# HBK1-40 Module Datasheet V1.0

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# Revision History

| Version | Date | Author(s) | Description |
|---|---|---|---|
| 1.0 | 2020-10-30 | Z | Creation manual |
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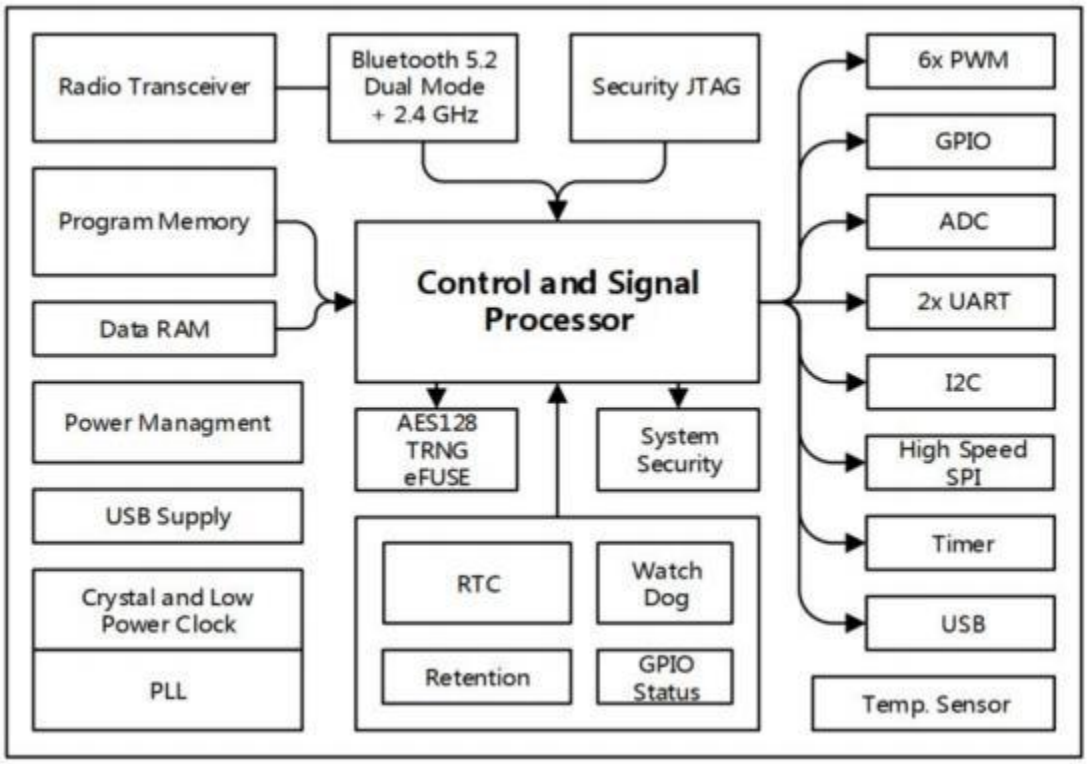
# 1 Overview

