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Hypersynes International Co., Ltd

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Hypersynes Bluetooth Module User Manual

Model/Type reference: HyperBT

Manufacturer's name: Shenzhen Hypersynes Co., Ltd

Address: Building 50, Ailian Industrial Zone, Wulian Community, Longgang Street, Longgang District, Shenzhen

About [HyperSynes](#)

Shenzhen Hypersynes Co., Ltd is a high-tech corporation that specializes in the R&D and production of Smart Kitchen products Such as Bluetooth WIFI Meat BBQ thermometer, Smart WiFi BLE PID Temp Controller for Kamado, Wood Pellet Smoker, Gas Grill, Electric Smokers, and So on. HyperSynes has been focusing on smart grill thermometers since its establishment in 2013. And More than 40 different models of thermometers with high quality and unique designs are provided to you. We are very happy to facilitate your business with our creative products. HyperSynes is a design-driven company that helps clients improve user experience and built a better reputation among end-users. Hundreds of clients from the United States, Europe, and Australia have benefitted from our high-quality products and services. Hypersynes focus on Proprietary Wireless, Powered Sensors Temperature, Humidity, Co2, flow, speed, pressure, and weight. We have extensive design experience in RF antennas and hardware. Provide mature software and hardware services Such as APP, SDK, UI, UX, industrial design, development, and mass production. As a world-leading Smart Kitchen Cooking, IOT wood Pellet PID ODM solution provider, Hypersynes partners with businesses to help them design, manufacture, test, certify, package, kit, and deliver extraordinary IoT devices and end-to-end IoT services to empower every aspect within the Kitchen and Cooking. Turn your idea into a product with a high-quality and very competitive price. More creative products are under development, you are warmly invited to join us and share our vision.

HyperSynes

Turn Ideas into Products

PROFESSIONAL
PROVIDER
FOR
SMART DEVICES

- Wireless BBQ Thermometer
- BBQ Grill Smoker Controller
- BBQ Tank Scale
- Home Thermometer & Hygrometer
- More Smart Devices

1.0 Key Features

■ Bluetooth

- Compatible with Bluetooth v5.1, ETSI EN 300 328 and EN 300 440 Class 2 (Europe), FCC CFR47 Part 15 (US) and ARIB STD-T66 (Japan) core
- Supports up to 3 BLE connections

■ Processing and memories

- 16 MHz 32-bit Arm® Cortex® M0+ with SWD interface
- 128 Kbytes internal FLASH □ 48 Kbytes RAM
- 144 Kbytes ROM □ 32 Kbytes OTP

■ Current Consumption

- 2 mA RX at VBAT=3V
- 4 mA TX at VBAT=3V and 0 dBm
- 1.8 uA at sleep with all RAM retained

■ Radio

- Programmable RF transmit power from -19 to +2.2 dBm
- -93 dBm receiver sensitivity

■ Interfaces

- Quadrature decoder with 3 channels
- 4 channel 11-bit ENOB ADC
- 2 general purpose timers with PWM capabilities
- Built in temperature sensor
- 9 GPIOs
- SPI
- 2x UART, 1wire UART support
- I2C

■ Power Management

- Operating range (1.8V - 3.3V)
- Inrush current control

■ Other

- Real Time Clock

■ Module Software Development Kit

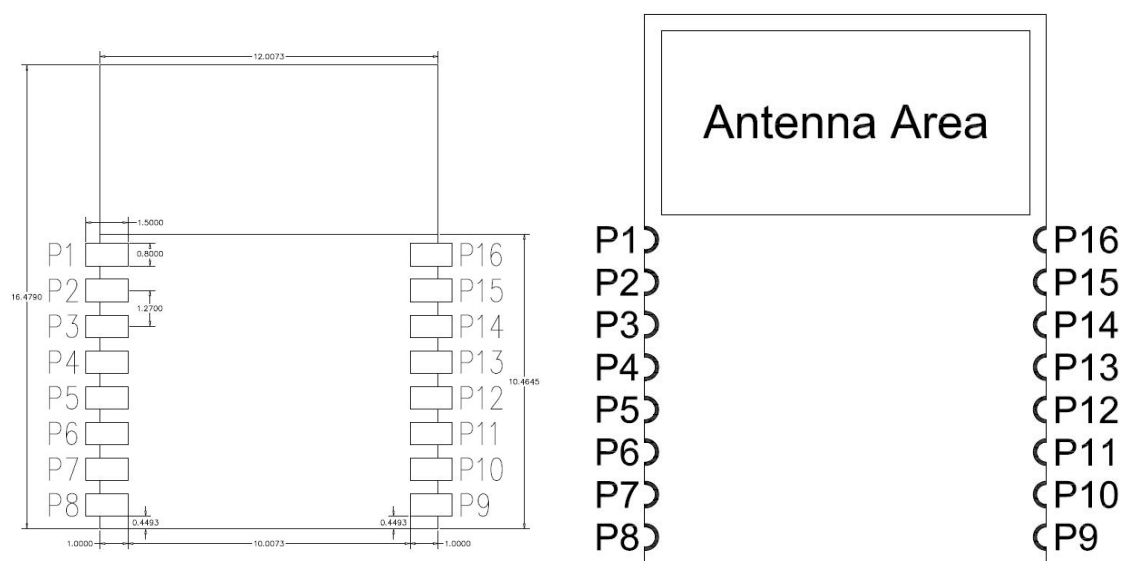
- Configurable DSPS
- Codeless v2.0
- SDK6 support

