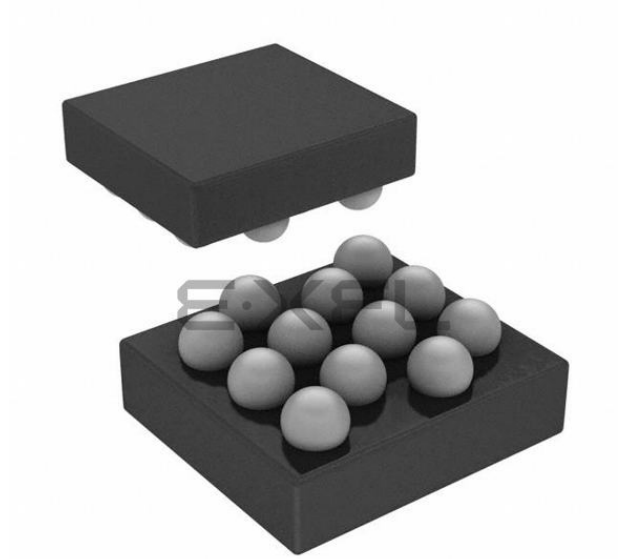

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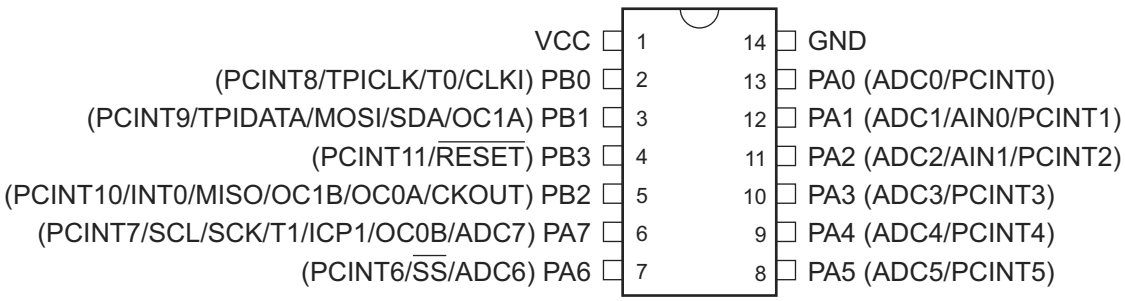
What is "Embedded - Microcontrollers"?

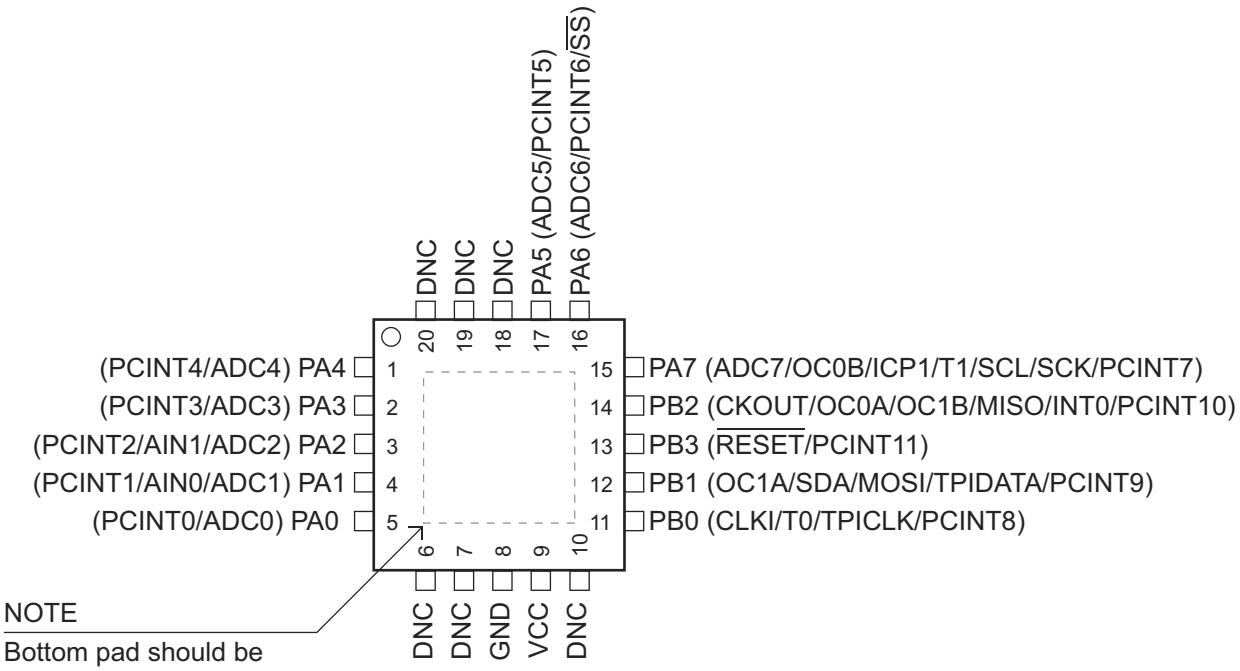
"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

