

**CYW20737S**

## Bluetooth Low Energy System-in-Package (SiP) Module

The CYW20737S is a compact, highly integrated Bluetooth Low Energy (BLE) system-in-package (SiP) module. The CYW20737S SiP includes an embedded BLE antenna, 24 MHz clock, and 512 Kb EEPROM, so only a minimal set of external components is needed to create a standalone BLE device.

The CYW20737S is designed to accelerate time to market. The Bluetooth stack and several application profiles are built into the module, allowing customers to focus on their core applications. To further reduce application development time, the CYW20737S includes integrated software support, with one-click installation of the complete environment and a one-click compile/build/link/load cycle. All this, coupled with an ultrasmall form factor and support for a wide voltage range, makes the CYW20737S well suited for virtually any Bluetooth Smart application.

### Cypress Part Numbering Scheme

Cypress is converting the acquired IoT part numbers from Broadcom to the Cypress part numbering scheme. Due to this conversion, there is no change in form, fit, or function as a result of offering the device with Cypress part number marking. The table provides Cypress ordering part number that matches an existing IoT part number.

**Table 1. Mapping Table for Part Number between Broadcom and Cypress**

| Broadcom Part Number | Cypress Part Number |
|----------------------|---------------------|
| BCM20737S            | CYW20737S           |

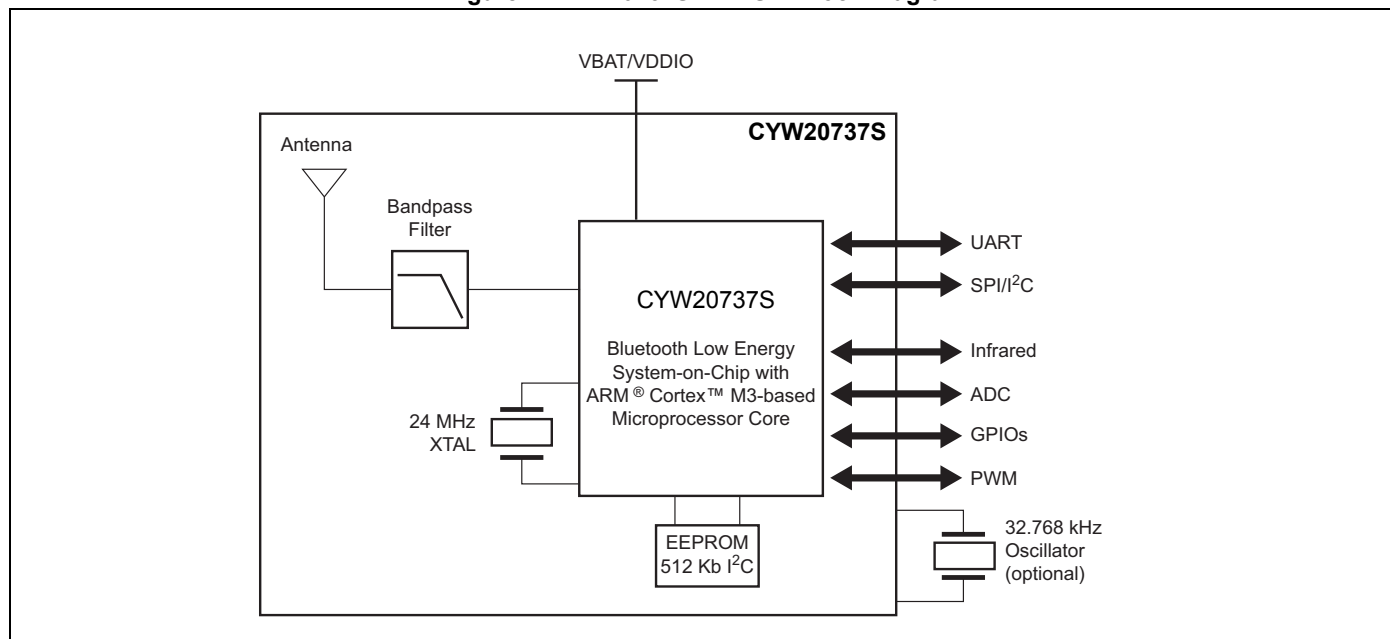
### Features

- ARM Cortex-M3 microcontroller unit (MCU)
- Embedded 512 Kb EEPROM
- Broadcom Serial Control (BSC), SPI, and UART interfaces
- FCC and CE compliant
- RoHS compliant, certified lead- and halogen-free
- Moisture Sensitivity Level (MSL) 3 compliant
- 6.5 mm × 6.5 mm × 1.2 mm Land Grid Array (LGA) 48-pin package

### Applications

Profiles supported in ROM:

- Battery status
  - Blood pressure monitor
  - Find me
  - Heart rate monitor
  - Proximity
  - Thermometer
  - Weight scale
  - Time
  - Blood glucose monitor
  - Support for RSA security library
  - Support for LE Audio
  - Support for pairing using NFC tags
- Additional profiles supported in RAM:
- Blood glucose monitor
  - Temperature alarm
  - Location
  - Other custom profiles

**Figure 1. CYW20737S BLE SiP Block Diagram**


## IoT Resources

Cypress provides a wealth of data at <http://www.cypress.com/internet-things-iot> to help you to select the right IoT device for your design, and quickly and effectively integrate the device into your design. Cypress provides customer access to a wide range of information, including technical documentation, schematic diagrams, product bill of materials, PCB layout information, and software updates. Customers can acquire technical documentation and software from the Cypress Support Community website (<http://community.cypress.com/>).

## Contents

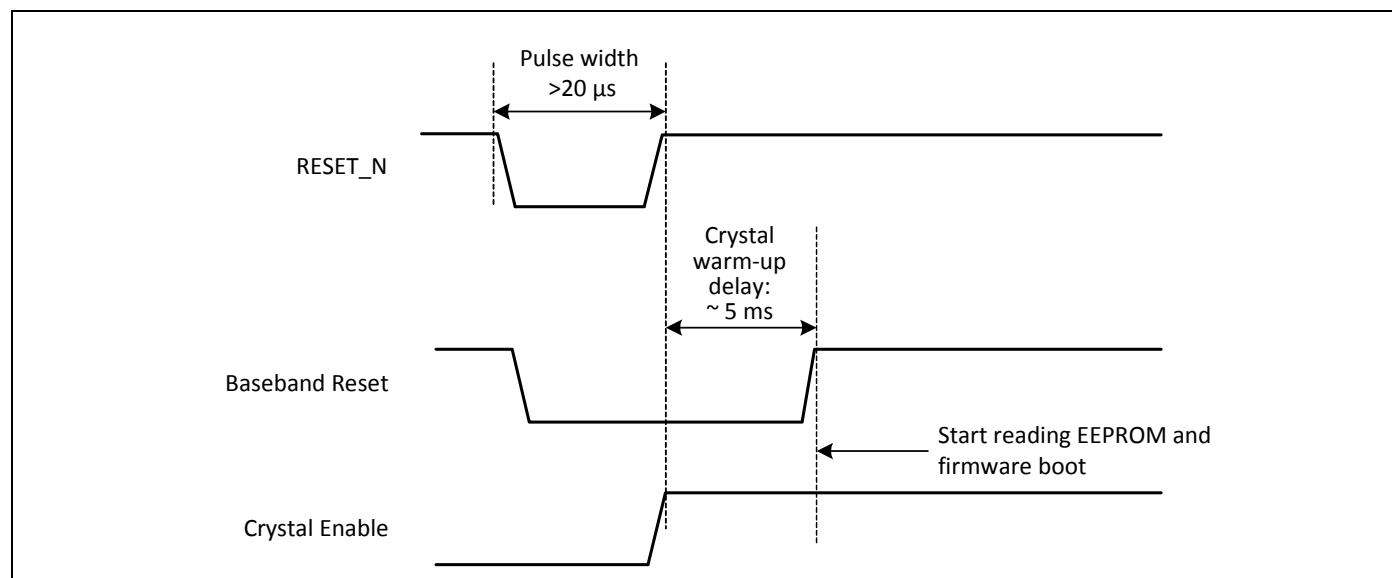
|                                                 |           |                                                        |           |
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## 1. Functional Description

### 1.1 External Reset

External reset timing for the CYW20737S is illustrated in [Figure 2](#).

