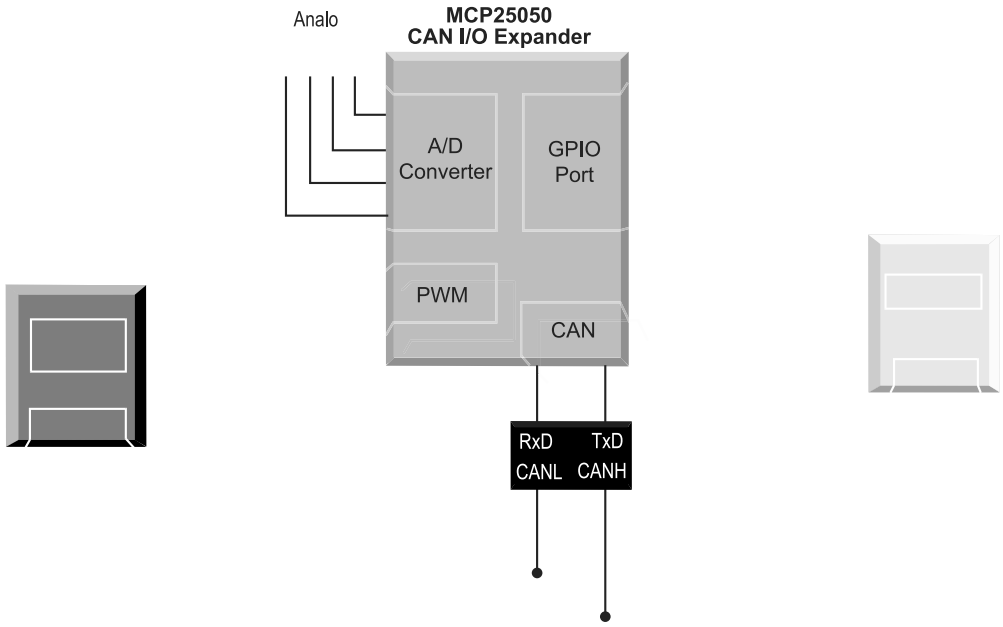

Analo
MCP25050
CAN I/O Expander
A/D
Converter
GPIO
Port
PWM
CAN
RxD
TxD
CANL
CANH

MCP2120 Infrared Encoder/Decoder

Unlike the MCP2150 and MCP2140 which implement the IrDAfistack, the MCP2120 is simply an encoder/decoder. This allows the application processor to implement all or part of the IrDA stack, or implement a custom protocol using IR.

MCP2120 Features:

- UART to IrDA encoder/decoder
- Supports IrDA physical layer specification (v.1.3)
- Interfaces with IrDA compliant transceivers
- Interfaces to standard UARTs

MCP2120 Features (Cont.):

- Operates up to the full standard IrDA data rate (115.2 kbaud) 312.5 kbaud maximum
- Low power mode
- Hardware and software baud control

Development Tools Support:

- MCP2120/MCP2150 Developer s Kit (DM163008)
- MCP212X Developer s Daughter Board (MCP212XEV-DB)

MCP2122 Infrared Encoder/Decoder

The MCP2122 is a stand-alone IrDA standard encoder/ decoder device. The MCP2122 has two interfaces: the host UART interface and the IR interface. The host UART interfaces to the UART of the host controller. The IR interface connects to an infrared (IR) optical transceiver circuit, which converts electrical pulses into IR light (encode) and converts IR light into electrical pulses (decode).