2.0 Applications

- Beacons ■ Remote Controls, ■ Proximity tags ■ Low Power Sensors
■ Commissioning/Provisioning ■ RF pipe ■ Toys ■ Industrial applications
■ Data acquisition ■ Wellness ■ Infotainment ■ IoT ■ Robotics ■ Gaming

3.0 Block Diagram

HyperSynes HyperBT module is based on the Dialog Semiconductor DA14531 SoC configured in buck mode. With an integrated 1Mbit flash, 32MHz XTAL and a printed antenna, it allows faster time to market at reduced development cost. The module, as seen in Figure 1, comprises of: - 2 Mbit SPI FLASH - 32MHz XTAL - 2 decoupling capacitors - a power inductor - a CLC filter and matching components for the printed antenna.



4.0 Characteristics

All MIN/MAX specification limits are guaranteed by design, production testing and/or statistical characterization. Typical values are based on characterization results at default measurement conditions and are informative only. Default measurement conditions (unless otherwise specified): VBAT= 3.0 V, TA = 25 oC. All radio measurements are performed with standard RF measurement equipment.

4.1 Absolute Maximum Ratings

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, so functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification are not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

Absolute Maximum Ratings Parameter Description Conditions Min Max Unit VBAT_LIM limiting battery supply voltage -0.1 3.6 V

4.2 Recommended Operating Conditions

Table 1: Recommended Operating Conditions

Parameter	Description	Conditions	Min	Typ	Max	Unit
VBAT	battery supply voltage enabling FLASH programming		1.65		3.3	V
VPIN	voltage on a pin		-0.1		3.3	V
TA	ambient operating temperature		-40	27	85	°C

4.3 Device Characteristics

Table 2: DC Characteristics

Parameter	Description	Conditions	Min	Typ	Max	Unit
IBAT_SLP_48K	battery supply current with system in extended sleep mode and all RAM retained			2.1		μA
IBAT_RF_RX	battery supply current	Continuous RX; FLASH in sleep mode; DCDC converter is on;		2.3		mA
IBAT_RF_TX_+3 dBm	battery supply current	Continuous TX; FLASH in sleep mode; DCDC converter is on; Output power at 2.5 dBm;		4.3		mA
IBAT_RF_TX_0dBm	battery supply current	Continuous TX; FLASH in sleep mode; DCDC converter is on; Output power at 0 dBm;		3.6		mA
IBAT_RF_TX_-3dBm	battery supply current	Continuous TX; FLASH in sleep mode; DCDC converter is on; Output power at -3.5 dBm;		2.8		mA
IBAT_RF_TX_-7dBm	battery supply current	Continuous TX; FLASH in sleep mode; DCDC converter is on; Output power at -7 dBm		2.3		mA
IBAT_RF_TX_-13dBm	battery supply current	Continuous TX; FLASH in sleep mode; DCDC converter is on; Output power at -13.5 dBm		1.8		mA

Table 3 XTAL32MHz - Recommended Operating Conditions

Parameter	Description	Conditions	Min	Typ	Max	Unit
fXTAL_32M	crystal oscillator frequency			32		MHz
ΔfXTAL	crystal frequency tolerance	After trimming; including aging and temperature drift		-25	25	ppm

Table 4: Digital IO - Recommended Operating Conditions

Parameter	Description	Conditions	Min	Typ	Max	Unit
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VIH	HIGH level input voltage		0.52			V
VIL	LOW level input voltage				0.27	V

Table 5: Digital IO - DC Characteristics

Parameter	Description	Conditions	Min	Typ	Max	Unit
IIH	HIGH level input current		-10		10	μA
IIL	LOW level input current		-10		10	μA
IIH_PD	HIGH level input current		60		180	μA
IIL_PU	LOW level input current		-180		-60	μA
VOH	HIGH level input current		0.8*VB AT			V
VOL	LOW level input current				0.2*VB AT	V
VOH_LOWDRV	HIGH level output voltage		0.8*VB AT			V

FCC Statement:

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.

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.

Information to user

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this

section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

Labelling Requirements for the Host device

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the FCC ID of the module, preceded by the words

"Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Cricket

MODEL: HyperBT

FCC ID: 2AI4MBT

The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID .

Cricket

MODEL: HyperBT

FCC ID: 2AI4MBT

OEM Statement

2.1 General

Answer 1: Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

Answer 2: CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Summarize the specific operational use conditions

Answer : This module is stand-alone modular. If the end product will involve the multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Answer : Not applicable

2.5 Trace antenna designs

Answer : Not applicable

2.6 RF exposure considerations

Answer : This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

2.7 Antennas:

Answer :This radio transmitter FCCID:2AI4MBT has been approved by the Federal Communications Commission to operate with the antenna types listed below and marked with the maximum allowable gain: 0dBi, Antenna Type: PCB Antenna, Antennas not included in this list Types again greater than the maximum gain of any type listed are strictly prohibited for use with this device.

2.8 Label and compliance information

Answer :The final end product must be labeled in a visible area with the folowing" Contains FCCID:2AI4MBT

2.9 Information on test modes and additional testing requirements⁵

Answer :Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host

2.10 Additional testing, Part 15 Subpart B disclaimer

Answer :Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements fothe system such as Part 15 B.