**Figure 2. External Reset Timing**



### 1.2 32.768 kHz Oscillator

The CYW20737S includes a standard Pierce oscillator. The oscillator circuit includes a comparator with hysteresis on the output to create a single-ended digital output. The hysteresis eliminates chatter when the input is near the comparator threshold (~100 mV). The oscillator circuit can be designed for a 32 kHz or 32.768 kHz crystal oscillator, and can also be driven by an external clock input with a similar frequency. Characteristics for a 32 kHz oscillator are defined in [Table 2](#).

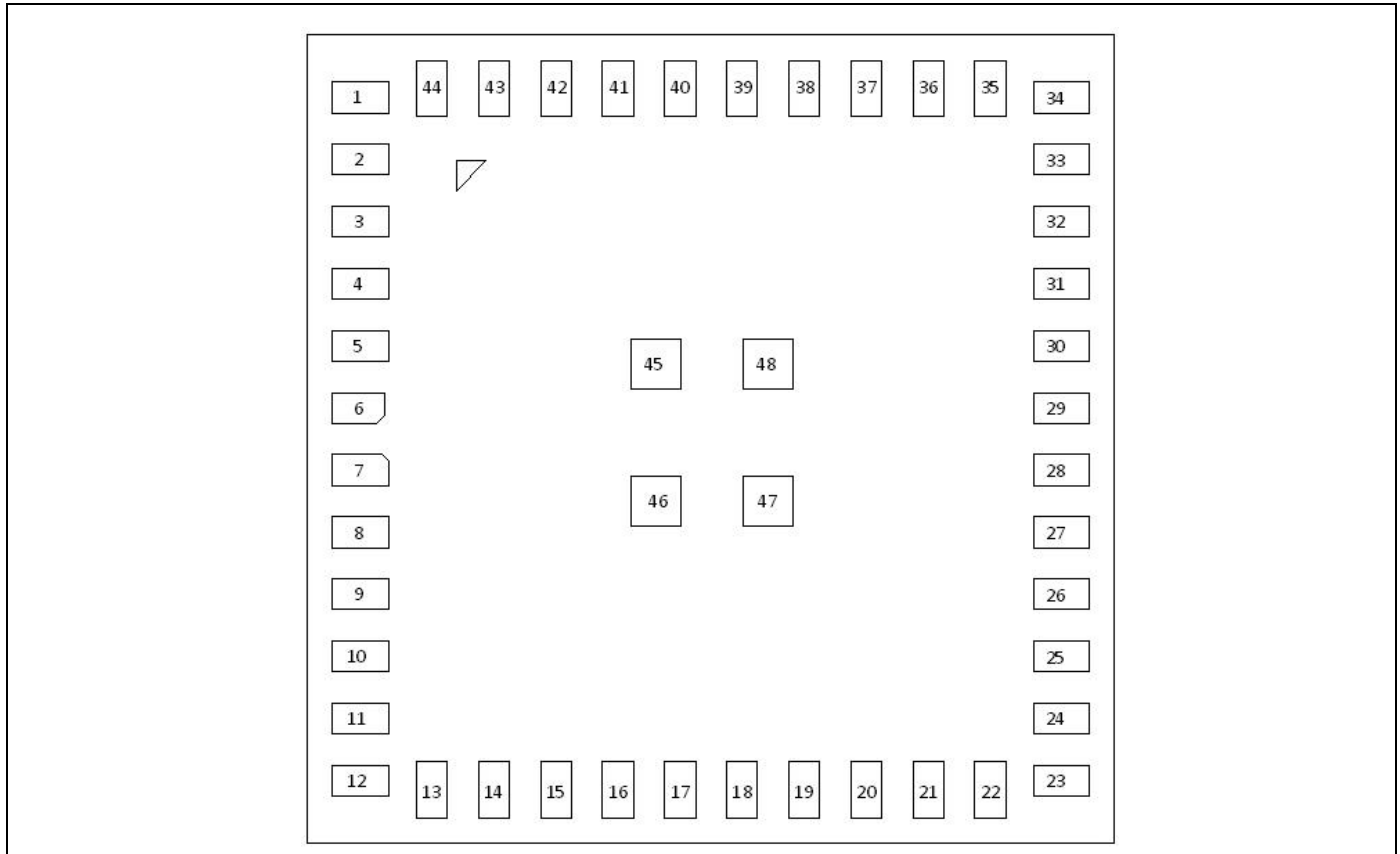
**Table 2. 32 kHz Crystal Oscillator Characteristics**

| Parameter                 | Symbol               | Conditions            | Min. | Typ.   | Max. | Unit |
|---------------------------|----------------------|-----------------------|------|--------|------|------|
| Output frequency          | $F_{\text{osc}}$     | —                     | —    | 32.768 | —    | kHz  |
| Frequency tolerance       | $F_{\text{tol}}$     | Crystal-dependent     | —    | 100    | —    | ppm  |
| Start-up time             | $T_{\text{startup}}$ | —                     | —    | —      | 500  | μs   |
| Crystal drive level       | $P_{\text{drv}}$     | For crystal selection | 0.5  | —      | —    | μW   |
| Crystal series resistance | $R_{\text{series}}$  | For crystal selection | —    | —      | 70   | kΩ   |
| Crystal shunt capacitance | $C_{\text{shunt}}$   | For crystal selection | —    | —      | 1.3  | pF   |

## 2. Pin Map and Signal Descriptions

The CYW20737S pin map is shown in [Figure 3](#).

**Figure 3. CYW20737S (TOP View)**



The signal name, type, and description of each pin in the CYW20737S is listed in [Table 3 on page 6](#). The symbols shown under I/O Type indicate pin directions (I/O = bidirectional, I = input, O = output) and the internal pull-up/pull-down characteristics (PU = weak internal pull-up resistor and PD = weak internal pull-down resistor), if any.

**Table 3. Pin Descriptions**

| Pin | Name              | I/O Type | Description                                                                                                                                                   |
|-----|-------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | GPIO: P27<br>PWM1 | I        | Default direction: Input.<br>After POR state: Input floating.<br>Drain current: 16 mA<br>Alternate function: MOSI (master and slave) for SPI_2                |
| 2   | GND               | GND      | GND                                                                                                                                                           |
| 3   | VBAT              | I        | Battery supply input.                                                                                                                                         |
| 4   | GND               | GND      | GND                                                                                                                                                           |
| 5   | GND               | GND      | GND                                                                                                                                                           |
| 6   | GND               | GND      | GND                                                                                                                                                           |
| 7   | GND               | GND      | GND                                                                                                                                                           |
| 8   | GND               | GND      | GND                                                                                                                                                           |
| 9   | GND               | GND      | GND                                                                                                                                                           |
| 10  | Reserved          | –        | Leave floating                                                                                                                                                |
| 11  | GND               | GND      | GND                                                                                                                                                           |
| 12  | GND               | GND      | GND                                                                                                                                                           |
| 13  | GND               | GND      | GND                                                                                                                                                           |
| 14  | GND               | GND      | GND                                                                                                                                                           |
| 15  | GND               | GND      | GND                                                                                                                                                           |
| 16  | GND               | GND      | GND                                                                                                                                                           |
| 17  | GND               | GND      | GND                                                                                                                                                           |
| 18  | UART_RX           | I        | UART_RX. This pin is pulled low through an internal 10 kΩ resistor.                                                                                           |
| 19  | UART_TX           | O, PU    | UART_TX                                                                                                                                                       |
| 20  | GND               | GND      | GND                                                                                                                                                           |
| 21  | SCL               | I/O, PU  | SCL I/O, PU clock signal for an external I <sup>2</sup> C device                                                                                              |
| 22  | SDA               | I/O, PU  | SDA I/O, PU data signal for an external I <sup>2</sup> C device                                                                                               |
| 23  | GND               | GND      | GND                                                                                                                                                           |
| 24  | GND               | GND      | GND                                                                                                                                                           |
| 25  | GPIO: P1          | I        | Default direction: Input.<br>After POR state: Input floating.<br>This pin is tied to the WP pin of the embedded EEPROM.<br>Requires an external 10K pull-up   |
| 26  | TMC               | I        | Test mode control. Pull this pin high to invoke test mode; leave it floating if not used.<br>This pin is connected to GND through an internal 10 kΩ resistor. |
| 27  | RESET_N           | I/O PU   | Active-low system reset with open-drain output                                                                                                                |

