
ATtiny417 / ATtiny814 / ATtiny816 / ATtiny817

DATASHEET PRELIMINARY SUMMARY

Introduction

The Atmel® ATtiny417/814/816/817 microcontrollers are using the 8-bit AVR® processor with hardware multiplier, running at up to 20MHz, with up to 4/8KB Flash, 256/512 bytes of SRAM and 128 bytes of EEPROM in a 14-, 20- or 24-pin package. The series uses the latest technologies from Atmel with a flexible and low power architecture including Event System and SleepWalking, accurate analog features and advanced peripherals. Capacitive touch interfaces with driven shield are supported with the integrated QTouch® peripheral touch controller.

Features

- CPU
 - Atmel® AVR® 8-bit CPU
 - Running at up to 20MHz
 - Single Cycle I/O Access
 - Two-level Interrupt Controller
 - Two-cycle Hardware Multiplier
- Memories
 - 4/8KB In-system self-programmable Flash Memory
 - 128B EEPROM
 - 256/512B SRAM
- System
 - Power-on Reset (POR)
 - Brown-out Detection (BOD)
 - Clock Options:
 - 16/20MHz Low Power Internal RC Oscillator with:
 - ±3% Accuracy over Full Temp and Voltage Range
 - ±2% Drift over Limited Temp and 1.8 ... 3.6V Voltage Range
 - 32.768kHz Ultra Low Power (ULP) Internal RC Oscillator with ±10% Accuracy, ±2% Calibration Step Size
 - 32.768kHz External Crystal Oscillator

- External Clock Input
- Single Pin Unified Program Debug Interface (UPDI)
- Three Sleep Modes:
 - Idle with All Peripherals Running and Mode for Immediate Wake Up Time
 - Standby
 - Configurable Operation of Selected Peripherals
 - SleepWalking Peripherals
 - Power Down with Wake-up Functionality
- Peripherals
 - One 16-bit Timer/Counter Type A with Dedicated Period Register, Three Compare Channels (TCA)
 - One 16-bit Timer/Counter type B with Input Capture (TCB)
 - One 12-bit Timer/Counter type D Optimized for Control Applications (TCD)
 - One 16-bit Real Time Counter (RTC) Running from External Crystal or Internal RC Oscillator
 - One USART with Fractional Baud Rate Generator, Auto-baud, and Start-of-frame Detection
 - Master/Slave Serial Peripheral Interface (SPI)
 - Master/Slave TWI with Dual Address Match
 - Standard Mode (Sm, 100kHz)
 - Fast Mode (Fm, 400kHz)
 - Fast Mode Plus (Fm+, 1MHz)
 - Configurable Custom Logic (CCL) with Two Programmable Lookup Tables (LUT)
 - Analog Comparator (AC) with Fast Propagation Delay
 - 10-bit 115ksps Analog to Digital Converter (ADC)
 - 8-bit Digital to Analog Converter (DAC)
 - Five Selectable Internal Voltage References: 0.55V, 1.1V, 1.5V, 2.5V and 4.3V
 - Automated CRC Memory Scan
 - Watchdog Timer (WDT) with Window Mode, with Separate On-chip Oscillator
 - Peripheral Touch Controller (PTC)⁽¹⁾
 - Capacitive Touch Buttons, Sliders and Wheels
 - Wake-up on Touch
 - Driven Shield for Improved Moisture and Noise Handling Performance
 - Six Self-capacitance and Nine Mutual-capacitance Channels
 - External Interrupt on All General Purpose Pins
- I/O and Packages:
 - 12 to 22 Programmable I/O Lines
 - 14-pin SOIC150
 - 20-pin QFN 3x3 and SOIC300
 - 24-pin QFN 4x4
- Temperature Ranges:
 - -40°C to 105°C
 - -40°C to 125°C Temperature Graded Device Options Available
- Speed Grades:
 - 0-5MHz @ 1.8V – 5.5V
 - 0-10MHz @ 2.7V – 5.5V