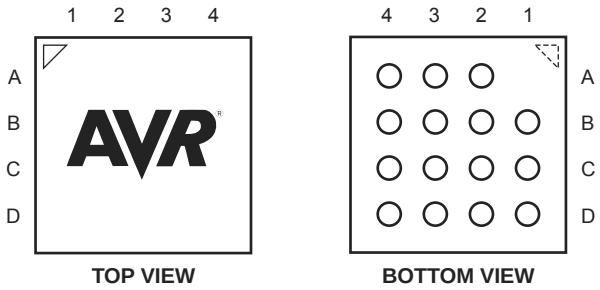
Details	
Product Status	Active
Core Processor	AVR
Core Size	8-Bit
Speed	12MHz
Connectivity	I²C, SPI
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	10
Program Memory Size	2KB (1K x 16)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	128 x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.5V
Data Converters	A/D 8x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	12-UFBGA, WLCSP
Supplier Device Package	12-WLCSP (1.56x1.4)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/attiny20-uur

Features

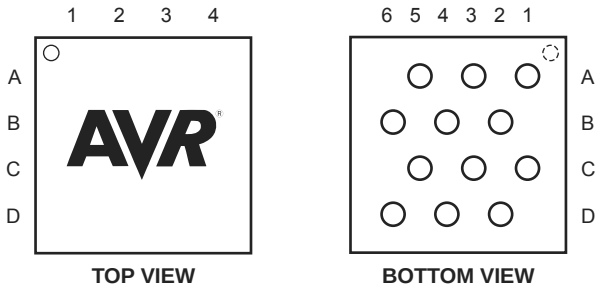




NOTE
Bottom pad should be soldered to ground.
DNC: Do Not Connect



	1	2	3	4
A		PA5	PA6	PB2
B	PA4	PA7	PB1	PB3
C	PA3	PA2	PA1	PB0
D	PA0	GND	GND	VCC