**Table 3. Pin Descriptions (Cont.)**

| Pin | Name      | I/O Type | Description                                                                                                                                                                                                                                                                               |
|-----|-----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28  | GPIO: P0  | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions: <ul style="list-style-type: none"> <li>■ A/D converter input</li> <li>■ Peripheral UART TX (PUART_TX)</li> <li>■ MOSI (master and slave) for SPI_2</li> <li>■ IR_RX</li> <li>■ 60Hz_main</li> </ul> |
| 29  | GND       | GND      | GND                                                                                                                                                                                                                                                                                       |
| 30  | GPIO: P3  | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions: <ul style="list-style-type: none"> <li>■ Peripheral UART CTS (PUART_CTS)</li> <li>■ SPI_CLK (master and slave) for SPI_2</li> </ul>                                                                 |
| 31  | GPIO: P2  | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions: <ul style="list-style-type: none"> <li>■ Peripheral UART RX (PUART_RX)</li> <li>■ SPI_CS (slave only) for SPI_2</li> <li>■ SPI_MOSI (master only) for SPI_2</li> </ul>                              |
| 32  | GPIO: P4  | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions: <ul style="list-style-type: none"> <li>■ Peripheral UART RX (PUART_RX)</li> <li>■ MOSI (master and slave) for SPI_2.</li> <li>■ IR_TX</li> </ul>                                                    |
| 33  | GPIO: P8  | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions: A/D converter input.                                                                                                                                                                                |
| 34  | GPIO: P33 | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions: <ul style="list-style-type: none"> <li>■ A/D converter input</li> <li>■ MOSI (slave only) for SPI_2</li> <li>■ Auxiliary clock output (ACLK1)</li> <li>■ Peripheral UART RX (PUART_RX)</li> </ul>   |

**Table 3. Pin Descriptions (Cont.)**

| Pin | Name              | I/O Type | Description                                                                                                                                                                                                               |
|-----|-------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 35  | GPIO: P32         | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions:<br>■ A/D converter input<br>■ SPI_CS (slave only) for SPI_2.<br>■ Auxiliary clock output (ACLK0)<br>■ Peripheral UART TX (PUART_TX) |
| 36  | GPIO: P25         | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions:<br>■ MISO (master and slave) for SPI_2<br>■ Peripheral UART RX (PUART_RX)                                                           |
| 37  | GPIO: P24         | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions:<br>■ SPI_CLK (master and slave) for SPI_2<br>■ Peripheral UART TX (PUART_TX)                                                        |
| 38  | NC                | NC       | No Connection (N/C).                                                                                                                                                                                                      |
| 39  | GPIO: P13<br>PWM3 | I        | Default Direction: Input<br>After POR State: Input Floating<br>Drain current: 16 mA<br>Alternate function: A/D converter input                                                                                            |
|     | GPIO: P28<br>PWM2 | I        | Default direction: Input.<br>After POR state: Input floating.<br>Drain current: 16 mA<br>Alternate functions:<br>■ A/D converter input<br>■ LED1<br>■ IR_TX                                                               |
| 40  | GPIO: P14<br>PWM2 | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate function: A/D converter input                                                                                                                  |
|     | GPIO: P38         | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions:<br>■ A/D converter input<br>■ MOSI (master and slave) for SPI_2<br>■ IR_TX                                                          |
| 41  | GPIO: P15         | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions:<br>■ A/D converter input<br>■ IR_RX<br>■ 60 Hz_main                                                                                 |

**Table 3. Pin Descriptions (Cont.)**

| Pin | Name              | I/O Type | Description                                                                                                                                |
|-----|-------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 42  | GPIO: P26<br>PWM0 | I        | Default direction: Input.<br>After POR state: Input floating.<br>Drain current: 16 mA<br>Alternate function: SPI_CS (slave only) for SPI_2 |
| 43  | GPIO: P12         | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions:<br>■ A/D converter input<br>■ XTALO32K               |
|     | XTALO32K          | O        | Low-power oscillator (LPO) output.<br>Alternate functions:<br>P12<br>P26                                                                   |
| 44  | GPIO: P11         | I        | Default direction: Input.<br>After POR state: Input floating.<br>Alternate functions:<br>■ A/D converter input<br>■ XTALI32K               |
|     | XTALI32K          | I        | Low-power oscillator (LPO) input.<br>Alternate functions:<br>■ P11<br>■ P27                                                                |
| 45  | GND               | GND      | GND                                                                                                                                        |
| 46  | GND               | GND      | GND                                                                                                                                        |
| 47  | GND               | GND      | GND                                                                                                                                        |
| 48  | GND               | GND      | GND                                                                                                                                        |

### 3. Electrical Specifications

Absolute maximum ratings are defined in [Table 4](#).

**Table 4. Absolute Maximum Ratings**

| Parameter                                   | Min. | Max. | Unit |
|---------------------------------------------|------|------|------|
| Supply power                                | NA   | 3.63 | V    |
| Storage temperature                         | −40  | 125  | °C   |
| Voltage ripple                              | 0    | ±2   | %    |
| Power supply (VBAT absolute maximum rating) | 1.62 | 3.63 | V    |

Power for the CYW20737S module is provided by the host through the power pins.

**Table 5. Voltage**

| Symbol | Parameter       | Min. | Typ. | Max. | Unit |
|--------|-----------------|------|------|------|------|
| VBAT   | Battery voltage | 1.62 | –    | 3.63 | V    |

**Table 6. Current Consumption**

| Operating Mode | Condition                                         | Nominal | Maximum | Unit |
|----------------|---------------------------------------------------|---------|---------|------|
| Receive        | Receiver and baseband are both operating, 100%    | 24.0    | 28.0    | mA   |
| Transmit       | Transmitter and baseband are both operating, 100% | 24.0    | 28.0    | mA   |
| Sleep          | Wake in < 5 ms                                    | 55.0    | 60.0    | μA   |
| Deep Sleep     | Wake on interrupt                                 | 2.0     | 2.5     | μA   |

**Note:** All measurements taken at 25°C

Based on the current measurements in [Table 6 on page 10](#), CYW20737S peak power values are:

- RX: 101.6 mW
- TX: 101.6 mW
- Sleep mode: 217.8 μW
- Deep Sleep mode: 9.1 μW

## 4. RF Specifications

CYW20737S receiver specifications are defined in [Table 7](#).

**Table 7. Receiver Specifications**

| Parameter                 | Mode and Conditions                                                                          | Min. | Typ. | Max. | Unit |
|---------------------------|----------------------------------------------------------------------------------------------|------|------|------|------|
| Frequency range           | –                                                                                            | 2402 | –    | 2480 | MHz  |
| RX sensitivity (standard) | Packets: 200<br>Payload: PRBS 9<br>Length: 37 Bytes<br>Dirty Transmitter: off.<br>PER: 30.8% | –    | –94  | –    | dBm  |
| Maximum input             | –                                                                                            | –10  | –    | –    | dBm  |

**Note:** All measurements taken at 3.0V (default voltage)

RF transmitter specifications are defined in [Table 8](#).

**Table 8. Transmitter Specifications**

| Parameter                                            | Min. | Typ. | Max. | Unit      |
|------------------------------------------------------|------|------|------|-----------|
| <b>Transmitter</b>                                   |      |      |      |           |
| Frequency range <sup>a</sup>                         | 2402 | –    | 2480 | MHz       |
| Output power adjustment range                        | –20  | –    | 4    | dBm       |
| Output power                                         | –    | 2    | –    | dBm       |
| Output power variation                               | –    | 2.5  | –    | dB        |
| <b>LO Performance</b>                                |      |      |      |           |
| Initial carrier frequency tolerance                  | –    | –    | ±150 | kHz       |
| <b>Frequency Drift</b>                               |      |      |      |           |
| Frequency drift                                      | –    | –    | ±50  | kHz       |
| Drift rate                                           | –    | –    | 20   | kHz/50 μs |
| <b>Frequency Deviation</b>                           |      |      |      |           |
| Average deviation in payload<br>(sequence: 00001111) | 225  | –    | 275  | kHz       |
| Average deviation in payload<br>(sequence: 10101010) | 185  | –    | –    | kHz       |
| Channel spacing                                      | –    | 2    | –    | MHz       |

a. This parameter is taken from the Bluetooth 4.0 specification.

