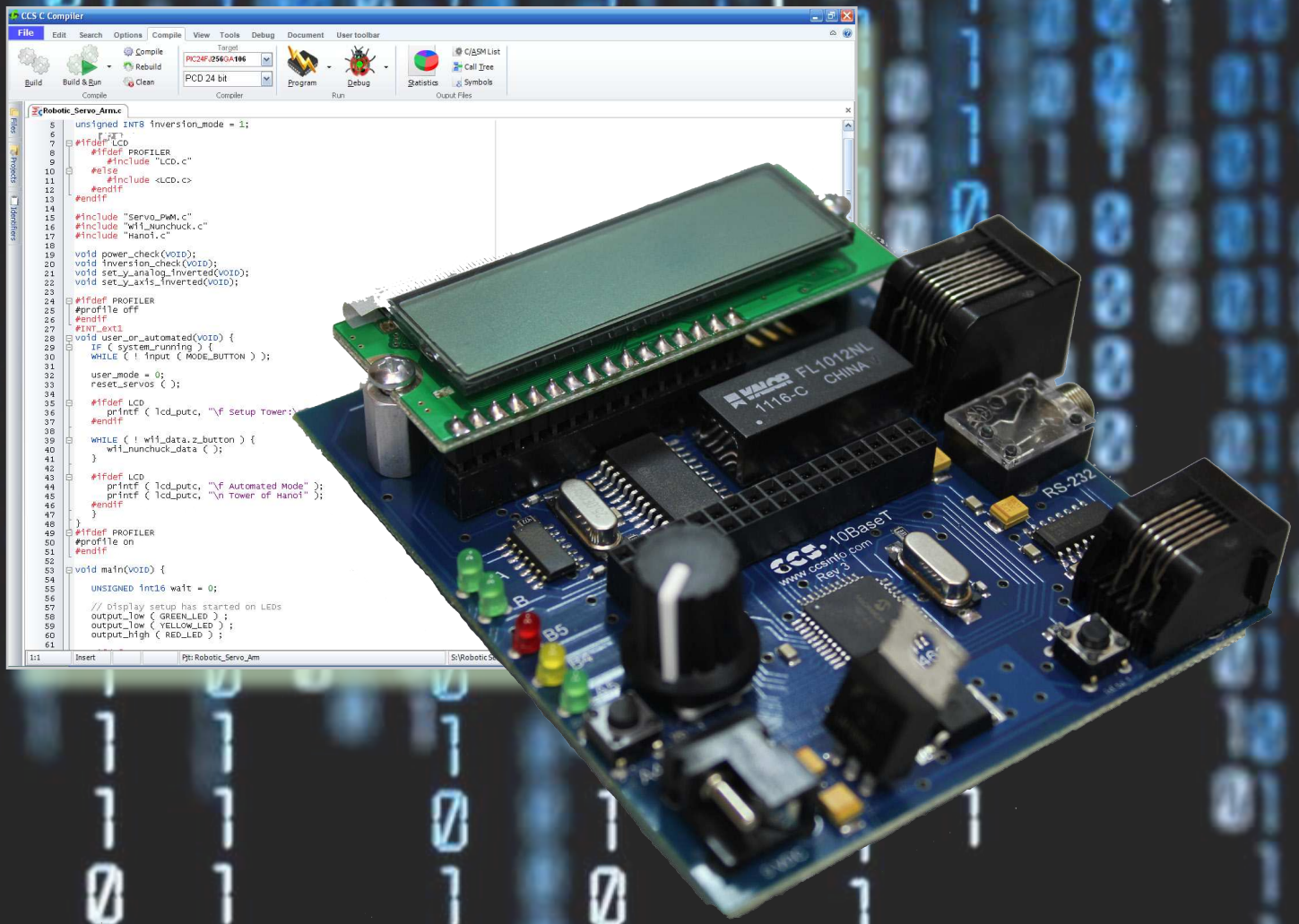
Professional - Powerful

Microchip PIC® MCU

Development Tool Solutions



CCS Inc

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CCS C Version 5 -
The C Code Conqueror

New features of V5 include:

· Numerous built-in libraries that generate relevant and tight code for a specific application. For example: RS232, RS485, PWM, timers, Capacitive and much more.

· IDE editor integrated with C to provide advanced editing such as finding a symbol definition, finding all references to an ID, bookmarking across files, background compiling with syntax marking, syntax helping, column editing and support for regular expressions.

· Multiple compiler versions can be installed and versions can be selected in the IDE. This allows an easy way to fix a project on a specific version for testing and certification.

· C Profiler Tool to track time and usage information on functions, code blocks and receive live data from running programs.

· CCS Data Streaming allows an ICD unit to be used so program I/O can be routed to a PC window inside and without the debugger.

