



Welcome to [E-XFL.COM](https://www.e-xfl.com)

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	20MHz
Connectivity	I ² C, IrDA, LINbus, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, POR, WDT
Number of I/O	12
Program Memory Size	4KB (4K x 8)
Program Memory Type	FLASH
EEPROM Size	128 x 8
RAM Size	256 x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.5V
Data Converters	A/D 10x10b; D/A 1x8b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	14-SOIC (0.154", 3.90mm Width)
Supplier Device Package	14-SOIC
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/attiny414-ssnr



ATtiny214/414/814

AVR® Microcontroller with Core Independent Peripherals and picoPower® Technology

Introduction

The ATtiny214/414/814 microcontrollers are using the high-performance low-power AVR® RISC architecture, and is capable of running at up to 20MHz, with up to 2/4/8KB Flash, 128/256/512bytes of SRAM and 64/128bytes of EEPROM in a 14- pin package. The series uses the latest technologies 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
 - AVR® 8-bit CPU
 - Running at up to 20MHz
 - Single Cycle I/O Access
 - Two-level Interrupt Controller
 - Two-cycle Hardware Multiplier
- Memories
 - 2/4/8KB In-system self-programmable Flash Memory
 - 64/128B EEPROM
 - 128/256/512B SRAM
- System
 - Power-on Reset (POR)
 - Brown-out Detection (BOD)
 - Clock Options:
 - 16/20MHz Low Power Internal RC Oscillator
 - 32.768kHz Ultra Low Power (ULP) Internal RC Oscillator
 - 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
 - 6-channel Event System
 - 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 Low 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 Programmable I/O Lines
 - 14-pin SOIC150
- 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.

Table of Contents

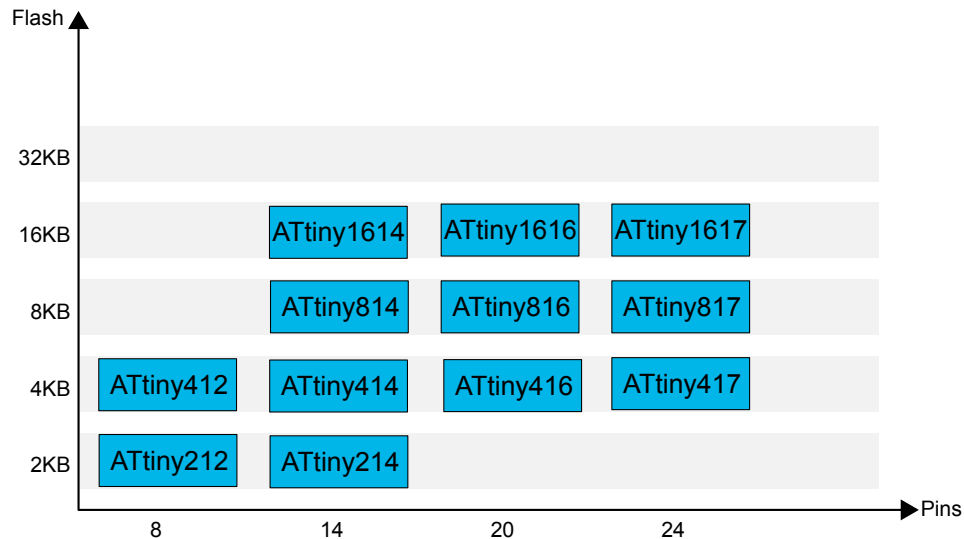
Introduction.....	1
Features.....	1
1. tinyAVR [®] 1-Series Overview.....	4
1.1. Configuration Summary.....	5
2. Ordering Information.....	6
2.1. ATtiny214.....	6
2.2. ATtiny414.....	6
2.3. ATtiny814.....	6
3. Block Diagram.....	7
4. Pinout.....	9
4.1. 14-pin SOIC.....	9
5. I/O Multiplexing and Considerations.....	10
5.1. Multiplexed Signals.....	10
6. Package Drawings.....	11
6.1. 14-pin SOIC150.....	11
7. Thermal Considerations.....	12
7.1. Thermal Resistance Data.....	12
7.2. Junction Temperature.....	12
The Microchip Web Site.....	13
Customer Change Notification Service.....	13
Customer Support.....	13
Microchip Devices Code Protection Feature.....	13
Legal Notice.....	14
Trademarks.....	14
Quality Management System Certified by DNV.....	15
Worldwide Sales and Service.....	16