## 5. ADC Specifications

CYW20737S ADC specifications are defined in [Table 9](#).

**Table 9. ADC Specifications**

| Parameter                          | Symbol        | Conditions                          | Min.  | Typ. | Max.   | Unit             |
|------------------------------------|---------------|-------------------------------------|-------|------|--------|------------------|
| Number of input channels           | –             | –                                   | –     | 9    | –      | –                |
| Channel switching rate             | $f_{ch}$      | –                                   | –     | –    | 133.33 | Kch/s            |
| Input signal range                 | $V_{inp}$     | –                                   | 0     | –    | 3.63   | V                |
| Reference settling time            | –             | Charging refsel                     | 7.5   | –    | –      | μs               |
| Input resistance                   | $R_{inp}$     | Effective, single-ended             | –     | 500  | –      | kΩ               |
| Input capacitance                  | $C_{inp}$     | –                                   | –     | –    | 5      | pF               |
| Conversion rate                    | $F_c$         | –                                   | 5.859 | –    | 187    | kHz              |
| Conversion time                    | $T_c$         | –                                   | 5.35  | –    | 170.7  | μs               |
| Resolution                         | R             | –                                   |       | 16   |        | Bits             |
| Absolute voltage measurement error | –             | Using on-chip ADC firmware driver   | –     | ±2   | –      | %                |
| Current                            | I             | $I_{avdd1p2} + I_{avdd3p3}$         | –     | –    | 1      | mA               |
| Power                              | P             | –                                   | –     | 1.5  | –      | mW               |
| Leakage Current                    | $I_{leakage}$ | T = 25°C                            | –     | –    | 100    | nA               |
| Power-up time                      | $T_{powerup}$ | –                                   | –     | –    | 200    | μs               |
| Integral nonlinearity              | $I_{NL}$      | In the guaranteed performance range | –1    | –    | 1      | LSB <sup>a</sup> |
| Differential nonlinearity          | $D_{NL}$      | In the guaranteed performance range | –1    | –    | 1      | LSB <sup>a</sup> |

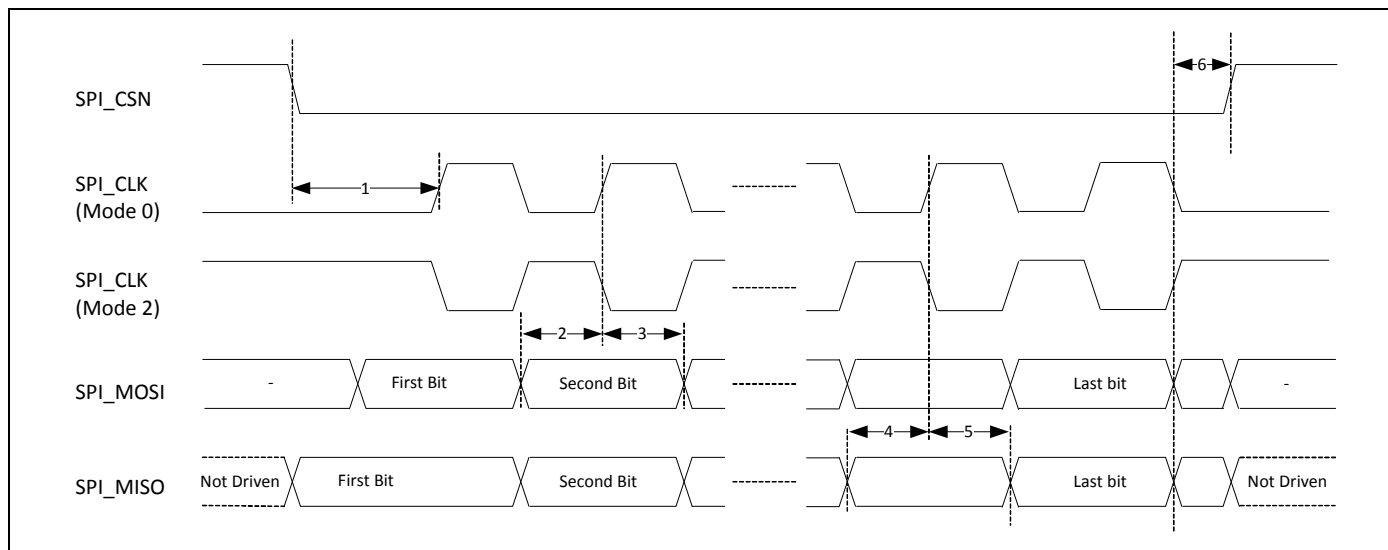
a. LSBs are expressed at the 10-bit level.

## 6. Timing and AC Characteristics

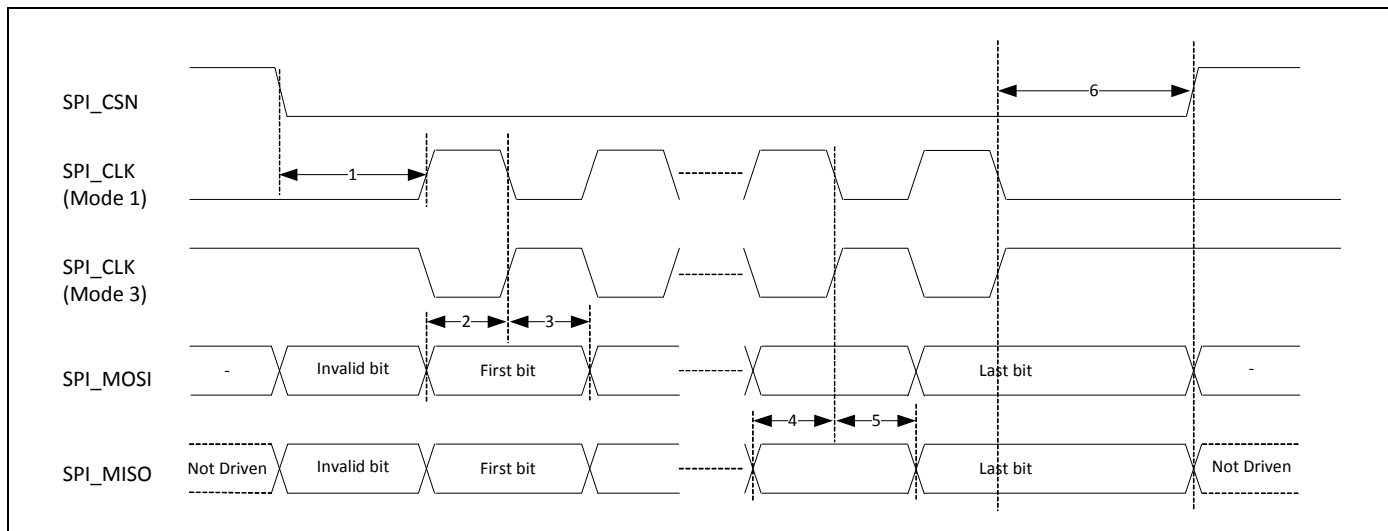
### 6.1 SPI Timing

SPI interface timing is illustrated in [Figure 4](#) and [Figure 5](#) and defined in [Table 10](#) on page 14.