- 0-20MHz @ 4.5V – 5.5V

Note:

1. Only Available in Devices with 8KB Flash.

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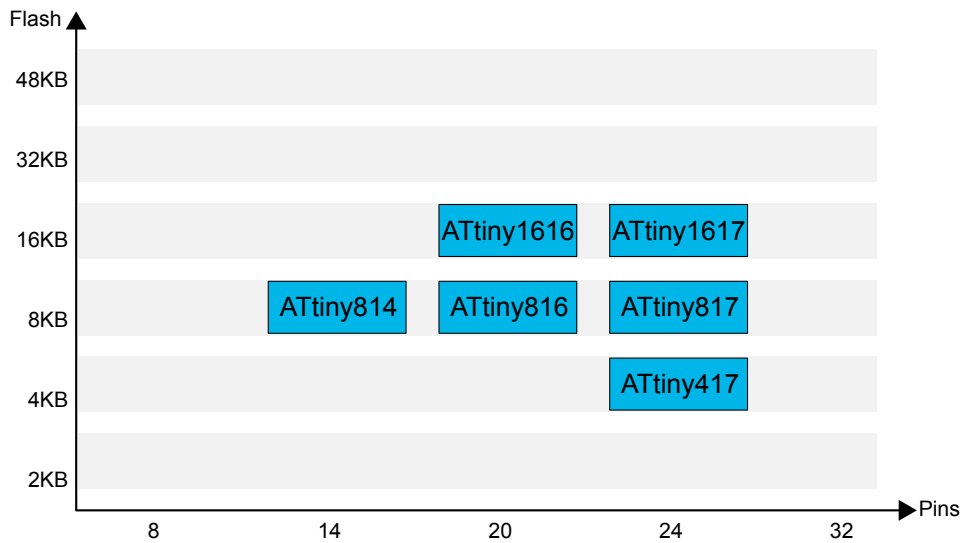
1. ATtiny Device Family Overview

Figure 1-1 shows the feature compatible devices in the ATtiny device family, including pin out variants and memory variants.

Migration within the vertical direction can be done without modifications to the code, as these devices are fully pin and feature compatible.

Migration in the horizontal direction will introduce a change in pin count and therefore also in the available features. The peripherals are however fully compatible in the horizontal direction as well, it is just a matter of how many instances of the peripherals are present in a device with more or less pins.

Figure 1-1. Device Family Overview

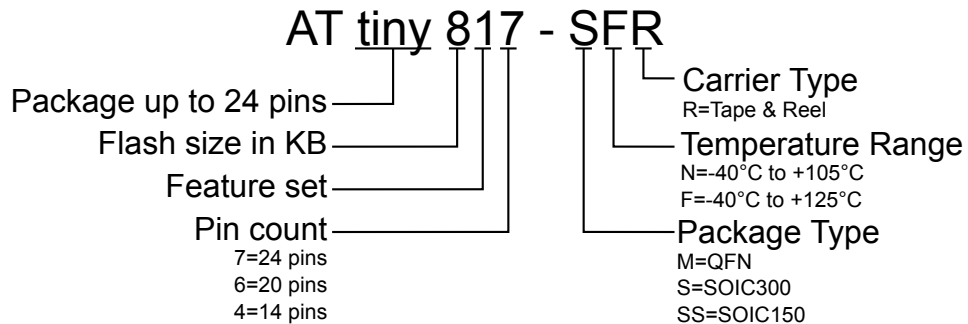


The fully compatible variants of the ATtiny devices, that is the vertical migration option in Figure 1-1, come with both smaller and larger Flash memories.

Devices with different Flash memory size typically also have different SRAM and EEPROM.