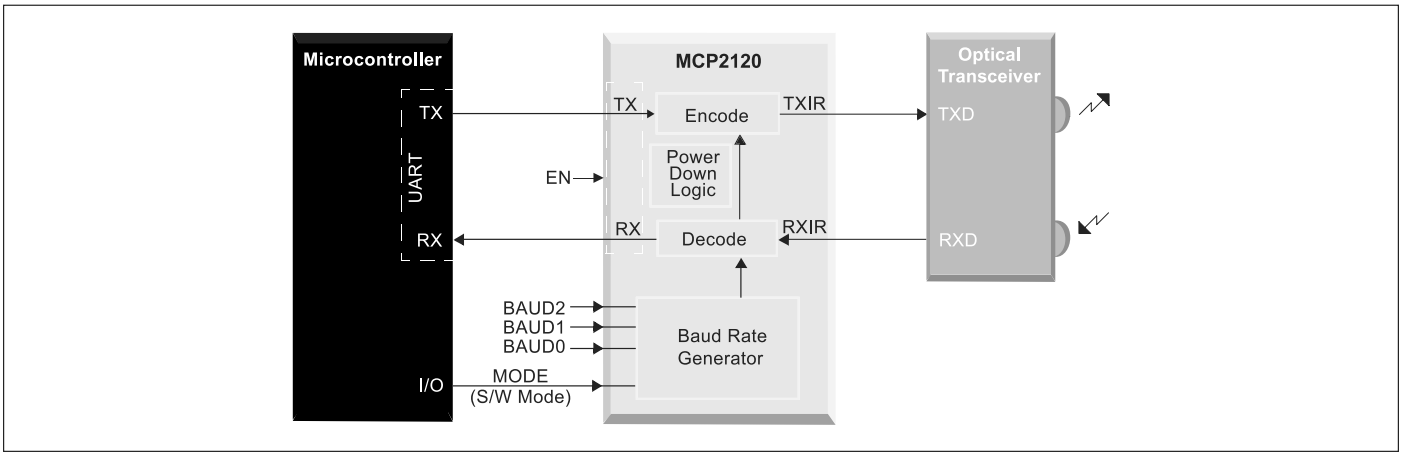
MCP2122 Features:

- UART to IrDA encoder/decoder
- Supports IrDA physical layer specification (v.1.3)
- Interfaces with IrDA compliant transceivers
- Interfaces to standard UARTs
- Operates up to the full standard IrDA data rate (115.2 kbaud)
- Low power mode
- 16X clock input

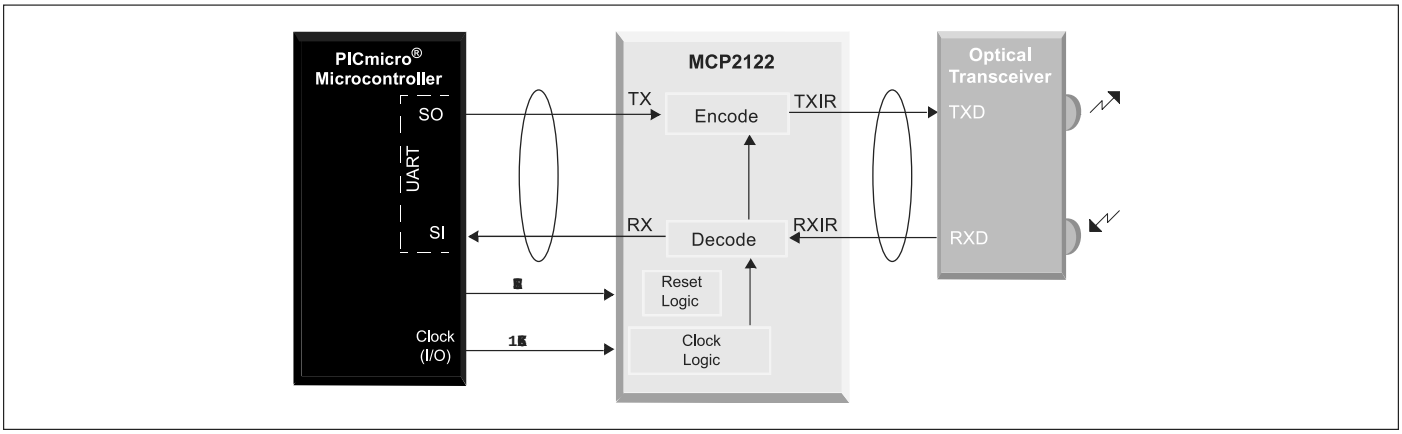
Development Tools Support:

- MCP212X Developer s Daughter Board (MCP212XEV-DB)
- SOIC 8-Lead Evaluation Board (SOIC8EV)

MCP2120 Typical System Block Diagram



MCP2122 Typical System Block Diagram



Product specifications can be found on page 13.