**Figure 4. SPI Timing—Modes 0 and 2**



**Figure 5. SPI Timing—Modes 1 and 3**

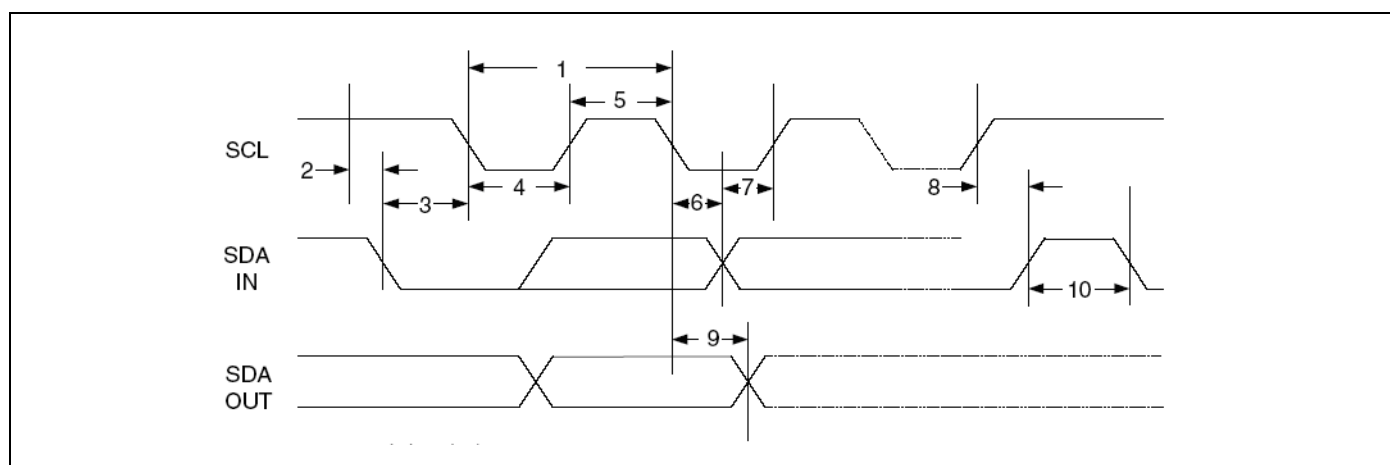


**Table 10. SPI Interface Timing Specifications**

| Reference | Characteristics                             | Min.    | Typ.    | Max.     |
|-----------|---------------------------------------------|---------|---------|----------|
| 1         | Time from CSN asserted to first clock edge  | 1 SCK   | 100     | $\infty$ |
| 2         | Master setup time                           | –       | 1/2SCK  | –        |
| 3         | Master hold time                            | 1/2SCK  | –       | –        |
| 4         | Slave setup time                            | –       | 1/2 SCK | –        |
| 5         | Slave hold time                             | 1/2 SCK | –       | –        |
| 6         | Time from last clock edge to CSN deasserted | SCK     | 10 SCK  | 100      |

## 6.2 BSC Interface Timing

BSC interface timing is illustrated in [Figure 6](#) and is defined in [Table 11](#).

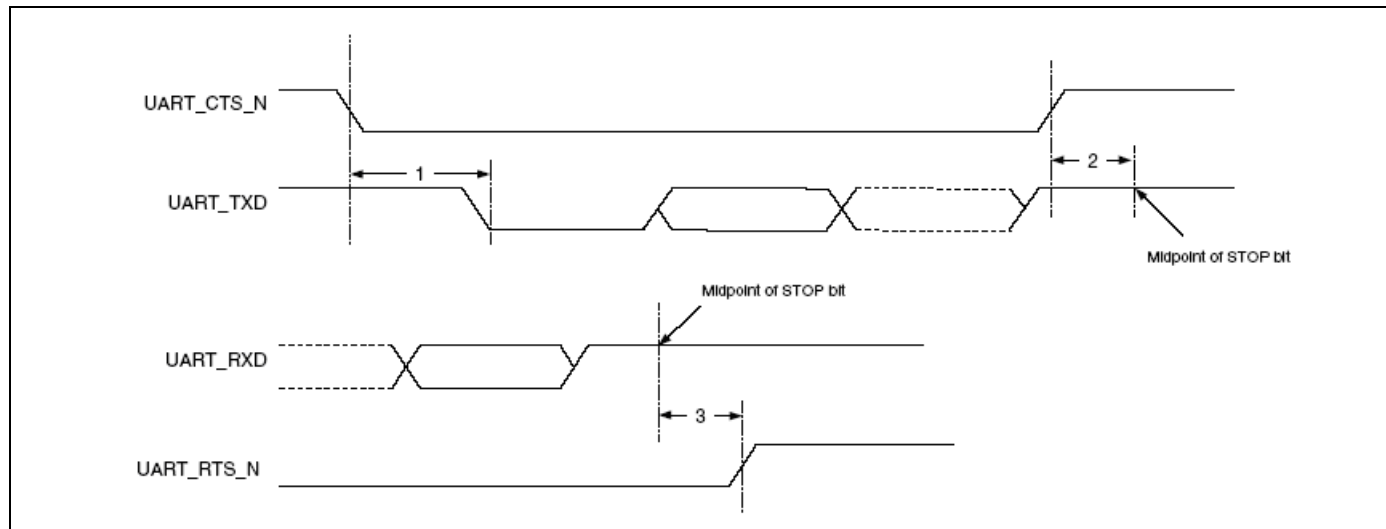
**Figure 6. BSC Interface Timing**

**Table 11. BSC Interface Timing Specifications**

| Reference | Characteristics            | Min. | Max.                | Unit |
|-----------|----------------------------|------|---------------------|------|
| 1         | Clock frequency            | –    | 100, 400, 800, 1000 | kHz  |
| 2         | START condition setup time | 650  | –                   | ns   |
| 3         | START condition hold time  | 280  | –                   | ns   |
| 4         | Clock low time             | 650  | –                   | ns   |
| 5         | Clock high time            | 280  | –                   | ns   |
| 6         | Data input hold time       | 0    | –                   | ns   |
| 7         | Data input setup time      | 100  | –                   | ns   |
| 8         | STOP condition setup time  | 280  | –                   | ns   |
| 9         | Output valid from clock    | –    | 400                 | ns   |
| 10        | Bus free time              | 650  | –                   | ns   |

### 6.3 UART Timing

UART timing is illustrated in [Figure 7](#) and defined in [Table 12](#).

**Figure 7. UART Timing**



**Table 12. UART Timing Specifications**

| Reference | Characteristics                                         | Min. | Max. | Unit           |
|-----------|---------------------------------------------------------|------|------|----------------|
| 1         | Delay time, UART_CTS_N low to UART_TXD valid            | –    | 24   | Baudout cycles |
| 2         | Setup time, UART_CTS_N high before midpoint of stop bit | –    | 10   | ns             |
| 3         | Delay time, midpoint of stop bit to UART_RTS_N high     | –    | 2    | Baudout cycles |

## 7. PCB Design and Manufacturing Recommendations

### 7.1 Pad and Solder Mask Opening Dimensions

CYW20737S pad and solder mask opening dimensions are defined in [Table 13](#).

**Table 13. Pad and Solder Mask Dimensions**

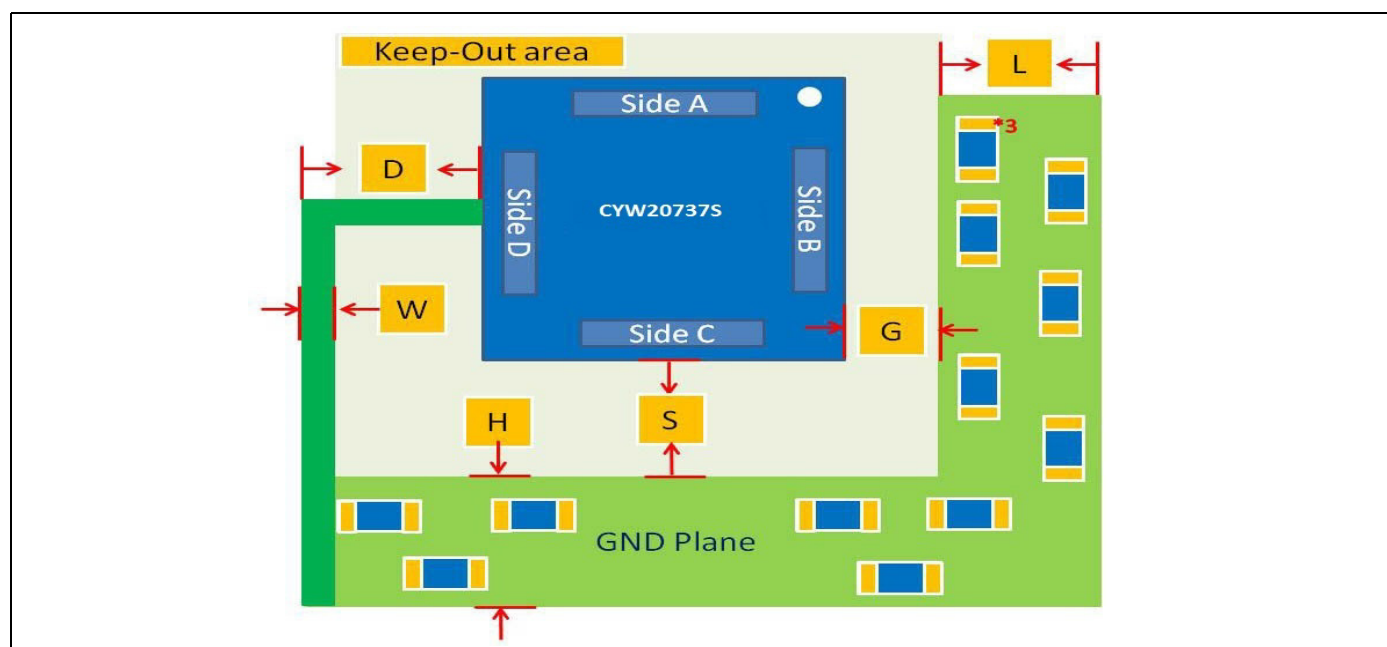
| Pad Type | Pad Dimensions | Solder Mask Opening Dimensions | Unit |
|----------|----------------|--------------------------------|------|
| Type A   | 0.6 × 0.25     | 0.7 × 0.35                     | mm   |
| Type B   | 0.55 × 0.3     | 0.65 × 0.4                     |      |
| Type C   | 0.4 × 0.4      | 0.5 × 0.5                      |      |