The name of a device of the ATtiny family contains information as depicted below:

Figure 1-2. ATtiny Device Designations



1.1 Configuration Summary

1.1.1 Peripheral Summary

Table 1-1. Peripheral Summary

	ATtiny417	ATtiny814	ATtiny816	ATtiny817
Pins	24	14	20	24
SRAM	256B	512B	512B	512B
Flash	4KB	8KB	8KB	8KB
EEPROM	128B	128B	128B	128B
Max. frequency (MHz)	20	20	20	20
16-bit Timer/Counter type A (TCA)	1	1	1	1
16-bit Timer/Counter type B (TCB)	1	1	1	1
12-bit Timer/Counter type D (TCD)	1	1	1	1
Real Time Counter (RTC)	1	1	1	1
USART	1	1	1	1
SPI	1	1	1	1
TWI (I ² C)	1	1	1	1
ADC	1	1	1	1
ADC channels	12	10	12	12

	ATtiny417	ATtiny814	ATtiny816	ATtiny817
DAC	1	1	1	1
AC	1	1	1	1
AC inputs	2p/2n	1p/1n	2p/2n	2p/2n
Peripheral Touch Controller (PTC) ⁽¹⁾	No	Yes ⁽²⁾	Yes ⁽²⁾	Yes ⁽²⁾
PTC number of self-capacitance channels ⁽¹⁾	-	6	6	6
PTC number of mutual-capacitance channels ⁽¹⁾	-	9	9	9
Custom Logic	1	1	1	1
Window Watchdog	1	1	1	1
Event System channels	6	6	6	6
General purpose I/O	22	12	18	22
External interrupts	22	12	18	22
CRCSCAN	1	1	1	1

Note:

1. The PTC takes control over the ADC while the PTC is used.
2. PTC is only available in devices with 8KB Flash (ATtiny817, ATtiny816 and ATtiny814).

2. Ordering Information

2.1 ATtiny41x

Table 2-1. ATtiny417 Ordering Codes

Ordering Code ⁽¹⁾	Flash	Package Type (GPC)	Leads	Power Supply	Operational Range	Carrier Type
ATtiny417-MNR	4KB	QFN 4x4 (ZHA)	24	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny417-MFR	4KB	QFN 4x4 (ZHA)	24	1.8V - 5.5V	Industrial (-40°C +125°C)	Tape & Reel

1. Pb-free packaging complies to the European Directive for Restriction of Hazardous Substances (RoHS directive). Also Halide free and fully Green.

2.2 ATtiny81x

Table 2-2. ATtiny814 Ordering Codes

Ordering Code ⁽¹⁾	Flash	Package Type (GPC)	Leads	Power Supply	Operational Range	Carrier Type
ATtiny814-SSNR	8KB	SOIC150 (SVQ)	14	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny814-SSFR	8KB	SOIC150 (SVQ)	14	1.8V - 5.5V	Industrial (-40°C +125°C)	Tape & Reel

Table 2-3. ATtiny816 Ordering Codes

Ordering Code ⁽¹⁾	Flash	Package Type (GPC)	Leads	Power Supply	Operational Range	Carrier Type
ATtiny816-MNR	8KB	QFN 3x3 (ZCL)	20	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny816-MFR	8KB	QFN 3x3 (ZCL)	20	1.8V - 5.5V	Industrial (-40°C +125°C)	Tape & Reel
ATtiny816-SNR	8KB	SOIC300 (SRJ)	20	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny816-SFR	8KB	SOIC300 (SRJ)	20	1.8V - 5.5V	Industrial (-40°C +125°C)	Tape & Reel

