DongXing zigbee modules

Specifications and design guidelines

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The draft []	The current version:	V1.5
[quality] officially released	The designer:	Tomlin
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Version history

DATE	Version	Author	Content	review	The release date
2016-09-09	V1.1	Tomlin	Set up the first draft		2016-09-09

Review

This document lists the customers in the process of using DongXing module design products, various stages matters needing attention.Please customers familiar with this document, first consider in advance in the design, production and effectively avoid the potential problems, in order to achieve the purpose of rapid production.

1. The suitable module model

Version

DZ-NO-E3585-L：Dongxing Zigbee NoPA On BoardAnt Ember 3585 L Shape module

DZ-NO-E3585-T：Dongxing Zigbee NoPA On BoardAnt Ember 3585 TShape module

DZ-NO-E3585-B：Dongxing Zigbee NoPA On BoardAnt Ember 3585 On BoardAnt B Shape module

DB-NO-T8267-L：Dongxing BLE NoPA On BoardAnt Telink 8267 L Shape module

DB-NO-T8267-T：Dongxing BLE NoPA On BoardAnt Telink 8267 TShape module

DB-NO-T8267-B：Dongxing BLE NoPA On BoardAnt Telink 8267 On BoardAnt BShape module

Basic characteristics of the module

Omit

Module type instructions

The official version of the code

- DZ: Dongxing Dongxing Zigbee

- DB: Dongxing Dongxing BLE

- NO: NoPA On BoardAnt

- PO: PA On BoardAnt

- NE: NoPA External Ant

- PE: PA External Ant

- E3585: Ember 3585

- N5169:NXP 5169

- T8267: Telink 8267

- Marvell

- L :L Shape，Used for A19 - OFD, A19 lamp - TW, and bowl light bulb

- B：Onboard Used for A19 RGBW

