

Texas Instruments Incorporated殿

# 工事設計の認証書

Certificate of Construction Type

|   |   |
|---|---|
| 特定無線設備の種別<br>Classification of Specified<br>Radio Equipment                     | 証明規則第2条第1項第19号の無線設備<br>2. 4GHz帯高度化小電力データ通信システム  |
| 電波の型式、<br>周波数及び<br>空中線電力<br>Type of Emission,<br>Frequency and<br>Antenna Power | G1D 2412~2472MHz<br>(5MHz間隔13波) 0.007W/MHz<br>D1D, G1D 2412~2472MHz<br>(5MHz間隔13波) 0.004W/MHz |
| 型式又は名称<br>Model/Name of Equipment   | CC3200MODR1M2AMOB   |
| 製造者名<br>Manufacturer Name   | Texas Instruments Incorporated  |
| 認証番号<br>Certification Number  | 001-A08148  |
| 工事設計の<br>認証をした年月日<br>Date of Certification                                      | 平成28年 8月15日   |

上記のとおり、電波法第38条の24第1項の規定に基づく工事設計の認証を行ったものであることを証する。

This is to certify that above type certification has been granted in accordance with the provisions set out in Article 38-24 Paragraph 1 of the Radio Law.

平成28年 8月15日

一般財団法人 テレコムエンジニアリングセンター  
Telecom Engineering Center



## "Obligations to Conform to Construction Types" and Relevant Provisions

Telecom Engineering Center

1. In case that a registered certification agency receives an application for type certification from a person who deals with specified radio equipment, the certification agency conducts certification service for the construction type concerning whether the equipment conforms to the technical regulations stipulated in the Radio Law. This certification is referred to as "certification of construction type" and includes the method to verify each equipment conforms to the construction type.
2. The certification of construction type is to certify that a specified radio equipment manufactured under the construction design including design drawings and the type of radio equipment and the quality control system applied at manufacturing stage conforms to the applicable technical regulations. The design drawings for manufacturing the radio equipment and the quality control system for ensuring each radio equipment is rightly manufactured corresponding with the design drawings are examined for the certification.
3. A person who has been granted a certification of construction type (hereafter "certified dealer") by a registered certification agency is required to manufacture the radio equipment according to the construction design submitted. In other words, the certified dealer is obliged to ensure that the radio equipment conforms to the certified construction type.
4. To execute the obligations to conform to construction types, a certified dealer shall inspect the equipment according to the inspection method described in the "statement of verification method" submitted with the certification application, and make and maintain inspection records.
5. The inspection record includes the following six items and shall be maintained for ten years from the date of the inspection. The inspection record can be stored by an electromagnetic means. However it is required to immediately display the record by using a personal computer, etc.
  - (1) Certification number of construction type
  - (2) Date and place of inspection
  - (3) Name of responsible person for inspection
  - (4) Quantity of specified radio equipment inspected
  - (5) Inspection method
  - (6) Inspection result

Note: Inspection method is not specified especially.
6. A certified dealer may affix a mark showing the certification to the specified radio equipment based on the certified construction type after executing the obligation described in the preceding paragraph. The mark shall be made in accordance with the applicable ministerial ordinance and affixed to an easily recognizable place of the equipment.

7. Any person shall not affix the mark or a mistakable mark to radio equipment in Japan, except the cases of affixing the mark pursuant to the Radio Law. Any person who has modified radio equipment affixing the mark shall remove the mark.

A person who violates these provisions will be punished.

### Abstract from Radio Law

#### Article 38-7 (Mark)

(1) The registered certification agency shall, upon granting technical regulations conformity certification pertaining to its registration, affix the mark indicating the certification of conformity with technical regulations to the specified radio equipment in accordance with the applicable ministerial ordinance of the Ministry of Internal Affairs and Communications.

(2) (Ellipsis)

(3) Any person who has modified the specified radio equipment affixing the mark pursuant to the provisions of paragraph (1) of this article, Article 38-26 or Article 38-35 shall remove the mark by means stipulated in the applicable ministerial ordinance of the Ministry of Internal Affairs and Communications.

#### Article 38-24 (Certification of Construction Type of Specified Radio Equipment)

A registered certification agency, upon request from a person who conducts business of dealing in specified radio equipment, shall certify that the construction type of said specified radio equipment (including the method to verify each equipment conforms to said construction type) conforms to the technical regulations specified in the preceding Chapter (hereinafter referred to as "certification of construction type").

#### Article 38-25 (Obligations to Conform to Construction Types)

(1) A person who was granted the certification of construction type (hereinafter referred to as "certified dealer") by a registered certification agency shall, when dealing specified radio equipment based on the construction type pertaining to said certification of construction type (hereinafter referred to as "certified construction type"), ensure that said specified radio equipment conforms to said certified construction type.

(2) A certified dealer shall conduct an examination on specified radio equipment specified in the preceding paragraph that it deals, in accordance with the verification method pertaining to the certification of construction type, and prepare and maintain the examination records in accordance with the applicable ministerial ordinance of the Ministry of Internal Affairs and Communications.

#### Article 38-26 (Mark of Specified Radio Equipment Based on Certified Construction Type)

A certified dealer may, upon performing the obligations under the provisions of paragraph (2) of the preceding article with regard to specified radio equipment based on a certified construction type, affix to said specified radio equipment the mark stipulated in the applicable ministerial ordinance of the Ministry of Internal Affairs and Communications.



## 電波法に基づく工事設計合致義務等の御案内

電波法では、登録証明機関から工事設計認証を受けた方は、特定無線設備を取り扱う場合においては、認証を受けた工事設計等に合致させる義務が課せられています。

このため、登録証明機関協議会\*として、工事設計認証を受けられた皆様などに電波法令に基づく工事設計合致義務等の制度の概要を、下記のとおりご案内申し上げます。

### 記

#### 1. 工事設計の合致義務等について

工事設計の合致義務等は、電波法第38条の25の第1項により、「登録証明機関による工事設計認証を受けた者（以下「認証取扱業者」という。）は、当該工事設計認証に係る工事設計（以下「認証工事設計」という。）に基づく特定無線設備を取り扱う場合においては、当該特定無線設備を当該認証工事設計に合致するようにしなければならない。」と規定されています。

また、第2項では、「認証取扱業者は、工事設計認証に係る確認の方法に従い、その取扱いに係る前項の特定無線設備について検査を行い、総務省令で定めるところにより、その検査記録を作成し、これを保存しなければならない。」と規定されています。

検査記録に記載すべき事項は、特定無線設備の技術基準適合証明等に関する規則(以下、「証明規則」という)第19条の規定により、次のとおりとなっています。

- ① 検査に係る工事設計認証番号
- ② 検査を行った年月日及び場所
- ③ 検査を実施した責任者の氏名
- ④ 検査を行った特定無線設備の数量
- ⑤ 検査の方法
- ⑥ 検査の結果

更に、検査記録は、検査の日から10年間保存することが義務づけられています。又、検査記録の保存には、電磁的記録に係る記録媒体で行うことができますが、この場合、電子計算機等を用いて直ちに表示することのできる状態である必要があると規定されています。

#### 2. 認証工事設計に基づく特定無線設備の表示について

表示は、電波法第38条の26の規定により、「認証取扱業者は認証工事設計に基づく特定無線設備について、前条（電波法第38条の25）第2項の規定による義務を履行したときは、当該特定無線設備に総務省令で定める表示を付することができる。」と規定されています。

また、前条（電波法第38条の25）第2項の規定に違反したときは、電波法第38条の28第2項の規定により、表示を付することを禁止される場合があります。

なお、表示は、証明規則 20 条により、総務省令で定める様式（証明規則様式第 7 号）のものを特定無線設備の見やすい箇所に付さなければならないと規定しています。

### 3 工事設計合致義務に違反した場合の罰則について

工事設計合致義務に違反した場合は、罰則の規定が設けられています。

罰則は、電波法第 110 条、第 112 条、第 113 条、第 114 条に規定されており、第 114 条においては、法人罰も規定されており、一億円以下の罰金刑が規定されています。

工事設計合致義務に関する主なものとしては、次のとおりです。

- ① 総務大臣の表示の禁止命令に違反した場合
- ② 紛らわしい表示を付した場合  
等

\*)登録証明機関で構成する団体

**TELEC**

# 工事設計の認証申込受理書

受付番号 10A42800407  
平成28年 7月21日

一般財団法人 テレコムエンジニアリングセンター

下記の通り「工事設計の認証申込書」を受理いたしましたので通知致します。

## 記

|                             |   |
|-----------------------------|---|
| 工事設計の認証申込の受理概要              |   |
| 申込受理年月日                     | 平成28年 7月21日   |
| 申込者名                        | Texas Instruments Incorporated  |
| 特定無線設備の種別                   | 証明規則第2条第1項第19号の無線設備<br>2. 4GHz帯高度化小電力データ通信システム  |
| 特定無線設備の型式又は名称               | CC3200MODR1M2AMOB   |
| 特定無線設備の製造者                  | Texas Instruments Incorporated  |
| 工事設計認証を希望する電波の型式、周波数及び空中線電力 | G1D 2412~2472MHz (5MHz間隔13波) 0.007W/MHz<br>D1D, G1D 2412~2472MHz (5MHz間隔13波) 0.004W/MHz |
| 予定している認証番号                  | 001-A08148  |