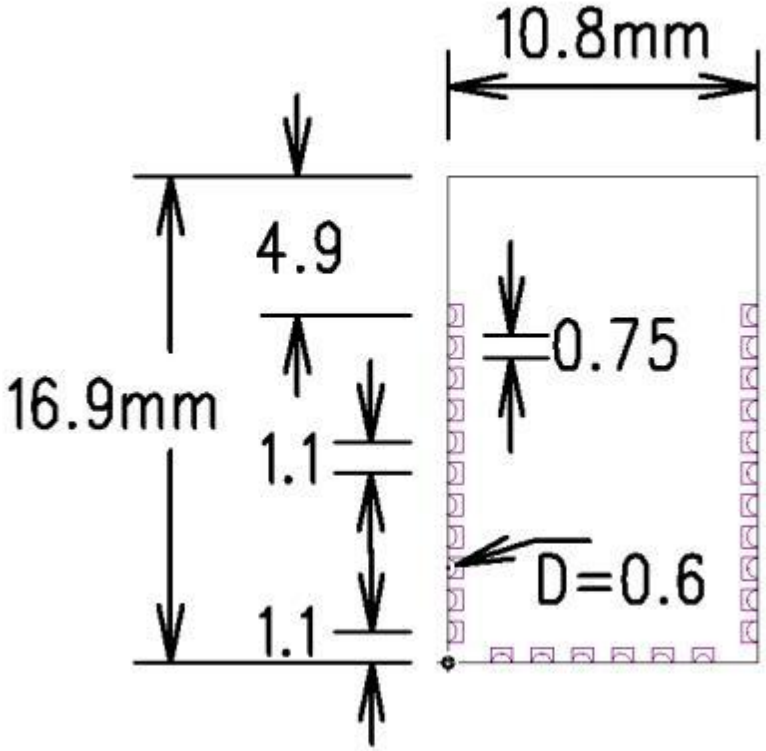
The BK3633 chip is a highly integrated wireless system on chip, which supports Bluetooth 5.2 Dual Mode and proprietary 2.4 GHz protocols. It integrates a high-performance RF transceiver, baseband, low power processor, rich feature peripheral units, programmable protocol and profile to support a wide range of applications. The Flash program memory makes it suitable for customized applications.