· C++ style CIN/COUT I/O streams with full data formatting to any device or for strings.

· Identifier explorer to easily show the usage and relationship of all program identifiers.

· Graphical viewing of program statistics and the call tree.

· Easy function to copy a project, zip up all project files for archive, or to quickly copy the hex file to a standard location.

· Various options for saving all source code changes. Easy viewing in the IDE to show changes between source code versions.

· Fast native Win32 IDE with no .net, and no Java, and fully integrated for Win8.

Processor & Peripheral Controls

The CCS C Compiler for PIC10, PIC12, PIC14, PIC16, PIC18 and PIC24 microcontrollers has over 307 Built-in Functions to access PIC® MCU hardware easily and producing efficient and highly optimized code.

Functions such as timers, A/D, EEPROM, SSP, PSP, USB, I2C and more:

• Built-in libraries that work with all chips for RS-232 serial I/O, I2C, discrete I/O and precision delays

• Serial I/O functions allow standard functions such as GETC() and PRINTF() to be used for RS-232 like I/O

• Formatted printf allows for easy formatting and display in HEX or decimal

• Multiple I2C and RS232 ports may be easily defined

• #use rs232() offers options to specify a maximum wait time for getc

• Hardware transceiver used when possible, but for all other occasions the compiler generates a software serial transceiver

• Microcontroller clock speed may be specified in a PRAGMA to permit built-in functions to delay for a given number of microseconds or milliseconds

• Functions such as INPUT() and OUTPUT_HIGH() properly maintain the tri-state registers

• Compiler directives determine if tri-state registers are refreshed on every I/O or if the I/O is as fast as possible

• #USE SPI ()

• Simple functions like READ_ADC() to read a value from A/D converter

• Source code drivers included for LCD modules, keypads, 24xx and 94xx serial EEPROM, X10, DS1302 and NJU6355 real time clocks, Dallas touch memory devices, DS2223 and PCF8570, LTC1298 and PCF8591 A/D converters, temperature sensors, digital pots, I/O expander and much more

Advanced Functions

The compiler can handle inline or separate functions, as well as parameter passing in re-usable registers. Transparent to the user, the compiler handles calls across pages automatically and analyzes program structure and call tree to optimize RAM and ROM usage.

Additional features include:

• Efficient function implementation allow call trees deeper than the hardware stack

• Automatic linking handles multiple code pages

• Assembly code may be inserted anywhere in the source and may reference C variables

• Function Overloading allows for several functions with the same name, but differences in number and type of parameters

• Default Parameters can be used in a function if arguments are not used in a call

• Interrupt functions supported on PCM/PCH. The compiler generates all start-up and clean-up code as well as identifying the correct function to be called

• Reference parameters may be used to improve code readability and inline function efficiency

• Generation of multiple HEX files for chips with external memory

• Variable Number Of Parameters in a function

• Relocatable Objects / Multiple Compilation Unit (IDE Only)

• Automatic #fuses Configuration

CCS C Compiler -
Code Optimization at its core!

CCS C Compiler is comprised with Standard C operators and built-in libraries that are specific to PIC® MCU registers, and access to hardware features from C. Exclusive features include:

PIC10 / PIC12 / PIC14 / PIC16 / PIC18

1, 8, 16, 32-bit integer types & 32-bit floating point
Bit Arrays and Fixed Point Decimals
#BIT and #BYTE will allow C variables to be placed at absolute addresses to map registers to C variables
Standard one-bit type (Short Int) permits the compiler to generate very efficient Bit-oriented code
Constants (including strings and arrays) are saved in program memory
Flexible Handling of Constant Data
Variable length Constant Strings
AddressMod capability to create user defined address spaces in memory device

Advanced Features in PIC24 & dsPIC® DSCs

Also 48 & 64-bit floating point for calculations requiring greater precision or broader range
#BIT, #BYTE and #WORD will allow C variables to be placed at absolute addresses to map registers
Constants packed in all bytes of ROM
Enhanced oscillator control to choose from a multitude of clock sources, PLL and power saving options
Function recursion allows for interactive processing algorithms

Example Programs

A large number of example programs are included with the software. The following is a list of many of the programs. Most programs will work with any chip by just changing the #INCLUDE line that includes the device information. All of the following programs have wiring instructions at the beginning of the code in a comment header. The SIOW.EXE program included in the program directory may be used to demonstrate the example programs and uses a PC COM port to communicate with the target.