## ご確認ください

この受理書は、当センターに工事設計の認証を申込された申込者に対して通知するものです。  
申込手続に関して、当センターは審査を開始いたします。  
申込を受理した日から15日（休日及び補正期間を除く）以内に行います。なお、不測の事情により、期間内に認証が終了しない事態が発生した場合には、その理由を付して通知します。  
センターは、工事設計の認証の申込を受けた特定無線設備について、次の基準を満たさない場合は工事設計の認証の証明を拒否します。

- (1) 電波法及び無線設備規則の技術基準に適合しない場合。
- (2) 手数料の収納がない場合。
- (3) 書類に不備があり、補正の書類の提出がない場合。

また、センターは申込を受理した書類に不備があり補正の書類、追加の書類に対して提出の要求をしてから20日以内に措置がとられない場合は、申込者に取り下げを求めることがあります。  
なお、申込を取下げの場合には取下げ手数料を請求します。  
その他御不明な点につきましては、中込頂きました当センター担当部署までお問い合わせください。

# 工事設計の認証申込書

平成28年 月 日

一般財団法人テレコムエンジニアリングセンター 殿

申込者 郵便番号 TX 75243  
 住所(本社) 12500 TI Boulevard, Dallas, USA  
 法人名 Texas Instruments Incorporated  
 役職代表者名 ECS Business Unit Manager, Matthias Lange  
 担当部署 TI EP EVM Planning Manager  
 責任者名 Kelley Foltz

*Kelley Foltz*

※私は下記の代理人を定めて、工事設計の認証に関する申込手続に係る権限を委任します。

申込代理人 郵便番号 〒105-0001  
 住 所 東京都港区虎ノ門5-3-12-404  
 法人名 データラック株式会社  
 役職、氏名 佐久間 晃裕



別添の工事設計書により電波法第38条の24の規定による工事設計の認証について、  
技術基準適合証明・認証に関する契約約款に従い申し込みます。

| 申込の区分                           | 新規 <input type="checkbox"/>   | 簡易 <input checked="" type="checkbox"/>                           |
|---------------------------------|---|--|
| 特定無線設備の種類                       | 証明規則第2条第1項第19号 の無線設備  |  |
| 特定無線設備の型式又は名称                   | CC3200MODR1M2AMOB   |  |
| 特定無線設備の製造者名                     | Texas Instruments Incorporated  |  |
| 工事設計認証を希望する電波の型式、<br>周波数及び空中線電力 | G1D: 2412~2472MHz (5MHz 間隔) 0.007 W/MHz<br>D1D, G1D: 2412~2472MHz (5MHz 間隔) 0.004 W/MHz   |  |
| 電気通信回線の接続                       | 有 <input type="checkbox"/>  | 無 <input checked="" type="checkbox"/>                            |
| 特定無線設備の提出                       | 有 <input type="checkbox"/>  | 無 <input checked="" type="checkbox"/>                            |
| 特性試験結果資料の提出                     | 有 <input checked="" type="checkbox"/>   | 無 <input type="checkbox"/>                                       |
| 設備規則第14条の2第1項の規定が適用             | 有 <input type="checkbox"/>  | 無 <input checked="" type="checkbox"/>                            |
| 簡易の場合                           | 工事設計書の変更 *  | 有 <input checked="" type="checkbox"/> 無 <input type="checkbox"/> |
|                                 | 確認方法書の変更 *  | 有 <input type="checkbox"/> 無 <input checked="" type="checkbox"/> |
|                                 | 認証番号 *  | 001-A04799   |
|                                 | 相違点 *   | (別紙)   |
| 申込者の ISO9001 認定                 | 有 <input checked="" type="checkbox"/><br>無 <input type="checkbox"/> 所在地<br><br>製造工場名<br>製造工場の ISO9000s 認定 有 <input type="checkbox"/> 無 <input type="checkbox"/>                   |  |
| 連絡先                             | 郵便番号、住所 TX 75243, 12500 TI Boulevard, Dallas, USA<br>部署 SimpleLink Wi-Fi Applications Manager<br>氏名 Josh Wyatt<br>電話 Phone +1-214-567-5124<br>E-mail 又は FAX Fax josh.wyatt@ti.com |  |
| 備考                              |   |  |

注 ※は委任を行う場合に委任者などを記載する。委任がない場合は不要です。

\* は申込区分が新規の場合は不要です。

## 工事設計の認証を受けた特定無線設備との相違点

| 変更の工事の種類(注) | 相違内容  |  |  |       | 備考                  |
|-------------|-------|--|--|-------|---------------------|
|             | 相違箇所  | 新  | 旧  | 電気的特性 |                     |
| 二           | 空中線   | 19種類追加<br>計20種類  | 1種類  |       | 別紙<br>空中線資料         |
| 二           | 空中線電力 | G1D 0.007W/MHz<br>D1D,G1D 0.004W/MHz<br>D1D.G1D 0.004W/MHz | G1D 0.004W/MHz<br>D1D, G1D 0.0003 W/MHz<br>D1D. G1D 0.0003 W/MHz |       | 既存のプログラム<br>により変更する |
|             |       |  |  |       |                     |
|             |       |  |  |       |                     |

注 変更の工事の種類を記載して下さい。

例 二(軽微)、三(確認方法)、四(その他)



## 申込書別紙資料

Application Documents

## 別紙

### ①申込の特定無線設備の概要

#### (ア) 目的または用途

本設備は証明規則第2条第1項第19号に規定する「2.4GHz帯高度化小電力データ通信システム」の無線設備で、データ通信を行うモジュールです。

#### (イ) 寸法・質量

① 寸法 (mm) 高:2.3 幅:17.5 奥:20.5

② 重量(g): 1.8g

### ②手数料請求先

データトラック株式会社

連絡先 佐久間 晃裕

TEL 03-5405-2148 FAX 03-5405-2398

E-mail: asakuma@datatrak.jp

### ③認証ラベル

申込者が作成します。

### ④工事設計書の認証書について郵送を希望します。

# 工事設計書

## Design Specifications

工事設計書

|                   |   |  |  |
|-------------------|---|--|--|
| 1. 通信方式           |   | 単信方式   |  |
| 2.<br>送<br>信<br>機 | (1) 定格出力                                | G1D : 0.007 W/MHz<br>D1D, G1D : 0.004 W/MHz  | (2) 発射可能な電波の型式及び周波数の範囲<br>D1D, G1D : 2412~2472MHz<br>(5MHz 間隔 13波) |
|                   | (3) 発振                                  | 水晶発信器によるシンセサイザ方式<br>原発振周波数 : 40.000MHz   |  |
|                   | (4) 変調                                  | <p>直接拡散方式</p> <p>802.11b<br/>1Mbps: BPSK、2Mbps: QPSK、5.5、11Mbps: CCK<br/>変調信号の送信速度に等しい周波数<br/>1MHz (1/2Mbps 時) 1.375MHz (5.5/11Mbps 時)</p> <p>直交周波数分割多重方式</p> <p>802.11g<br/>6、9Mbps : BPSK-OFDM、12、18Mbps : QPSK<br/>24、36Mbps : 16QAM、48、54Mbps : 64QAM<br/>サブキャリア数 : 52 (うち4サブキャリアにパイロット)</p> <p>802.11n 2.4GHz帯 &lt;MCS0-7, HT20&gt; 800ナノ秒ガードインターバル使用時<br/>6.5Mbps : OFDM-BPSK、13/19.5Mbps : QPSK、<br/>26/39Mbps : 16QAM、52/58.5、65Mbps : 64QAM<br/>サブキャリア数 : 56 (うち4サブキャリアにパイロット)</p> <p>802.11n 2.4GHz帯 &lt;MCS0-7, HT20&gt; 400ナノ秒ガードインターバル使用時<br/>7.2Mbps : OFDM-BPSK、14.4/21.7Mbps : QPSK、<br/>28.9/43.3Mbps : 16QAM、57.8/65/72.2Mbps : 64QAM<br/>サブキャリア数 : 56 (うち4サブキャリアにパイロット)</p> |  |
|                   | 3. 製造者名等                                | 製造者名<br>Texas Instruments Incorporated   | 型式又は名称<br>CC3200MODR1M2AMAMOB                                      |
| 4. 空中線            | (1) 型式及び構成                              | (2) 利得   |  |
|                   | 1 - ANTO16008LCD2442MA1 Multilayer Chip | +1.6 dBi   |  |
|                   | 2 - ANTO16008LCD2442MA2 Multilayer Chip | +2.5 dBi   |  |
|                   | 3 - AM03DP-ST01 Chip                    | +1.6 dBi   |  |
|                   | 4 - UB18CP-100ST01 Chip antenna unit    | -1.0 dBi   |  |
|                   | 5 - AF216M245001 Chip Helical Monopole  | +1.5 dBi   |  |
|                   | 6 - AH212M245001 Chip monopole          | +0.9 dBi   |  |
|                   | 7 - AH316M245001 Chip monopole          | +1.9 dBi   |  |
|                   | 8 - AA2402SPU Dipole                    | +2.0 dBi   |  |
|                   | 9 - AA2402RSPU Dipole                   | +2.0 dBi   |  |
|                   | 10 - AA2402A-UFLLP Dipole               | +2.0 dBi   |  |
|                   | 11 - AA2402AU-UFLLP Dipole              | +2.0 dBi   |  |
|                   | 12 - 1019-016 Monopole                  | +2.14 dBi  |  |
|                   | 13 - 1019-017 Monopole                  | +2.14 dBi  |  |