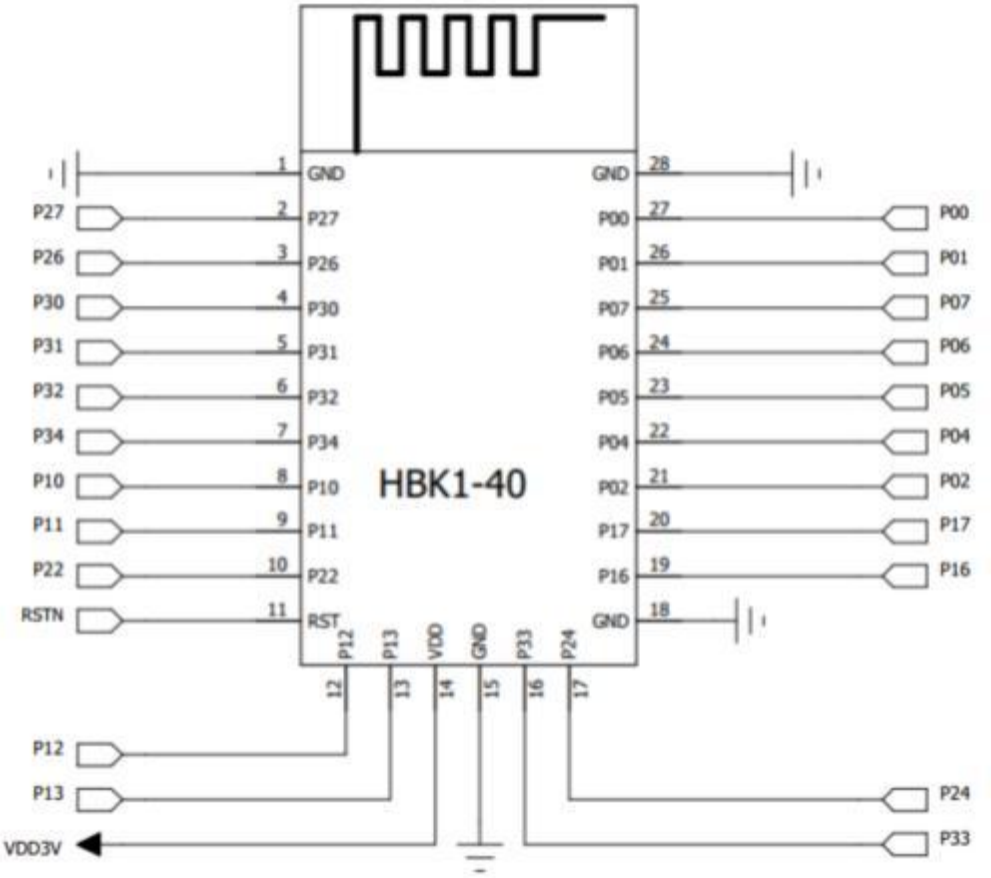
# 2 Features

- Bluetooth 5.2 Dual Mode and proprietary 2.4 GHz protocol
- Around 5 mA full operation current
- Around 1 μA deep sleep current with low power running timer
- Bluetooth Low Energy (LE) 125 kbps, 500 kbps, 1 Mbps and 2 Mbps
- Classic Bluetooth 1 Mbps
- Proprietary 2.4 GHz 250 kbps, 1 Mbps and 2 Mbps
- High output power up to 10 dBm and Bluetooth LE Power Control
- 32-bit RISC Core with 80 KB data memory and up to 80 MHz speed
- 500 KB programmable Flash
- 32-byte eFUSE

# 3 Package Dimensions



# 4 Pin definition



# 5 Pin description

| PIN | Name | Description |
|---|---|---|
| 1 | GND | Ground |
| 2 | P27 | General purpose IO |
| 3 | P26 | General purpose IO |
| 4 | P30 | General purpose IO， ADC |
| 5 | P31 | General purpose IO， ADC |
| 6 | P32 | General purpose IO， ADC |
| 7 | P34 | General purpose IO， ADC |
| 8 | P10 | General purpose IO |
| 9 | P11 | General purpose IO |
| 10 | P22 | General purpose IO， |
| 11 | RST | Reset pin of the system, low active |
| 12 | P12 | General purpose IO |
| 13 | P13 | General purpose IO |
| 14 | VDD | Power, 3.3 V |
| 15 | GND | Ground |
| 16 | P33 | General purpose IO， ADC |
| 17 | P24 | General purpose IO |
| 18 | GND | Ground |
| 19 | P16 | General purpose IO |
| 20 | P17 | General purpose IO |
| 21 | P02 | General purpose IO |
| 22 | P04 | General purpose IO |
| 23 | P05 | General purpose IO |
| 24 | P06 | General purpose IO |
| 25 | P07 | General purpose IO |
| 26 | P01 | General purpose IO， DL_UART_RX |
| 27 | P00 | General purpose IO， DL_UART_TX |
| 28 | GND | Ground |