1. tinyAVR® 1-Series Overview

The figure below shows the tinyAVR 1-series, laying out pin count variants and memory sizes:

- Vertical migration can be done upwards without code modification, since these devices are pin compatible and provide the same or even more features. Downward migration may require code modification due to fewer available instances of some peripherals.
- Horizontal migration to the left reduces the pin count and therefore also the available features.

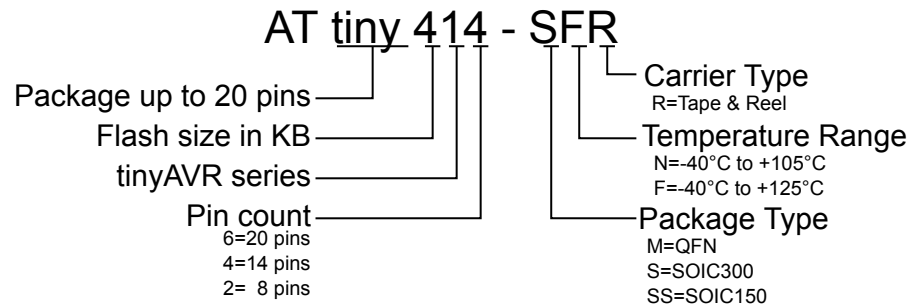
Figure 1-1. tinyAVR®1-Series Overview



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

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

Figure 1-2. Device Designations



1.1 Configuration Summary

1.1.1 Peripheral Summary

Table 1-1. Peripheral Summary

	ATtiny214	ATtiny414	ATtiny814
Pins	14	14	14
SRAM	128B	256B	512B
Flash	2KB	4KB	8KB
EEPROM	64B	128B	128B
Max. frequency (MHz)	20	20	20
16-bit Timer/Counter type A (TCA)	1	1	1
16-bit Timer/Counter type B (TCB)	1	1	1
12-bit Timer/Counter type D (TCD)	1	1	1
Real Time Counter (RTC)	1	1	1
USART	1	1	1
SPI	1	1	1
TWI (I ² C)	1	1	1
ADC	1	1	1
ADC channels	10	10	10
DAC	1	1	1
AC	1	1	1
Peripheral Touch Controller (PTC) ⁽¹⁾	No	No	1
PTC number of self-capacitance channels ⁽¹⁾	-	-	6
PTC number of mutual-capacitance channels ⁽¹⁾	-	-	9
Custom Logic/Configurable Lookup Tables	1	1	1
Window Watchdog	1	1	1
Event System channels	6	6	6
General purpose I/O	12	12	12
External interrupts	12	12	12
CRCSCAN	1	1	1

Note:

1. The PTC takes control over the ADC while the PTC is used.

2. Ordering Information

2.1 ATtiny214

Table 2-1. ATtiny214 Ordering Codes

Ordering Code ⁽¹⁾	Flash	Package Type (GPC)	Leads	Power Supply	Operational Range	Carrier Type
ATtiny214-SSNR	2KB	SOIC150 (SVQ)	14	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny214-SSFR	2KB	SOIC150 (SVQ)	14	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 ATtiny414

Table 2-2. ATtiny414 Ordering Codes

Ordering Code ⁽¹⁾	Flash	Package Type (GPC)	Leads	Power Supply	Operational Range	Carrier Type
ATtiny414-SSNR	4KB	SOIC150 (SVQ)	14	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny414-SSFR	4KB	SOIC150 (SVQ)	14	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.