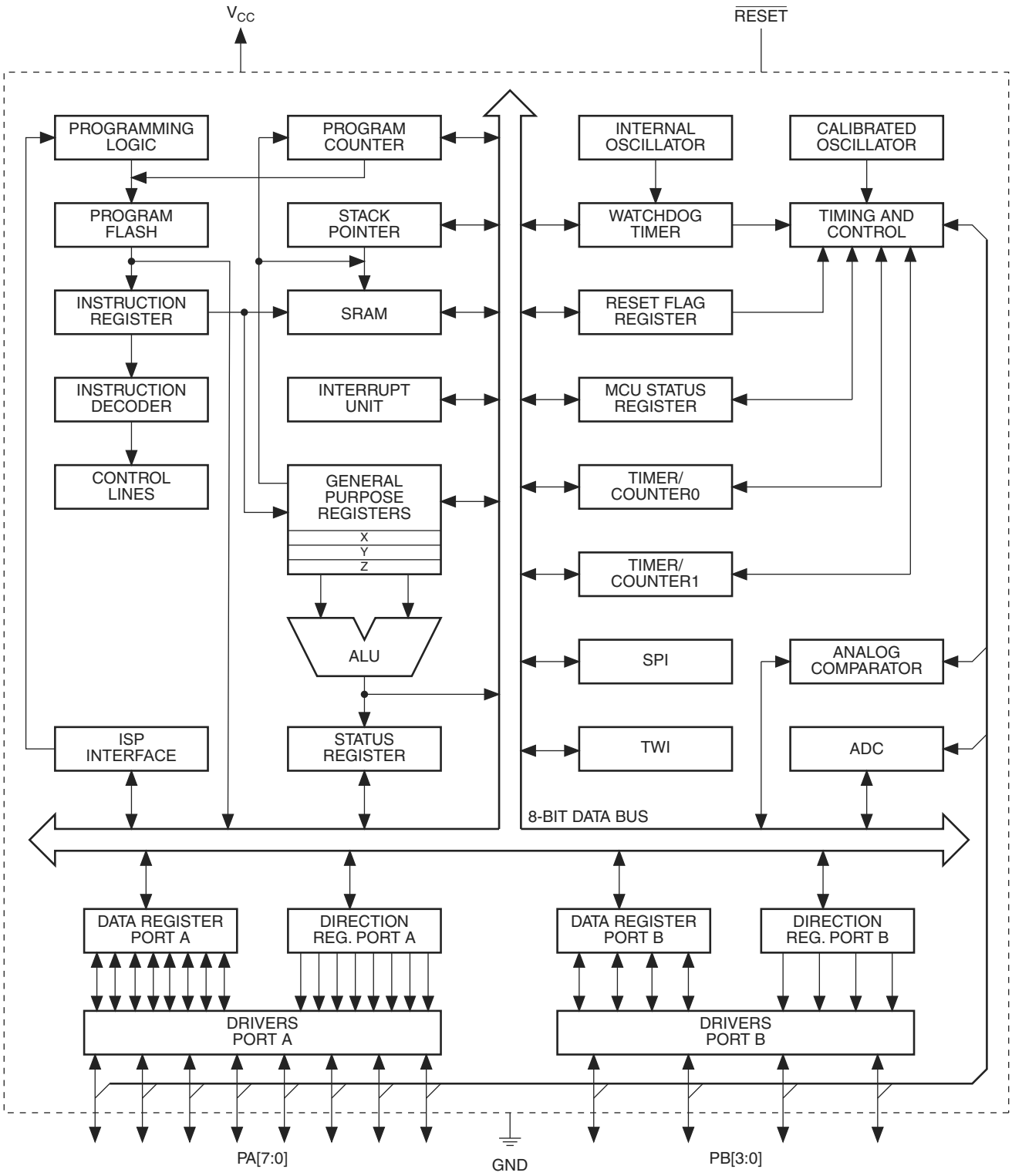


	1	2	3	4	5	6
A	PA4		PA1		PA2	
B		PA6		GND		VDD
C	PA5		PA7		PB1	
D		PB2		PB3		PB0

Table 20-4 on page 170

“Alternate Port Functions” on page 47

page 37


VCC
RESET
PROGRAMMING LOGIC
PROGRAM COUNTER
INTERNAL OSCILLATOR
CALIBRATED OSCILLATOR
PROGRAM FLASH
STACK POINTER
WATCHDOG TIMER
TIMING AND CONTROL
INSTRUCTION REGISTER
SRAM
RESET FLAG REGISTER
INSTRUCTION DECODER
INTERRUPT UNIT
MCU STATUS REGISTER
CONTROL LINES
GENERAL PURPOSE REGISTERS
X
Y
Z
TIMER/ COUNTER0
TIMER/ COUNTER1
ALU
SPI
ANALOG COMPARATOR
ISP INTERFACE
STATUS REGISTER
TWI
ADC
8-BIT DATA BUS
DATA REGISTER PORT A
DIRECTION REG. PORT A
DATA REGISTER PORT B
DIRECTION REG. PORT B
DRIVERS PORT A
DRIVERS PORT B
PA[7:0]
GND
PB[3:0]