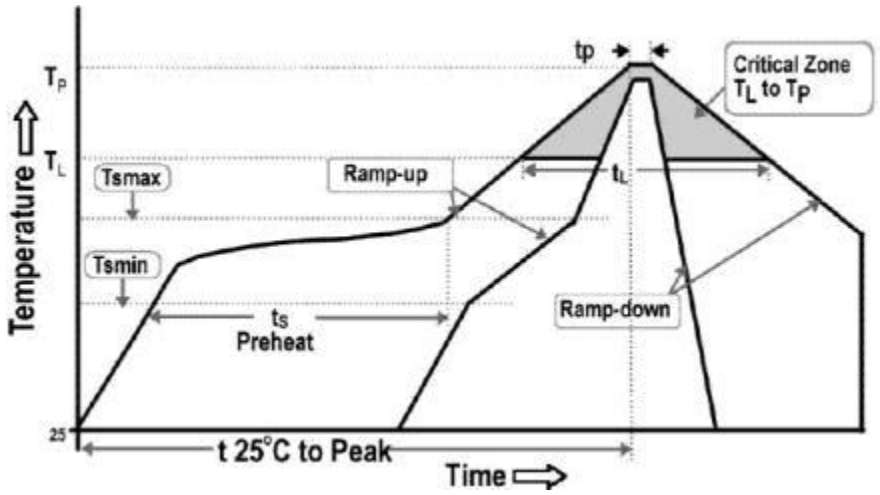
# 6 DC Characteristics

| Name | Parameter (Condition) | Min | Typical | Max | Unit |
|---|---|---|---|---|---|
| VDD | Power Supply | 2.8 | 3.0 | 3.6 | V |
| TEMP | Temperature | -40 | +20 | +125 | ºC |
| VIH | High level | VCC-0.3 | | VCC+0.3 | V |
| VIL | Low level | VSS | | VSS+0.3 | V |
| VOH | High level (IOH=-0.25 mA) | VCC- 0.3 | | VCC | V |
| VOL | Low level (IOL=0.25 mA) | VSS | | VSS+0.3 | V |
| IVDD | Deep sleep (1 kHz Timer) | | 0.9 | | μA |
| IVDD | Shutdown | | 100 | | nA |
| IVDD | Sleep current (RF OFF, 32 kHz clock, DIG Retention) | | 2 | | μA |
| IVDD | Active RX (3.3 V) | | 5.5 | | mA |
| IVDD | Active TX @ 0 dBm (3.3 V) | | 6.1 | | mA |

# 7 RF Characteristics

| | | | | | |
|---|---|---|---|---|---|
| FOP | Operating frequency | 2402 | | 2480 | MHz |
| FXTAL | Crystal frequency | | 16 | | MHz |
| RFSK | Air data rate | 0.125 | 1 | 2 | Mbps |
| PRF | Output power | -20 | 9.5 | +10 | dBm |
| BLE 1 Mbps data rate performance | | | | | |
| PBW | Modulation 20 dB bandwidth | | | 1 | MHz |
| PRF1 | Out of band emission 2 MHz | | -35 | | dB |
| PRF2 | Out of band emission 3 MHz | | -45 | | dB |
| Carrier Drift | Maximum carrier drift | -50 | 5 | 50 | kHz |
| Drift Rate | Maximum drift rate | | 2.5 | 20 | kHz/50μs |
| Δf1avg | Maximum modulation | 225 | 255 | 275 | kHz |
| Δf2min | Minimum modulation | 185 | 213 | | kHz |
| Δf2avg/Δf1avg | | 0.8 | 0.92 | | |
| Max Input | 30.8% PER | | 0 | | dBm |
| RXSENS | 30.8% PER sensitivity | | -96 | | dBm |

# 8 Solder Reflow Profile




| Profile Feature | | Specification |
|---|---|---|
| Average Ramp-Up Rate (tsmax to tp) | | 3°C/second max. |
| Pre_heat | Temperature Min (Tsmin) | 150°C |
| | Temperature Max (Tsmax) | 200°C |
| | Time (ts) | 60-180 seconds |
| Time Maintained above | Temperature (TL) | 217°C |
| | Time (tL) | 60-150 seconds |
| Peak/Classification Temperature (Tp) | | 260°C |
| Time within 5°C of Actual Peak Temperature (tp) | | 20-40 seconds |
| Ramp-Down Rate | | 6°C/second max. |
| Time 25°C to Peak Temperature | | 8 minutes max. |

## RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, PBB&PBDE content in accordance with directive 2002/95/EC(RoHS).

# 9.FCC statement

1) FCC Interference Statement (Part 15.105 (b))

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 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.

2) FCC Part 15 Clause 15.21

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

3) FCC Part 15.19(a)

"This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

5) FCC RF Exposure Guidance Statement

"In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

6) Integration instructions for End-product manufacturers according to KDB 996369 D03

List of applicable FCC rules:

FCC Part 15 Subpart C 15.247 & 15.207 & 15.209

Specific operational use conditions:

The module is a Bluetooth module with BLE function. Operation Frequency: 2402-2480MHz

Number of Channel: 40; Modulation: GFSK

The module can be used for mobile or portable applications with a maximum 1.87dBi antenna. The host manufacturer installing this module into their product must ensure that the final composit product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product

which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

RF exposure considerations:

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Antennas:

Antenna Specification is as follows: Antenna Type: PCB antenna, max gain: 1.87dBi.

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna; The module shall be only used with the designated PCB antenna that has been originally tested and certified with this module. As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.)

Label and compliance information:

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2BHDPHBK1-40" with their finished product.

Information on test modes and additional testing requirements:

Operation Frequency: 2402-2480MHz

Number of Channel: 40

Modulation: GFSK

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product. Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

Additional testing, Part 15 Subpart B disclaimer:

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 &15.207 & 15.209 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.