PIC12F1822/16F182X

8/14/20-Pin 8-Bit Flash Microcontroller Product Brief

High-Performance RISC CPU:

- Only 49 Instructions to learn
- Operating Speed:
  - DC – 32 MHz clock input
  - DC – 125 ns instruction cycle
- Interrupt Capability with Automatic Context Saving
- 16-Level Deep Hardware Stack with Optional Overflow/Underflow Reset
- Direct, Indirect and Relative Addressing modes:
  - Two full 16-bit File Select Registers (FSRs)
  - FSRs can read program and data memory

Special Microcontroller Features:

- Precision Internal Oscillator:
  - Factory calibrated to ±1%, typical
  - Software selectable frequency range from 32 MHz to 31 kHz
- 31 kHz Low-Power Internal Oscillator
- External Oscillator Block with:
  - 4 crystal/resonator modes up to 32 MHz using 4xPLL
  - 3 external clock modes up to 32 MHz
- 4x Phase Locked Loop (PLL)
- Fail-Safe Clock Monitor
- Two-Speed Start-up
- Power-Saving Sleep mode
- Power-on Reset (POR)
- Power-up Timer (PWRT)
- Oscillator Start-Up Timer (OST)
- Brown-out Reset (BOR) with Selectable Trip Point
- Extended Watchdog Timer (WDT)
- In-Circuit Serial Programming™ (ICSP™) via two pins
- In-Circuit Debug (ICD) via Two Pins
- Enhanced Low-Voltage Programming (LVP)
- Operating Voltage Range:
  - 1.8V to 3.6V (PIC1XLF182X)
  - 1.8V to 5.5V (PIC1XF182X)
- Programmable Code Protection
- Self-Programmable under Software Control

Low-Power Features:

- Standby Current (PIC1XLF182X):
  - 30 nA @ 1.8V, typical
- Operating Current (PIC1XLF182X):
  - 75 μA @ 1 MHz, 1.8V, typical
- Low-Power Watchdog Timer Current (PIC1XLF182X):
  - 500 nA @ 1.8V, typical

Peripheral Features:

- Up to 17 I/O Pins and 1 Input-only Pin:
  - High current sink/source for LED drivers
  - Individually programmable interrupt-on-change pins
  - Individually programmable weak pull-ups
- Timer0: 8-Bit Timer/Counter with 8-Bit Programmable Prescaler
- Enhanced Timer1:
  - 16-bit timer/counter with prescaler
  - External Gate Input mode
  - Dedicated low-power 32 kHz oscillator driver
- Up to three Timer2 modules (Timer2,4,6): 8-Bit Timer/Counter with 8-Bit Period Register, Prescaler and Postscaler
- Up to two Enhanced Capture, Compare, PWM modules (ECCP):
  - Software selectable time-bases
  - Auto-shutdown and auto-restart
  - PWM steering
- Up to two Capture, Compare, PWM modules (CCP):
  - Software selectable time-bases
- Up to two Master Synchronous Serial Port (MSSP) with SPI and I^2C™ with:
  - 7-bit address masking
  - SMBus/PMBus™ compatibility
- Enhanced Universal Synchronous Asynchronous Receiver Transmitter (EUSART):
  - RS-232, RS-485 and LIN compatible
  - Auto-Baud Detect
  - Auto-wake-up on start
- SR Latch (Integrated 555 Timer):
  - Multiple Set/Reset input options
- Analog-to-Digital Converter (ADC):
  - 10-bit resolution
  - Up to 12 channels
- Up to 2 Comparators:
  - Rail-to-rail inputs
  - Power mode control
  - Software controllable hysteresis
- Voltage Reference 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
- Capacitive Touch oscillator module:
  - Up to 12 channels
- Data Signal Modulator:
  - Select modulator and carrier sources from various module outputs.