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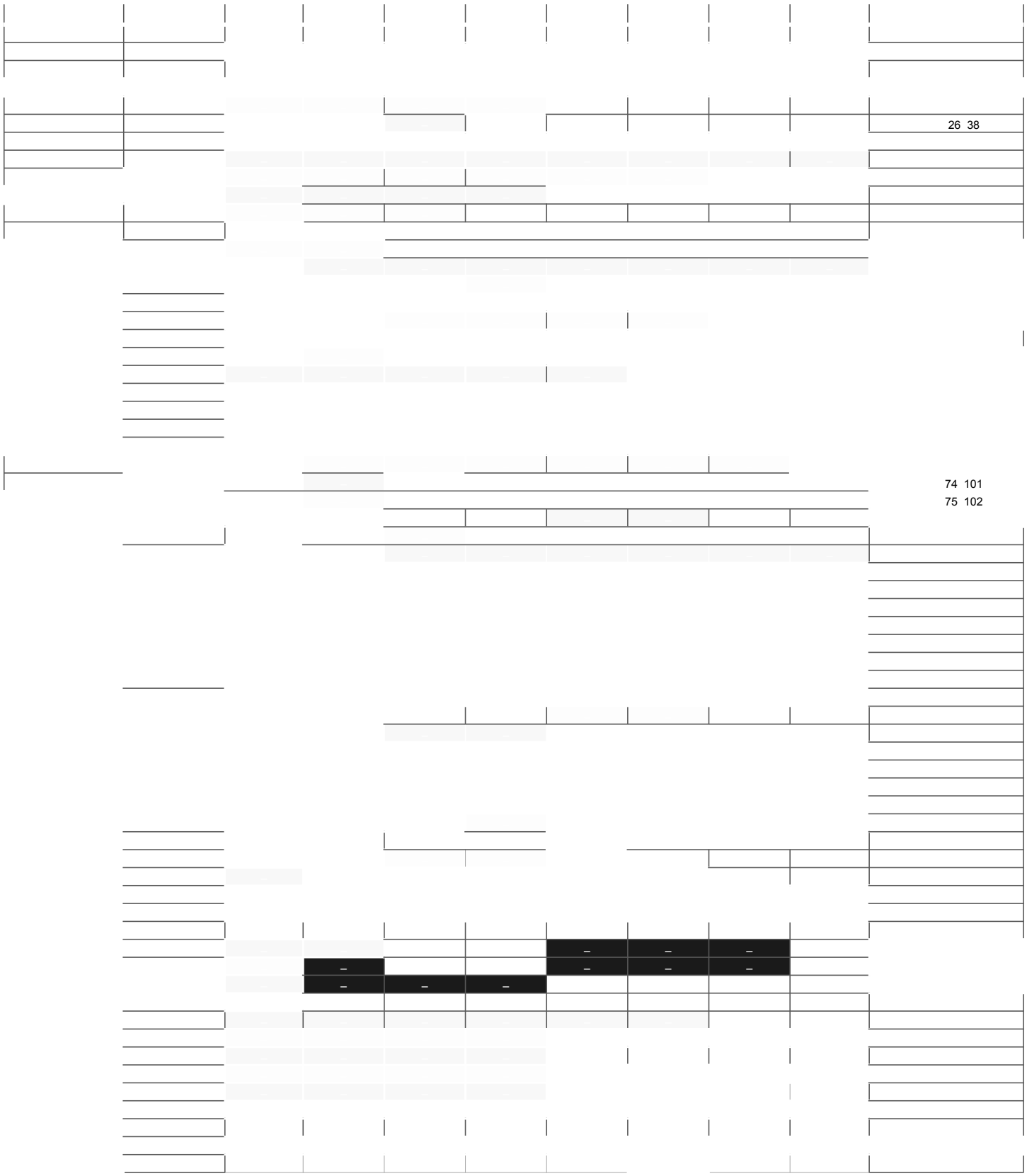

26 38
74 101
75 102

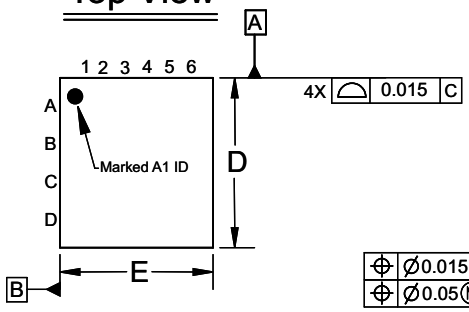
Speed	Supply Voltage	Temperature Range	Package [2]	Ordering Code [1]
12 MHz	1.8 – 5.5V	Industrial (-40°C to +85°C) [4]	12U-1	ATtiny20-UUR
			14S1	ATtiny20-SSU
				ATtiny20-SSUR
			14X	ATtiny20-XU
				ATtiny20-XUR
			15CC1	ATtiny20-CCU
				ATtiny20-CCUR
			20M2	ATtiny20-MMH [3]
				ATtiny20-MMHR [3]