|                        |   |             |           |
|------------------------|---|-------------|-----------|
|                        | 14 - 1019-018   | Monopole    | +2.14 dBi |
|                        | 15 - 1019-019   | Monopole    | +2.14 dBi |
|                        | 16 - MEIWX-2411SAXX-2400  | Rubber Whip | +2.0 dBi  |
|                        | 17 - MEIWX-2411RSXX-2400  | Rubber Whip | +2.0 dBi  |
|                        | 18 - MEIWX-282XSAXX-2400  | Rubber Whip | +2.0 dBi  |
|                        | 19 - MEIWX-282XRSXX-2400  | Rubber Whip | +2.0 dBi  |
|                        | 20 - MEIWF-HP01RS2X-2400  | Rubber Whip | +2.0 dBi  |
| 5. 附属装置の種類<br>及び形式又は名称 | 混信防止機能<br>設備規則第9条の4第8号適用(識別符号自動送受信)<br>付加装置の概要: 64-pin インターフェースを有する電子機器等<br>付加装置への接続方法: はんだ付け接続   |             |           |
| 6. その他の工事設計            | 1~5の欄までの記載事項以外の工事設計について電波法第3章に規定する技術基準に適合しています。<br>モジュール状の特定無線設備  |             |           |
| 7. 添付図面                | 無線設備系統図   |             |           |
| 8. 参考事項                | 無線設備の型式又は名称: CC3200MODR1M2AMAMOB<br>中線インピータンス: 50Ω<br>電気通信回線への接続: 無<br>使用温度範囲は-20℃~+70℃です。<br>定格電源電圧: 3.3VDC<br>動作可能電圧: 2.97VDC (Vcc-10%) ~ 3.63VDC (Vcc+10%)<br>容易に開かない方法: 無線設備の無線部を構成する半導体部品の端子数は64あり、端子間隔が0.5mmの集積回路が面実装されてます。 |             |           |

(日本工業規格A列4番)

## 無線設備系統図

Functional Bloc Diagram

## 5 Detailed Description

### 5.1 Overview

The CC3200 device has a rich set of peripherals for diverse application requirements. The device optimizes bus matrix and memory management to give the application developer the needed advantage. This section briefly highlights the internal details of the CC3200 device and offers suggestions for application configurations.

#### 5.1.1 Device Features

### 5.2 Functional Block Diagram

Figure 5-1 shows the functional block diagram of the CC3200 SimpleLink Wi-Fi solution.

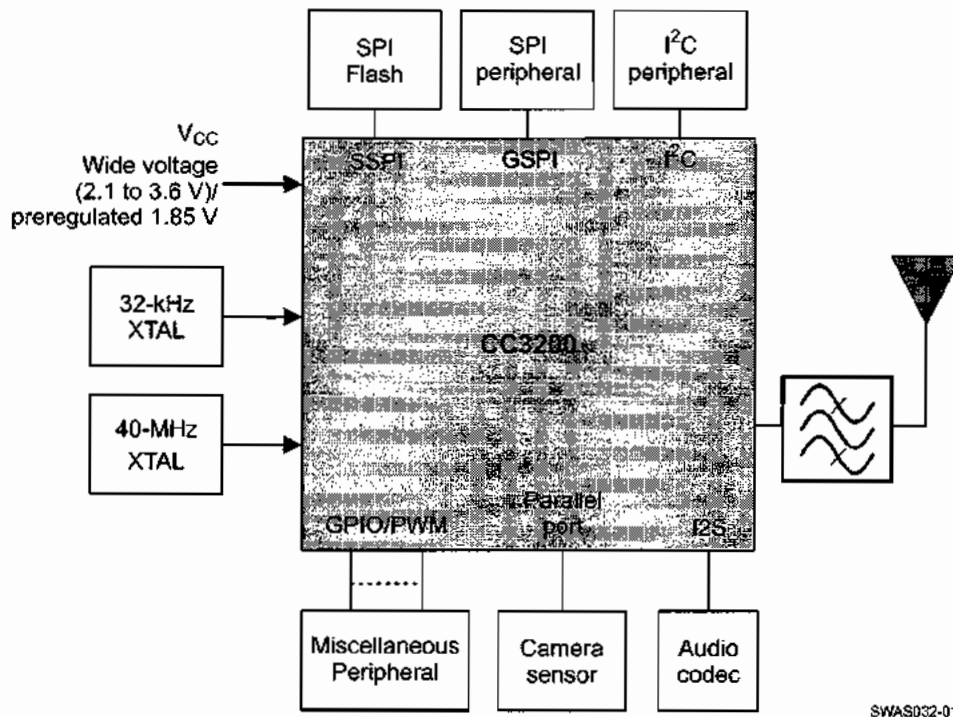


Figure 5-1. Functional Block Diagram

### 5.3 ARM Cortex-M4 Processor Core Subsystem

The high-performance ARM Cortex-M4 processor provides a low-cost platform that meets the needs of minimal memory implementation, reduced pin count, and low power consumption, while delivering outstanding computational performance and exceptional system response to interrupts.

- The ARM Cortex-M4 core has low-latency interrupt processing with the following features:
  - A 32-bit ARM Cortex Thumb® instruction set optimized for embedded applications
  - Handler and thread modes
  - Low-latency interrupt handling by automatic processor state saving and restoration during entry and exit
  - Support for ARMv6 unaligned accesses

# CC3200 SimpleLink™ Wi-Fi® and Internet-of-Things Solution, a Single-Chip Wireless MCU

## 1 Device Overview

### 1.1 Features

- CC3200 SimpleLink Wi-Fi—Consists of Applications Microcontroller, Wi-Fi Network Processor, and Power-Management Subsystems
- Applications Microcontroller Subsystem
  - ARM® Cortex®-M4 Core at 80 MHz
  - Embedded Memory
    - RAM (Up to 256KB)
    - External Serial Flash Bootloader, and Peripheral Drivers in ROM
  - 32-Channel Direct Memory Access (μDMA)
  - Hardware Crypto Engine for Advanced Fast Security, Including
    - AES, DES, and 3DES
    - SHA2 and MD5
    - CRC and Checksum
  - 8-Bit Parallel Camera Interface
  - 1 Multichannel Audio Serial Port (McASP) Interface with Support for Two I2S Channels
  - 1 SD/MMC Interface
  - 2 Universal Asynchronous Receivers and Transmitters (UARTs)
  - 1 Serial Peripheral Interface (SPI)
  - 1 Inter-Integrated Circuit (I<sup>2</sup>C)
  - 4 General-Purpose Timers with 16-Bit Pulse-Width Modulation (PWM) Mode
  - 1 Watchdog Timer
  - 4-Channel 12-Bit Analog-to-Digital Converters (ADCs)
  - Up to 27 Individually Programmable, Multiplexed GPIO Pins
- Wi-Fi Network Processor Subsystem
  - Featuring Wi-Fi Internet-On-a-Chip™
  - Dedicated ARM MCU Completely Offloads Wi-Fi and Internet Protocols from the Application Microcontroller
  - Wi-Fi and Internet Protocols in ROM
  - 802.11 b/g/n Radio, Baseband, Medium Access Control (MAC), Wi-Fi Driver, and Supplicant
  - TCP/IP Stack
    - Industry-Standard BSD Socket Application Programming Interfaces (APIs)
    - 8 Simultaneous TCP or UDP Sockets
    - 2 Simultaneous TLS and SSL Sockets
  - Powerful Crypto Engine for Fast, Secure Wi-Fi and Internet Connections with 256-Bit AES Encryption for TLS and SSL Connections
  - Station, AP, and Wi-Fi Direct® Modes
  - WPA2 Personal and Enterprise Security
  - SimpleLink Connection Manager for Autonomous and Fast Wi-Fi Connections
  - SmartConfig™ Technology, AP Mode, and WPS2 for Easy and Flexible Wi-Fi Provisioning
  - TX Power
    - 18.0 dBm @ 1 DSSS
    - 14.5 dBm @ 54 OFDM
  - RX Sensitivity
    - –95.7 dBm @ 1 DSSS
    - –74.0 dBm @ 54 OFDM
  - Power-Management Subsystem
    - Integrated DC-DC Supports a Wide Range of Supply Voltage:
      - V<sub>BAT</sub> Wide-Voltage Mode: 2.1 to 3.6 V
      - Preregulated 1.85-V Mode
    - Advanced Low-Power Modes
      - Hibernate: 4 μA
      - Low-Power Deep Sleep (LPDS): 120 μA
      - RX Traffic (MCU Active): 59 mA @ 54 OFDM
      - TX Traffic (MCU Active): 229 mA @ 54 OFDM, Maximum Power
      - Idle Connected (MCU in LPDS): 695 μA @ DTIM = 1
  - Clock Source
    - 40.0-MHz Crystal with Internal Oscillator
    - 32.768-kHz Crystal or External RTC Clock
  - Package and Operating Temperature
    - 0.5-mm Pitch, 64-Pin, 9-mm × 9-mm QFN
    - Ambient Temperature Range: –40°C to 85°C





