
28-Pin, 8-Bit 'Enhanced Baseline' Microcontroller Product Brief

Description:

This document describes the 28-pin 'Enhanced Baseline' device with Flash program memory self-write capability, interrupts and op amps.

Processor Features:

- Interrupt Capability
- PIC16F570 Operating Speed:
 - DC – 20 MHz Crystal oscillator
 - DC – 200 ns Instruction cycle
- High Endurance Program and Flash Data Memory Cells:
 - 2048 x 12 user execution memory
 - 64 x 8 self-writable data memory
 - 100,000 write program memory endurance
 - 1,000,000 write Flash data memory endurance
 - Program and Flash data retention: >40 years
- General Purpose Registers (SRAM):
 - 132 x 8 memory
- Only 36 Single-Word Instructions to Learn:
 - Modified baseline CPU
 - Added `RETURN` and `RETFIE` instructions
 - Added `MOVLB` instruction
- All Instructions are Single-Cycle except for Program Branches which are Two-Cycle
- Four-Level Deep Hardware Stack
- Direct, Indirect and Relative Addressing modes for Data and Instructions

Peripheral Features:

- Device Features:
 - 24 I/Os
 - Individual direction control
 - High-current source/sink
- 8-Bit Real-Time Clock/Counter (TMR0) with 8-Bit Programmable Prescaler
- In-Circuit Serial Programming™ (ICSP™) via Two External Pin Connections
- Analog Comparator (CMP):
 - Two analog comparators
 - Absolute and programmable references
- Analog-to-Digital Converter (ADC):
 - 8-bit resolution
 - 8 external input channels
 - 0.6V reference input
- Operational Amplifiers (op amps):
 - Two operational amplifiers
 - Fully-accessible visibility

Microcontroller Features:

- Brown-out Reset (BOR)
- Power-on Reset (POR)
- Device Reset Timer (DRT)
- Watchdog Timer (WDT) with its own on-chip RC Oscillator for Reliable Operation
- Programmable Code Protection (CP)
- Power-Saving Sleep mode with Wake-up on Change Feature
- Selectable Oscillator Options:
 - INTOSC: Precision 4 or 8 MHz internal oscillator
 - EXTRC: Low-cost external RC oscillator
 - LP: Power-saving, low-frequency crystal
 - XT: Standard crystal/resonator
 - HS: High-speed crystal/resonator
 - EC: High-speed external clock
- Variety of Packaging Options:
 - 28-Lead SPDIP, SOIC, SSOP, QFN

CMOS Technology:

- Low-Power, High-Speed CMOS Flash Technology
- Fully-Static Design
- Wide Operating Voltage and Temperature Range:
 - Industrial: 2.0V to 5.5V
 - Extended: 2.0V to 5.5V
- Operating Current:
 - 170 uA @ 2V, 4 MHz, typical
 - 15 uA @ 2V, 32 kHz, typical
- Standby Current:
 - 100 nA @ 2V, typical

PIC16F570

PIC16F570 Family Types

Device	Pins/I/O Pins	Flash	Data EE (B)	SRAM (B)	8-Bit ADC Channels	Op Amp	Comparator	8-Bit Timers	BOR	Stack Levels	Interrupts	8 MHz Int. Osc.	Interrupt-on-change Pins	Weak Pull-up Pins
PIC16F570	28/24	2KW	64	132	8	2	2	1	Y	4	Y	Y	8	8