LCD
A/D
PWM
Comparator
PSP
Interrupts
Magnetic Card Reader
Frequency counter
7 Seg LED
Data Logger
Pattern Generator
Stepper Motors
Tone Generation
Sensors
Fixed Point
TCP/IP
Floating Point
ICD Debugging
Advanced Macros
Memory Management
I^2C
DTMF Tones
CRC Calculator
CCP
Watchdog Timer
Analog Comparator
Optical Encoder
USB
Boot Loader
CAN Bus
I/O for 8-Pin Parts
Sleep
Timers
Web Server
E-mailer
MOD Bus
LIN Bus
RFID
SPI
RTOS
Serial

Generic header files are included for the standard PIC® microcontrollers. These files are in the DEVICES directory. The pins of the chip are defined in these files in the form PIN_B2. It is recommended that for a given project, the file is copied to a project header file and the PIN_xx defines be changed to match the actual hardware. For example; LCDRW (matching the mnemonic on the schematic). Use the generic include files by placing the following in your main .C file:

Included C Drivers

SERIAL EEPROM/FLASH
2041
24xx
25xx
93xx
AT2421
AT25256
CE51X
CE62X
CE67X
9512
MMC/SD
FLOATEE

STRING FUNCTIONS
STDLIB
STRING

STANDARD C
ERRNO
ASSERT
FLOAT
LIMITS
SETJMP
STDDEF
STDIO
STDLIBM

DIGITAL POT
AD8400
DS1868
MCP41010

TEMPERATURE
DS1621
DS1621M
DS1631
DS1624
LM75CIM3

USB
USBN960X
PIC_USB
PIC18_USB

ANALOG
14KCAL
68HC68R1
AD7705
AD7715
ADS8320
LTC1298
MAX517
MCP3208

TRIG
MATH

SOUNDS
ISD4003
TONES
WTS701

LCD MODULE
GLCD
KS0108
LCD420
SED1335
HDM64GS12

RS232
INPUT
LOADER

ACCELEROMETER
ADXL210

NETWORKING/ INTERNET
TCP
PPP
S7600
RTL8019
ENC28J60

REAL-TIME CLOCK
DS1302
NJU6355
DS1305
ISL1209

CAN FUNCTIONALITY
MCP251x
8xxx8
18F4580

RFID
EM4095
EM4402
EM4150

EXPANDED I/O
74165
74595
MAX7300
SC28L19x

SERIAL RAM
68HC68R1
68HC68R2
PCF8570
M68AF031
PCF8570
D41256
MT4264

OTHER
Digital Compass
Keypad
Mag Card Reader
PLL Interface
Dallas One Wire
IR Decoder
Line Tracker
Servo Control
X10
Cyclic Redundancy Code
RS485
N9085UD
PNI11096
LMX2326

TOUCH
Dallas Touch

Built-in Functions that Maximize Code Efficiency

Built-In Functions

CODE PROFILER
profileout()

RS-232
fprintf( )
getc( )
getch( )
gets( )
kbhit( )
perror()
printf( )
putchar( )
puts( )
setup_uart( )

SPI TWO-WIRE I/O
setup_spi1( )
setup_spi2( )
setup_spi3( )
spi_data_is_in( )
spi_data_is_in2( )
spi_data_is_in3( )
spi_init()
spi_prewrite()
spi_read_16()
spi_read()
spi_read2_16()
spi_read2()
spi_read3_16()
spi_read3()
spi_read4_16()
spi_speed()
spi_write_16()
spi_write()
spi_write2_16()
spi_write2()
spi_write3_16()
spi_write3()
spi_write4_16()
spi_xfer()

VOLTAGE REF
setup_comparator( )*
setup_low_volt_detect( )
setup_vref( )

ANALOG
adc_done()
adc_done2()
dac_write()
read_adc()
read_adc2()
set_adc_channel()
set_adc_channel2()
setup_adc_ports()
setup_adc_ports2()
setup_adc()
setup_adc2()
setup_dac()
setup_opamp1()
setup_opamp2()
setup_port_a()

STANDARD C SPECIAL
bsearch()
mblen()
mbstowcs()
mbtowc()
qsort()
rand()
srand()
_va_arg()
va_arg()
va_end()
va_start()
wcstombs()
wctomb()

I²C
i2c_isr_state()
i2c_poll()
i2c_read()
i2c_slaveaddr()
i2c_speed()
i2c_start()
i2c_stop()
i2c_write()

STANDARD C MATH
abs()
atoe()
atof()
atof48()
atof64()
atoi()
atoi32()
atoi48()
atoi64()
div()
ldiv()

STANDARD C MEMORY
calloc()
free()
get_motor_pwm_count()
longjmp()
malloc()
memchr()
memcmp()
memcpy()
memmove()
memset()
offsetof()
offsetofbit()
realloc()
set_motor_pwm_duty()
set_motor_pwm_event()
set_motor_unit()
setjmp()
setup_motor_pwm()

DELAYS
delay_cycles( )
delay_ms( )
delay_us( )