## 1.2 Applications

- For Internet-of-Things applications, such as:
  - Cloud Connectivity
  - Home Automation
  - Home Appliances
  - Access Control
  - Security Systems
  - Smart Energy
  - Internet Gateway
  - Industrial Control
  - Smart Plug and Metering
  - Wireless Audio
  - IP Network Sensor Nodes

## 1.3 Description

Start your design with the industry's first single-chip microcontroller unit (MCU) with built-in Wi-Fi connectivity. Created for the Internet of Things (IoT), the SimpleLink CC3200 device is a wireless MCU that integrates a high-performance ARM Cortex-M4 MCU, allowing customers to develop an entire application with a single IC. With on-chip Wi-Fi, Internet, and robust security protocols, no prior Wi-Fi experience is required for faster development. The CC3200 device is a complete platform solution including software, sample applications, tools, user and programming guides, reference designs, and the TI E2E™ support community. The device is available in a QFN package that is easy to layout.

The applications MCU subsystem contains an industry-standard ARM Cortex-M4 core running at 80 MHz. The device includes a wide variety of peripherals, including a fast parallel camera interface, I2S, SD/MMC, UART, SPI, I<sup>2</sup>C, and four-channel ADC. The CC3200 family includes flexible embedded RAM for code and data and ROM with external serial flash bootloader and peripheral drivers.

The Wi-Fi network processor subsystem features a Wi-Fi Internet-on-a-Chip and contains an additional dedicated ARM MCU that completely offloads the applications MCU. This subsystem includes an 802.11 b/g/n radio, baseband, and MAC with a powerful crypto engine for fast, secure Internet connections with 256-bit encryption. The CC3200 device supports Station, Access Point, and Wi-Fi Direct modes. The device also supports WPA2 personal and enterprise security and WPS 2.0. The Wi-Fi Internet-on-a-chip includes embedded TCP/IP and TLS/SSL stacks, HTTP server, and multiple Internet protocols.

The power-management subsystem includes integrated DC-DC converters supporting a wide range of supply voltages. This subsystem enables low-power consumption modes, such as the hibernate with RTC mode requiring less than 4  $\mu$ A of current.

**Device Information<sup>(1)</sup>**

| PART NUMBER | PACKAGE  | BODY SIZE       |
|-------------|----------|-----------------|
| CC3200      | QFN (64) | 9.0 mm x 9.0 mm |

(1) For all available packages, see the orderable addendum at the end of the datasheet.

### 1.4 Functional Block Diagram

Figure 1-1 shows the CC3200 hardware overview.

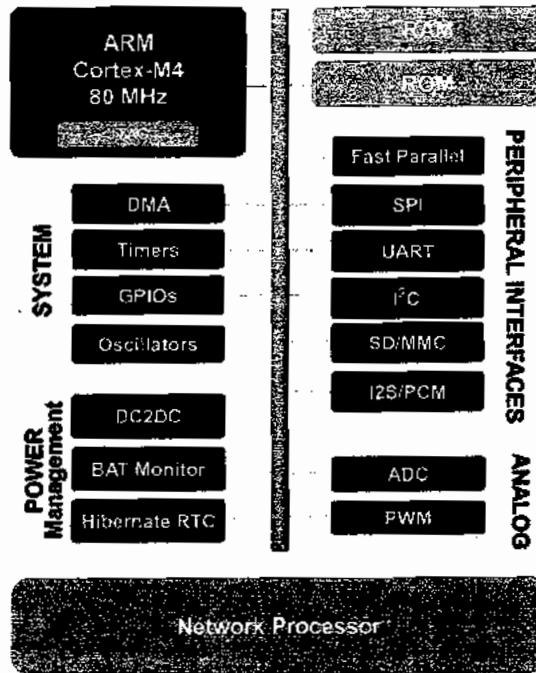


Figure 1-1. CC3200 Hardware Overview

Figure 1-2 shows an overview of the CC3200 embedded software.

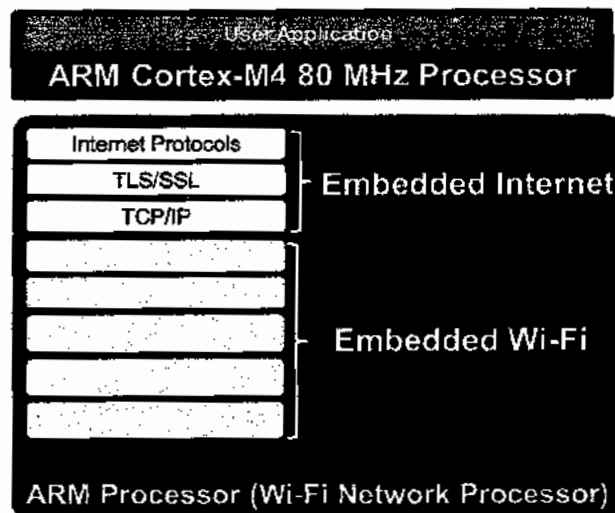


Figure 1-2. CC3200 Embedded Software Overview

Figure 1-3 shows a block diagram of the CC3200 device.

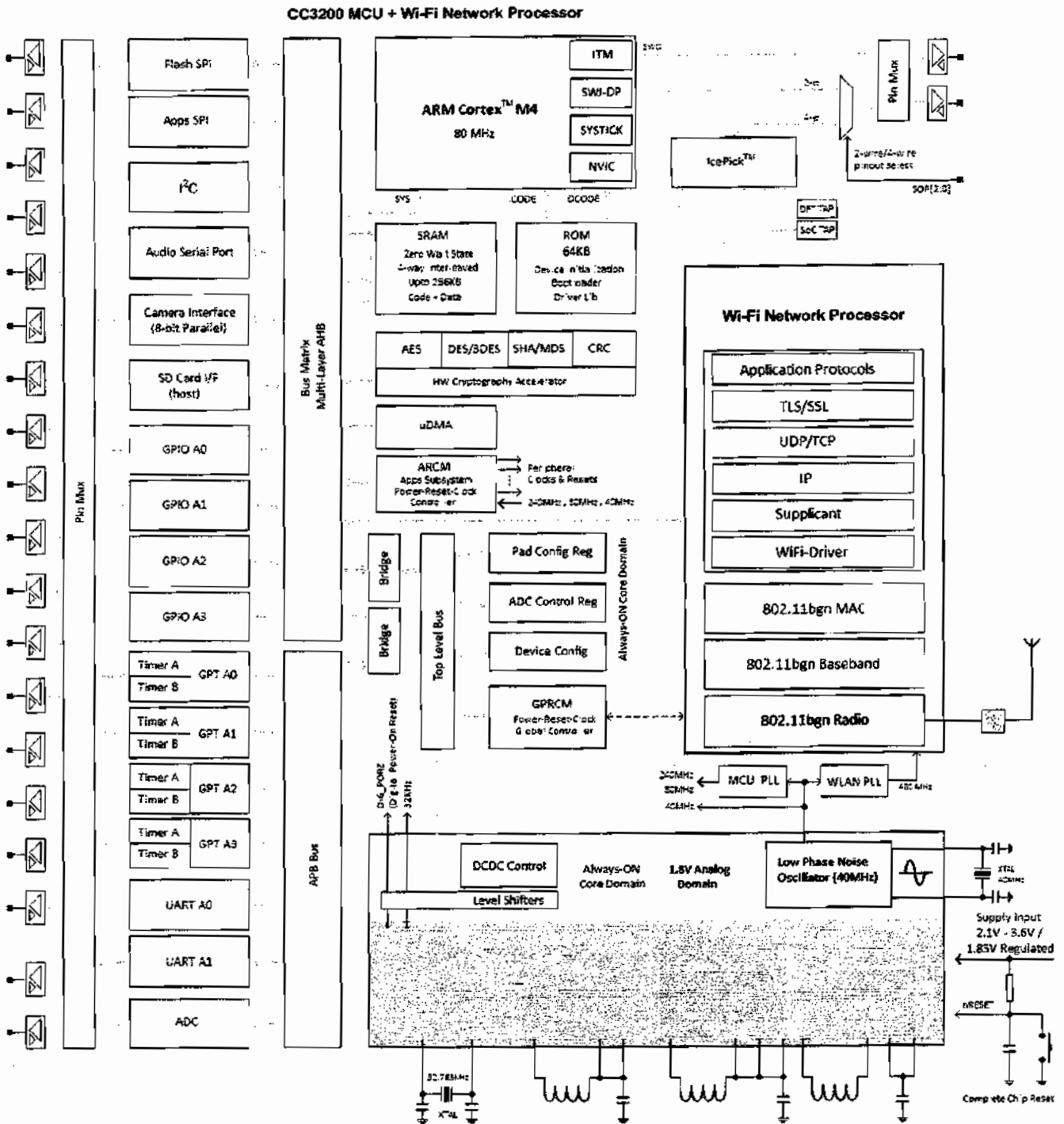
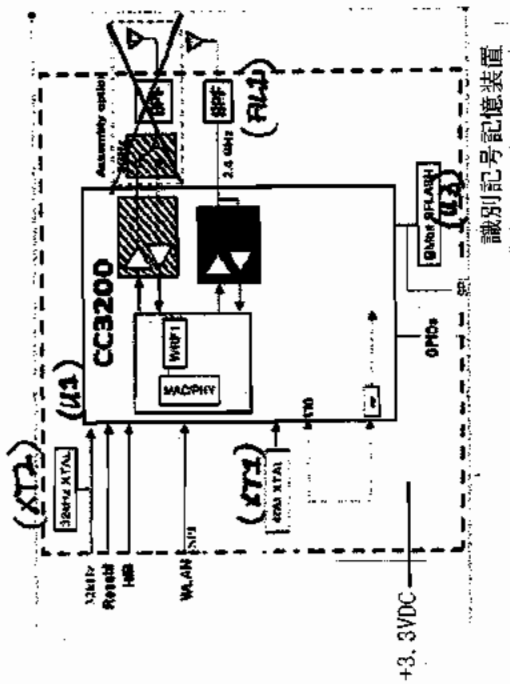