-
-
-

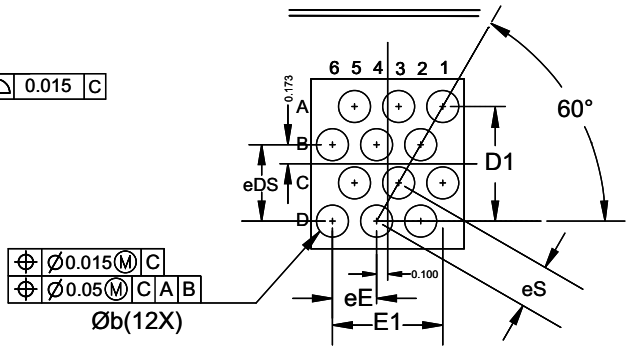
-
-

Package Type	
12U-1	12-ball 1.540 x 1.388mm Body, 0.433 mm thick, 0.40 mm Pitch (3x4 Staggered Array), WLCSP
14S1	14-lead, 0.150" Wide Body, Plastic Gull Wing Small Outline Package (SOIC)
14X	14-lead, 4.4 mm Body, Thin Shrink Small Outline Package (TSSOP)
15CC1	15-ball (4 x 4 Array), 0.65 mm Pitch, 3.0 x 3.0 x 0.6 mm, Ultra Thin Fine-Pitch Ball Grid Array Package (UFBGA)
20M2	20-pad, 3 x 3 x 0.85 mm Body, Very Thin Quad Flat No Lead Package (VQFN)

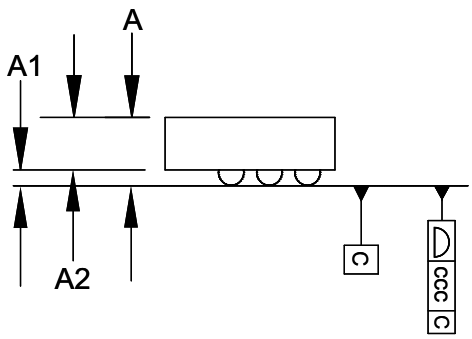
Top View



Bottom view



Side View



Note 1: Dimension "b" is measured at the maximum ball dia. in a plane parallel to seating plane.

Note 2: "CCC" applied to whole wafer.

COMMON DIMENSIONS
(UNIT OF MEASURE=MM)

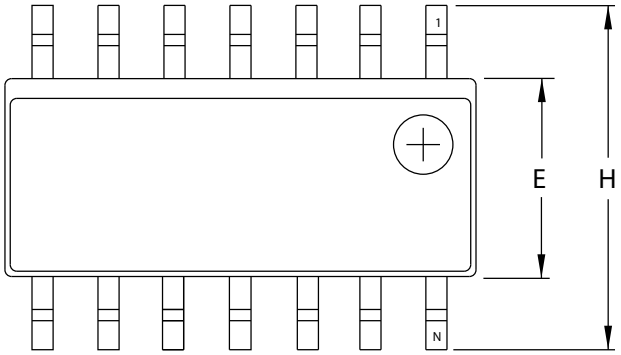
SYMBOL	MIN	NOM	MAX	NOTE
A	-	-	0.538	
A1	0.164	-	-	
A2	0.280	0.305	0.330	
b	0.239	0.269	0.299	1
D(MAX)	1.555			
D1	1.039 BSC			
E(MAX)	1.403			
E1	1.000 BSC			
eDS	0.693 BSC			
eE	0.400 BSC			
eS	0.400 BSC			
ccc	0.075			2

Pin Assignment Matrix

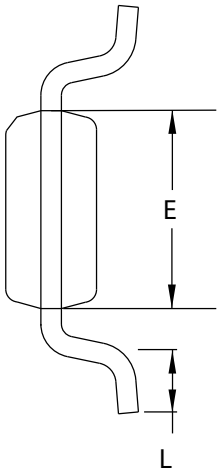
	1	2	3	4	5	6
A	PA4		PA1		PA2	
B		PA6		GND		VDD
C	PA5		PA7		PB1	
D		PB2		PB3		PB0

