OEM MANUAL

Refer to Freescale MC13213 operations manuals for complete descriptions.
Microcontroller Features
• Low voltage MCU with 40 MHz low power HCS08 CPU core
• Up to 60K flash memory with block protection and security and 4K RAM
— MC13211: 16KB Flash, 1KB RAM
— MC13212: 32KB Flash, 2KB RAM
— MC13213: 60KB Flash, 4KB RAM
• Low power modes (Wait plus three Stop modes)
• Dedicated serial peripheral interface (SPI) connected internally to 802.15.4 modem
• One external 4-channel (5-channel internal) 16-bit timer/pulse width modulator (TPM) module and one external 1-channel (3-channel internal) 16-bit timer/pulse width modulator module, each with selectable input capture, output capture, and PWM capability.
• 8-bit port keyboard interrupt (KBI)
• 8-channel 8-10-bit ADC
• Two independent serial communication interfaces (SCI)
• Multiple clock source options
— Internal clock generator (ICG) with 243 kHz oscillator that has +/-0.2% trimming Resolution and +/-0.5% deviation across voltage.
— Start-up oscillator of approximately 8 MHz
— External crystal or resonator
— External source from modem clock for very high accuracy source or system low-cost option
• Inter-integrated circuit (IIC) interface with 100 kbps operation
• In-circuit debug and flash programming available via on-chip background debug module (BDM)
— Two comparator and 9 trigger modes
— Eight deep FIFO for storing change-of-flow addresses and event-only data
— Tag and force breakpoints
— In-circuit debugging with single breakpoint
• System protection features
— Programmable low voltage interrupt (LVI)
— Optional watchdog timer (COP)
— Illegal opcode detection
• Up to 32 MCU GPIO with programmable pull-ups

RF Modem Features
• Fully compliant 802.15.4 Standard transceiver supports 250 kbps O-QPSK data in 5.0 MHz channels and full spread-spectrum encode and decode
• Operates on one of 16 selectable channels in the 2.4 GHz ISM band
• -1 to 0 dBm nominal output power, programmable from -27 dBm to +3 dBm typical
• Receive sensitivity of <-92 dBm (typical) at 1% PER, 20-byte packet, much better than the 802.15.4 Standard of -85 dBm
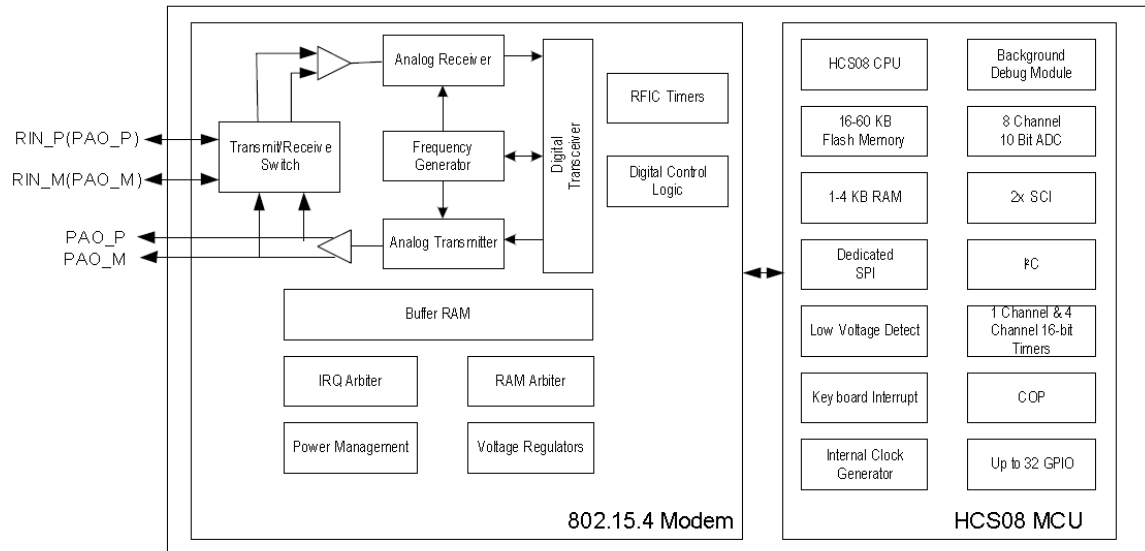
• Integrated transmit/receive switch

Figure 1. MC1321x System Level Block Diagram

VOLTAGE INFORMATION:

Table 7. Recommended Operating Conditions

Characteristic	Symbol	Min	Typ	Max	Unit
Power Supply Voltage ($V_{BATT} = V_{DDINT}$)[1]	V_{BATT}, V_{DDINT}	2.0	2.7	3.4	Vdc
Input Frequency	f_{in}	2.405	-	2.480	GHz
Operating Temperature Range	T_A	-40	25	85	°C
Logic Input Voltage Low	V_{IL}	0	-	30% V_{DDINT}	V
Logic Input Voltage High	V_{IH}	70% V_{DDINT}	-	V_{DDINT}	V
SPI Clock Rate	f_{SPI}	-	-	8.0	MHz
RF Input Power	P_{max}	-	-	10	dBm
Crystal Reference Oscillator Frequency (±40 ppm over operating conditions to meet the 802.15.4 Standard.)	f_{ref}	16 MHz Only			

[1] If the supply voltage is produced by a switching DC-DC converter, ripple should be less than 100 mV peak-to-peak.

CHANNEL NUMBER TO FREQUENCY RANGE:
* Channel number (0-15)
* Channel frequencies :
* 0 : 2.405GHz
* 1 : 2.410GHz
* 2 : 2.415GHz

* 3 : 2.420GHz
* 4 : 2.425GHz
* 5 : 2.430GHz
* 6 : 2.435GHz
* 7 : 2.440GHz
* 8 : 2.445GHz
* 9 : 2.450GHz
* 10: 2.455GHz
* 11: 2.460GHz
* 12: 2.465GHz
* 13: 2.470GHz
* 14: 2.475GHz
* 15: 2.480GHz

FCC STATEMENT

• This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

— This device may not cause harmful interference.

— This device must accept any interference received, including interference that may cause undesired operation.

• Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and   used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this   equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

    Reorient or relocate the receiving antenna.

    Increase the separation between the equipment and receiver.

    Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

    Consult the dealer or an experienced radio/TV technician for help.

RF warning statement:

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.