### 7.2 PCB Layout Recommendations

The following layout recommendations are referenced to [Figure 8 on page 16](#).

- Connect to system ground from side D of the module (pins 13–22).
- The L-shaped ground plane is required for the embedded BLE antenna. Keep the GND continuous. Do not cut off the GND shape to accommodate trace routes.
- An L-shaped ground plane is required. If the L-shaped GND plane is located on the top layer of the PCB, do not place components on the ground plane. If this cannot be avoided, move the L-shaped ground plane to another layer.
- Antenna efficiency of 31–41% can be achieved based on the layout in [Figure 8 on page 16](#) and the dimensions listed below. Following these layout recommendations is expected to yield 50+ meters of usable range; deviating from these recommendations may reduce the range of the antenna.
  - D: 4.5 mm (typical)
  - G, H, S: 3 mm (typical)
  - L: 3 mm (minimum)
  - W: 0.4 mm (typical)
- Route signal traces out of the module from side C (between pins 27 and 30) or side D (between pins 16 and 19) of the module. Traces can be overlapped to avoid routing through the keep-out area.
- Do not route traces from side A or side B.

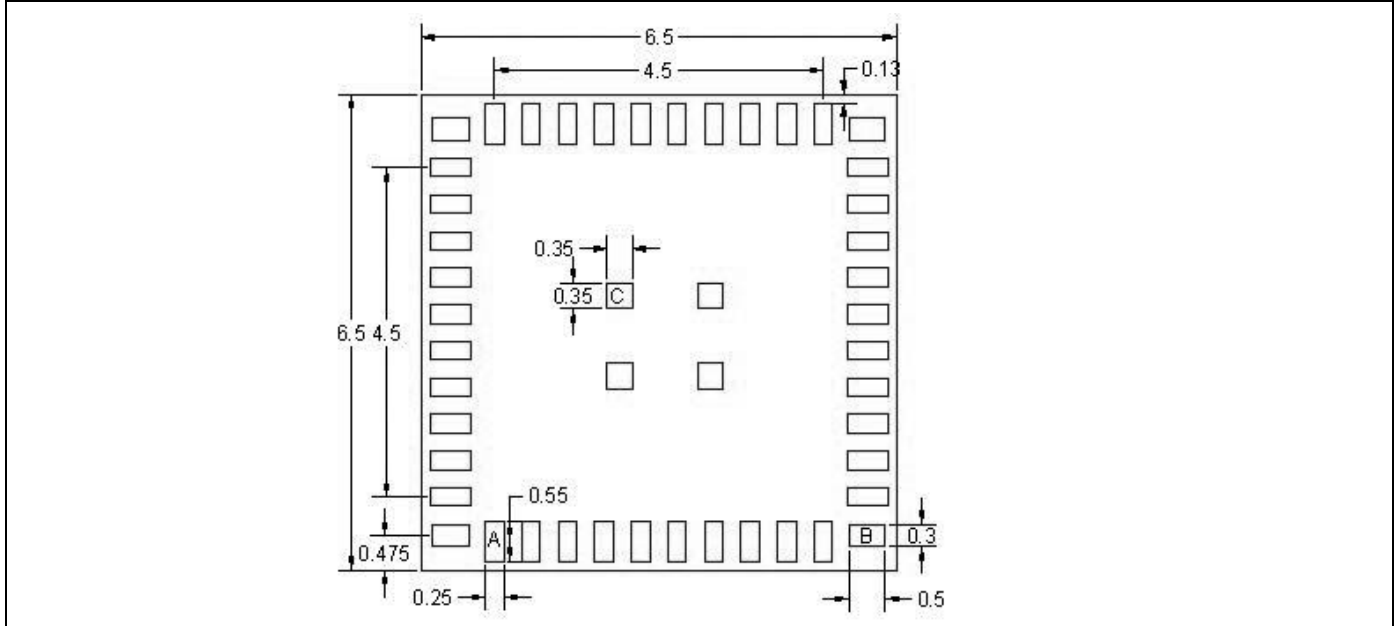
**Figure 8. PCB Layout Example**



### 7.3 PCB Stencil

The recommended PCB stencil is shown in [Figure 9](#) (all measurements in mm). Use an unsolder mask to set the module footprint.

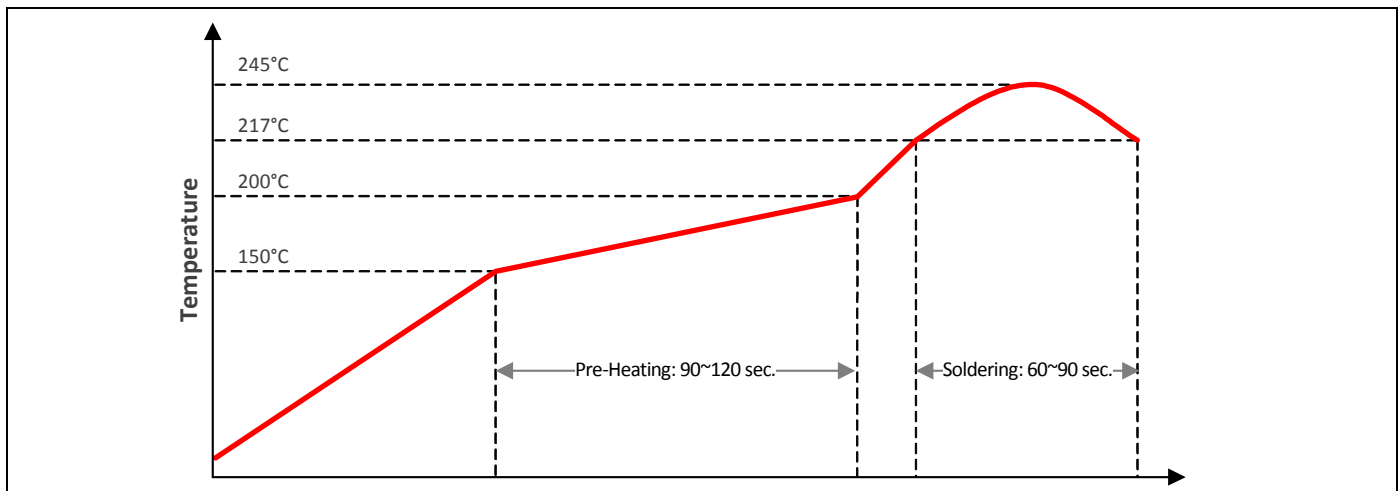
**Figure 9. CYW20737S Stencil (Bottom View)**



### 7.4 Solder Reflow

The recommended solder reflow profile for the CYW20737S is defined in [Figure 10](#).

