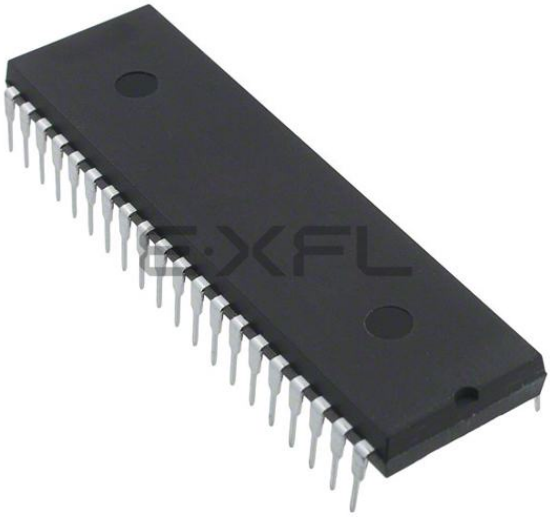

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What is "Embedded - Microcontrollers"?

"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	PIC
Core Size	8-Bit
Speed	48MHz
Connectivity	I²C, SPI, UART/USART, USB
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	33
Program Memory Size	32KB (16K x 16)
Program Memory Type	FLASH
EEPROM Size	256 x 8
RAM Size	2K x 8
Voltage - Supply (Vcc/Vdd)	2.3V ~ 5.5V
Data Converters	A/D 25x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Through Hole
Package / Case	40-DIP (0.600", 15.24mm)
Supplier Device Package	40-PDIP
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/pic18f45k50-i-p

PIC18(L)F2X/45K50

PIC18(L)F2X/45K50 USB Flash MCU Product Brief

Universal Serial Bus Features:

- USB V2.0 Compliant
- Crystal-less Full Speed (12 Mb/s) and Low-Speed Operation (1.5 Mb/s)
- Supports Control, Interrupt, Isochronous and Bulk Transfers
- Supports up to 32 Endpoints (16 Bidirectional)
- 1 Kbyte Dual Access RAM for USB
- On-Chip USB Transceiver

Flexible Oscillator Structure:

- 3x and 4x PLL Clock Multipliers
- Two External Clock modes, Up to 48 MHz (12 MIPS)
- Internal 31 kHz Oscillator
- Internal Oscillator, 31 kHz to 16 MHz
  - Factory calibrated to ± 1%
  - Self-tune to ± 0.20% max. from USB or secondary oscillator
- Secondary Oscillator using Timer1 @ 32 kHz
- Fail-Safe Clock Monitor:
  - Allows for safe shutdown if any clock stops

Peripheral Highlights:

- Up to 33 I/O Pins plus 3 Input-Only Pins:
  - High-current Sink/Source 25 mA/25 mA
  - Three programmable external interrupts
  - 11 programmable Interrupt-on-Change
  - 9 programmable weak pull-ups
  - Programmable slew rate
- SR Latch
- Enhanced Capture/Compare/PWM (ECCP) module:
  - One, two or four PWM outputs
  - Selectable polarity
  - Programmable dead time
  - Auto-shutdown and auto-restart
  - Pulse steering control
- Capture/Compare/PWM (CCP) module
- Master Synchronous Serial Port (MSSP) module Supporting 3-Wire SPI (all 4 modes) and I^2C™ Master and Slave modes
- Two Analog Comparators with Input Multiplexing
- 10-Bit Analog-to-Digital (A/D) Converter module:
  - Up to 25 input channels
  - Auto-acquisition capability
  - Conversion available during Sleep
- Digital-to-Analog Converter (DAC) module:
  - Fixed Voltage Reference (FVR) with 1.024V, 2.048V and 4.096V output levels
  - 5-bit rail-to-rail resistive DAC with positive and negative reference selection
- High/Low-Voltage Detect module
- Charge Time Measurement Unit (CTMU):
  - Supports capacitive touch sensing for touch screens and capacitive switches
- Enhanced USART module:
  - Supports RS-485, RS-232 and LIN/J2602
  - Auto-wake-up on Start bit
  - Auto-Baud Detect

Extreme Low-Power Management with XLP:

- Sleep mode: 20 nA, typical
- Watchdog Timer: 300 nA, typical
- Timer1 Oscillator: 800 nA @ 32 kHz
- Peripheral Module Disable

Special Microcontroller Features:

- Low-Power, High-Speed CMOS Flash Technology
- C Compiler Optimized Architecture for Re-Entrant Code
- Power Management Features:
  - Run: CPU on, peripherals on, SRAM on
  - Idle: CPU off, peripherals on, SRAM on
  - Sleep: CPU off, peripherals off, SRAM on
- Priority Levels for Interrupts
- Self-Programmable under Software Control
- 8 x 8 Single-Cycle Hardware Multiplier
- Extended Watchdog Timer (WDT):
  - Programmable period from 4 ms to 131s
- Single-Supply In-Circuit Serial Programming™ (ICSP™) via Two Pins
- In-Circuit Debug (ICD) with Three Breakpoints via Two Pins
- Optional dedicated ICD/ICSP Port (44-Pin TQFP Package Only)
- Wide Operating Voltage Range:
  - F devices: 2.3V to 5.5V
  - LF devices: 1.8V to 3.6V
- Flash Program Memory of 10,000 Erase/Write Cycles Minimum and 20-year Data Retention

PIC18(L)F2X/45K50 Family Types

Device	Program Memory		Data Memory		Pins	I/O	10-bit A/D channels	Comparators	CCP/ ECCP	BOR/LVD	CTMU	MSSP	EUSART	Timers 8-bit/16-bit	USB 2.0
	Flash (bytes)	Single Word Instructions	SRAM (bytes)	Data EEPROM (bytes)											
PIC18(L)F45K50	32K	16384	2048	256	40/44	36	25-ch	2	1/1	Yes	Yes	1	1	2/2	Yes
PIC18(L)F25K50	32K	16384	2048	256	28	25	14-ch	2	1/1	Yes	Yes	1	1	2/2	Yes
PIC18(L)F24K50	16K	8192	2048	256	28	25	14-ch	2	1/1	Yes	Yes	1	1	2/2	Yes

FIGURE 1: 28-PIN PDIP, SOIC, SSOP DIAGRAM FOR PIC18(L)F2XK50

28-PIN PDIP (300 MIL), SOIC, SSOP

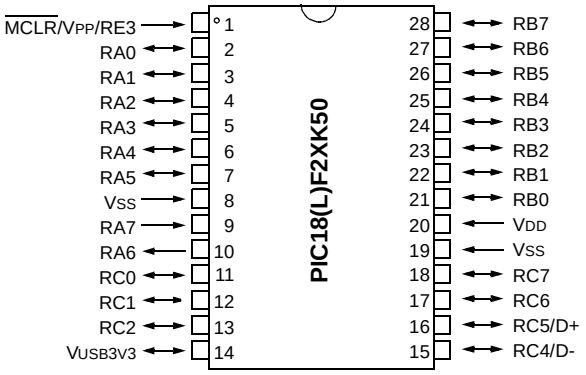


FIGURE 2: 28-PIN QFN DIAGRAM FOR PIC18(L)F2XK50

28-PIN QFN

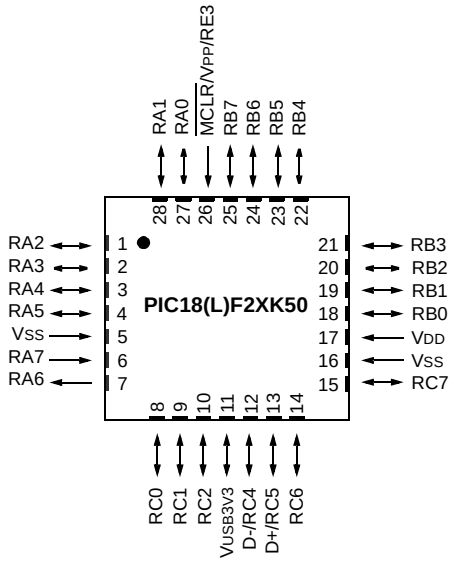


FIGURE 3: 40-PIN PDIP DIAGRAM FOR PIC18(L)F45K50

40-PIN PDIP (600 MIL)