- T:T Shape Used for bowl light bulb

- F:F Shape Used for test

- V1.3:Version 1.3

Module shapes and models

1. The on-board antenna model DZ - NO - E3585 – L

2. The block diagram
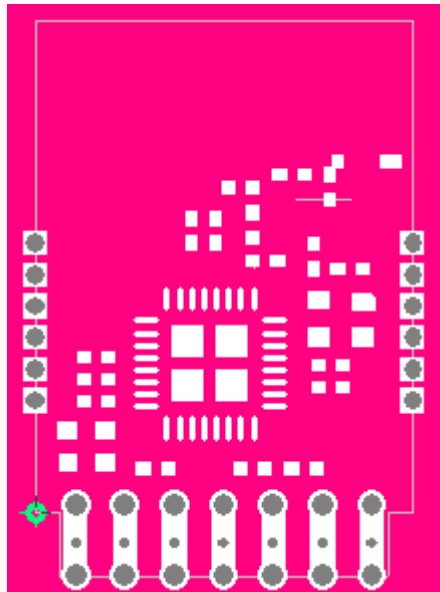
3. Pin definition
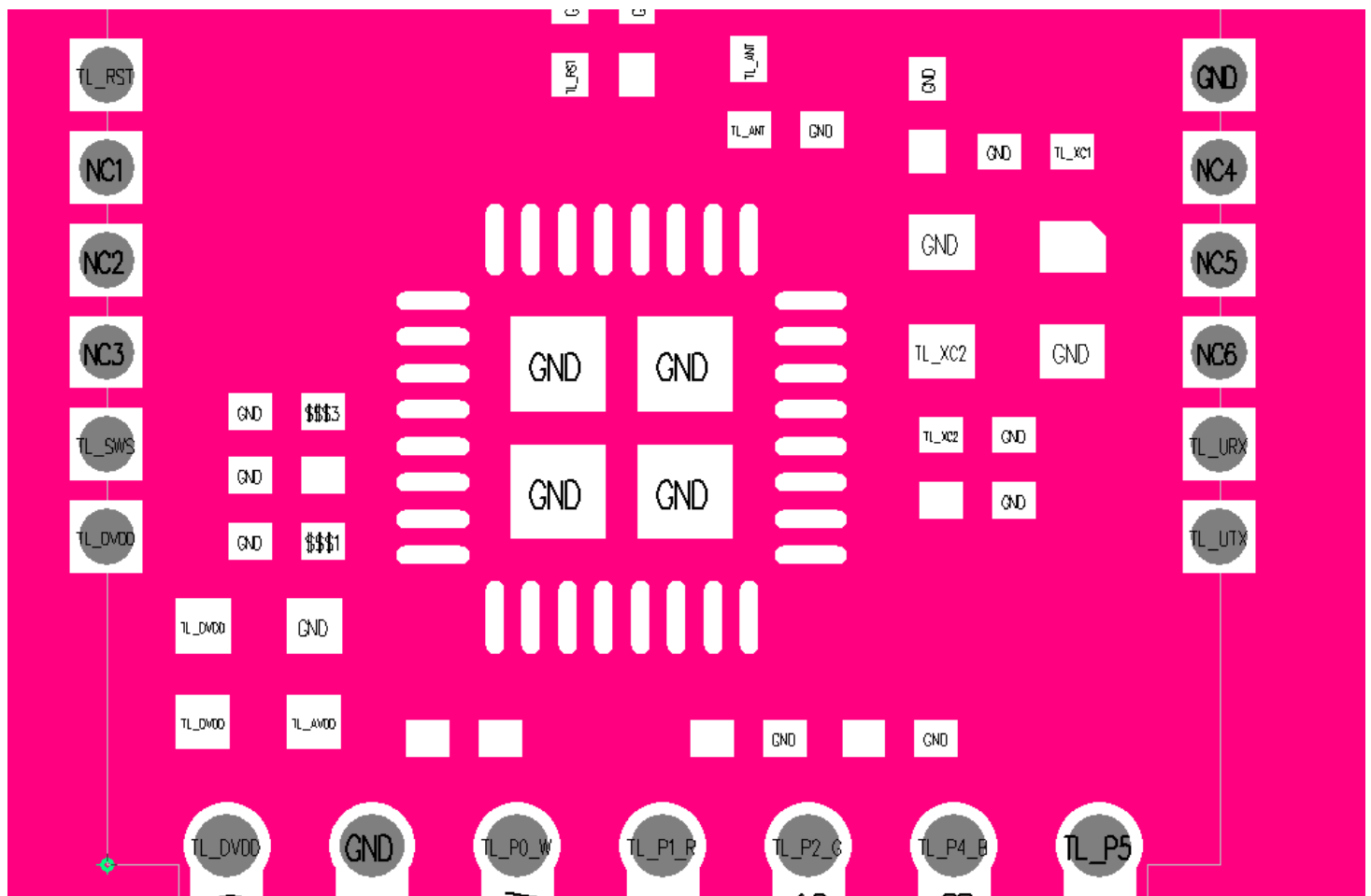
二、The hardware design considerations

2.1 Refer to the packaging design

omit

2.2 Typical electrical parameters of the module

General features are as follows:

1) Embedded 32-bit high performance MCU with clock up to 48MHz.

2) Program memory: external 128/256/512KB Flash (TLSR8267) or internal 512KB Flash (TLSR8267F512).

3) Data memory: 16KB on-chip SRAM.

4) 12MHz/16MHz & 32.768KHz Crystal and 32KHz/32MHz embedded RC oscillator.

5) A rich set of I/Os:

   ✧ TLSR8267: Up to 37/21 GPIOs depending on package option;

   ✧ TLSR8267F512: Up to 36/21 GPIOs depending on package option;

   ✧ DMIC (Digital Mic);

   ✧ AMIC (Analog Mic);

   ✧ Mono-channel Audio output;

   ✧ SPI;

   ✧ I2C;

   ✧ UART with hardware flow control;

   ✧ USB;

   ✧ Debug Interface.

6) Up to 6 channels of PWM, 2-channel IR.

7) Sensor:

   ✧ 14bit ADC with PGA;

   ✧ Temperature sensor.

8) One quadrature decoder.

9) Embedded hardware AES.

10) TLSR8267 Operating temperature: -40℃~+85℃ temperature range.

11) TLSR8267F512 Operating temperature:

- ✦ ET versions: -40℃~+85℃ temperature range;

- ✦ AT versions: -40℃~+125℃ temperature range.

12) Supports Apple HomeKit without external DSP.

1.2.2 RF Features

RF features include:

1) BLE/2.4GHz RF transceiver embedded, working in worldwide 2.4GHz ISM band.

2) Bluetooth 4.2 Compliant, 1Mbps and 2Mbps LE Enhancement FIPD version.