DISCRETE I/O
get_tris_X()
input_change_X()
input_state()
input_X()
input()
output_bit()
output_drive()
output_float()
output_high()
output_low()
output_toggle()
output_X()
port_X_pullups()
set_mode_X()
set_pulldown()
set_pullup()
set_slow_slew_X()
set_tris_X()

CAPTURE/COMPARE PWM
get_capture()
set_compare_time()
set_power_pwm_override()
set_power_pwm0_duty()
set_power_pwm2_duty()
set_power_pwm4_duty()
set_power_pwm6_duty()
set_pwm_duty()
set_pwm_period()
setup_capture()
setup_ccp1_duty()
setup_ccp1()
setup_ccp2_duty()
setup_ccp2()
setup_ccp3_duty()
setup_ccp3()
setup_ccp4_duty()
setup_ccp4()
setup_ccp5()
setup_ccp6_duty()
setup_compare()
setup_power_pwm_faults()
setup_power_pwm_pins()
setup_power_pwm()

REAL TIME CLOCK
setup_rtc( )*
setup_rtc _alarm( )*
rtc_read( )*
rtc_write( )*
rtc_alarm_read( )*
rtc_alarm_write( )*

LCD
setup_lcd( )
lcd_contrast()
lcd_load( )
lcd_symbol( )

DIRECT MEMORY ACCESS
dma_start()
dma_status()
setup_dma()

PROCESSOR CONTROLS
act_status()
brownout_enable()
clear_interrupt()
disable_interrupts()
enable_interrupts()
ext_int_edge()
goto_address()
interrupt_active()
jump_to_isr()
label_address()
read_bank()
reset_cpu()
restart_cause()
restart_wdt()
setup_act()
setup_counters()
setup_oscillator()
setup_wdt()
sleep_ulpwu()
sleep()
write_bank()

BIT MANIPULATION
_mul()
bit_clear()
bit_first()
bit_last()
bit_set()
bit_test()
make16()
make32()
make8()
rotate_left()
rotate_right()
shift_left()
shift_right()
swap()

RTOS
rtos_await()
rtos_disable()
rtos_enable()
rtos_msg_poll()
rtos_msg_read()
rtos_msg_send()
rtos_overrun()
rtos_run()
rtos_signal()
rtos_stats()
rtos_terminate()
rtos_wait()
rtos_yield()

MEMORY ACCESS
erase_eeprom()
erase_program_eeprom()
erase_program_memory()
read_calibration()
read_configuration_memory()
read_eeprom()
read_extended_ram()
read_external_memory()
read_program_eeprom()
read_program_memory()
read_program_memory8()
read_rom_memory()
setup_external_memory()
write_configuration_memory()
write_eeprom()
write_extended_ram()
write_external_memory()
write_program_eeprom()
write_program_memory()
write_program_memory8()

QUADRATURE ENCODER INTERFACE
setup_qei( )*
qei_get_count( )*
qei_set_count( )*
qei_status( )*

STANDARD C CHAR
atol()
isalnum()
isalpha()
isamong()
isamoung()
iscntrl()
isdigit()
isgraph()
islower()
isprint()
ispunct()
isspace()
isupper()
isxdigit()
itoa()
sprintf()
strcat()
strchr()
strcmp()
strcoll()
strcopy()
strcpy()
strcspn()
strerror()
stricmp()
strlen()
strlwr()
strncat()
strncmp()
strncpy()
strpbrk()
strrchr()
strspn()
strstr()
strtod()
strtof()
strtof48()
strtok()
strtol()
strtoul()
strxfrm()
tolower()
toupper()

CAPACITIVE TOUCH
touchpad_getc()
touchpad_hit()
touchpad_state()

PARALLEL MASTER I/O
pmp_address()
pmp_input_full()
pmp_output_full()
pmp_overflow()
pmp_read()
pmp_write()
setup_pmp()

PARALLEL SLAVE I/O
psp_input_full()
psp_output_full()
psp_overflow()
psp_read()
psp_write()
setup_psp()

DCI
dci_data_received()
dci_read()
dci_start()
dci_transmit_ready()
dci_write()
setup_dci()

TIMERS/TICK TIMERS
get_ticks()
get_timer()
get_timer1_capt()
get_timer2_capt()
get_timerX()
set_ticks()
set_timer()
set_timerX()
setup_timer_X()

CRC
crc_calc()
crc_calc8()
crc_init()
setup_crc()

Preprocessor Functions

STANDARD C
#define
#elif
#else
#endif
#error
#if
#ifdef
#ifexpr
#ifndef
#include
#list
#nolist
#pragma
#undef
#warning
defined()
definedinc()