Figure 1-3. CC3200 Functional Block Diagram

**Revision History:**

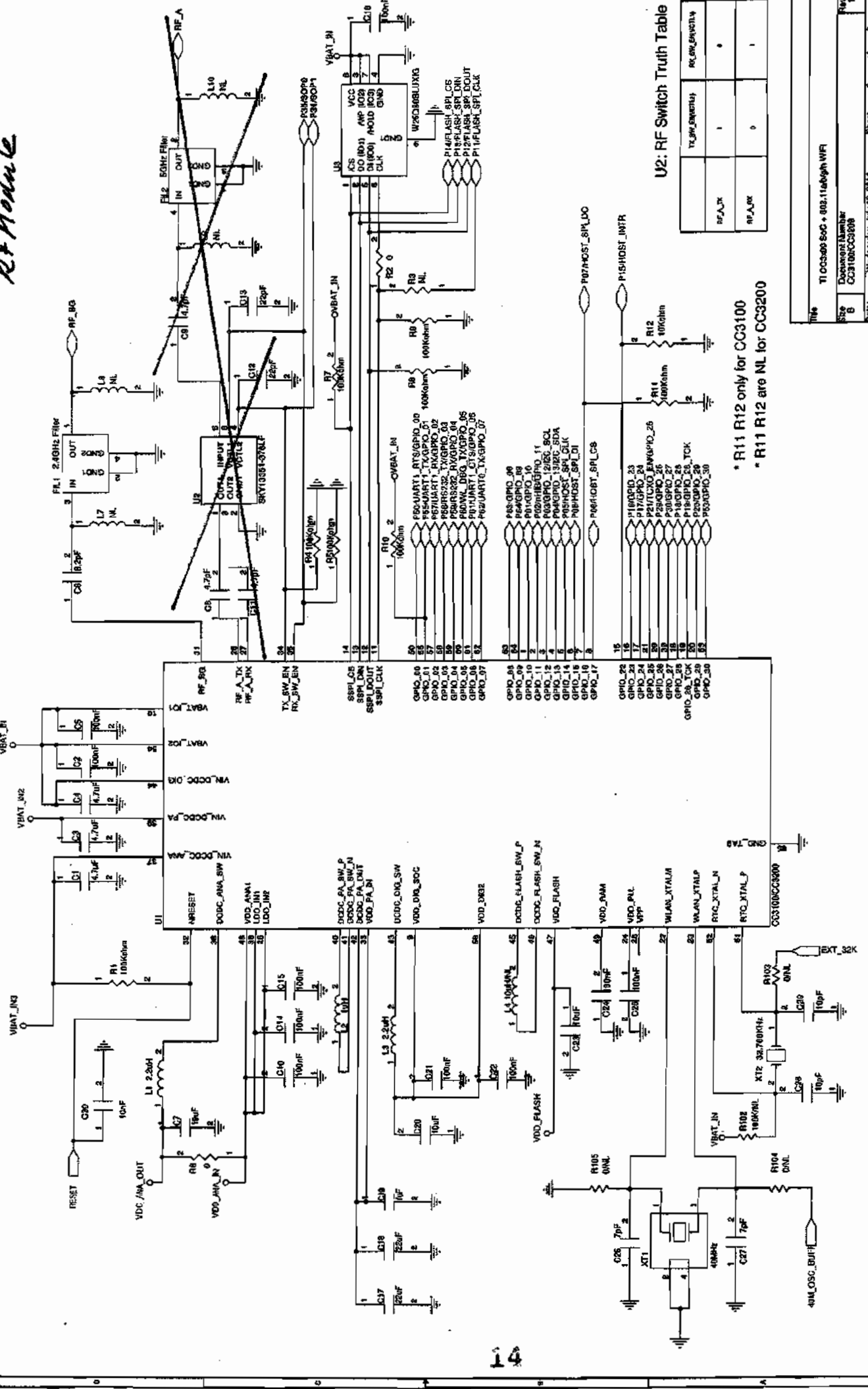
- Rev -1.0 (9/25, 13)
- 1) Initial release for CC3xxRB Module
- Rev -1.1 (9/27, 13)
- Rev -1.2 (10/6, 13)
- 1) Add R6 0ohm between VDD\_ANA\_OUT and VDD\_ANA\_IN,
- Rev -1.3 (10/7, 13)
- 1) Change L4 footprint from 1d-e2x1\_25-2 to 1-0603s0.
- Rev -1.4 (10/23, 13)
- 1) Change module pin39 name from reserve to VDD\_FLASH
- Rev -1.5 (12/23, 13)
- 1) Change C26/C27 from 8pf to 7pf, Improve frequency error.
- Rev -1.6 (03/26, 14)
- 1) Change U1 footprint
- Rev -1.7 (05/07, 14)
- 1) Add R7 R8 R9 R10 R11 R12 pull-up & pull-down resistors



GID : 2412~2472MHz (5MHz 間隔 13 波)  
 DID, GID : 2412~2472MHz (5MHz 間隔 13 波)

|       |                                 |
|-------|---------------------------------|
| FIG   | TICC3000 SoC + 802.11n/gh WiFi  |
| Size  | Document Number                 |
| B     | Freedom Factory & Block Diagram |
| Rev   | 1.1                             |
| Sheet | 1 of 3                          |
| DATE  | FEB07,REV.09,2014               |

# RF Module



**U2: RF Switch Truth Table**

| REFL_EN | REFL_SW | REFL_CLK |
|---------|---------|----------|
| 1       | 1       | 0        |
| 1       | 0       | 1        |

\* R11 R12 only for CC3100  
 \* R11 R12 are NL for CC3200

T1 CC3200 SOC + 802.11a/b/g/n WiFi  
 Document Number: CC3100/CC3200  
 Rev: 1.7  
 Date: Wed 06/26/2013 18:29:14



# ANT016008LCS2442MA1 for 2.4GHz Single Band

## ■ Shape

L = 1.6 +/- 0.1mm  
 W = 0.8 +/- 0.1mm  
 T = 0.4mm Max



## ■ Feature

- Ultra Small
- Low Profile
- High Performance
- Small Keep-out Area
- Linear Polarization
- Lower price

## Actual data

Efficiency: -1.3 dB (74 %) @ 2.442GHz  
 Peak Gain: 1.3 dBi @ 2.442GHz  
 Average Gain: 0.3 dBi (ZX-plane Vertical polarization) @ 2.442GHz

