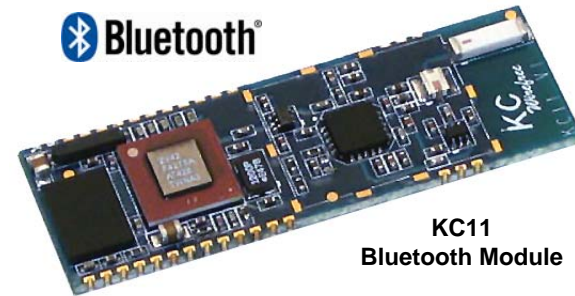


Features

- ▶ **Bluetooth v1.2 specification**
- ▶ **Complete RF ready module**
- ▶ **Class 1 radio**
- ▶ **High-speed data rates up to 921K baud**
- ▶ **High-performance ARM7 processor up to 48MHz**
- ▶ **High-security 128-bit encryption**
- ▶ **Amplified range up to 200m**
- ▶ **Miniature solution 15mm by 48mm**
- ▶ **All Bluetooth data rates (57.6 to 723.2 Kb/sec)**
- ▶ **SPI interface, up to 24MHz**
- ▶ **14 general purpose I/O**
- ▶ **AT command set**
- ▶ **Dynamic configuration**
- ▶ **Low power sniff mode**
- ▶ **Point-to-point and point-to-multipoint capability**
- ▶ **Multiple device bonding**
- ▶ **USB 2.0 compatible**
- ▶ **CPU, radio, antenna, & firmware on module**
- ▶ **Zeevo 4002 and 4301 Bluetooth chip solutions**



KC11
Bluetooth Module

Description

The KC11 is a surface mount PCB module that provides ready to use Bluetooth wireless technology. The conveniently pre-programmed flash device contains firmware for serial cable replacement using the Bluetooth SPP profile per the Bluetooth v1.2 specification. Customized firmware is easily pre-loaded into these fully tuned and tested modules so that they are ready to install without any further procedures. The KC11 is a Class 1 Bluetooth Module supplied on a 32 pin surface mount 6 layer PCB with a miniature footprint.

Typical Cable Replacement Applications

- Serial communications
- Machine diagnostics and control
- Financial transactions
- Remote sensing
- Medical device communications
- Industrial control
- Home automation

Software Architecture

Lower Layer Stack

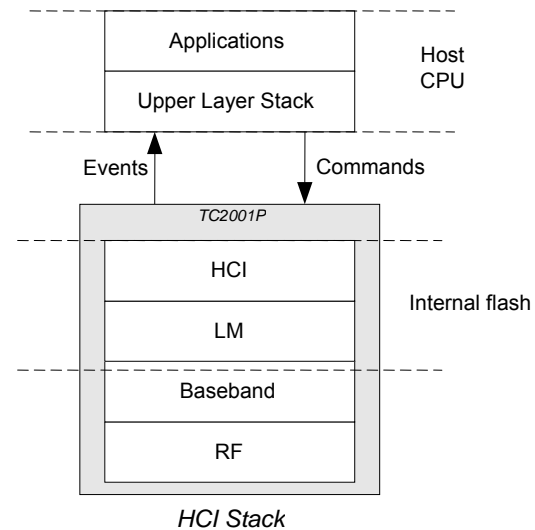
- Full Bluetooth data rate (723.3kbps maximum)
- All ACL (Asynchronous Connection Less) packet types (DM1, DH1, DM3, DH3, DM5, DH5, AUX1)
- SCO (Synchronous Connection Oriented) packet types (HV1, HV2, HV3)
- Point to multipoint and scatternet support—3 master and 7 slave links allowed (10 active links simultaneously)
- Master slave switch—supported during connection and post connection
- Authentication and encryption—encryption key length from 8-bits to 128-bits maximum
- Park, sniff, and hold modes—fully supported to maximum allowed intervals, approximately 50 parked slaves
- Dedicated Inquiry Access Code—for improved inquiry scan performance
- Dynamic packet selection—channel quality driven data rate to optimize link performance
- Dynamic power control—interference reduction and link performance optimization for all device classes
- Bluetooth test modes—per Bluetooth 1.2 specification
- Device power modes—active, sleep and deep sleep
- 802.11b co-existence—AWMA and AFH
- Persistent FLASH memory—for BD Address and radio parameter storage
- Wake on Bluetooth feature—optimized power consumption of host CPU
- SCO over UART, PCM, or SPI interface—application flexibility for host CPU
- Vendor specific HCI commands—to support device configuration and certification test modes