FUNCTION QUALIFIERS
#inline
#int_
#recursive
#separate

DEVICE SPECIFICATION
#device
#fuses
#hexcomment
#id
#pin_select
#serialize
#todo

RTOS
#task
#use rtos

PRE-DEFINED IDENTIFIERS
date
device
file
filename
line
pcb
pcd
pch
pcm
time

BUILT-IN LIBRARIES
#ocs
#use capture
#use delay
#use dynamic_memory
#use fast_io
#use fixed_io
#use i2c
#use profile
#use pwm
#use rs232
#use spi
#use standard_io
#use timer
#use touchpad

MEMORY CONTROL
#asm
#bank_dma
#bank1
#bankx
#banky
#bit
#byte
#endasm
#fill_rom
#locate
#org
#reserve
#rom
#type
#word
#zero_local_ram
#zero_ram

LINKER
#build
#import
#export

COMPILER CONTROL
#case
#ignore_warnings
#line
#module
#opt
#priority
#profile

Example C/ASM Listing

```
...................done=FALSE;
09C: BCF 3B, 1
...................while (!done&input(PIN_B2)) {
09D: BTFSC 3B, 1
09E: GOTO 0BC
09F: BTFSS 06, 2
0A0: GOTO 0BC
...................       level=limit*16;
0A1: MOVF 3D, W
0A2: MOVWF 3C
0A3: SWAPF 3C, F
0A4: MOVLW F0
0A5: ANDWF 3C, F
...................       if(get_rtcc()>71)
0A6: MOVF 01, W
0A7: MOVWF 20
0A8: MOVLW 48
0A9: SUBWF 20, W
0AA: BTFSS 03, 0
0AB: GOTO 0AE
...................                 output_high(PIN_B1);
0AC: BSF 06, 1
...................       else
0AD: GOTO 0AF
...................                 output_low(PIN_B1);
0AE: BCF 06, 1
...................       if(++limit==0x24)
0AF: INCF 3D, F
0B0: MOVLW 24
0B1: SUBWF 3D, W
0B2: BTFSC 03,2
...................                 limit=0;
0B3: CLRF 3D
...................       output_bit(PIN_B3,
...................       shift_left(&data,1,0));
0B4: BCF 03, 0
0B5: RLF 2D, F
0B6: BTFSC 03, 0
0B7: GOTO 0BA
0B8: BCF 06, 3
0B9: GOTO 0BB
0BA: BSF 06, 3
```

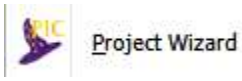
Standard C Syntax

- if, else, while, do, switch, case, for, return, goto, break, continue
- ! ~ ++ -- * = = , & |
- */% << >> ^ && || ? :
- <= < > >= == !=
- = += -= *= /= %= >>= <<= &= ^=m |=
- typedef, static, suto, const, enum, struct, union
- Arrays up to 5 subscripts
- Structures and Unions may be nested
- Custom bit fields (1-8 bits) within structures
- ENUMerated types
- CONstant variables, arrays, structures, and strings
- Full function parameter support (any number and kind)
- C++ reference parameters and comments allowed

- Supports user defined data storage locations
- C data types may reside in any type of storage
- User-defined access routines
- Implements a virtual memory scheme
- Located C data in program memory
- Targets with external memory can use the external bus for data

