



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	PIC
Core Size	8-Bit
Speed	16MHz
Connectivity	I <sup>2</sup> C, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	17
Program Memory Size	3.5KB (2K x 14)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	128 x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.5V
Data Converters	A/D 12x8b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	20-SOIC (0.295", 7.50mm Width)
Supplier Device Package	20-SOIC
Purchase URL	<a href="https://www.e-xfl.com/product-detail/microchip-technology/pic16f720t-i-so">https://www.e-xfl.com/product-detail/microchip-technology/pic16f720t-i-so</a>

## 20-Pin 8-Bit CMOS Flash Microcontroller Product Brief

### High-Performance RISC CPU:

- Only 35 Instructions to Learn:
  - All single-cycle instructions except branches
- Operating Speed:
  - DC – 16 MHz oscillator/clock input
  - DC – 250 ns instruction cycle
- Up to 4K x 14 Words of Flash Program Memory
- Up to 256 bytes of Data Memory (RAM)
- Interrupt Capability
- 8-Level Deep Hardware Stack
- Direct, Indirect and Relative Addressing modes
- Processor Self-Write/Read access to Program Memory

### Special Microcontroller Features:

- Precision Internal Oscillator:
  - 16 MHz or 500 kHz operation
  - Factory calibrated to  $\pm 1\%$ , typical
  - Software tunable
  - Software selectable  $\div 1$ ,  $\div 2$ ,  $\div 4$  or  $\div 8$  divider
- Power-Saving Sleep mode
- Industrial and Extended Temperature Range
- Power-on Reset (POR)
- Power-up Timer (PWRT)
- Brown-out Reset (BOR)
- Multiplexed Master Clear with Pull-up/Input Pin
- Programmable Code Protection
- In-Circuit Serial Programming™ (ICSP™) via Two Pins
- High-Endurance Flash Cell:
  - 10,000 write Flash endurance (typical)
  - Flash retention: > 40 years
- Wide Operating Voltage Range:
  - 1.8V to 5.5V (PIC16F720/721)
  - 1.8V to 3.6V (PIC16LF720/721)

### Low-Power Features:

- Standby Current:
  - 50 nA @ 1.8V, typical
- Operating Current:
  - 100  $\mu$ A @ 1 MHz, 1.8V, typical
- Low-Power Watchdog Timer Current:
  - 500nA @ 1.8V, typical

### Peripheral Features:

- Up to 17 I/O Pins and 1 Input-only Pin:
  - High-current source/sink for direct LED drive
  - Interrupt-on-pin change
  - Individually programmable weak pull-ups
- A/D Converter:
  - 8-bit resolution
  - 12 channels
  - Selectable Voltage reference
- Timer0: 8-Bit Timer/Counter with 8-Bit Programmable Prescaler
- Enhanced Timer1
  - 16-bit timer/counter with prescaler
  - External Gate Input mode with toggle and single shot modes
  - Interrupt-on-gate completion
- Timer2: 8-Bit Timer/Counter with 8-Bit Period Register, Prescaler and Postscaler
- Capture, Compare, PWM module (CCP)
  - 16-bit Capture, max resolution 12.5 ns
  - 16-bit Compare, max resolution 250 ns
  - 10-bit PWM, max frequency 15 kHz
- Addressable Universal Synchronous Asynchronous Receiver Transmitter (AUSART)
- Synchronous Serial Port (SSP)
  - SPI (Master/Slave)
  - I<sup>2</sup>C™ (Slave) with Address Mask