11/16/12

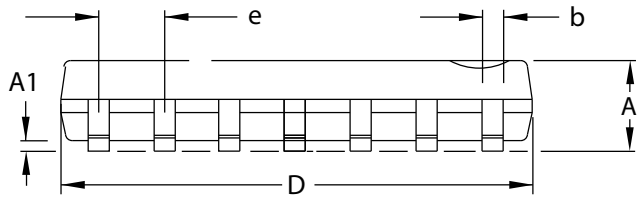
Atmel Package Drawing Contact: packagedrawings@atmel.com	**TITLE** **12U-3**, 12-ball 1.555 x 1.403mm Body, 0.538 mm thick, 0.40 mm Pitch (4x6 Staggered Array), WLCSP (354A0)	**GPC** GGF	**DRAWING NO.** 12U-3	**REV.** A



Top View



End View



Side View

COMMON DIMENSIONS
(Unit of Measure = mm/inches)

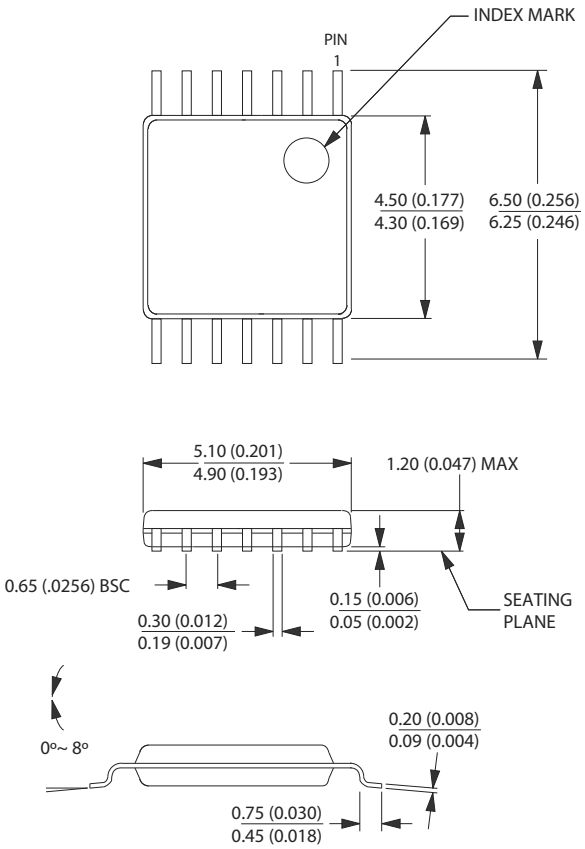
SYMBOL	MIN	NOM	MAX	NOTE
A	1.35/0.0532	–	1.75/0.0688	
A1	0.1/.0040	–	0.25/0.0098	
b	0.33/0.0130	–	0.5/0.0200 5	
D	8.55/0.3367	–	8.74/0.34442	
E	3.8/0.1497	–	3.99/0.15743	
H	5.8/0.2284	–	6.19/0.2440	
L	0.41/0.0160	–	1.27/0.05004	
e	1.27/0.050 BSC			

Notes:
1. This drawing is for general information only; refer to JEDEC Drawing MS-012, Variation AB for additional information.
2. Dimension D does not include mold Flash, protrusions or gate burrs. Mold Flash, protrusion and gate burrs shall not exceed 0.15 mm (0.006") per side.
3. Dimension E does not include inter-lead Flash or protrusion. Inter-lead flash and protrusions shall not exceed 0.25 mm (0.010") per side.
4. L is the length of the terminal for soldering to a substrate.
5. The lead width B, as measured 0.36 mm (0.014") or greater above the seating plane, shall not exceed a maximum value of 0.61 mm (0.024") per side.