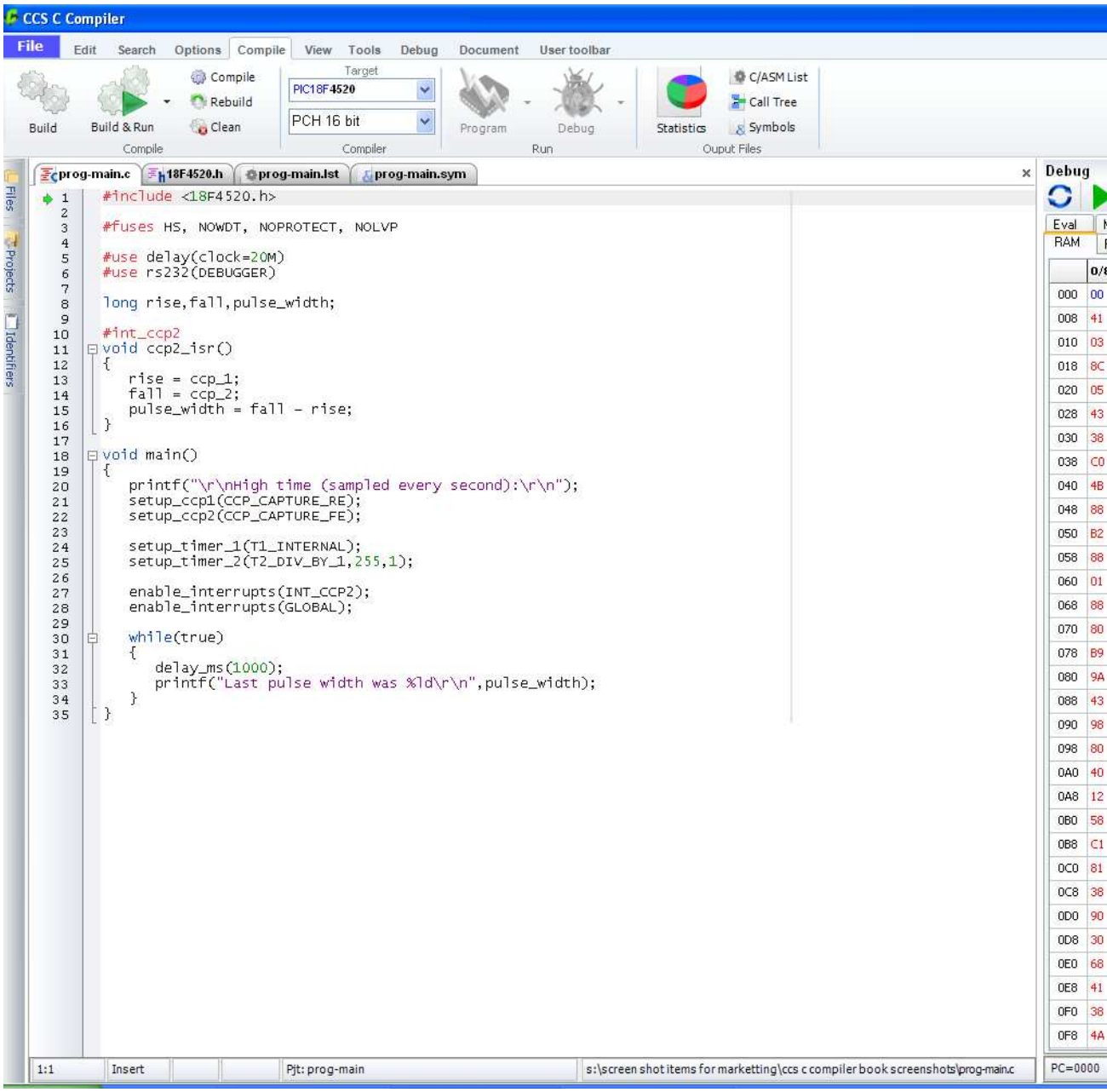
Project Navigation

File bar shows all project related files and can quickly open or compile a file.
Identifier bar shows all project functions and identifiers.



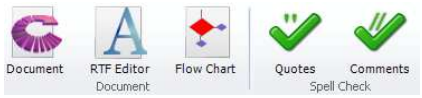
Wizards

Simplifies configuration of drivers and peripherals to start projects quickly. Forms based on interactive questions to aid in set-up of options, such as calculating and showing the timer options based on your clocks.
Included in PCW: CAN Bus, USB, RS-485, and many more



Tools

Device Selector
Edit/Add to Device Database
Generate C Constant Declarations from hex/binary
Special Function Register Reference
Serial Port Monitor
File compare for list or source files

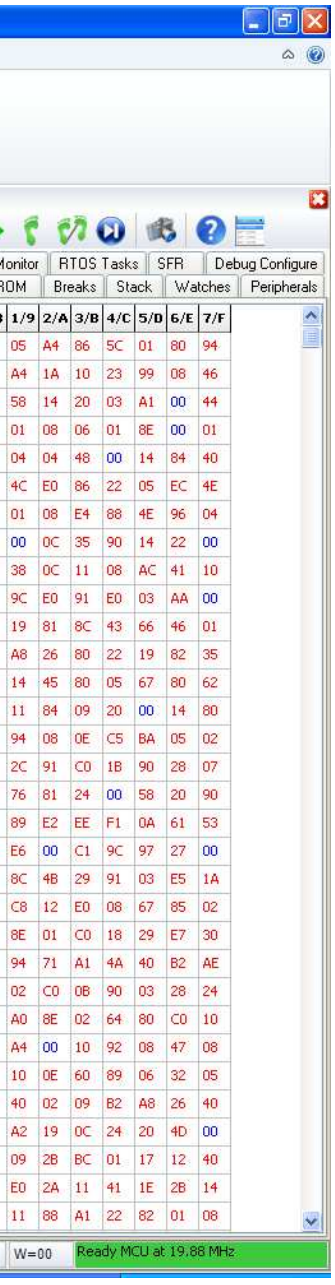


Editor Features

RTOS--integrated for maximum efficiency and multi-tasking allowed with deterministic scheduling
Automated C indenting
Context Sensitive Help
Color Syntax Highlighting

Special Viewers

Include quick and easy access to data sheets, valid fuses, interrupts for devices, hex file disassembler, .COD file interpreter, and an advanced source/list file compare.