## for Center Position

## ■ Evaluation Board

Board size: 50x20x1mm<sup>2</sup>  
 Antenna keep out area: 5x3mm<sup>2</sup>

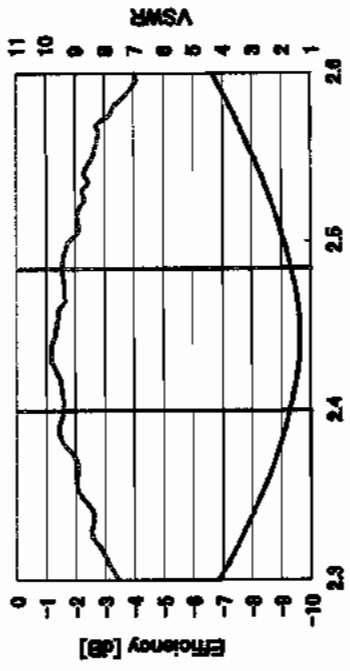


## ■ Electrical Characteristics

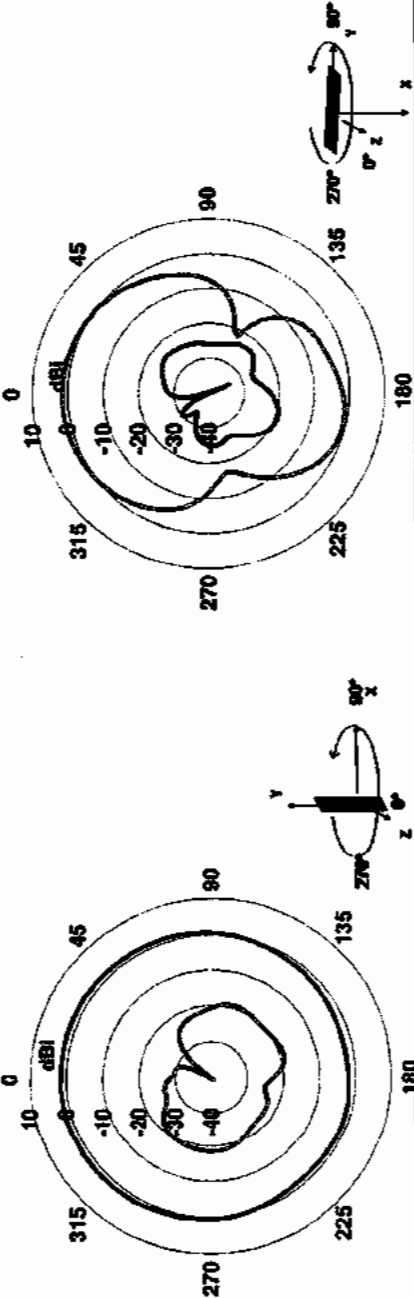
| Efficiency [dB] | 2.4 GHz band |            |
|-----------------|--------------|------------|
|                 | @2.4 GHz     | @2.442 GHz |
| Peak gain       | -1.6         | -1.3       |
| Average Gain    | 1.3 [dBi]    |            |
|                 | ZX-plane     | 1.6 [dBi]  |
|                 | ZY-plane     | 1.2 [dBi]  |
| Average Gain    | TX-H         | -21.5      |
|                 | TX-V         | 0.0        |
|                 | TX-H         | -2.9       |
|                 | TX-V         | -24.1      |
|                 | TX-H         | -3.1       |
|                 | TX-V         | -12.2      |
| Average Gain    | TX-H         | -21.5      |
|                 | TX-V         | 0.3        |
|                 | TX-H         | -2.6       |
|                 | TX-V         | -24.7      |
|                 | TX-H         | -2.7       |
|                 | TX-V         | -11.8      |
| Average Gain    | TX-H         | -21.3      |
|                 | TX-V         | -0.2       |
|                 | TX-H         | -3.1       |
|                 | TX-V         | -24.8      |
|                 | TX-H         | -3.2       |
|                 | TX-V         | -12.3      |

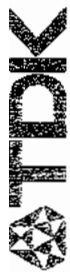
TX-H=Horizontal polarization  
 TX-V=Vertical polarization

## ■ VSWR & Efficiency



## ■ Linear Polarization Pattern @ 2.442GHz





# ANT016008LCS2442MA2 for 2.4GHz Single Band

## Shape

- L = 1.6 +/- 0.1mm
- W = 0.8 +/- 0.1mm
- T = 0.4mm Max

## Feature

- Ultra Small
- Low Profile
- For corner location
- Small Keep-out Area
- Linear Polarization

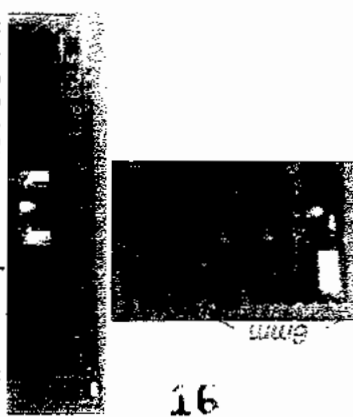
## Measurement data

Efficiency: -2.3 dB (59%)@2.442GHz  
 Peak Gain: 2.5 dBi@2.442GHz  
 Average Gain: -0.8 dBi (ZX-plane Vertical polarization)@2.442GHz

for Corner Position

## Evaluation Board

Board size: 50x10x1mm<sup>2</sup>  
 Antenna keep out area: 6 x 2.5 mm<sup>2</sup>

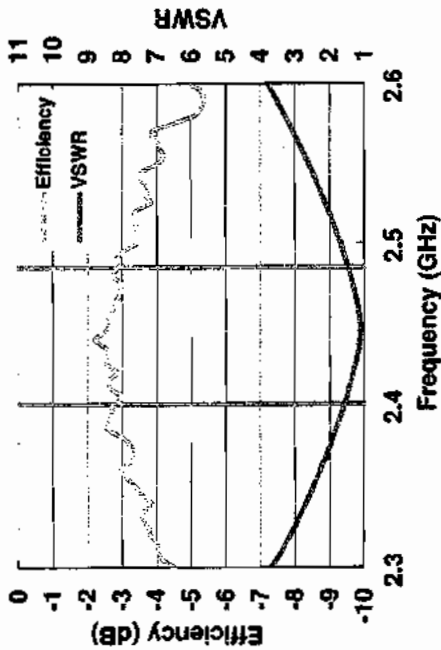


## Electrical Characteristics

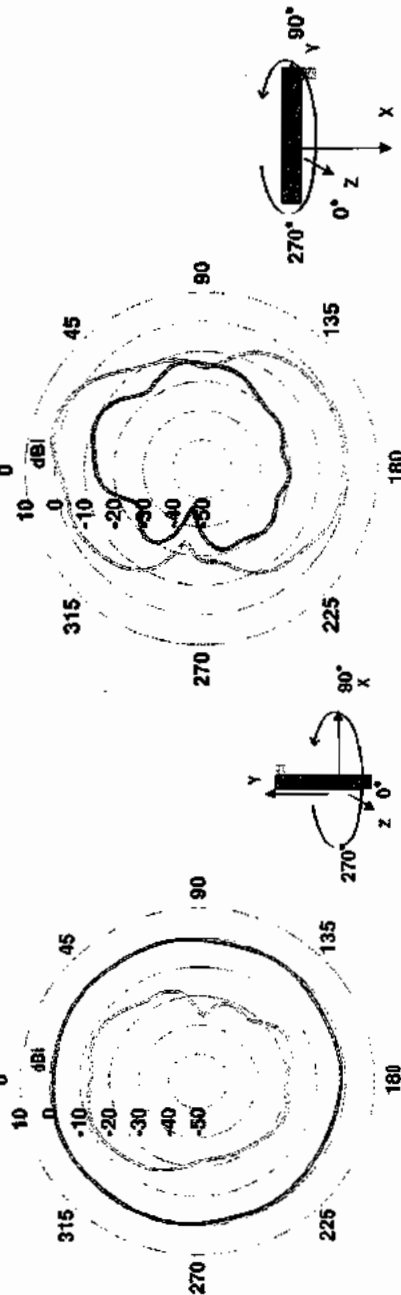
| Efficiency [dB] | 2.4GHz band |           |
|-----------------|-------------|-----------|
|                 | @2.4GHz     | @2.442GHz |
| Peak gain       | -2.8        | -2.3      |
|                 | 1.6 [dBi]   | 2.5 [dBi] |
| Average Gain    | ZX-plane    | -16.1     |
|                 | ZY-plane    | -4.3      |
|                 | XY-plane    | -3.9      |
|                 | TX-V        | -16.0     |
|                 | TX-V        | -0.8      |
|                 | TX-V        | -3.6      |
|                 | TX-V        | -16.8     |
|                 | TX-V        | -3.3      |
|                 | TX-V        | -18.6     |
|                 | TX-V        | -19.8     |

TX: Vertical polarization

## VSWR & Efficiency



## Linear Polarization Pattern @ 2.442GHz



2.4GHz 帯用 For 2.4GHz Band

● AM03DP-ST01 \*



■特長

- 小型・低背アンテナ
- 高利得
- 無指向性
- 外部調整回路により、機種毎の調整が容易

■用途

- 無線 LAN、Bluetooth™ 等
- DECT (1.9GHz)

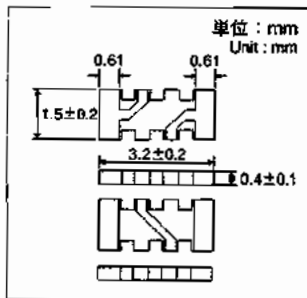
■Features

- Very small
- High gain
- Omni-directional
- With an external tuning circuit, the adjustment to an application frequency range is possible.