2.3 ATtiny814

Table 2-3. ATtiny814 Ordering Codes

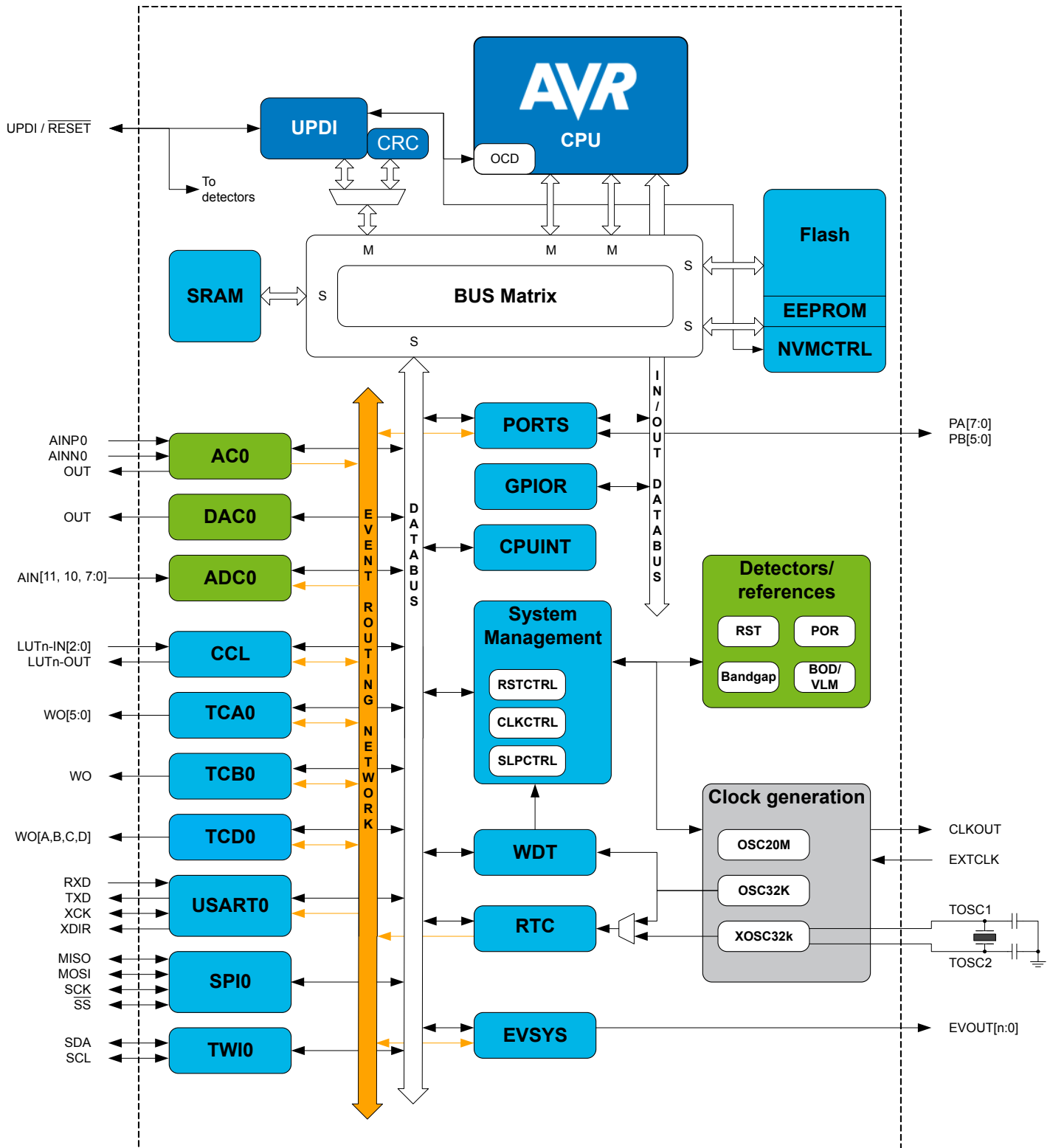
Ordering Code ⁽¹⁾	Flash	Package Type (GPC)	Leads	Power Supply	Operational Range	Carrier Type
ATtiny814-SSNR	8KB	SOIC150 (SVQ)	14	1.8V - 5.5V	Industrial (-40°C +105°C)	Tape & Reel
ATtiny814-SSFR	8KB	SOIC150 (SVQ)	14	1.8V - 5.5V	Industrial (-40°C +125°C)	Tape & Reel