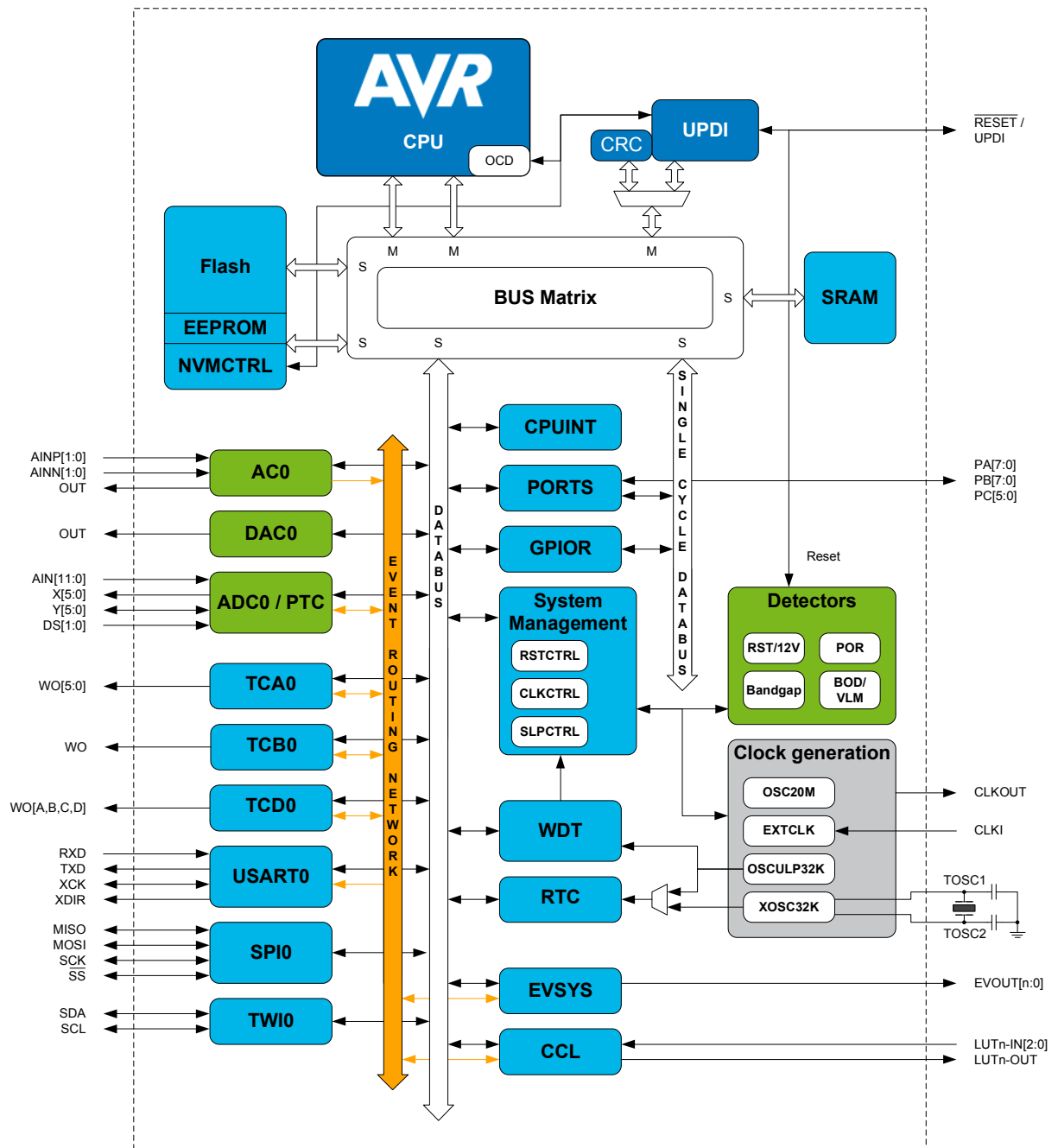
Table 2-4. ATtiny817 Ordering Codes

Ordering Code ⁽¹⁾	Flash	Package Type (GPC)	Leads	Power Supply	Operational Range	Carrier Type
ATtiny817-MNR	8KB	QFN 4x4 (ZHA)	24	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny817-MFR	8KB	QFN 4x4 (ZHA)	24	1.8V - 5.5V	Industrial (-40°C +125°C)	Tape & Reel

Note:

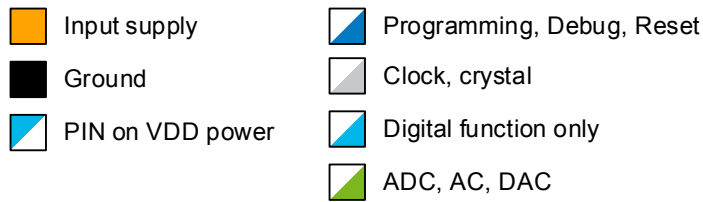
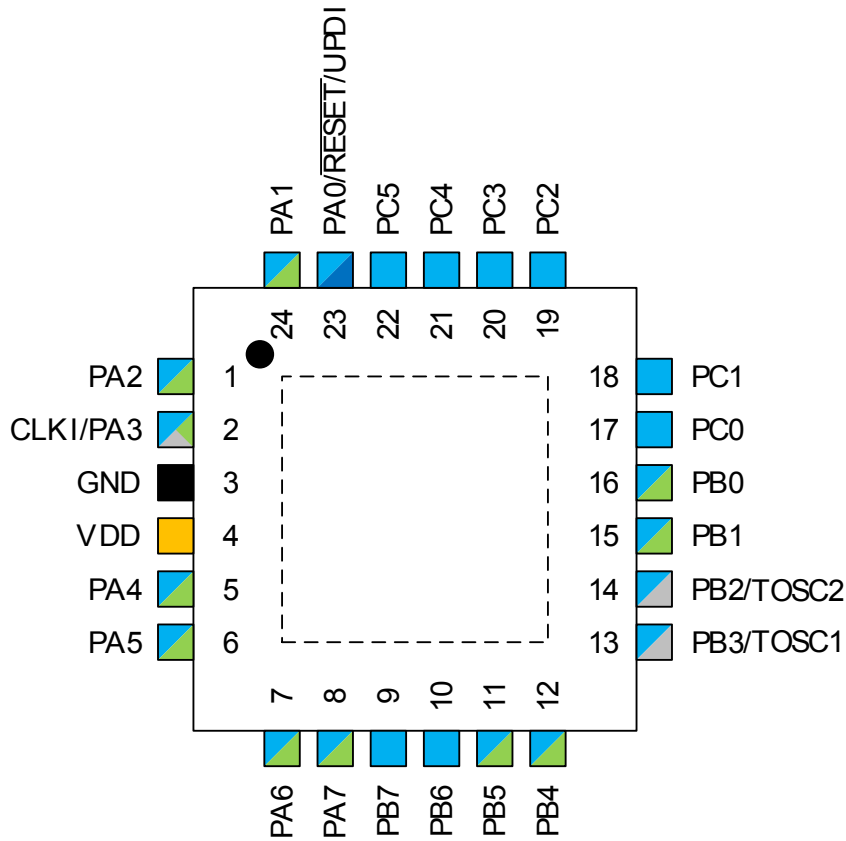
1. Pb-free packaging complies to the European Directive for Restriction of Hazardous Substances (RoHS directive). Also Halide free and fully Green.