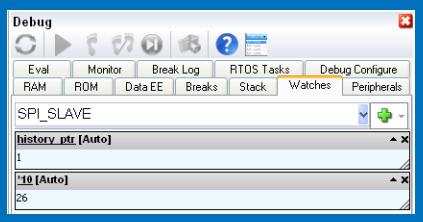
RAM

The RAM window allows the user to view all the memory locations in the device RAM.

- C brace matching
- Multiple open windows
- Technical Support Wizard
- Multiple Compilation Unit preprocessor directives
- Documentation Generator
- Flow Chart Editor
- RTF Documentation Generator
- Spellchecker
- Download Manager

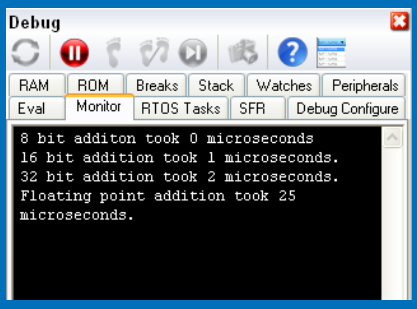
C Aware Real-time Debugger

*Can be used with the CCS ICD and Mach X, and Microchip MPLABX®, REAL ICE™.



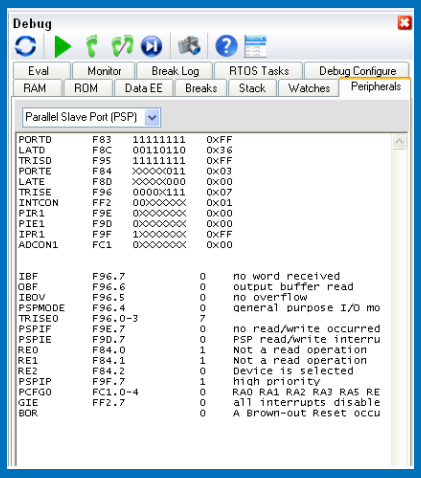
Watches

Full C expressions can be specified. Arrays and structures are understood and shown in natural form. Variables can be modified and break points can be set.



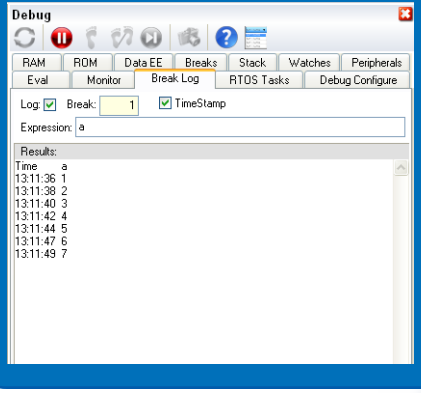
Serial Data

A monitor allows character I/O to and from the target platform. The target platform can printf to this debugger window and getc from it.



Peripherals

Special function registers are grouped by a function and each bit is fully interpreted in the debugger window.



Logging

Configurable to save data each time a specified source line is executed. Set-up profiles can be saved and used with any project.
Debugger data can be printed or saved to disk file.

Programming and Debugging Solutions that Meet ALL of Your Requirements!

LOAD-n-GO Handheld Programmer

- Stores up to four firmware images
- Update products in the field
- Enables technicians and engineers to update deployed products without a PC
- Programs devices via ICSP™ even when target system is powered down
- Ability to program PIC32 family

Sku# 53503-814

MACH X Programmer

- Supports all PIC and dsPIC families, MCPxxxx(CAN Bus chips) and PIC32
- In-Circuit programming via a standard ICD connector
- Use as a debugger with use of CCS C through USB
- Program and read HEX and COF files
- User selectable verify voltages (2V to 5.5V) fulfills all requirements on a production programmer required by Microchip's ICSP specifications
- Debugging ability for ISCP devices

Sku# 53500-503

All CCS debuggers and programmers are supported by CCSLOAD, the free CCS Programmer Control Software. CCSLOAD features a Windows user interface with extensive diagnostics and security options and a command line interface that will run on Linux and Window's platforms.

ICD-U64 In-Circuit Programmer/Debugger

- Fast and easy-to-use ICD solution
- Supports all Microchip's PIC® MCUs and dsPIC®DSCs
- Covers all targets that have debug mode when used in conjunction with CCS IDE compilers
- Provides In-Circuit Serial Programming (ICSP) support for all Flash chips
- Powers and connects through USB
- Ability to program PIC32 family

Sku# 53502-852

Prime8 Production ICSP™ Programmer

- Carry out low-cost production programming
- Programs up to 8 devices concurrently
- Operates in stand-alone mode or while connected to a PC
- Supplies up to 200ma at 2-5V to power target devices
- Ability to program PIC32 family

Sku# 53504-830

About CCS

CCS is a leading worldwide supplier of embedded software development tools that enable companies to develop premium products based on Microchip PIC® MCU and dsPIC® DSC devices. Complete proven tool chains from CCS include a code optimizing C compiler, application specific hardware platforms and software development kits. CCS products accelerate development of energy saving industrial automation, wireless and wired communication, automotive, medical device and consumer product applications.