FIGURE 1: 28-PIN PDIP, SOIC, SSOP DIAGRAM FOR PIC16F570

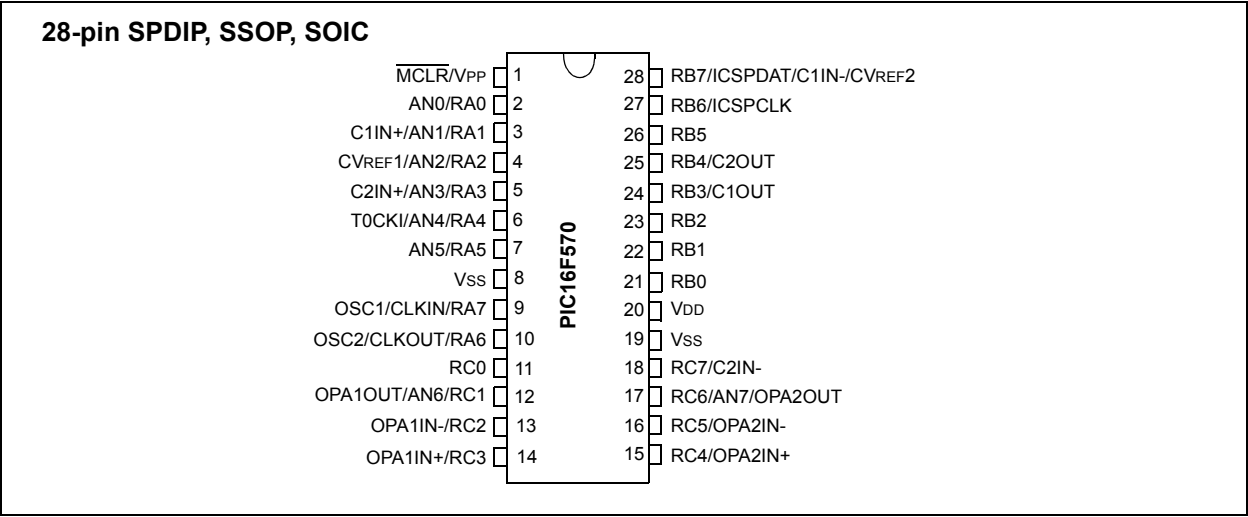
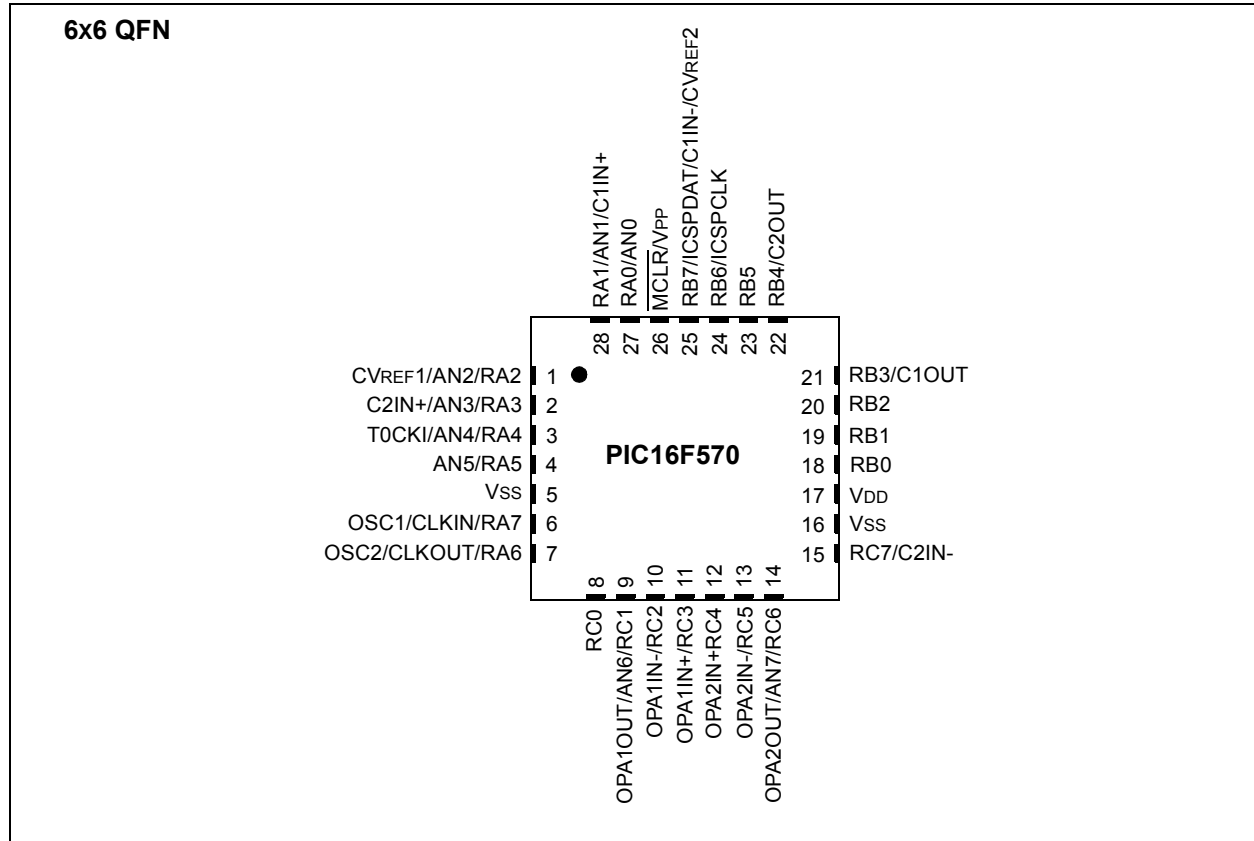