3. Block Diagram

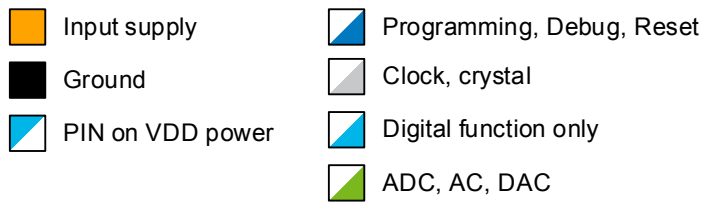
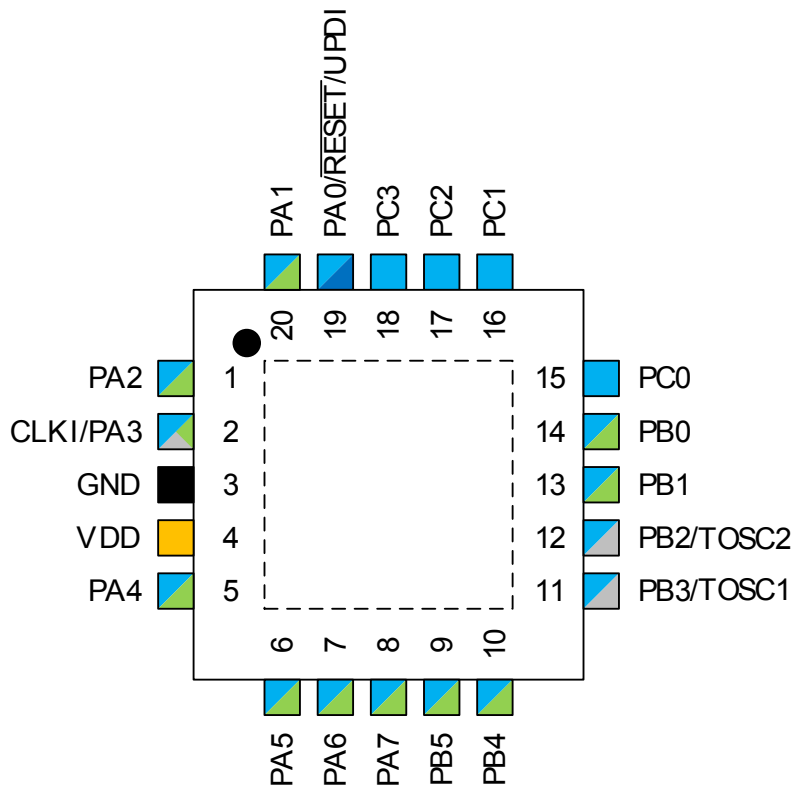


4. Pinout

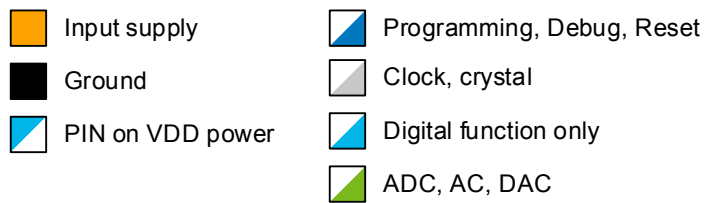
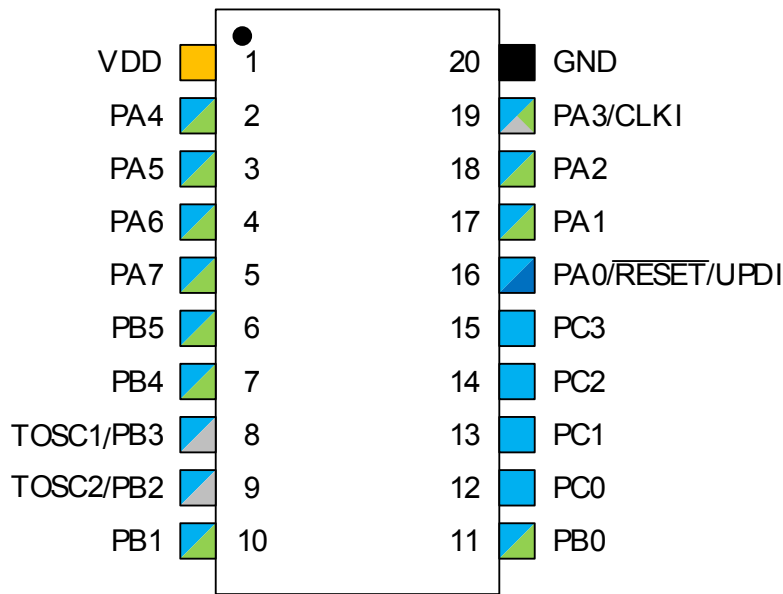
4.1 24-pin QFN