**Figure 10. Solder Reflow Profile**



## 8. Packaging and Storage Information

The CYW20737S is available in a tape and reel package and is shipped in an ESD-protected moisture-resistant (MSL-3) bag as shown in [Figure 11](#). The storage temperature range is  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

**Figure 11. CYW20737S ESD/Moisture Packaging**

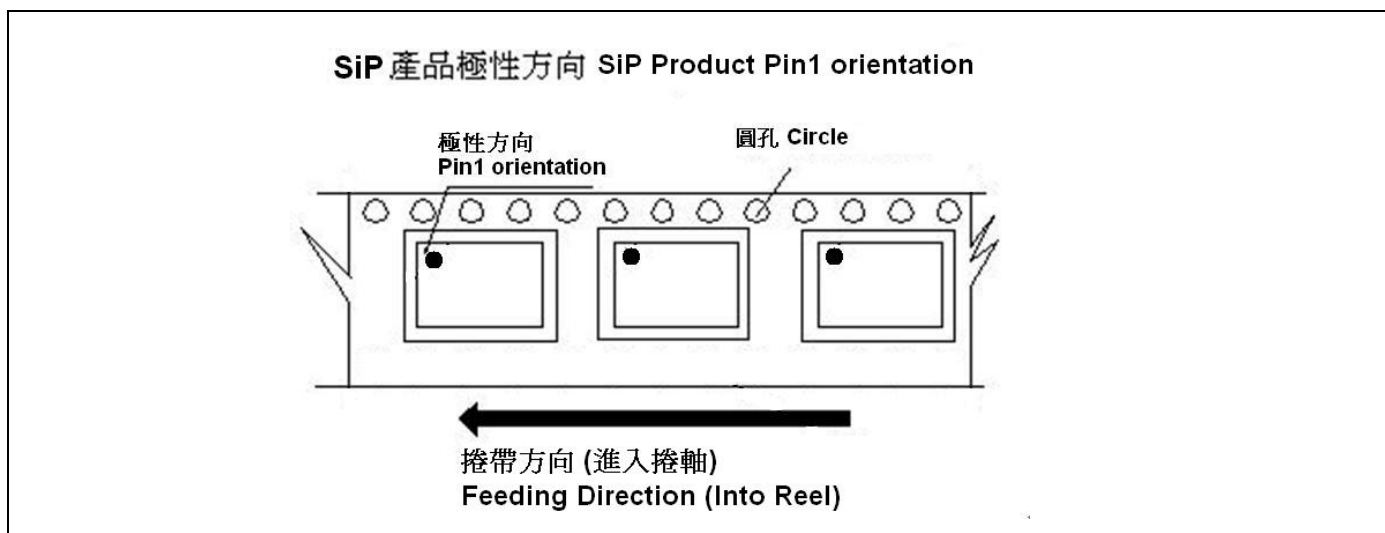


The moisture sensitivity label on the CYW20737S shipping bag is shown in [Figure 12 on page 19](#).

**Figure 12. CYW20737S Moisture Sensitivity Label**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                          |                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Caution</b><br>This bag contains<br><b>MOISTURE-SENSITIVE DEVICES</b> | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>LEVEL</b><br/> <b>3</b> </div><br><small>If blank, see adjacent bar code label</small> |
| 1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)<br>2. Peak package body temperature: <b>260</b> °C<br><small>If blank, see adjacent bar code label</small><br>3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be<br>a) Mounted within: <b>168</b> hours of factory conditions<br><small>If blank, see adjacent bar code label</small><br>≤ 30 °C / 60% RH. or<br>b) Stored per J-STD-033<br>4. Devices require bake, before mounting, if:<br>a) Humidity Indicator Card reads >10% for level 2a - 5a devices or >60% for level 2 devices when read at 23 ±5°C<br>b) 3a or 3b are not met<br>5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure. |                                                                          |                                                                                                                                                                       |
| Bag Seal Date: <b>APR 26 2011</b><br><small>If blank, see adjacent bar code label</small><br><small>Note: Level and body temperature defined by IPC/JEDEC J-STD-020</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                          |                                                                                                                                                                       |

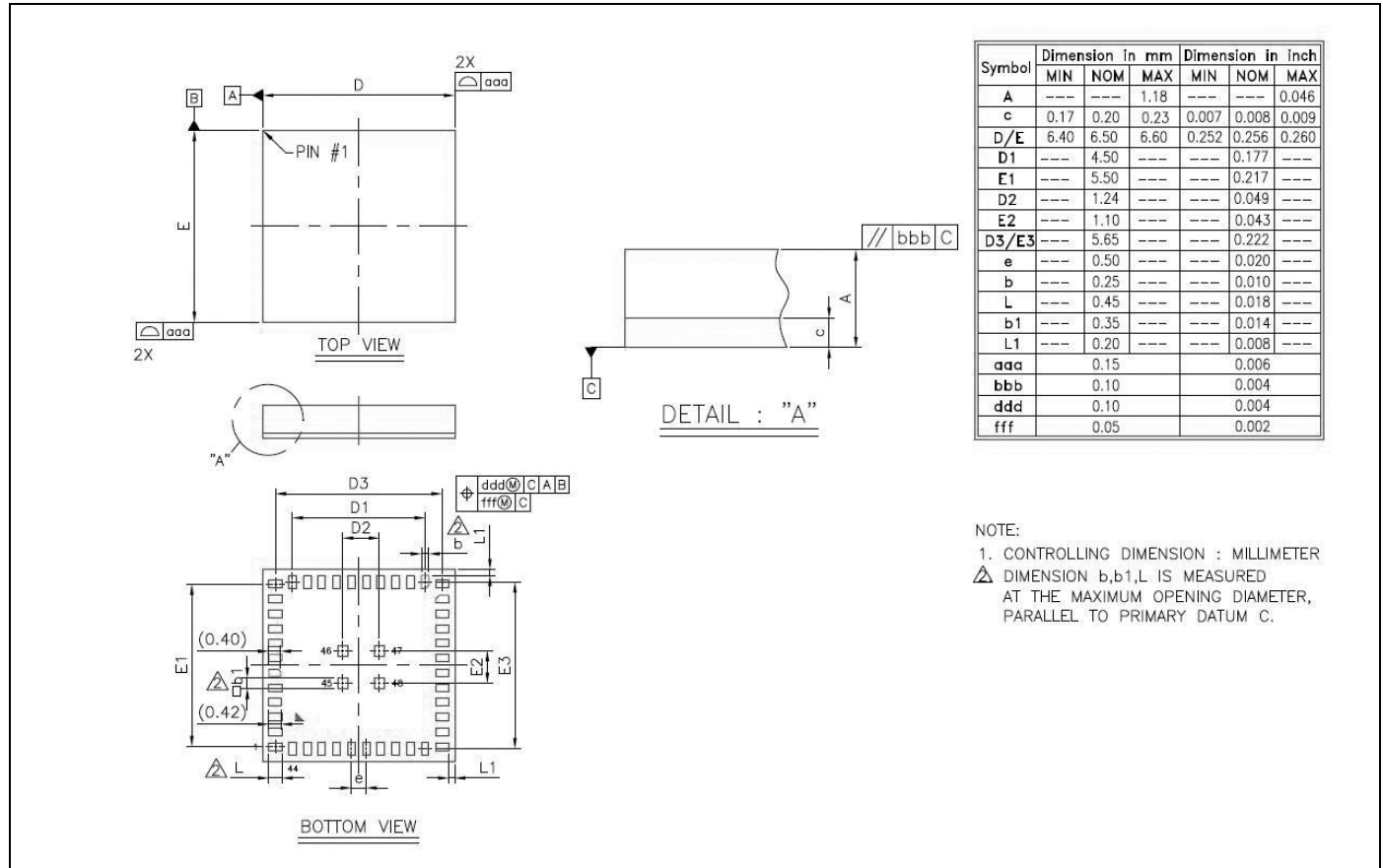
Figure 13 shows the location of pin 1 on the CYW20737S relative to its orientation on the tape packaging.