2/5/02

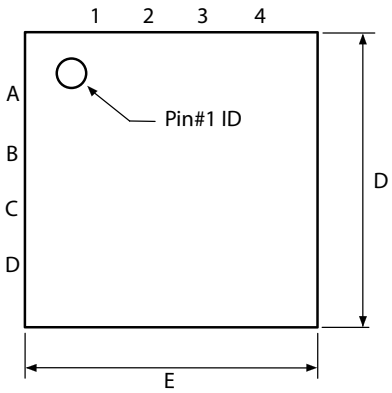
Atmel	Package Drawing Contact: packagedrawings@atmel.com	TITLE	DRAWING NO.	REV.
		14S1, 14-lead, 0.150" Wide Body, Plastic Gull Wing Small Outline Package (SOIC)	14S1	A

Dimensions in Millimeters and (Inches).
Controlling dimension: Millimeters.
JEDEC Standard MO-153 AB-1.

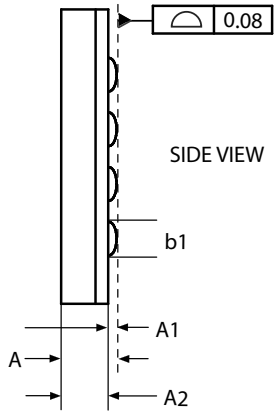


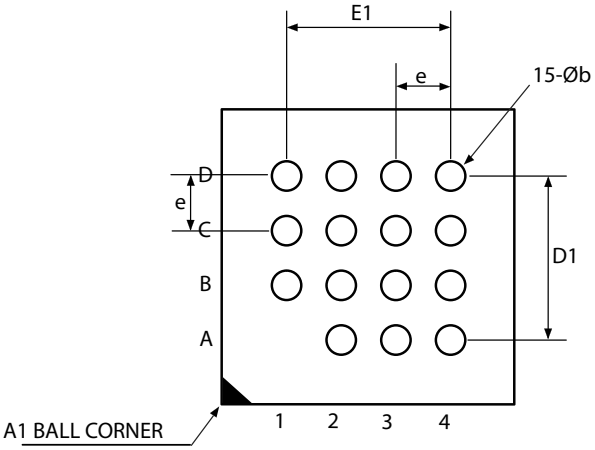
05/16/01

Atmel	Package Drawing Contact: packagedrawings@atmel.com	TITLE 14X (Formerly "14T") , 14-lead (4.4 mm Body) Thin Shrink Small Outline Package (TSSOP)	DRAWING NO. . 14X	REV. . B



TOP VIEW





BOTTOM VIEW

COMMON DIMENSIONS
(Unit of Measure = mm)

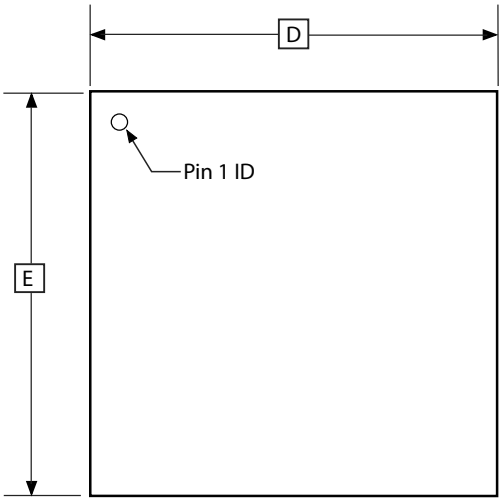
SYMBOL	MIN	NOM	MAX	NOTE
A	–	–	0.60	
A1	0.12	–	–	
A2		0.38 REF		
b	0.25	0.30	0.35	1
b1	0.25	–	–	2
D	2.90	3.00	3.10	
D1		1.95 BSC		
E2.90	3.00	3.10		
E1		1.95 BSC		
e	0.65 BSC			

Note1: Dimension "b" is measured at the maximum ball dia. in a plane parallel to the seating plane.

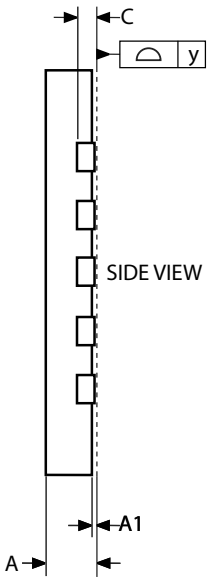
Note2: Dimension "b1" is the solderable surface defined by the opening of the solder resist layer.