MCP23008/MCP23S08 8-bit I/O Expander

The MCP23X08 device provides 8-bit, general purpose, parallel I/O expansion for I²C bus or SPI applications. The two devices differ in the number of hardware address pins and the serial interface:

MCP23008 I²C interface; three address pins
MCP23S08 SPI interface; two address pins

The MCP23X08 consists of multiple 8-bit con guration registers for input, output and polarity selection.

MCP23008 Features:

- High speed I²C interface:
  - 100 kHz
  - 400 kHz
  - 1.7 MHz
- Three hardware address pins for up to eight devices on the bus
- Configurable interrupt output pin
- Configurable interrupt source
- High current drive for each output (25 mA)
- Eight individually selectable I/O pins
- Low standby current (1 μA max)

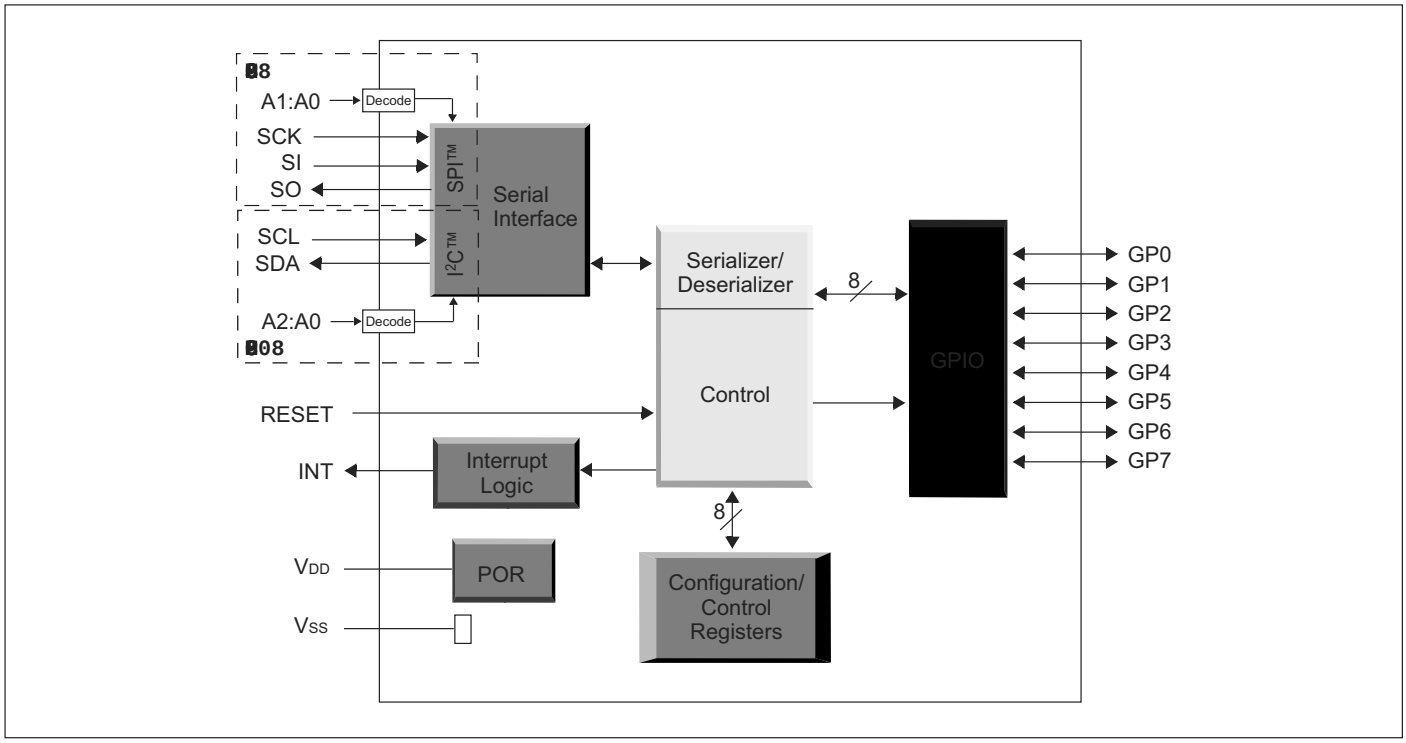
MCP23S08 Features:

- High speed SPI interface:
  - 10 MHz
- Two hardware address pins for up to four devices on the bus
- Configurable interrupt output pin
- Configurable interrupt source
- High current output drive for each pin (25 mA)
- Eight individually selectable I/O pins
- Low standby current (1 μA max)

Development Tools Support:

- MCP23X08 Evaluation Board (MCP23X08EV)

MCP23008/MCP23S08 Typical System Block Diagram



Product specifications can be found on page 14.

MCP23017/MCP23S17 16-bit I/O Expander

The MCP23017/MCP23S17 (MCP23X17) device family provides 16-bit, general purpose parallel I/O expansion for I²C bus or SPI applications. The two devices differ only in the serial interface.

MCP23017 I²C interface
MCP23S17 SPI interface

The MCP23X17 consists of multiple 8-bit con guration registers for input, output and polarity selection.

MCP23017 Features:

- High speed I²C interface:
  - 100 kHz
  - 400 kHz
  - 1.7 MHz
- Three hardware address pins for up to eight devices on the bus
- Configurable interrupt output pin
- Configurable interrupt source
- High current drive for each output (25 mA)
- Sixteen individually selectable I/O pins
- Low standby current (1 μA max)

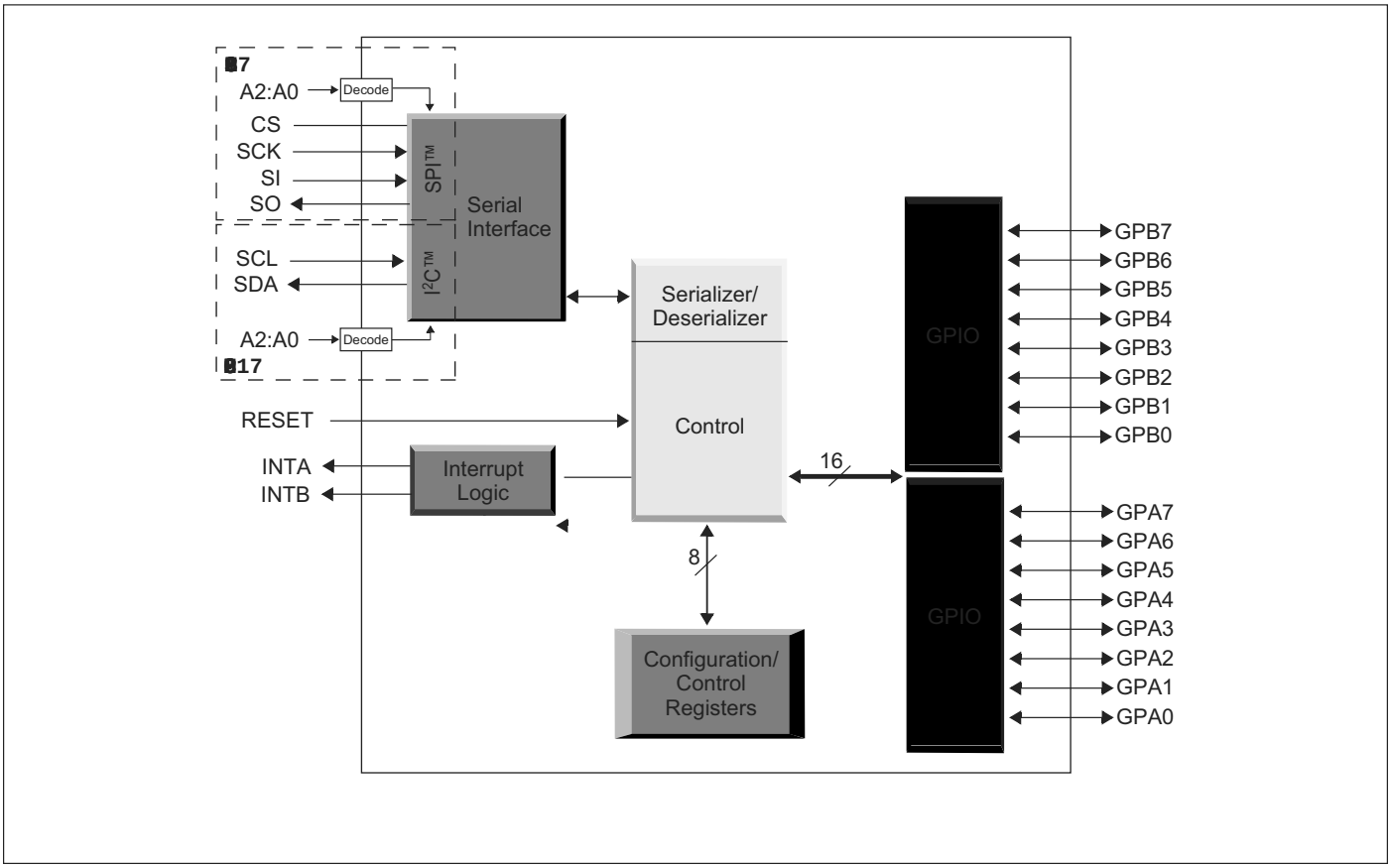
MCP23S17 Features:

- High speed SPI interface
- Three hardware address pins for up to eight devices on the bus
- Configurable interrupt output pin
- Configurable interrupt source
- High current drive for each output (25 mA)
- Sixteen individually selectable I/O pins
- Low standby current (1 μA max)

Development Tools Support:

None available at this time.

MCP23017/MCP23S17 Typical System Block Diagram



Product specifications can be found on page 14.

See the Microchip Product Selector Guide for complete product selection and specifications

Device	Operating Voltage (V)	Operating Temp. Range (°C)	Unique Features	Packages
MCP2510(1)	2.7 to 5.5	-40 to +125	CAN 2.0B Active controller with SPI interface to MCU, 3 transmit buffers, 2 receive buffers, HW and SW message triggers	18 PDIP, SOIC, 20 TSSOP
MCP2515	2.7 to 5.5	-40 to +125	MCP2510 pin-compatible upgrade with enhanced features including higher throughput and data byte filtering	18 PDIP, SOIC, 20 TSSOP
MCP25020	2.7 to 5.5	-40 to +125	CAN 2.0B Active I/O Expander, Configurable I/O, 2 PWM outputs	14 PDIP, SOIC
MCP25025	2.7 to 5.5	-40 to +85	CAN 2.0B Active I/O Expander, Configurable I/O, 2 PWM outputs, one-wire CAN option	14 PDIP, SOIC
MCP25050	2.7 to 5.5	-40 to +125	Mixed-Signal CAN 2.0B Active I/O Expander, Configurable I/O, 4 10-bit ADCs, 2 PWM outputs	14 PDIP, SOIC
MCP25055	2.7 to 5.5	-40 to +85	Mixed-Signal CAN 2.0B Active I/O Expander, Configurable I/O, 4 10-bit ADCs, 2 PWM outputs, One-wire CAN option	14 PDIP, SOIC
MCP2551	4.5 to 5.5	-40 to +125	High-Speed CAN Transceiver (1 Mbps max. CAN bus speed), ISO 11898 compatible, Industry standard pinout	8 PDIP, SOIC

(1) Not recommended for new designs, use MCP2515.