Upper Layer Stack

- SDAP, GAP, SPP, and DUN protocols
- RFCOMM, SDP, and L2CAP supported

HCI Interface

- Bluetooth 1.2 specification compliant
- HCI USB transport layer (H2)
- HCI UART transport layer (H4)
- Firmware upgrade over UART



Hardware Specifications

Absolute Maximum Ratings

Rating	Min	Typical	Max	Unit
Storage temperature range	-40	-	+150	°C
Supply voltage, V _{DD}	-0.3	-	+ 3.6	Volts
RF input power	-	-	-5	dBm

Recommended Operating Conditions

Rating	Min	Typical	Max	Unit
Operating Temperature Range	-20	-	85	°C
Supply Voltage V _{DD}	2.7	3.3	3.6	Volts
Signal Pin Voltage	-	3.3	-	Volts
RF Frequency	2400	-	2483.5	MHz

Current Consumption

General Conditions: V_{DD}= 3.3V, temperature = 25 °C, frequency = 2.402 - 2.480 GHz, 50 Ω antenna, 12 MHz ext crystal, and 32 KHz ext sleep crystal.

Modes	Avg	Unit
Typical Power Consumption		
ACL data 115K Baud UART at max throughput (Master)	98.0	mA
ACL data 115K Baud UART at max throughput (Slave)	95.0	mA
Connection, no data traffic, master	18.0	mA
Connection, no data traffic, slave	28.0	mA
Connection in sniff (Tsniff=100ms), no data traffic, master	10.2	mA
Connection in sniff (Tsniff=100ms), no data traffic, slave	10.8	mA
Connection in sniff (Tsniff=375ms), no data traffic, master	2.75	mA
Connection in sniff (Tsniff=375ms), no data traffic, slave	3.50	mA
Standby, without deep sleep	16.5	mA
Standby, with deep sleep	1.2	mA
Page/Inquiry scan, deep sleep	6.1	mA
Peak current	210	mA

* All current consumption numbers include on-die regulators and flash memory

I/O Operating Characteristics (V_{DD} = 3.3 V, unless otherwise specified)

Symbol	Parameter	Min	Max	Unit	Conditions
V _{IL}	Low-Level Input Voltage	-	0.8	Volts	
V _{IH}	High-Level Input Voltage	2.0	-	Volts	
V _{OL}	Low-Level Output Voltage	-	0.4	Volts	I _{OL} = 2mA
V _{OH}	High-Level Output Voltage	2.4	-	Volts	I _{OH} = 2mA
I _{OL}	Low -Level Output Current	-	2.2	mA	V _{OL} = 0.4 V
I _{OH}	High-Level Output Current	-	3.1	mA	V _{OH} = 2.4 V
I _I	Input Leakage Current	-1	+1	uA	@V _I = 3.3V or 0V
V _{T+}	Schmitt Trigger Low-High	1.47	1.50	Volts	
V _{T-}	Schmitt Trigger High-Low	0.89	0.95	Volts	
R _{PU}	Pull-up Resistor	53	113	KΩ	Resistor Turned On
R _{PD}	Pull-down Resistor	43	118	KΩ	Resistor Turned On
C _I	Input Capacitance		7.5	pF	

USB I/O Operating Characteristics (V_{DD} = 3.3 V)

Symbol	Parameter	Min	Max	Unit	Conditions
V _{IL}	Low-Level Input Voltage	-	0.8	Volts	
V _{IH}	High-Level Input Voltage	2.0	-	Volts	
V _{OL}	Low-Level Output Voltage	-	0.3	Volts	
V _{OH}	High-Level Output Voltage	2.8	-	Volts	
C _{in}	Input Capacitance	-	25	pF	DP or DM to GND