Note:

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

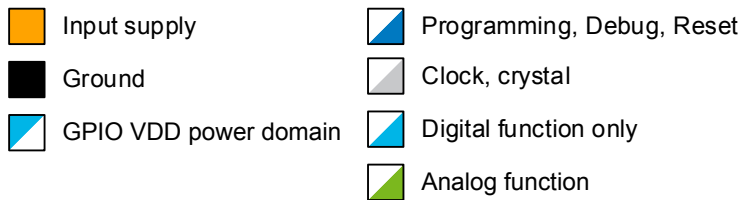
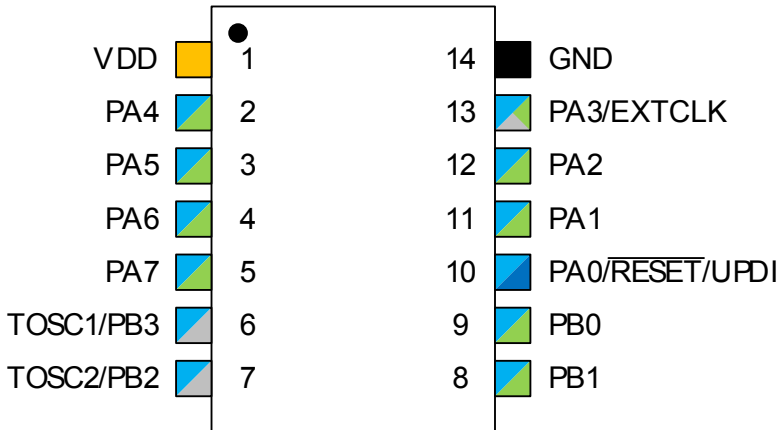
3. Block Diagram

Figure 3-1. ATtiny214 / ATtiny414 Block Diagram



4. Pinout

4.1 14-pin SOIC



5. I/O Multiplexing and Considerations

5.1 Multiplexed Signals

Table 5-1. PORT Function Multiplexing

SOIC 14-pin	Pin Name ^(1,2)	Other/Special	ADC0	PTC ⁽³⁾	AC0	DAC0	USART0	SPI0	TWI0	TCA0	TCB0	TCD0	CCL
10	PA0	RESET UPDI	AIN0										LUT0-IN0
11	PA1	BREAK	AIN1				TXD	MOSI	SDA				LUT0-IN1
12	PA2	EVOUT0	AIN2				RxD	MISO	SCL				LUT0-IN2
13	PA3	EXTCLK	AIN3				XCK	SCK		WO3			
14	GND												
1	VDD												
2	PA4		AIN4	X0/Y0			XDIR	SS		WO4		WOA	LUT0-OUT
3	PA5		AIN5	X1/Y1	OUT					WO5	WO	WOB	
4	PA6		AIN6	X2/Y2	AINN0	OUT							
5	PA7		AIN7	X3/Y3	AINP0								LUT1-OUT
6	PB3	TOSC1					RxD			WO0			
7	PB2	TOSC2, EVOUT1					TxD			WO2			
8	PB1		AIN10	X4/Y4			XCK		SDA	WO1			
9	PB0		AIN11	X5/Y5			XDIR		SCL	WO0			

Note:

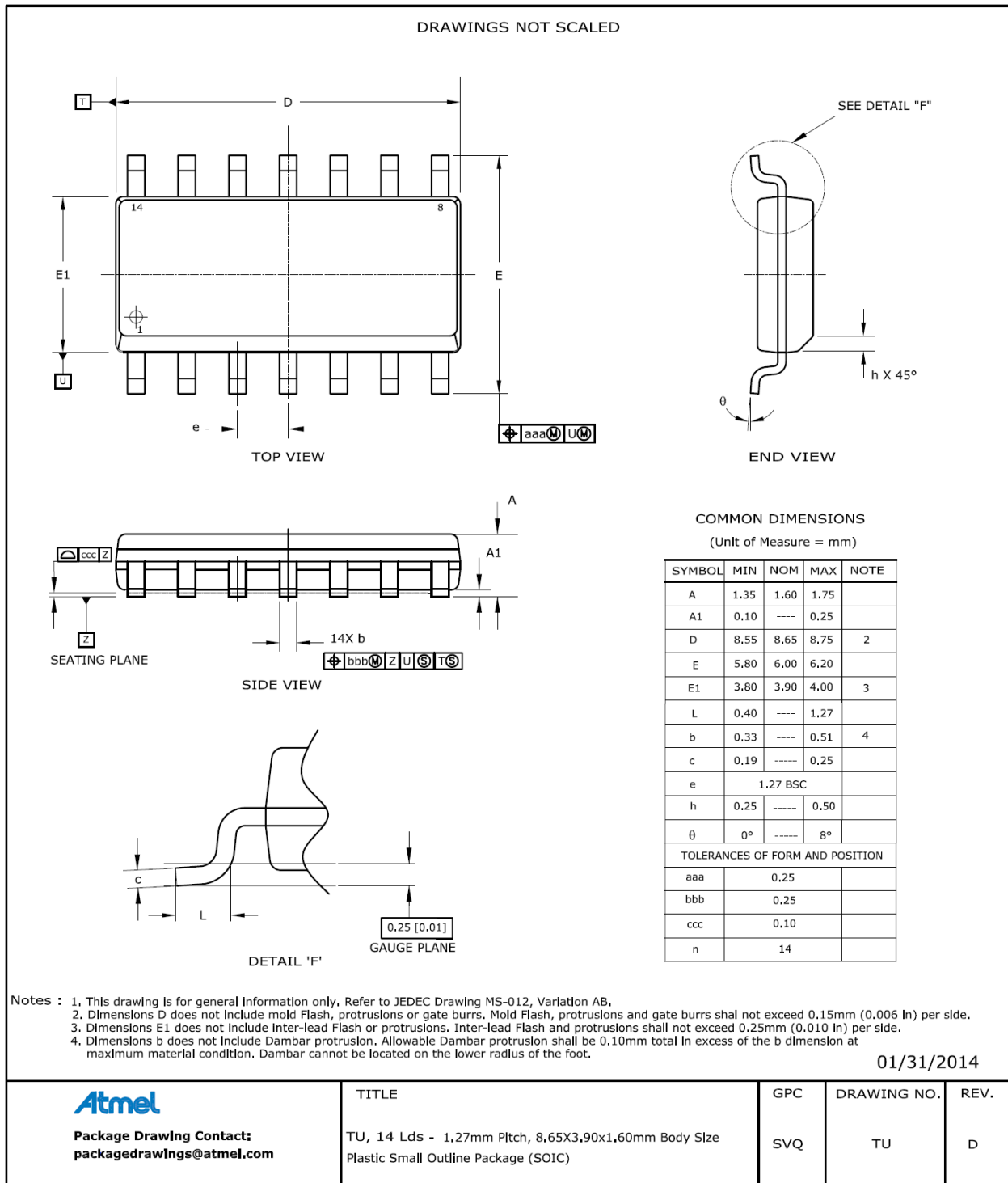
1. Pins names are of type P_x_n, with *x* being the PORT instance (A,B) and *n* the pin number. Notation for signals is PORT_x_PIN_n. All pins can be used as event input.
2. All pins can be used for external interrupt, where pins P_x2 and P_x6 of each port have full asynchronous detection.
3. PTC is only available in devices with 8KB Flash (ATtiny814). Every PTC line can be configured as X-line or Y-line.