Device	Description	V_{REG} Output Voltage (V)	Operating Temp. Range (°C)	V_{REG} Output Current (mA)	V_{CC} Range (V)	Max Baud Rate	LIN Specification Supported	Packages
MCP201	LIN transceiver with integrated V_{REG}	4.75 to 5.25	-40 to +125	50 (1)	6.0 to 18 (2)	20 Kbaud	Revision 1.2	8 PDIP, SOIC

(1) Output current can be increased with external pass transistor.
(2) Can withstand 40V load dump.

Device	MAC	PHY	TX/RX RAM Buffer	Interrupts	LEDs	Operating Voltage	Temp. Range (°C)	Max Speed MHz	Serial	Ethernet Specification Supported	Packages
ENC28J60(1)	Yes	Yes	8 KB	2	2	3.3	0 to +70	25	SPI	IEEE 802.3	28 SDIP, SOIC, SSOP, MLF

(1) Contact marketing for availability.

Device	Operating Voltage (V)	Operating Temp. Range (°C)	Min./Max. Baud Rate (Kbaud)	Unique Features	Packages
MCP2120	2.5 to 5.5	-40 to +85	0/325	UART to IR encoder/decoder with both hardware and software baud rate selection	14 PDIP, SOIC
MCP2122	1.8 to 5.5	-40 to +125	-/115,200	UART to IR encoder/decoder with 16x clock input	8 PDIP, SOIC
MCP2140	2.7 to 5.5	-40 to +85	-/9.6	IrDA® protocol handler plus bit encoder/decoder, fixed baud rate, low power, low cost	18 PDIP, SOIC, 20 TSSOP
MCP2150	3.0 to 5.5	-40 to +85	9.6/115.2	IrDA® Standard protocol handler plus bit encoder/decoder on one chip for DTE applications, programmable device ID	18 PDIP, SOIC, 20 TSSOP
MCP2155	3.0 to 5.5	-40 to +85	9.6/115.2	IrDA® Standard protocol handler plus bit encoder/decoder on one chip for DCE applications, programmable device ID	18 PDIP, SOIC, 20 TSSOP

Device	Description	Operating Voltage (V)	Operating Temp. Range (°C)	Bus Type	Max. Bus Frequency (kBits/s)	Features	Packages
MCP23008 MCP23S08	8-bit I/O Port Expander	1.8 to 5.5	-40 to +125	I 2C	1.7 MHz	3 HW address inputs, HW interrupt, 25 mA source/sink capability per I/O	18 PDIP, SOIC, 20 TSSOP
				SPI	10 MHz	3 HW address inputs, 2 HW interrupt, 25 mA source/sink capability per I/O	
MCP23016(1)	16-bit I/O Port Expander	2.0 to 5.5	-40 to +85	I 2C	400	3 HW address inputs, HW interrupt, 25 mA source/sink capability per I/O	28 PDIP, SOIC, SSOP
MCP23017 MCP23S17	16-bit I/O Port Expander	1.8 to 5.5	-40 to +125	I 2C	1.7 MHz	3 HW address inputs, 2 HW interrupt, 25 mA source/sink capability per I/O	28 PDIP, SOIC, SSOP, QFN
				SPI	10 MHz		

(1) Not recommended for new designs.

Related Support Material

The following Application Notes and Tech Briefs are available on the Microchip web site:

CAN Communications

AN212: Smart Sensor CAN Node Using the MCP2510 and PIC16F876

Demonstrates a way to implement a simple input pressure switch connected to a node board, along with a visual light source to display the value in terms of brightness. Several uses for different types of inputs and outputs can be implemented by using the basic techniques from this design.

AN215: A Simple CAN Node Using the MCP2510 and PIC12C67X

Describes the design, development and implementation of a smart, low cost, stand-alone Controller Area Network (CAN) node. Combines the 8-pin PIC12C672 with the 18-pin MCP2510 stand-alone CAN controller to create a fully autonomous CAN node, which supports both time-based and event driven message transmission.