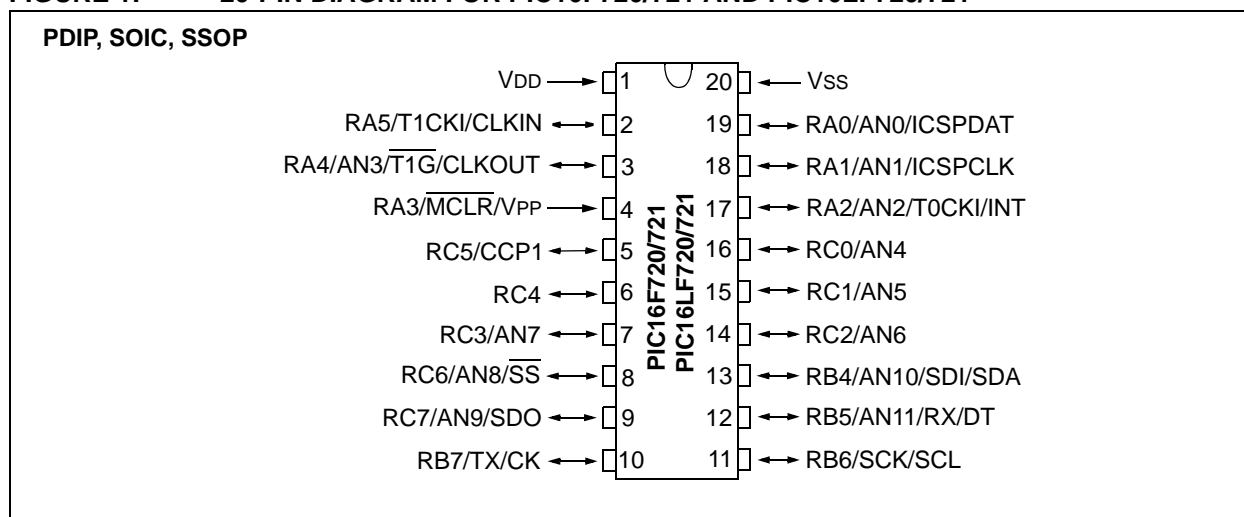
**TABLE 1: PIC16F720/721 AND PIC16LF720/721 FAMILY TYPES**

Device	Program Memory Flash (words)	SRAM (bytes)	I/O	Timers 8/16-bit	8-bit A/D (ch)	AUSART	CCP	SSP
PIC16F720	2048	128	18	2/1	12	Yes	1	1
PIC16F721	4096	256	18	2/1	12	Yes	1	1
PIC16LF720	2048	128	18	2/1	12	Yes	1	1
PIC16LF721	4096	256	18	2/1	12	Yes	1	1