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TABLE 1: PIC12F1822/16F182X AND PIC12LF1822/16LF1823 FAMILY TYPES

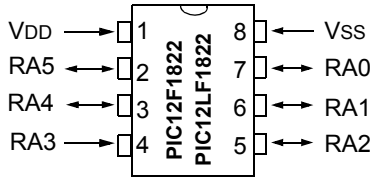
Device	Program Memory Flash (words)	Data EEPROM (bytes)	SRAM (bytes)	I/Os	10-bit A/D (ch)	Timers 8/16-bit	EUSART	MSSP	ECCP/ CCP	Cap Touch Channels
PIC12F1822	2048	256	128	6	4	2/1	1	1	1/0	4
PIC12LF1822	2048	256	128	6	4	2/1	1	1	1/0	4
PIC16F1823	2048	256	128	12	8	2/1	1	1	1/0	8
PIC16LF1823	2048	256	128	12	8	2/1	1	1	1/0	8
PIC16F1824	4096	256	256	12	8	4/1	1	1	2/2	8
PIC16LF1824	4096	256	256	12	8	4/1	1	1	2/2	8
PIC16F1825	8192	256	1024	12	8	4/1	1	1	2/2	8
PIC16LF1825	8192	256	1024	12	8	4/1	1	1	2/2	8
PIC16F1828	4096	256	256	18	12	4/1	1	1	2/2	12
PIC16LF1828	4096	256	256	18	12	4/1	1	1	2/2	12
PIC16F1829	8192	256	1024	18	12	4/1	1	2	2/2	12
PIC16LF1829	8192	256	1024	18	12	4/1	1	2	2/2	12

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Note: Pin details are subject to change.

FIGURE 1: 8-PIN DIAGRAM FOR PIC12F1822/LF1822

PDIP, SOIC, DFN



Note: See Table 2 for location of all peripheral functions.

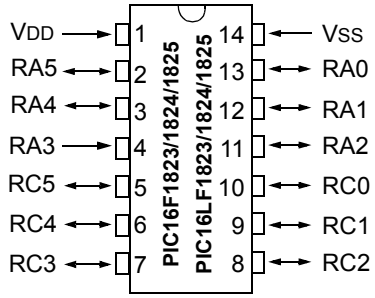
TABLE 2: 8-PIN ALLOCATION TABLE (PIC12F1822/LF1822)

I/O	8-Pin PDIP/SOIC/DFN	A/D	Reference	Cap Sense	Comparator	SR Latch	Timers	CCP	EUSART	MSSP	Interrupt	Modulator	Pull-up	Basic
RA0	7	AN0	DACOUT	CPS0	C1IN+	—	—	P1B(1)	TX(1) CK(1)	SDO(1) $\overline{SS}$(1)	IOC	MDOUT	Y	ICSPDAT/ ICDDAT
RA1	6	AN1	VREF	CPS1	C1IN0-	SRI	—	—	RX(1) DT(1)	SCL SCK	IOC	MDMIN	Y	ICSPCLK/ ICDCLK
RA2	5	AN2	—	CPS2	C1OUT	SRQ	T0CKI	CCP1(1) P1A(1) FLT0	—	SDA SDI	INT/ IOC	MDCIN1	Y	—
RA3	4	—	—	—	—	—	T1G(1)	—	—	$\overline{SS}$(1)	IOC	—	Y	$\overline{MCLR}$ VPP ICDMCLR
RA4	3	AN3	—	CPS3	C1IN1-	—	T1G(1) T1OSO	P1B(1)	TX(1) CK(1)	SDO(1)	IOC	MDCIN2	Y	OSC2 CLKOUT CLKR
RA5	2	—	—	—	—	SRNQ	T1CKI T1OSI	CCP1(1) P1A(1)	RX(1) DT(1)	—	IOC	—	Y	OSC1 CLKIN
VDD	1	—	—	—	—	—	—	—	—	—	—	—	—	VDD
Vss	8	—	—	—	—	—	—	—	—	—	—	—	—	Vss

Note 1: Pin functions can be assigned to one of two pin locations via software.

FIGURE 2: 14-PIN DIAGRAM FOR PIC16F/LF1823/1824/1825

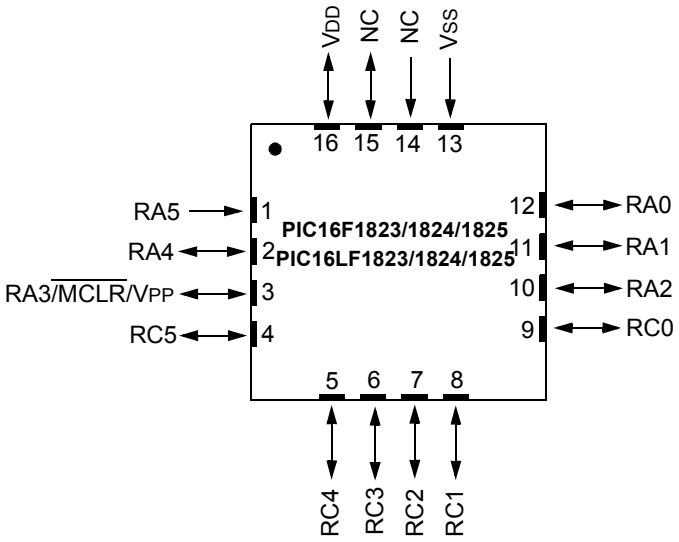
PDIP, SOIC, TSSOP



Note: See Table 3 for location of all peripheral functions.