AN228: A CAN Physical Layer Discussion

A discussion of the many network protocols which are described using the seven layer Open System Interconnection (OSI) mode.

AN739: An In-Depth Look at the MCP2510

Focuses on using the MCP2510 including the minimal configuration necessary to enable the CAN node, features and implementation, a detailed discussion of many of the registers and potential pitfalls during implementation.

AN754: Understanding Microchip's CAN Module Bit Timing

Investigates the relationships between bit timing parameters, the physical bus propagation delays and oscillator tolerances throughout the system as they pertain to Microchip's CAN module and assists in optimizing the bit timing for given physical system attributes.

AN816: A CAN System Using Multiple MCP25025 I/O Expanders

Describes a control system for a scissor-lift, which is essentially a mobile work platform enabling the user to reach relatively high places. All of the operations and movements use one Master Node and three I/O Expander Nodes.

AN872: Upgrading from the MCP2510 to the MCP2515

This application note discusses the differences between the MCP2510 and MCP2515 (and possible impact of these differences) in an effort to assist with the upgrade process.

AN873: Using the MCP2515 CAN Developer's Kit

Serves as a three-part tutorial for the MCP2515/2510 developer's kit and discusses the three software templates in detail as well as the important menu items.

Infrared Communications

AN858: Interfacing The MCP215X to a Host Controller

Discusses the operation of the MCP215X Host UART interface, implements an embedded system (as an IrDAfi Standard Secondary device), and describes the setup of PDA devices to operate as the IrDA Standard Primary device.

AN888: Programming the Palm OS for Embedded IR Applications

Strives to impart core, fundamental programming concepts and design considerations for the development of Palm OS application programs. Attention is given to each of the fundamental areas of Palm OS application development in the C programming language.

AN926: Programming the Pocket PC OS for Embedded IR Applications

This application note details the tools, supporting technologies and procedures for the development of infrared applications on Windows Mobile based devices.

AN941: Programming Windows XPfifor Embedded IR Applications

This application note details the tools, supporting technologies and procedures for the development of infrared applications on a Windows XPfibased PC.

AN927: Data Throughput and the MCP215X

Discusses techniques that will improve the data transfer throughput between IrDA standard Primary Device and embedded system.

AN946: Interfacing the MCP2122 to the Host Controller

This application note discusses methods with which to interface the MCP2122 to a Host Controller and how to use the PICmicro MCU s CCP and Timer 2 modules to generate the 16XCLK signal.

AN243: Fundamentals of the Infrared Physical Layer

Describes the fundamentals of the infrared physical layer, the IrDA standard and selecting the proper discrete emitter and photodiode components for circuit implementation.

TB073: Selecting an MCP21XX Device for IrDA® Applications

This document will help you select which MCP21XX family device is a good fit for your application.

AN923: Using the MCP2120 Developer s Board for IR Sniffing

Discusses the implementation of an IR Sniffer using the MCP2120 Developer s board connect to a PC running a program call Listen32.

AN756: Using the MCP2120 for Infrared Communications

A discussion regarding the encoding/decoding function in the MCP2120 which is performed as specified in the physical layer component of the IrDA® standard known as the IrPHY.

TB059: Using The MCP2150 Developer s Board With the MCP2155

This technical brief describes how the MCP2150 Developer s Board can be used for development of MCP2155 applications, and focuses on the Host UART signals from the U2 socket (MCP2150/MCP2155) to the MAX3238 device (U1) and the Header (J1).

AN758: Using the MCP2150 To Add IrDA® Standard Wireless Connectivity

Microchip s MCP2150 provides support for the IrDA standard protocol stack plus bit encoding/ decoding. This application note discusses the encoding/decoding functionality of this device.

TB046: Connecting the MCP2150 To The Psion Operating System

Since the MCP2150 is a protocol handler supporting IrDA® standards plus an encoder/decoder, it can be used as a Virtual Connector, a wireless link between an embedded application and an IrDA standard host. This host can be a handheld device using the Psion OS. The Psion OS is generally used for small Personal Digital Assistants (PDA) devices.