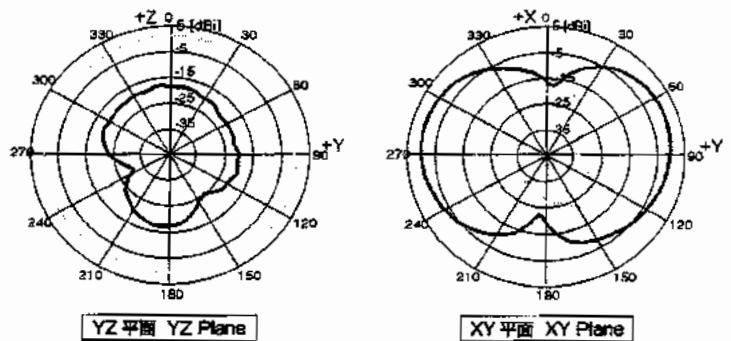
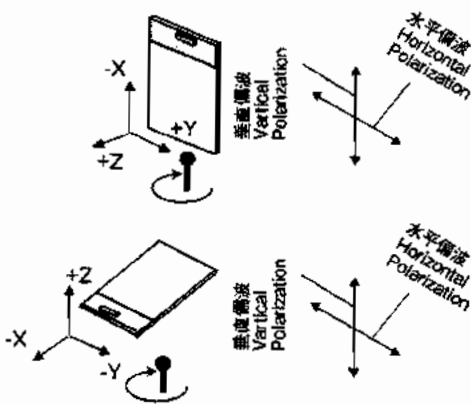
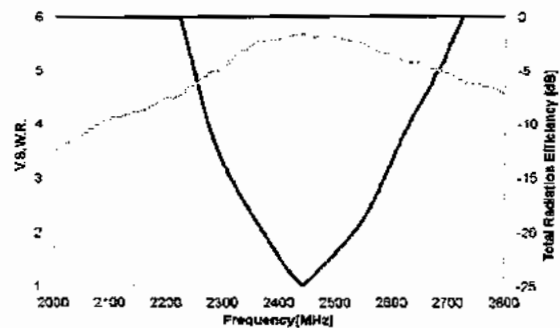
■Applications

- Wireless LAN, Bluetooth™ etc.
- DECT(1.9GHz)

■形状・寸法 Dimensions

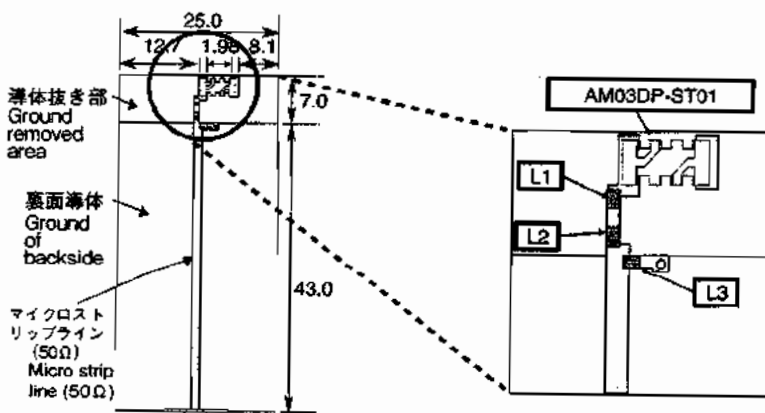


■ V.S.W.R. 特性および放射特性 (参考)  
V.S.W.R. & radiation characteristics (Reference) :



<帯域幅 Band width>  
V.S.W.R. ≤ 3 : 288MHz  
<利得 Gain @2442MHz>  
平均 Average : +1.7dBi  
最大 Maximum : +1.6dBi

チップアンテナ  
CHIP ANTENNAS



[ Units : mm ]

\* これらの特性は代表特性であり、保証特性ではありません。  
\* These characteristics are not guaranteed ones, but typical ones.

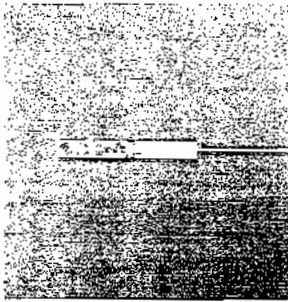
※弊社評価基板での調整例 (Ex) 2442MHz

| fc [MHz] | インダクタンス [nH] |     |     |
|----------|--------------|-----|-----|
|          | L1           | L2  | L3  |
| 2442     | 2.9          | 8.7 | 2.4 |



2.4GHz 帯用 For 2.4GHz Band

● UB18CP-100ST01



■特長

- チップアンテナとマッチング回路、同軸コネクタを実装したアンテナユニット
- 基板設計不要で開発費とイニシャルコストを低減

■用途

- 無線 LAN、Bluetooth™ 等
- DECT (1.9GHz)

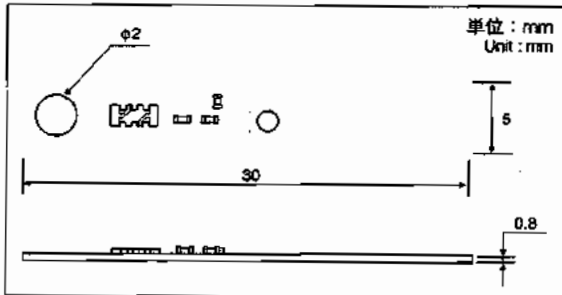
■Features

- The antenna unit has a chip antenna with a matching circuit and a coaxial cable.
- It is a design-free board and can reduce a development cost and initial cost.

■Applications

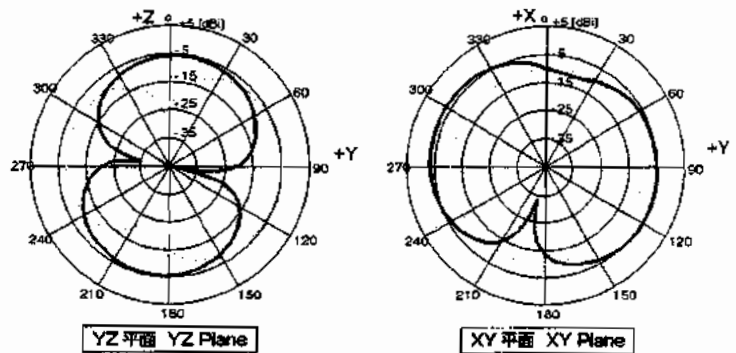
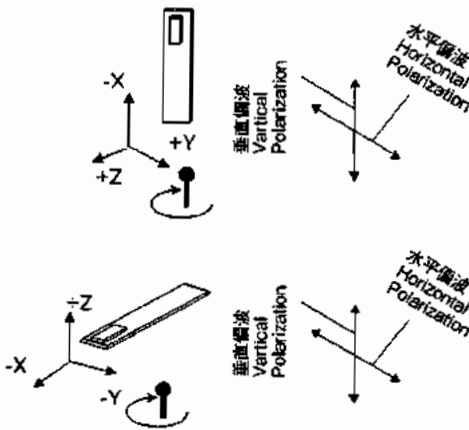
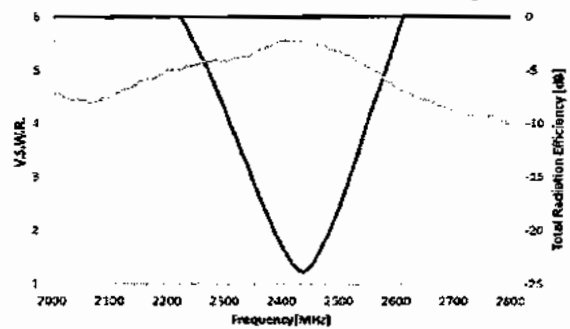
- Wireless LAN, Bluetooth™ etc.
- DECT (1.9GHz)

■形状・寸法 Dimensions



■ V.S.W.R. 特性および放射特性 (参考)

V.S.W.R. & radiation characteristics (Reference):



<帯域幅 Band width>  
V.S.W.R. ≤ 3 : 191MHz  
<利得 Gain @2442MHz>  
平均 Average : -4.4dBi  
最大 Maximum : -1.0dBi

■部品仕様 Parts specifications

| 基板材質<br>PCB Material | 同軸コネクタ&レセプタクル<br>Coaxial connector & receptacle | 同軸ケーブル長さ<br>Coaxial cable length |
|----------------------|---|----------------------------------|
| FR-4                 | I-PEX MHF Series                                | 100mm                            |

CHIP ANTENNAS  
ジャパンエレクトロニクス

# 2.4GHz Helical Monopole Antenna



**2.4GHz: AF 216M245001**

**Keep out area  
(No GND Area)**



**Keep Out Area  
(No GND Area)**

**Recommended Size**  
**5 x 8 mm (40mm<sup>2</sup>) or more**  
(Larger area provides the better performance.)

**Antenna Layout**      **Corner of PCB**

**Radiation Pattern**      **Normal (omni)**

# Data Sheet

## ■ Shapes

- L = 2.5 ± 0.2 mm
- W = 1.6 ± 0.2 mm
- T = 1.6 ± 0.2 mm

## ■ Feature

- \* Ultra Small
- \* Wide Band

## Actual data

- Efficiency : -1.5dB (70%)
- Peak Gain : 1.5dBi
- Average Gain : 0.0dBi (ZX plane-Vertical polarization)