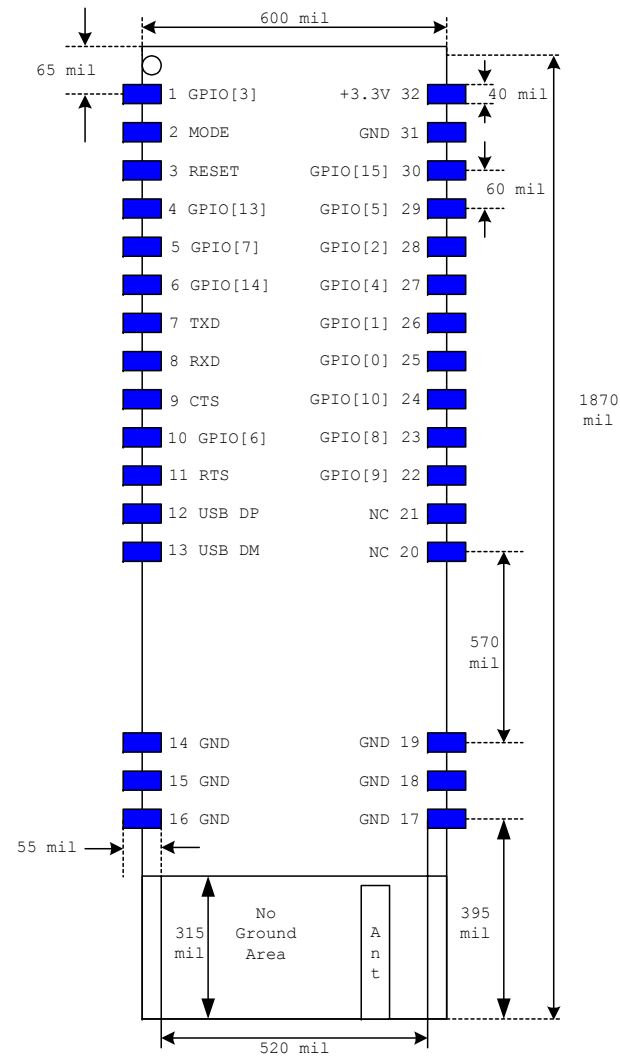
Selected RF Characteristics

General Conditions: V_{DD}= 3.3V, temperature = 25 °C, frequency = 2.402 - 2.480 GHz, 50 Ω antenna, 12 MHz ext crystal, and 32 KHz ext sleep crystal.

Parameters	Conditions	BT Spec	Typical	Unit
Antenna load			50	Ω
Radio Receiver				
Sensitivity level	BER < .001 with DH5	≤ -70	-88	dBm
Maximum usable level	BER < .001 with DH1	≥ -20	-5	dBm
Input VSWR			2.5:1	
Radio Transmitter				
Maximum output power	50 Ω load	+4 to +20	+18	dBm
Power control range		≥ 16	30	dB
Power control resolution		2 to 8	4	dB
Initial Carrier Frequency Tolerance		± 75	18	kHz
20 dB Bandwidth for modulated carrier		≤ 1000	930	kHz

Pin Assignments by Functional Grouping

Name	Type	Pin #	Description
Reset			
RESET#	I	3	Reset input (active low for 5 ms); Schmidt triggered
GPIO			
GPIO [0]	I/O	25	General Purpose Input/Output
GPIO [1]	I/O	26	General Purpose Input/Output
GPIO [2]	I/O	28	General Purpose Input/Output
GPIO [3]	I/O	1	General Purpose Input/Output
GPIO [4]	I/O	27	General Purpose Input/Output
GPIO [5]	I/O	29	General Purpose Input/Output
GPIO [6]	I/O	10	General Purpose Input/Output
GPIO [7]	I/O	5	General Purpose Input/Output
GPIO [8]	I/O	23	General Purpose Input/Output
GPIO [9]	I/O	22	General Purpose Input/Output
GPIO [10]	I/O	24	General Purpose Input/Output
GPIO [13]	I/O	3	General Purpose Input/Output
GPIO [14]	I/O	6	General Purpose Input/Output
GPIO [15]	I/O	30	General Purpose Input/Output
UART Interface			
RXD	I	8	Receive data
TXD	O	7	Transmit data
CTS#	I	9	Clear to send (active low)
RTS#	O	11	Request to send (active low)
USB Interface			
DM	I/O	13	USB data minus
DP	I/O	12	USB data plus
Reserved			
MODE	I	2	Reserved
Power and Ground			
V _{DD}		32	V _{DD}
GND		14-19,31	GND



KC11 Class 1 Bluetooth OEM Module Footprint

Layout Guidelines

The area around the KC11 module should be free of any ground planes, trace routings, or metal for at least 250 mil from the antenna in all directions. Traces should not be routed underneath the module.