FIGURE 3: 16-PIN DIAGRAM FOR PIC16F/LF1823/1824/1825

QFN



Note: See Table 3 for location of all peripheral functions.

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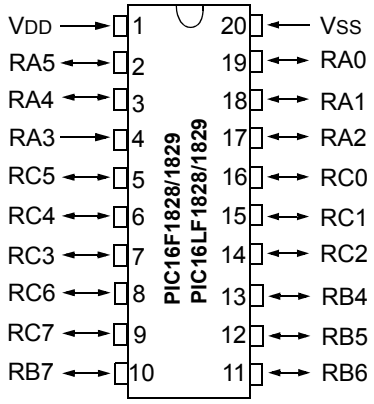
TABLE 3: 14-PIN AND 16-PIN ALLOCATION TABLE (PIC16F/LF1823/1824/1825)

I/O	14-Pin PDIP/SOIC/TSSOP	16-Pin QFN	A/D	Reference	Cap Sense	Comparator	SR Latch	Timers	CCP	EUSART	MSSP	Interrupt	Modulator	Pull-up	Basic
RA0	13	7	AN0	DACOUT	CPS0	C1IN+	—	—	—	TX(1) CK(1)	—	IOC	—	Y	ICSPDAT/ ICDDAT
RA1	12	11	AN1	VREF	CPS1	C12IN0-	SRI	—	—	RX(1) DT(1)	—	IOC	—	Y	ICSPCLK ICDCLK
RA2	11	10	AN2	—	CPS2	C1OUT	SRQ	T0CKI	CCP3(2) FLT0	—	—	INT/ IOC	—	Y	—
RA3	4	3	—	—	—	—	—	T1G(1)	—	—	$\overline{SS}$(1)	IOC	—	Y	$\overline{MCLR}$ VPP
RA4	3	2	AN3	—	CPS3	—	—	T1G(1) T1OSO	P2B(1,2)	—	SDO(1)	IOC	—	Y	OSC2 CLKOUT CLKR
RA5	2	1	—	—	—	—	—	T1CKI T1OSI	CCP2(1,2) P2A(1,2)	—	—	IOC	—	Y	OSC1 CLKIN
RC0	10	9	AN4	—	CPS4	C2IN+	—	—	P1D(1,2)	—	SCL SCK	—	—	Y	—
RC1	9	8	AN5	—	CPS5	C12IN1-	—	—	P1C(1,2) CCP4(2)	—	SDA SDI	—	—	Y	—
RC2	8	7	AN6	—	CPS6	C12IN2-	—	—	P1D(1) P2B(1,2)	—	SDO(1)	—	MDCIN1	Y	—
RC3	7	6	AN7	—	CPS7	C12IN3-	—	—	P1C(1) CCP2(1,2) P2A(1,2)	—	$\overline{SS}$(1)	—	MDMIN	Y	—
RC4	6	5	—	—	—	C2OUT	SRNQ	—	P1B	TX(1) CK(1)	—	—	MDOUT	Y	—
RC5	5	4	—	—	—	—	—	—	CCP1 P1A	RX(1) DT(1)	—	—	MDCIN2	Y	—
VDD	1	16	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	14	13	—	—	—	—	—	—	—	—	—	—	—	—	VSS

Note 1: Pin functions can be assigned to one of two pin locations via software.
2: Pin function only available on PIC16F1824 and PIC16F1825.