3) Rx Sensitivity: -92dBm@BLE 1Mbps.

4) Tx output power: +7dBm.

5) Single-pin antenna interface.

6) RSSI monitoring.

1.2.3 Features of power management module

Features of power management module include:

1) Embedded LDO.

2) Battery monitor: Supports low battery detection.

3) Power supply: 1.9V~3.6V.

4) Multiple stage power management to minimize power consumption.

5) Low power consumption:

- ✦ Receiver mode current: 12mA

- ✦ Transmitter mode current: 15mA @0dBm power, 22mA @max power

- ✦ Suspend mode current: 10uA (IO wakeup), 12uA (Timer wakeup)

- ✦ Deep sleep mode current: 1.7uA

1.2.4 USB features

USB features include:

1) Compatible with USB2.0 Full speed mode.

2) Supports 9 endpoints.

3) Supports ISP (In-System Programming) via USB port.

1.2.5 TLSR8267F512 Flash features

The TLSR8267F512 embeds Flash with features below:

1) TLSR8267F512 Flash: Total 512KB (4Mbits);

2) Flexible architecture: 4KB per Sector, 64KB/32KB per block;

3) Up to 256 Bytes per programmable page;

4) Write protect all or portions of memory;

5) Sector erase (4KB);

6) Block erase (32KB/64KB);

7) Cycle Endurance: 100,000 program/erases;

8) Data Retention: typical 20-year retention.

1.3 Typical applications

The TLSR8267/TLSR8267F512 can be applied to BLE systems; its typical applications include, but are not limited to the following:

✧ Smartphone and tablet accessories

✧ Remote Control and 3D glasses

✧ Sports and fitness tracking

✧ Wearable devices

3.2.2 Air interface data rate and RF channel frequency

Air interface data rate, the modulated signaling rate for RF transceiver when transmitting and receiving data, is configurable via related register setting: 1Mbps, 2Mbps.

For the TLSR8267/TLSR8267F512, RF transceiver can operate with frequency ranging from 2.400GHz to 2.4835GHz. The RF channel frequency setting determines the center of the channel.

3.3 Baseband

The baseband contains dedicated hardware logic to perform fast AGC control, access code correlation, CRC checking, data whitening, encryption/decryption and frequency hopping logic.

The baseband supports all features required by Bluetooth V4.2 specification.

4 Clock

4.1 Clock sources

The TLSR8267/TLSR8267F512 embeds a 32MHz RC oscillator which can be used as clock source for system, ADC and DMIC. A 32KHz RC oscillator is also embedded to provide clock source for sleep state.

Other than the RC clock source, PLL generates a 192MHz clock source, which can be used as clock sources for system, ADC and DMIC.