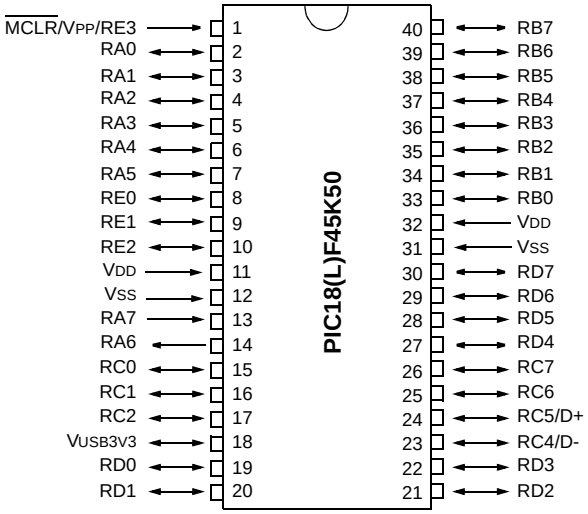


FIGURE 4: 40-PIN UQFN DIAGRAM FOR PIC18(L)F45K50

40-PIN UQFN

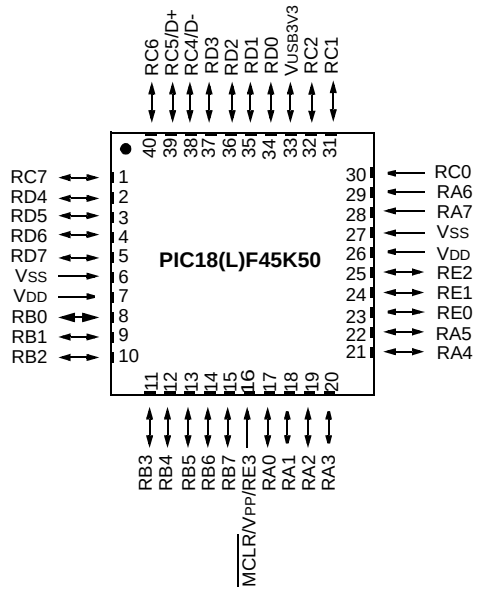
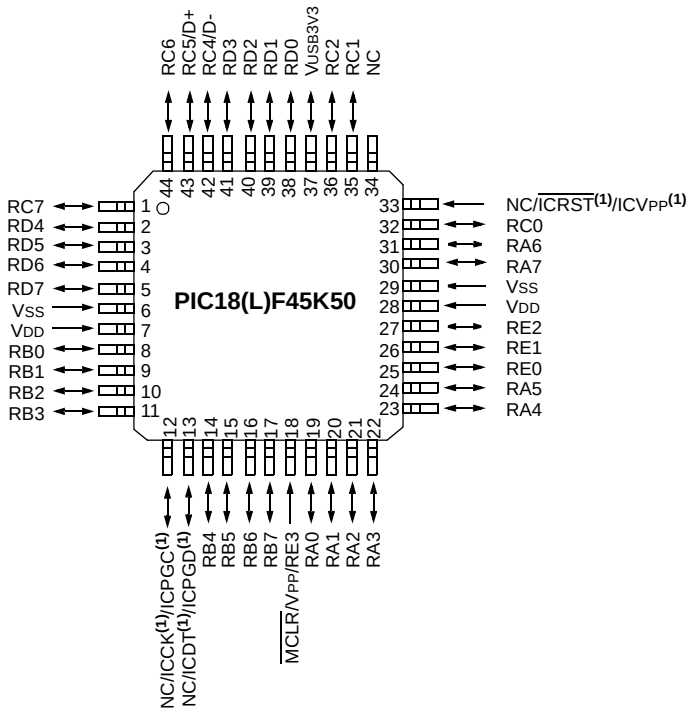


FIGURE 5: 44-PIN TQFP DIAGRAM FOR PIC18(L)F45K50

44-PIN TQFP



Note 1: Special ICPORT programming/debug port features available when ICPRT = 1

TABLE 1: PIC18(L)F2X/45K50 PIN SUMMARY

I/O	28-PIn PDIP/SOIC/SSOP	28-Pin QFN	40-Pin PDIP	40-Pin UQFN	44-Pin TQFP	Analog	Comparator	CTMU	SR Latch	Reference	USB	(E)CCP	EUSART	MSSP	Timers	Interrupts	Pull-up	Basic	ICD
RA0	2	27	2	17	19	AN0	C12IN0-												
RA1	3	28	3	18	20	AN1	C12IN1-	CTCMP											
RA2	4	1	4	19	21	AN2	C2IN+			VREF- DACOUT									
RA3	5	2	5	20	22	AN3	C1IN+			VREF+									
RA4	6	3	6	21	23		C1OUT		SRQ						T0CKI				
RA5	7	4	7	22	24	AN4	C2OUT		SRNQ	LVDIN				$\overline{SS}$					
RA6	10	7	14	29	31													OSC2 CLKO	
RA7	9	6	13	28	30													OSC1 CLKI	
RB0	21	18	33	8	8	AN12			SRI			$\overline{FLT0}$		SDI SDA		INT0	Y		
RB1	22	19	34	9	9	AN10	C12IN3-					P1C(5)		SCK SCL		INT1	Y		
RB2	23	20	35	10	10	AN8		CTED1				P1B(5)				INT2	Y		
RB3	24	21	36	11	11	AN9	C12IN2-	CTED2				CCP2(1)		SDO			Y		
RB4	25	22	37	12	14	AN11						P1D(5)				IOCB4	Y		
RB5	26	23	38	13	15	AN13									T1G T3CKI(2)	IOCB5	Y		
RB6	27	24	39	14	16											IOCB6	Y	PGC	
RB7	28	25	40	15	17											IOCB7	Y	PGD	