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

6. Package Drawings

6.1 14-pin SOIC150



7. Thermal Considerations

7.1 Thermal Resistance Data

The following table summarizes the thermal resistance data depending on the package.

Table 7-1. Thermal Resistance Data

Package Type	θ_{JA} [°C/W]	θ_{JC} [°C/W]
14-pin SOIC150 (SVQ)	58	26

Related Links

[Junction Temperature](#)

7.2 Junction Temperature

The average chip-junction temperature, T_J , in °C can be obtained from the following:

1. $T_J = T_A + (P_D \times \theta_{JA})$
2. $T_J = T_A + (P_D \times (\theta_{HEATSINK} + \theta_{JC}))$

where:

- θ_{JA} = Package thermal resistance, Junction-to-ambient (°C/W), see Thermal Resistance Data
- θ_{JC} = Package thermal resistance, Junction-to-case thermal resistance (°C/W), see Thermal Resistance Data
- $\theta_{HEATSINK}$ = Thermal resistance (°C/W) specification of the external cooling device
- P_D = Device power consumption (W)
- T_A = Ambient temperature (°C)

From the first equation, the user can derive the estimated lifetime of the chip and decide if a cooling device is necessary or not. If a cooling device is to be fitted on the chip, the second equation should be used to compute the resulting average chip-junction temperature T_J in °C.

Related Links

[Thermal Resistance Data](#)

The Microchip Web Site

Microchip provides online support via our web site at <http://www.microchip.com/>. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

Customer Change Notification Service

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at <http://www.microchip.com/>. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or Field Application Engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: <http://www.microchip.com/support>

Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.

- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip’s code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Legal Notice

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, AVR, AVR logo, AVR Freaks, BeaconThings, BitCloud, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, Helder, JukeBlox, KeeLoq, KeeLoq logo, Klear, LANCheck, LINK MD, maXStylus, maXTouch, MediaLB, megaAVR, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, Prochip Designer, QTouch, RightTouch, SAM-BA, SpyNIC, SST, SST Logo, SuperFlash, tinyAVR, UNI/O, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, EtherSynch, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and Quiet-Wire are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, CryptoAuthentication, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, Mindi, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PureSilicon, QMatrix, RightTouch logo, REAL ICE, Ripple Blocker, SAM-ICE, Serial Quad I/O, SMART-I.S., SQI, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2017, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-5224-1894-8

Quality Management System Certified by DNV

ISO/TS 16949

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC[®] MCUs and dsPIC[®] DSCs, KEELOQ[®] code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Worldwide Sales and Service