TB047: Connecting the MCP2150 to the Windows CE® Operating System

Similar to TB046 but using a Microsoft® Windows® CE Operating System (OS). Windows CE is an excellent host platform for use with the MCP2150 because of the light weight, low cost, ease of use and portability of these devices. Microsoft Windows includes a terminal client that can easily be used to demonstrate this capability.

TB048: Connecting the MCP2150 to the Windows® Operating System

This technical brief is similar to TB046, however, in this application the host is a Personal Computer (PC) using Microsoft Windows which includes a terminal client that can easily be used to demonstrate the capabilities of the MCP2150.

TB049: Connecting the MCP2150 to the Palm Operating System

Similar to TB046 but using the Palm Operating System (OS) Personal Digital Assistants (PDA) devices are an excellent host platform for use with the MCP2150 because of the light weight, low cost, ease of use and portability of these devices.

I/O Expander

AN972: I/O Expansion Using the MCP23X08 and PIC10F202

This application note discusses using the MCP23008 and MCP23S08 GPIO Expanders with a 6-pin PIC10F202 microcontroller unit (MCU). The discussion is based on the MCP23X08 Evaluation Board, P/N: MCP23008DM.

LIN Bus Communications

AN729: LIN Protocol Implementation Using PICmicro® MCUs

This application note is intended to provide a broad overview of the LIN bus and provide a high level look at how it works, how to implement a Slave node on a PICmicro® device and what it s designed to do.

AN829: LightKeeper Automotive Lighting Control Module

This application note describes an automotive exterior lighting control module using a PIC16C433.

Ethernet Communications

AN833: The Microchip TCP/IP Stack

This application note details Microchip s own freely available implementation of the TCP/IP Stack. This TCP/IP Stack is a suite of programs that provide services to standard TCP/IP-based applications (HTTP Server, Mail Client, etc.), or can be used in a custom TCP/IP or UDP/IP-based application.

AN870: An SNMP Agent for the Microchip TCP/IP Stack

This application note provides one of the key components of the SNMP Management system: the SNMP Agent that runs on the managed device. The simple agent presented here is designed to run on Microchip s PICmicro® microcontrollers and is implemented using services provided by the free Microchp TCP/IP stack.

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Microchip Technology is a leading provider of microcontroller, analog and memory products that provide risk-free product development, lower total system cost and faster time to market for thousands of diverse customer applications worldwide. Microchip s commitment to quality and innovation coupled with world-class development tools, dependable delivery and outstanding technical support sets us apart.

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- Op Amp family with the lowest power for a given gain bandwidth
- 600 nA/1.4V/10 kHz bandwidth Op Amps
- 1.8V charge pumps and comparators
- Lowest power 12-bit ADC in a SOT-23 package

Integration

- One of the first to market with integrated LDO with Reset and Fan Controller with temperature sensor
- PGA integrates MUX, resistive ladder, gain switches, high-performance amplifier, SPI interface

Space Savings

- Resets and LDOs in SC70, A/D converters in a 5-lead SOT-23 package
- CAN and IrDAfStandard protocol stack embedded in an 18-pin package

Accuracy

- Offset trimmed after packaging using Non-Volatile Memory

Innovation

- Low pin-count embedded IrDA Standard stack, FanSense technology
- SelectMode operation

For more information, visit the Microchip web site at:

Analog and Interface Products

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Power Management
- LDO & Switching Regulators
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- Voltage Dectectors
- Voltage References

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- Smart Battery Managers

Interface
- CAN Peripherals
- Infrared Peripherals
- LIN Transceiver
- Serial Peripherals

Mixed-Signal
- A/D Converter Families
- Digital Potentiometers
- System D/A Converters
- V/F and F/V Converters

Linear
- Op Amps
- Programmable Gain Amplifiers
- Comparators
- Linear Integrated Devices

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