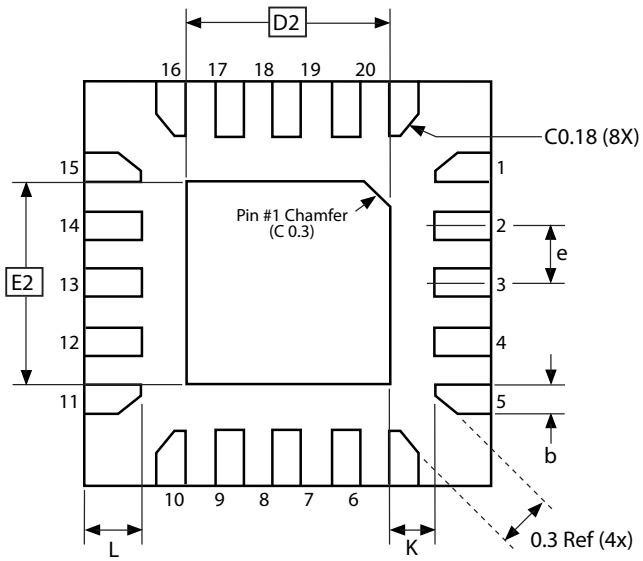
07/06/10

Atmel Package Drawing Contact: packagedrawings@atmel.com	TITLE	GPC	DRAWING NO.	REV.
	15CC1, 15-ball (4 x 4 Array), 3.0 x 3.0 x 0.6 mm package, ball pitch 0.65 mm, Ultra thin, Fine-Pitch Ball Grid Array Package (UFBGA)	CBC	15CC1	C



TOP VIEW





BOTTOM VIEW

COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	0.75	0.80	0.85	
A1	0.00	0.02	0.05	
b	0.17	0.22	0.27	
C	0.152			
D	2.90	3.00	3.10	
D2	1.40	1.55	1.70	
E 2.90	3.00	3.10		
E2	1.40	1.55	1.70	
e	–	0.45	–	
L	0.35	0.40	0.45	
K 0.20	–	–		
y	0.00	–	0.08	

10/24/08

Atmel Package Drawing Contact: packagedrawings@atmel.com	TITLE 20M2, 20-pad, 3 x 3 x 0.85 mm Body, Lead Pitch 0.45 mm, 1.55 x 1.55 mm Exposed Pad, Thermally Enhanced Plastic Very Thin Quad Flat No Lead Package (VQFN)	GPC ZFC	DRAWING NO. 20M2	REV. B

Revision	Date	Comments
8235F	09/2014	Changed text in Section 7.1 from 12U-1 to 12U-3. Updated back page.
8235E	03/13	Updated WLCSP ball configuration on page 3. Updated WLCSP package drawing, “12U-3” on page 13
8235D	10/12	Updated Document template, and “Pin Configurations” on page 2
8235C	06/12	Updated “Ordering Information” on page 12. Added Wafer Level Chip Scale Package “12U-3” on page 13.
8235B	04/11	Removed Preliminary status. Updated Bit syntax throughout the datasheet, e.g. from CS02:0 to CS0[2:0], Idle Mode description on page 6, “Capacitive Touch Sensing” on page 7 (section updated and moved), “Disclaimer” on page 7, Sentence on low impedance sources in “Analog Input Circuitry” on page 116, Description on 16-bit registers on page 9, Description on Stack Pointer on page 10, List of active modules in “Idle Mode” on page 23, Description on reset pulse width in “Watchdog Reset” on page 30, Program code on page 37, Bit description in Figure 11-3 on page 62, Section “Compare Output Mode and Waveform Generation” on page 63, Signal descriptions in Figure 11-5 on page 64 and Figure 11-7 on page 67, Equations on page 65 page 66, and page 67, Terminology in sections describing extreme values on page 66, and page 67, Description on creating frequency waveforms on page 67, Signal routing in Figure 12-1 on page 76, TOP definition in Table 12-1 on page 77, Signal names in Figure 12-3 on page 79, TWSHE bit description in “TWSCRA – TWI Slave Control Register A” on page 143, SPI slave assembly code example on page 129, Table 21-1 on page 174, Section “Speed” on page 168, Characteristics in Figure 21-3 on page 176, and Figure 21-8 on page 179. Added Note on internal voltage reference in Table 15-4 on page 121, PRADC in Table 21-2 on page 175, MISO output driver errata for device rev. A in “Errata” on page 18
8235A	03/10	Initial revision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