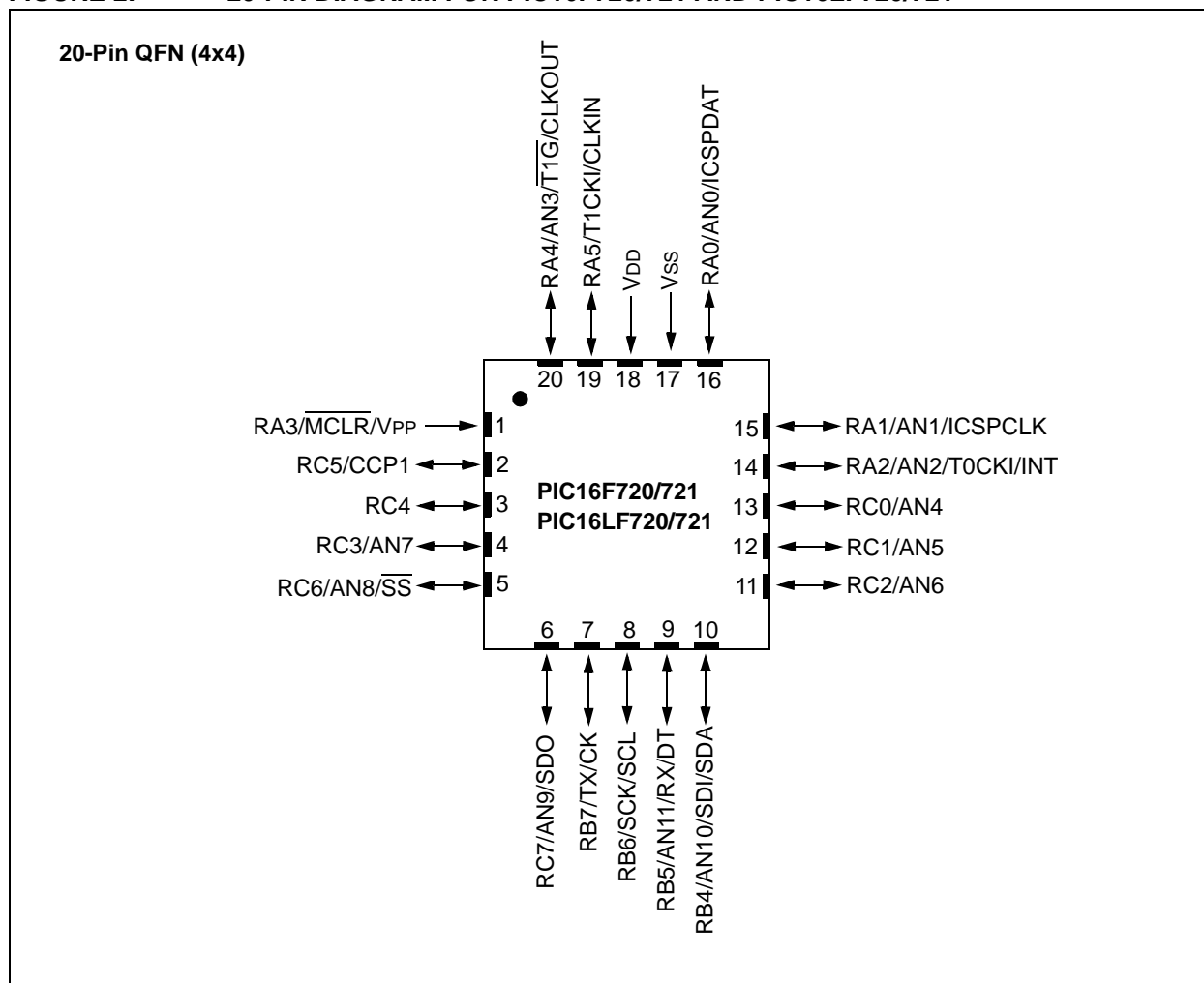
# PIC16F720/721

**Note:** Pin details are subject to change.

**FIGURE 1: 20-PIN DIAGRAM FOR PIC16F720/721 AND PIC16LF720/721**



**FIGURE 2: 20-PIN DIAGRAM FOR PIC16F720/721 AND PIC16LF720/721**



**TABLE 2: 20-PIN ALLOCATION TABLE (PIC16F720/721 AND PIC16LF720/721)**

I/O	20-Pin DIP/SOIC/ SSOP	20-Pin QFN	A/D	Timers	CCP	AUSART	SSP	Interrupt	Pull-up	Basic
RA0	19	16	AN0	—	—	—	—	IOC	Y	ICSPDAT/ ICDDAT
RA1	18	15	AN1	—	—	—	—	IOC	Y	ICSPCLK/ ICDCLK
RA2	17	14	AN2	T0CKI	—	—	—	INT/IOC	—	—
RA3	4	1	—	—	—	—	—	IOC	Y	MCLR/VPP
RA4	3	20	AN3	T1G	—	—	—	IOC	Y	CLKOUT
RA5	2	19	—	T1CKI	—	—	—	IOC	Y	CLKIN
RB4	13	10	AN10	—	—	—	SDI/SDA	IOC	Y	—
RB5	12	9	AN11	—	—	RX/DT	—	IOC	Y	—
RB6	11	8	—	—	—	—	SCK/SCL	IOC	Y	—
RB7	10	7	—	—	—	TX/CK	—	IOC	Y	—
RC0	16	13	AN4	—	—	—	—	—	—	—
RC1	15	12	AN5	—	—	—	—	—	—	—
RC2	14	11	AN6	—	—	—	—	—	—	—
RC3	7	4	AN7	—	—	—	—	—	—	—
RC4	6	3	—	—	—	—	—	—	—	—
RC5	5	2	—	—	CCP1	—	—	—	—	—
RC6	8	5	AN8	—	—	—	SS	—	—	—
RC7	9	6	AN9	—	—	—	SDO	—	—	—
VDD	1	18	—	—	—	—	—	—	—	VDD
Vss	20	17	—	—	—	—	—	—	—	Vss

# PIC16F720/721

---

NOTES:

---

**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, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, rPIC 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, MXDEV, MXLAB, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Octopus, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICtail, PIC<sup>32</sup> logo, REAL ICE, rLAB, Select Mode, Total Endurance, TSHARC, UniWinDriver, WiperLock 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.

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

© 2009, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.



Printed on recycled paper.

*Microchip received ISO/TS-16949:2002 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

#### Corporate Office

2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7200  
Fax: 480-792-7277  
Technical Support:  
<http://support.microchip.com>  
Web Address:  
[www.microchip.com](http://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

#### Kokomo

Kokomo, IN  
Tel: 765-864-8360  
Fax: 765-864-8387

#### 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: 86-10-8528-2100  
Fax: 86-10-8528-2104

#### China - Chengdu

Tel: 86-28-8665-5511  
Fax: 86-28-8665-7889

#### 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 - Xiamen

Tel: 86-592-2388138  
Fax: 86-592-2388130

#### China - Xian

Tel: 86-29-8833-7252  
Fax: 86-29-8833-7256

#### China - Zhuhai

Tel: 86-756-3210040  
Fax: 86-756-3210049

### ASIA/PACIFIC

#### India - Bangalore

Tel: 91-80-3090-4444  
Fax: 91-80-3090-4080

#### 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 - 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: 886-3-6578-300  
Fax: 886-3-6578-370

#### Taiwan - Kaohsiung

Tel: 886-7-536-4818  
Fax: 886-7-536-4803

#### 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

03/26/09