Note 1: Alternate CCP2 pin location based on Configuration bit.
2: Alternate T3CKI pin location based on Configuration bits.
3: Pins are enabled when ICPRT = 1, otherwise, they are disabled.
4: Location on 40/44-Pin parts (PIC18(L)F45K50). Function not on this pin on 28-Pin parts (PIC18(L)F2XK50).
5: Location on 28-Pin parts (PIC18(L)F2XK50). Function not on this pin on 40/44-Pin parts (PIC18(L)F45K50).
6: Alternate SDO pin location based on Configuration bits.
7: RE3, RC4 and RC5 can be used for digital input only (no output functionality).

TABLE 1: PIC18(L)F2X/45K50 PIN SUMMARY

I/O	28-PIn PDIP/SOIC/SSOP	28-Pin QFN	40-Pin PDIP	40-Pin UQFN	44-Pin TQFP	Analog	Comparator	CTMU	SR Latch	Reference	USB	(E)CCP	EUSART	MSSP	Timers	Interrupts	Pull-up	Basic	ICD
RC0	11	8	15	30	32										SOSCO T1CKI T3CKI T3G	IOCC0			
RC1	12	9	16	31	35							CCP2			SOSCI	IOCC1			
RC2	13	10	17	32	36	AN14		CTPLS				CCP1 P1A				IOCC2			
—	14	11	18	33	37	—					VUSB3V3							VDDCORE	
RC4[7]	15	12	23	38	42	—					D-					IOCC4			
RC5[7]	16	13	24	39	43	—					D+					IOCC5			
RC6	17	14	25	40	44	AN18							TX CK			IOCC6			
RC7	18	15	26	1	1	AN19							RX DT	SDO[6]		IOCC7			
RD0	—	—	19	34	38	AN20													
RD1	—	—	20	35	39	AN21													
RD2	—	—	21	36	40	AN22													
RD3	—	—	22	37	41	AN23													
RD4	—	—	27	2	2	AN24													
RD5	—	—	28	3	3	AN25						P1B[4]							
RD6	—	—	29	4	4	AN26						P1C[4]							
RD7	—	—	30	5	5	AN27						P1D[4]							
RE0	—	—	8	23	25	AN5													

Note 1: Alternate CCP2 pin location based on Configuration bit.
2: Alternate T3CKI pin location based on Configuration bits.
3: Pins are enabled when ICPRT = 1, otherwise, they are disabled.
4: Location on 40/44-Pin parts (PIC18(L)F45K50). Function not on this pin on 28-Pin parts (PIC18(L)F2XK50).
5: Location on 28-Pin parts (PIC18(L)F2XK50). Function not on this pin on 40/44-Pin parts (PIC18(L)F45K50).
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7: RE3, RC4 and RC5 can be used for digital input only (no output functionality).

TABLE 1: PIC18(L)F2X/45K50 PIN SUMMARY

I/O	28-PIn PDIP/SOIC/SSOP	28-Pin QFN	40-Pin PDIP	40-Pin UQFN	44-Pin TQFP	Analog	Comparator	CTMU	SR Latch	Reference	USB	(E)CCP	EUSART	MSSP	Timers	Interrupts	Pull-up	Basic	ICD
RE1	—	—	9	24	26	AN6													
RE2	—	—	10	25	27	AN7													
RE3(7)	1	26	1	16	18	—											Y	$\overline{MCLR}$ V_{PP}	
	20	17	11, 32	7, 26	7, 28													V_{DD}	
	8, 19	5, 16	12, 31	6, 27	6, 29													V_{SS}	
			–	–-	12(3)													ICPGC(3)	ICCK(3)
			–	–-	13(3)													ICPGD(3)	ICDT(3)
			–-	–-	33(3)													ICV_{PP}(3)	$\overline{ICRST}$(3)

Note 1: Alternate CCP2 pin location based on Configuration bit.
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