FIGURE 2: 28-PIN QFN DIAGRAM FOR PIC16F570



PIC16F570

TABLE 1: PIC16F570 PIN SUMMARY

I/O	28-Pin SPDIP	28-Pin QFN	A/D	Reference	Comparator	Op Amp	Timers	IOC	Pull-up	Basic
MCLR	1	26	—	—	—	—	—	N	Y	MCLR V _{PP}
RA0	2	27	AN0	—	—	—	—	N	N	—
RA1	3	28	AN1	—	C1IN+	—	—	N	N	—
RA2	4	1	AN2	CVREF1	—	—	—	N	N	—
RA3	5	2	AN3	—	C2IN+	—	—	N	N	—
RA4	6	3	AN4	—	—	—	T0CKI	N	N	—
RA5	7	4	AN5	—	—	—	—	N	N	—
RA6	10	7	—	—	—	—	—	N	N	OSC2 CLKOUT
RA7	9	6	—	—	—	—	—	N	N	OSC1 CLKIN
RB0	21	18	—	—	—	—	—	Y	Y	—
RB1	22	19	—	—	—	—	—	Y	Y	—
RB2	23	20	—	—	—	—	—	Y	Y	—
RB3	24	21	—	—	C1OUT	—	—	Y	Y	—
RB4	25	22	—	—	C2OUT	—	—	Y	Y	—
RB5	26	23	—	—	—	—	—	Y	Y	—
RB6	27	24	—	—	—	—	—	Y	Y	ICSPCLK
RB7	28	25	—	CVREF2	C1IN-	—	—	Y	Y	ICSPDAT
RC0	11	8	—	—	—	—	—	N	N	—
RC1	12	9	AN6	—	—	OPA1OUT	—	N	N	—
RC2	13	10	—	—	—	OPA1IN-	—	N	N	—
RC3	14	11	—	—	—	OPA1IN+	—	N	N	—
RC4	15	12	—	—	—	OPA2IN+	—	N	N	—
RC5	16	13	—	—	—	OPA2IN-	—	N	N	—
RC6	17	14	AN7	—	—	OPA2OUT	—	N	N	—
RC7	18	15	—	—	C2IN-	—	—	N	N	—
V _{DD}	20	17	—	—	—	—	—	—	—	V _{DD}
V _{SS}	8, 19	5, 16	—	—	—	—	—	—	—	V _{SS}

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.

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.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, KEELQ, KEELQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rPIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MTP, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

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

Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniclient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICTail, REAL ICE, rLAB, Select Mode, SQL, Serial Quad I/O, Total Endurance, TSHARC, UniWinDriver, WiperLock, ZENA and Z-Scale 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.

GestIC and ULPP are registered trademarks 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.

© 2012, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

ISBN: 9781620766255

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, KEELQ® 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

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

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Farmington Hills, MI
Tel: 248-538-2250
Fax: 248-538-2260

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

Santa Clara
Santa Clara, CA
Tel: 408-961-6444
Fax: 408-961-6445

Toronto
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
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 - Hangzhou
Tel: 86-571-2819-3187
Fax: 86-571-2819-3189

China - Hong Kong SAR
Tel: 852-2401-1200
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: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8203-2660
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

ASIA/PACIFIC

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: 91-20-2566-1512
Fax: 91-20-2566-1513

Japan - Osaka
Tel: 81-66-152-7160
Fax: 81-66-152-9310

Japan - Yokohama
Tel: 81-45-471-6166
Fax: 81-45-471-6122

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: 886-7-536-4818
Fax: 886-7-330-9305

Taiwan - Taipei
Tel: 886-2-2500-6610
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

UK - Wokingham
Tel: 44-118-921-5869
Fax: 44-118-921-5820