**Figure 13. CYW20737S Tape and Reel Pin 1 Location**


## 9. Mechanical Information

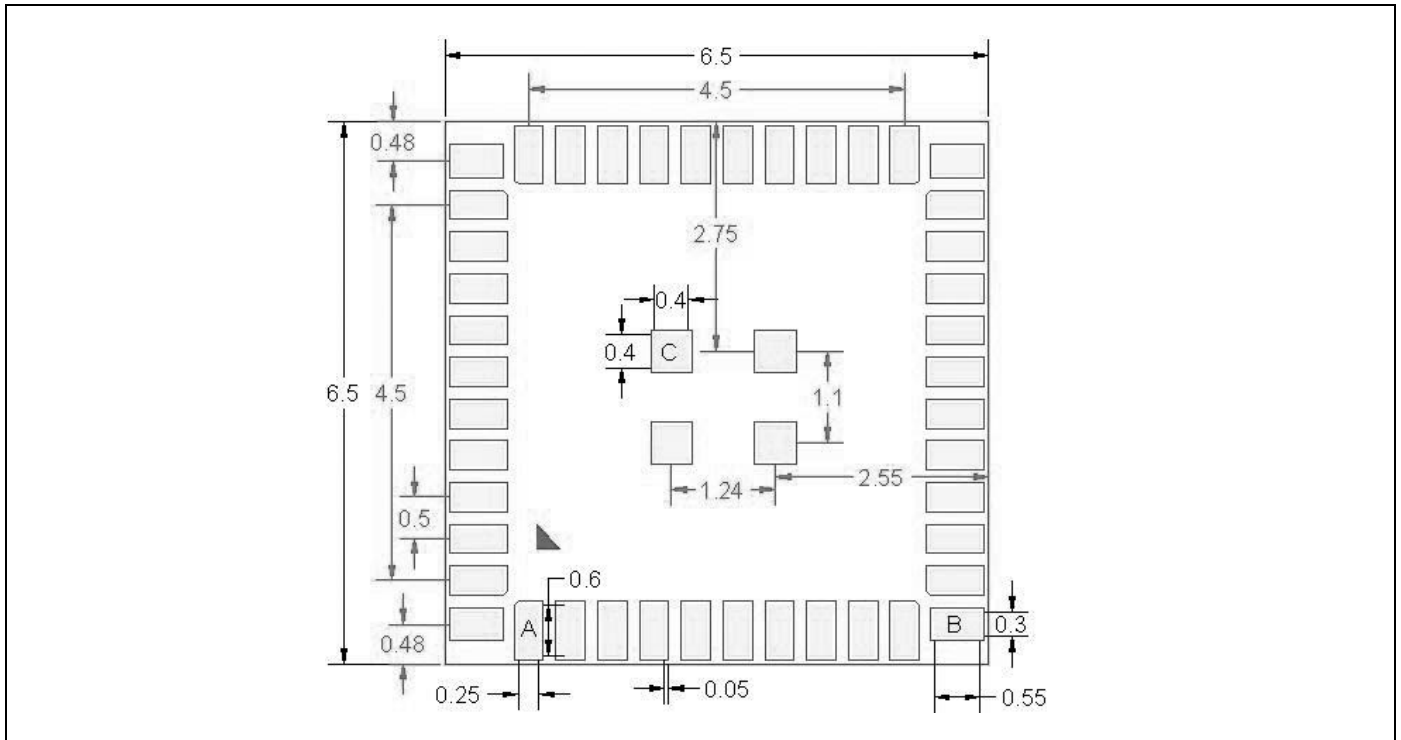
Package dimensions for the CYW20737S are shown in Figure 14.

**Figure 14. CYW20737S Package Dimensions**



Additional CYW20737S package dimensions are shown in Figure 15 on page 21.

**Figure 15. CYW20737S Pin Dimensions (Bottom View)**



## 10. Ordering Information

Table 14. Ordering Information

| Part Number | Package    | Operating Temperature | Humidity                |
|-------------|------------|-----------------------|-------------------------|
| CYW20737S   | 48-pin LGA | –40°C to +85°C        | 95% max., noncondensing |

## Regulatory Information

### FCC

#### FCC NOTICE:

The device complies with part 15 of the FCC Rules. The device meets the requirements for modular transmitter approval as detailed in FCC public Notice DA00-1407. transmitter 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.

#### CAUTION:

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Cypress Semiconductor may 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

#### LABELING REQUIREMENTS:

The Original Equipment Manufacturer (OEM) must ensure that FCC labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Cypress Semiconductor FCC identifier for this product as well as the FCC Notice above. The FCC identifier is FCC ID: **WAP-0737**

In any case the end product must be labeled exterior with "Contains FCC ID: **WAP-0737**".

#### ANTENNA WARNING:

This device is tested with a standard SMA connector and with the antennas listed below. When integrated in the OEMs product, these fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Any antenna not in the following table must be tested to comply with FCC Section 15.203 for unique antenna connectors and Section 15.247 for emissions.

#### RF EXPOSURE:

To comply with FCC RF Exposure requirements, the Original Equipment Manufacturer (OEM) must ensure to install the approved antenna in the previous.

The preceding statement must be included as a CAUTION statement in manuals, for products operating with the approved antennas in [Table 5](#) on page 10, to alert users on FCC RF Exposure compliance. Any notification to the end user of installation or removal instructions about the integrated radio module is not allowed.

The radiated output power of the device with the PCB antenna (FCC ID: **WAP-0737**) is far below the FCC radio frequency exposure limits. Nevertheless, use the device such a manner that minimizes the potential for human contact during normal operation.

End users may not be provided with the module installation instructions. OEM integrators and end users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

## ISED Certification

The device is licensed to meet the regulatory requirements of Industry Canada (IC),

License: IC: 7922A-0737

Manufacturers of mobile, fixed or portable devices incorporating this module are advised to clarify any regulatory questions and ensure compliance for SAR and/or RF exposure limits. Users can obtain Canadian information on RF exposure and compliance from [www.ic.gc.ca](http://www.ic.gc.ca).

This device has been designed to operate with the antennas listed in Table 5 on page 10, having a maximum gain of -1.5dBi, antennas not included in this list or having a gain greater than -1.5dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

### IC NOTICE:

The device including the built-in trace antenna complies with Canada RSS-GEN Rules. The device meets the requirements for modular transmitter approval as detailed in RSS-GEN. 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.

### IC RADIATION EXPOSURE STATEMENT FOR CANADA

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. (3) No SAR evaluation is required since maximum transmitter Pout is below IC threshold

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.  
(3) Aucune évaluation SAR n'est requise étant donné que la puissance maximale de l'émetteur est inférieure au seuil IC.

### LABELING REQUIREMENTS:

The Original Equipment Manufacturer (OEM) must ensure that IC labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Cypress Semiconductor IC identifier for this product as well as the IC Notice above. The IC identifier is 7922A-0737. In any case, the end product must be labeled in its exterior with "Contains IC: 7922A-0737".

## European R&TTE Declaration of Conformity

Hereby, Cypress Semiconductor declares that the Bluetooth module complies with the essential requirements and other relevant provisions of Directive 1999/5/EC. As a result of the conformity assessment procedure described in Annex III of the Directive 1999/5/EC, the end-customer equipment should be labeled as follows:



All versions of the device in the specified reference design can be used in the following countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, the United Kingdom, Switzerland, and Norway.

## Document History

| Document Title: CYW20737S Bluetooth Low Energy System-in-Package (SiP) Module<br>Document Number: 002-14888 |         |                 |                 |                                                                    |
|-------------------------------------------------------------------------------------------------------------|---------|-----------------|-----------------|--------------------------------------------------------------------|
| Revision                                                                                                    | ECN     | Orig. of Change | Submission Date | Description of Change                                              |
| **                                                                                                          | –       | –               | 09/26/2014      | 20737S-DS100-R:<br>Initial release                                 |
| *A                                                                                                          | –       | UTSV            | 11/06/2015      | 20737S-DS101-R:<br>Updated<br>• <a href="#">Table 5 on page 14</a> |
| *B                                                                                                          | 5444054 | UTSV            | 09/23/2016      | Updated to Cypress Template                                        |
| *C                                                                                                          | 5688156 | AESATMP7        | 04/21/2017      | Updated Cypress Logo and Copyright.                                |

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