External 12M/16M crystal is available via pin XC1, which can provide a 12MHz/16MHz clock source for system, ADC and DMIC. External 32K crystal is available via pin ANA_C<3>, which can provide a 32KHz clock source for system.
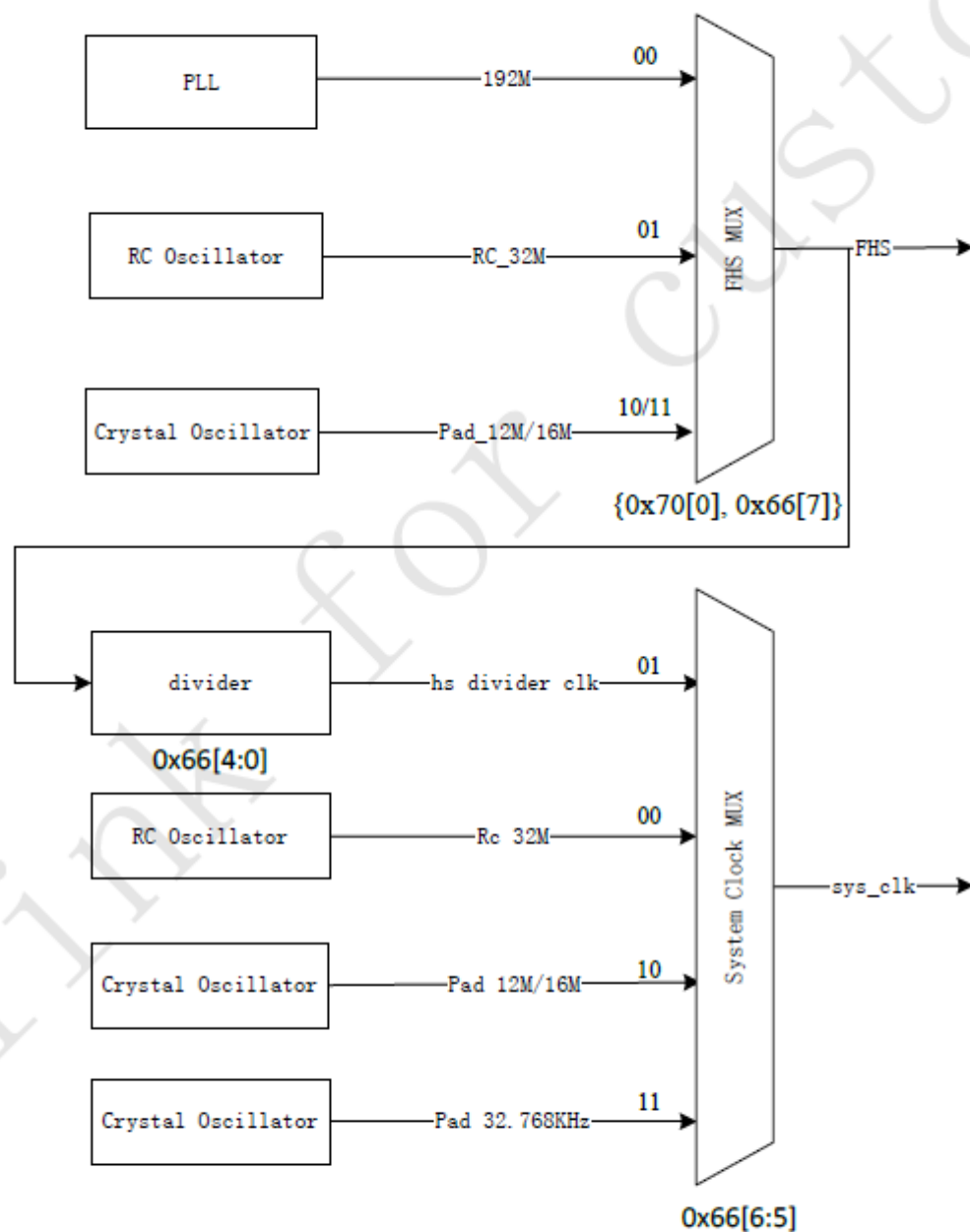
4.3   System clock

Figure 4- 1   Block diagram of system clock

2.3 RF design

The RF design

If you choose to PCB antenna module, in the hardware design needs to consider how to reduce the interference of external factors on its:

PCB antenna area design requirements

Module PCB antenna area and outside enlarge 15 mm area forbids spread copper, walk the line, put the components;

Suggest the module on the edge of the PCB layout;

2.4 ESD design

Module level of ESD: human body model (HBM) is 2000 v, the device model (CDM) is 500 v, if the product has a higher ESD requirement, must pay special attention to, all the pins may contact with the outside world, such as connected to the USB block these connectors, all want to reserve the location of the ESD protection devices.

If the module is not weld or directly to the board, but to work through the outer pull fuse, must pay attention to EMI problems, it is best to shielded wire connection, or reserve a common mode choke position on the board.

2.5. Burn the instructions :

VCC   GND   TL_SWS   3pin

Caution:

This device complies with Part 15 of the FCC Rules / Industry Canada licence-exempt RSS standard(s). 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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

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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

MPE Reminding

To satisfy FCC / IC RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation.
To ensure compliance, operations at closer than this distance is not recommended.

Les antennes installées doivent être situées de facon à ce que la population ne puisse y être exposée à une distance de moin de 20 cm. Installer les antennes de facon à ce que le personnel ne puisse approcher à 20 cm ou moins de la position centrale de l' antenne.
La FCC des états-unis stipule que cet appareil doit être en tout temps éoigné d'au moins 20 cm des personnes pendant son functionnement.

Information for the OEM Integrators

This device is intended for OEM integrators only. Please see the full grant of equipment document for restrictions.

Label Information to the End User by the OEM or Integrators

If the FCC ID of this module is not visible when it is installed inside another device, then the outside of the device into which the module is installed must be label with "Contains FCC ID: 2AKEQ-T8267T and IC: 22176-T8267T