FIGURE 4: 20-PIN DIAGRAM FOR PIC16F/LF1828/1829

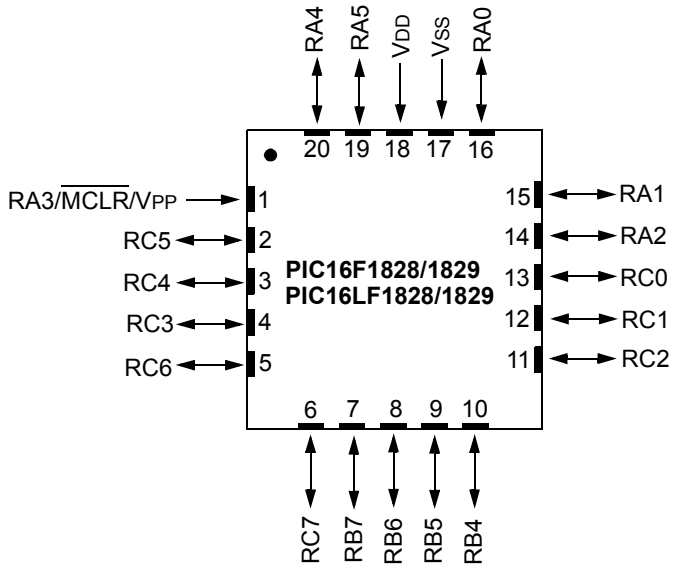
PDIP, SOIC, SSOP



Note: See Table 4 for location of all peripheral functions.

FIGURE 5: 20-PIN DIAGRAM FOR PIC16F/LF1828/1829

QFN 4x4



Note: See Table 4 for location of all peripheral functions.

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TABLE 4: 20-PIN ALLOCATION TABLE (PIC16F/LF1828/1829)

I/O	20-Pin PDIP/SOIC/SSOP	20-Pin QFN	A/D	Reference	Cap Sense	Comparator	SR Latch	Timers	CCP	EUSART	MSSP	Interrupt	Modulator	Pull-up	Basic
RA0	19	16	AN0	VREF- DACOUT	CPS0	C1IN+	—	—	—	—	—	IOC	—	Y	ICSPDAT/ ICDDAT
RA1	18	15	AN1	VREF+	CPS1	C12IN0-	SRI	—	—	—	—	IOC	—	Y	ICSPCLK/ ICDCLK
RA2	17	14	AN2	—	CPS2	C1OUT	SRQ	T0CKI	CCP3 FLT0	—	—	INT/ IOC	—	Y	—
RA3	4	1		—	—	—	—	$\overline{T1G}$(1)	—	—	—	IOC	—	Y	$\overline{MCLR}$ VPP
RA4	3	20	AN3	—	CPS3	—	—	$\overline{T1G}$(1) T1OSO	P2B(1)	—	$\overline{SS}$2(1,2)	IOC	—	Y	OSC2 CLKOUT
RA5	2	19	—	—	—	—	—	T1CKI T1OSI	CCP2(1) P2A(1)	—	SDO2(1,2)	IOC	—	Y	OSC1 CLKIN
RB4	13	10	AN10	—	CPS10	—	—	—	—	—	SDA1 SDI1	IOC	—	Y	—
RB5	12	9	AN11	—	CPS11	—	—	—	—	RX(1) DT(1)	SDA2(2) SDI2(2)	IOC	—	Y	—
RB6	11	8	—	—	—	—	—	—	—	—	SCL1 SCK1	IOC	—	Y	—
RB7	10	7	—	—	—	—	—	—	—	TX(1) CK(1)	SCL2(2) SCK2(2)	IOC	—	Y	—
RC0	16	13	AN4	—	CPS4	C2IN+	—	—	P1D(1)	—	$\overline{SS}$2(1,2)	—	—	Y	—
RC1	15	12	AN5	—	CPS5	C12IN1-	—	—	P1C(1)	—	SDO2(1,2)	—	—	Y	—
RC2	14	11	AN6	—	CPS6	C12IN2-	—	—	P1D(1) P2B(1)	—	—	—	MDCIN1	Y	—
RC3	7	4	AN7	—	CPS7	C12IN3-	—	—	P1C(1) CCP2(1) P2A(1)	—	—	—	MDMIN	Y	—
RC4	6	3	—	—	—	C2OUT	SRNQ	—	P1B	TX(1) CK(1)	—	—	MDOUT	Y	—
RC5	5	2	—	—	—	—	—	—	CCP1 P1A	RX(1) DT(1)	—	—	MDCIN2	Y	—
RC6	8	5	AN8	—	CPS8	—	—	—	CCP4	—	$\overline{SS}$	—	—	Y	—
RC7	9	6	AN9	—	CPS9	—	—	—	—	—	SDO	—	—	Y	—
VDD	1	18	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	20	20	—	—	—	—	—	—	—	—	—	—	—	—	VSS

Note 1: Pin functions can be assigned to one of two pin locations via software.

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