Established in 1996, CCS is a Microchip Premier 3rd Party Partner. For more information, please visit www.ccsinfo.com.

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Development Kits from CCS - Enable a design advantage!

CCS Development kits combine the powerful and optimized CCS C Compiler, an ICD-U64 In-Circuit Programmer/Debugger, application specific prototyping boards, and all required hardware accessories.

Kit Name	Push Buttton	3 LEDS	POTS	RS-232	I/O pins Total	I/O pins Analog	IDE Compiler	Special Features	
Capacitive Touch		1		1			PCW	PIC16LF727 with mTouch™ Sensing Solution. Equipped with *Tag Connect footprint for ICSP programming.	
CCS Wireless - Ember ZigBee™ Edition					15	4	PCWH	Full communication protocols with the Ember-ZigBee™ stack using the powerful Ember EM260 chip.	
DSP Starter	✓	✓	1	1	10	1	PCDIDE	Real ICE™ connector & a header to access the available GPIO, Runs at 30 MIPS	
DSP Analog	✓	✓	2	1	21	8	PCWHD	Includes a Texas Instruments TLV320AIC23B audio codec	
Embedded Internet	✓	2	2	1	6	1	PCWH	Realtek 8019A NE2000 Compatible NIC IC, with Ethernet jack	
Embedded Ethernet	✓	✓	1	1	30	12	PCWH	Header for I/O to PIC18F4620, LCD, Serial EEPROM, MMC card reader	
3.3V Ethernet Controller	✓	✓	1	1	20	2	PCWH	PIC18F67J60, prototyping board operating at 10-base T speeds	
Robotics					10	2	PCW	WTS701 Text-to-Speech Converter with Speaker, Proximity Detection,Infrared Detection, Ball Bearing Servo Motors & Expansion Port	
Embedded Serial Busses		✓			30	7	PCW	Has two nodes and shares common I/O, memory and sensor components between two PIC16 MCUs	
CAN Bus		9	3	3	30	10	PCWH	Includes a PIC18F4580, a PIC16F876A connected to an MCP2515 CAN peripheral, and two MCP25050 CAN expanders.	
CAN Bus 24		9	3	2	30	8	PCWHD	Includes a PIC24HJ56GP610 with two on-chip ECAN controllers, a dsPIC30F4012 connected to an MCP2515 CAN peripheral, and two MCP25050 CAN expanders.	
USB	✓	✓	1	2	26	11	PCWH	PIC18F4550 with an on-chip USB controller peripheral	
USB Master	2	✓	1	2	14	4	PCWH	Hosts a Vinculum™ VNC1L chip	
RFID		4		1			PCW	Short range RFID antenna connected to an external RFID transceiver IC	
USB for PIC24	✓	✓	1	2	30	5	PCWHD	PIC24FJ256GB206 with an on-chip USB controller peripheral	
PIC12F675	✓	✓	2	1	6	4	PCW	Board includes the 14-pin part for ICSP & debugging at the C level	
PIC12F683	✓	✓	2	1	6	4	PCW	Similar to PIC12F675 with twice the RMA & EEPROM, 3 timers & Capture/Compare/PWM module	
PIC16F877A	✓	✓	1	1	30	7	PCWH	Basic features for quick and easy learning	
PIC16F887	✓	✓	1	1	30	12	PCWH	Basic features of 877A family with additional I/O	
101:C on PIC16F818	✓	6			4	2		Complete C learning system with powerful and easy-to-use features on the PIC16F818.	
PIC16F1937	✓	✓	1	1			PCW	Includes a 93LC56 serial EEPROM, DS1631 digital thermometer and NJU6355 real-time clock.	
PIC18F4520	✓	✓	1	1	30	11	PCW	Basic features that require more RMA and Data EEPROM space	
PIC18F6722	✓	✓	1	2	48	11	PCW	RS-232 Level Converter connected to the C6/C7 UART and G1G2 UART	
PIC18F8722	✓	✓	1	2	29	13	PCW	External Flash & RAM	
PIC18F45K22	✓	✓	1	1	30	11	PCWH	Includes 93LC56 serial EEPROM chip, DS1631 digital thermometer chip, and NJU6355 real-time clock IC with attached 32.768kHz crystal	
PIC18F67J10	✓	✓	1	2	48	10	PCWH	Basic features for 3.3V applications	
PIC24F	✓	✓	1	2	48	16	PCDIDE	Runs at 16 MIPS	
PIC24H	✓	✓	1	2	48	18	PCDIDE	Runs at 40 MIPS-Low drive current	
ACE Kit	2	5	2	2			PCW	PIC16F877A with connectors and expanders	