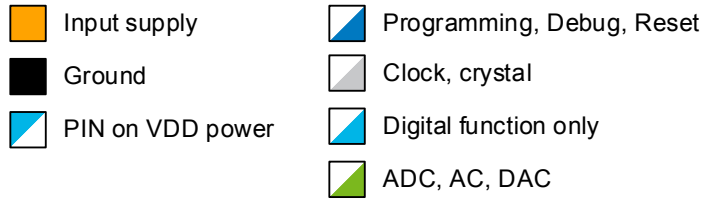
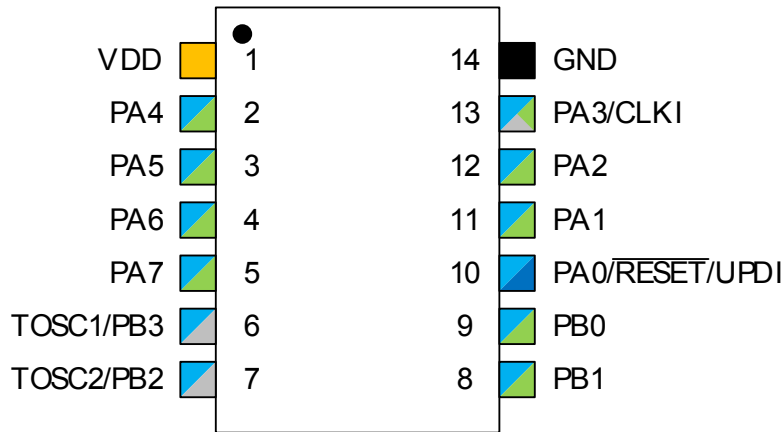
4.2 20-pin QFN



4.3 20-pin SOIC



4.4 14-pin SOIC



5. I/O Multiplexing and Considerations

5.1 Multiplexed Signals

Table 5-1. PORT Function Multiplexing

QFN 24-pin	QFN 20-pin	SOIC 20-pin	SOIC 14-pin	Pin Name ^(1,2)	Other/Special	ADC0	PTC ⁽³⁾	AC0	DAC0	USART0	SPI0	TWI0	TCA0	TCB0	TCDO	CCL
23	19	16	10	PA0	RESET UPDI	AIN0										LUT0-IN0
24	20	17	11	PA1	BREAK	AIN1				TXD	MOSI	SDA				LUT0-IN1
1	1	18	12	PA2	EVOUT0	AIN2				RxD	MISO	SCL				LUT0-IN2
2	2	19	13	PA3	CLKI	AIN3				XCK	SCK		WO3			
3	3	20	14	GND												
4	4	1	1	VDD												
5	5	2	2	PA4		AIN4	X0/Y0			XDIR	SS		WO4		WOA	LUT0-OUT
6	6	3	3	PA5		AIN5	X1/Y1	OUT					WO5	WO	WOB	
7	7	4	4	PA6		AIN6	X2/Y2	AINN0	OUT							
8	8	5	5	PA7		AIN7	X3/Y3	AINP0								LUT1-OUT
9				PB7												
10				PB6												
11	9	6		PB5	CLKOUT	AIN8		AINP1					WO2			
12	10	7		PB4		AIN9	DS1	AINN1					WO1			LUT0-OUT
13	11	8	6	PB3	TOSC1					RxD			WO0			
14	12	9	7	PB2	TOSC2, EVOUT1		DS0			TxD			WO2			
15	13	10	8	PB1		AIN10	X4/Y4			XCK		SDA	WO1			
16	14	11	9	PB0		AIN11	X5/Y5			XDIR		SCL	WO0			
17	15	12		PC0							SCK		WO		WOC	
18	16	13		PC1							MISO				WOD	LUT1-OUT
19	17	14		PC2	EVOUT2						MOSI					
20	18	15		PC3							SS		WO3			LUT1-IN0
21				PC4	BREAK								WO4			LUT1-IN1
22				PC5									WO5			LUT1-IN2

Note:

1. Pins names are of type Pxn, with x being the PORT instance (A,B) and n the pin number. Notation for signals is PORTx_PINn. All pins can be used as event input.
2. All pins can be used for external interrupt, where pins Px2 and Px6 of each port have full asynchronous detection.
3. PTC is only available in devices with 8KB Flash (ATtiny817, ATtiny816, ATtiny814). Every PTC line can be configured as X-line or Y-line.



Tip: Signals on alternative pin locations are in typewriter font.

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