AMERICAS	ASIA/PACIFIC	ASIA/PACIFIC	EUROPE
Corporate Office 2355 West Chandler Blvd. Chandler, AZ 85224-6199 Tel: 480-792-7200 Fax: 480-792-7277 Technical Support: http://www.microchip.com/support Web Address: www.microchip.com	Asia Pacific Office Suites 3707-14, 37th Floor Tower 6, The Gateway Harbour City, Kowloon Hong Kong Tel: 852-2943-5100 Fax: 852-2401-3431 Australia - Sydney Tel: 61-2-9868-6733 Fax: 61-2-9868-6755 China - Beijing Tel: 86-10-8569-7000 Fax: 86-10-8528-2104 China - Chengdu Tel: 86-28-8665-5511 Fax: 86-28-8665-7889 China - Chongqing Tel: 86-23-8980-9588 Fax: 86-23-8980-9500 China - Dongguan Tel: 86-769-8702-9880 China - Guangzhou Tel: 86-20-8755-8029 China - Hangzhou Tel: 86-571-8792-8115 Fax: 86-571-8792-8116 China - Hong Kong SAR Tel: 852-2943-5100 Fax: 852-2401-3431 China - Nanjing Tel: 86-25-8473-2460 Fax: 86-25-8473-2470 China - Qingdao Tel: 86-532-8502-7355 Fax: 86-532-8502-7205 China - Shanghai Tel: 86-21-3326-8000 Fax: 86-21-3326-8021 China - Shenyang Tel: 86-24-2334-2829 Fax: 86-24-2334-2393 China - Shenzhen Tel: 86-755-8864-2200 Fax: 86-755-8203-1760 China - Wuhan Tel: 86-27-5980-5300 Fax: 86-27-5980-5118 China - Xian Tel: 86-29-8833-7252 Fax: 86-29-8833-7256	China - Xiamen Tel: 86-592-2388138 Fax: 86-592-2388130 China - Zhuhai Tel: 86-756-3210040 Fax: 86-756-3210049 India - Bangalore Tel: 91-80-3090-4444 Fax: 91-80-3090-4123 India - New Delhi Tel: 91-11-4160-8631 Fax: 91-11-4160-8632 India - Pune Tel: 91-20-3019-1500 Japan - Osaka Tel: 81-6-6152-7160 Fax: 81-6-6152-9310 Japan - Tokyo Tel: 81-3-6880-3770 Fax: 81-3-6880-3771 Korea - Daegu Tel: 82-53-744-4301 Fax: 82-53-744-4302 Korea - Seoul Tel: 82-2-554-7200 Fax: 82-2-558-5932 or 82-2-558-5934 Malaysia - Kuala Lumpur Tel: 60-3-6201-9857 Fax: 60-3-6201-9859 Malaysia - Penang Tel: 60-4-227-8870 Fax: 60-4-227-4068 Philippines - Manila Tel: 63-2-634-9065 Fax: 63-2-634-9069 Singapore Tel: 65-6334-8870 Fax: 65-6334-8850 Taiwan - Hsin Chu Tel: 886-3-5778-366 Fax: 886-3-5770-955 Taiwan - Kaohsiung Tel: 886-7-213-7830 Taiwan - Taipei Tel: 886-2-2508-8600 Fax: 886-2-2508-0102 Thailand - Bangkok Tel: 66-2-694-1351 Fax: 66-2-694-1350	Austria - Wels Tel: 43-7242-2244-39 Fax: 43-7242-2244-393 Denmark - Copenhagen Tel: 45-4450-2828 Fax: 45-4485-2829 Finland - Espoo Tel: 358-9-4520-820 France - Paris Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79 France - Saint Cloud Tel: 33-1-30-60-70-00 Germany - Garching Tel: 49-8931-9700 Germany - Haan Tel: 49-2129-3766400 Germany - Heilbronn Tel: 49-7131-67-3636 Germany - Karlsruhe Tel: 49-721-625370 Germany - Munich Tel: 49-89-627-144-0 Fax: 49-89-627-144-44 Germany - Rosenheim Tel: 49-8031-354-560 Israel - Ra'anana Tel: 972-9-744-7705 Italy - Milan Tel: 39-0331-742611 Fax: 39-0331-466781 Italy - Padova Tel: 39-049-7625286 Netherlands - Druenen Tel: 31-416-690399 Fax: 31-416-690340 Norway - Trondheim Tel: 47-7289-7561 Poland - Warsaw Tel: 48-22-3325737 Romania - Bucharest Tel: 40-21-407-87-50 Spain - Madrid Tel: 34-91-708-08-90 Fax: 34-91-708-08-91 Sweden - Gothenberg Tel: 46-31-704-60-40 Sweden - Stockholm Tel: 46-8-5090-4654 UK - Wokingham Tel: 44-118-921-5800 Fax: 44-118-921-5820