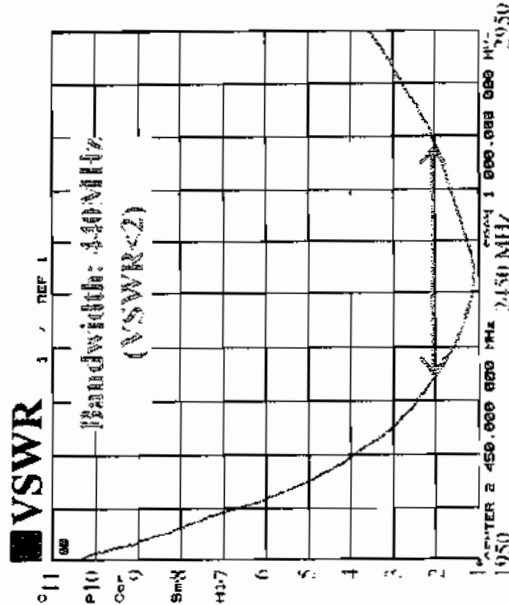


\*on Taiyo Yuden's Evaluation Board  
(52 x 10 mm)

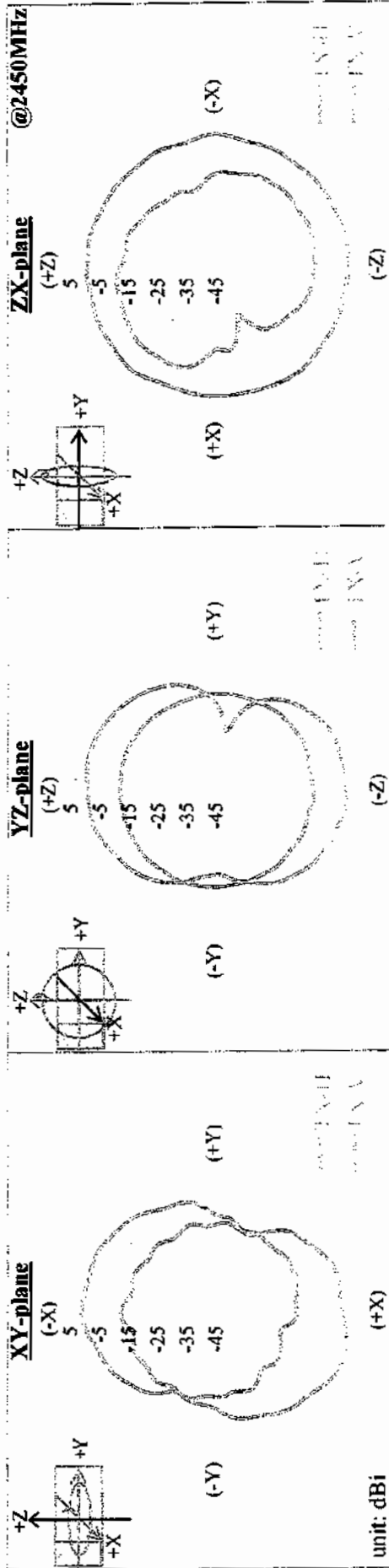
\*Element-GND Distance : 3.5 mm

## ■ Electrical Characteristics

|                    | 2400MHz       | 2450MHz       | 2500MHz       |
|--------------------|---------------|---------------|---------------|
| Efficiency [dB]    | -1.6<br>(69%) | -1.5<br>(70%) | -1.5<br>(71%) |
| Peak gain [dBi]    | 1.5           | 1.5           | 1.8           |
| Average gain [dBi] | XY-plane      | 2.9           | 3.0           |
|                    | YZ-plane      | 15.1          | 15.0          |
|                    | ZX-plane      | 2.9           | 3.2           |
| Average gain [dBi] | XY-plane      | 11.8          | 11.1          |
|                    | YZ-plane      | 11.8          | 11.1          |
| Average gain [dBi] | 0.0           | 0.0           | 0.1           |



## ■ Radiation Pattern



unit: dBi

# 2.4GHz Monopole Antenna



**2.4GHz: AH 212M245001**

**Keep out area  
(No GND Area)**



**Keep Out Area** (No GND Area)      **Recommended Size**  
**5 x 8 mm (40mm<sup>2</sup>) or more**  
(Larger area provides the better performance.)

**Antenna Layout**      **Corner of PCB**

**Radiation Pattern**      **Normal (omni)**

# Data Sheet

## Shapes

- L= 2.0 ± 0.1 mm
- W= 1.25 ± 0.2 mm
- T= 0.85 ± 0.2 mm



\*on Taiyo Yuden's Evaluation Board  
(52 x 10 mm)

\*Element-GND Distance : 4.0 mm

## Feature

- \* Ultra Small
- \* Low Profile

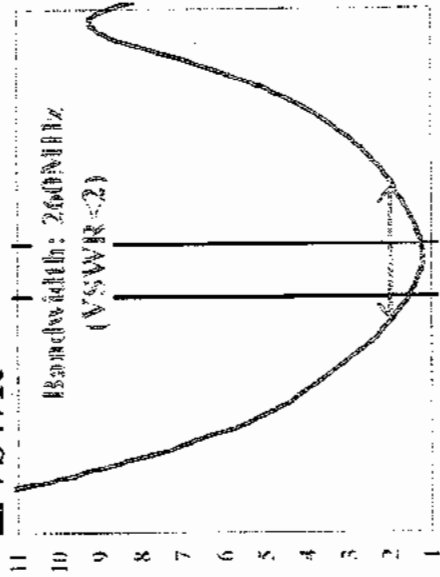
Actual data

Efficiency : -1.5dB (66%)  
 Peak Gain : 0.9dBi  
 Average Gain : -0.9dBi (ZX plane-Vertical polarization)  
 @2450MHz

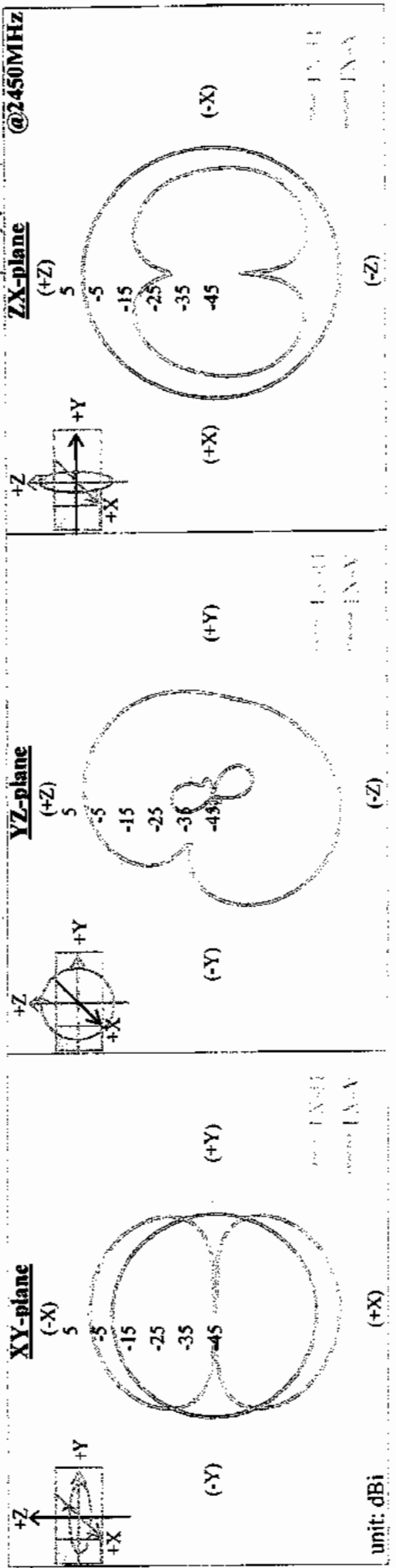
## Electrical Characteristics

|                    | 2400MHz       | 2450MHz       | 2500MHz       |
|--------------------|---------------|---------------|---------------|
| Efficiency [dB]    | -1.9<br>(64%) | -1.8<br>(66%) | -1.7<br>(68%) |
| Peak gain [dBi]    | 0.9           | 0.9           | 1.3           |
| Average gain [dBi] |               |               |               |
| XY-plane           | -3.1          | -3.0          | -3.5          |
| YZ-plane           | -9.8          | -9.3          | -8.7          |
| ZX-plane           | -3.0          | -3.0          | -2.9          |
| YZ-plane           | -35.7         | -35.1         | -34.9         |
| ZX-plane           | -10.1         | -9.8          | -9.5          |
| YZ-plane           | -1.0          | -0.9          | -0.9          |

## VSWR

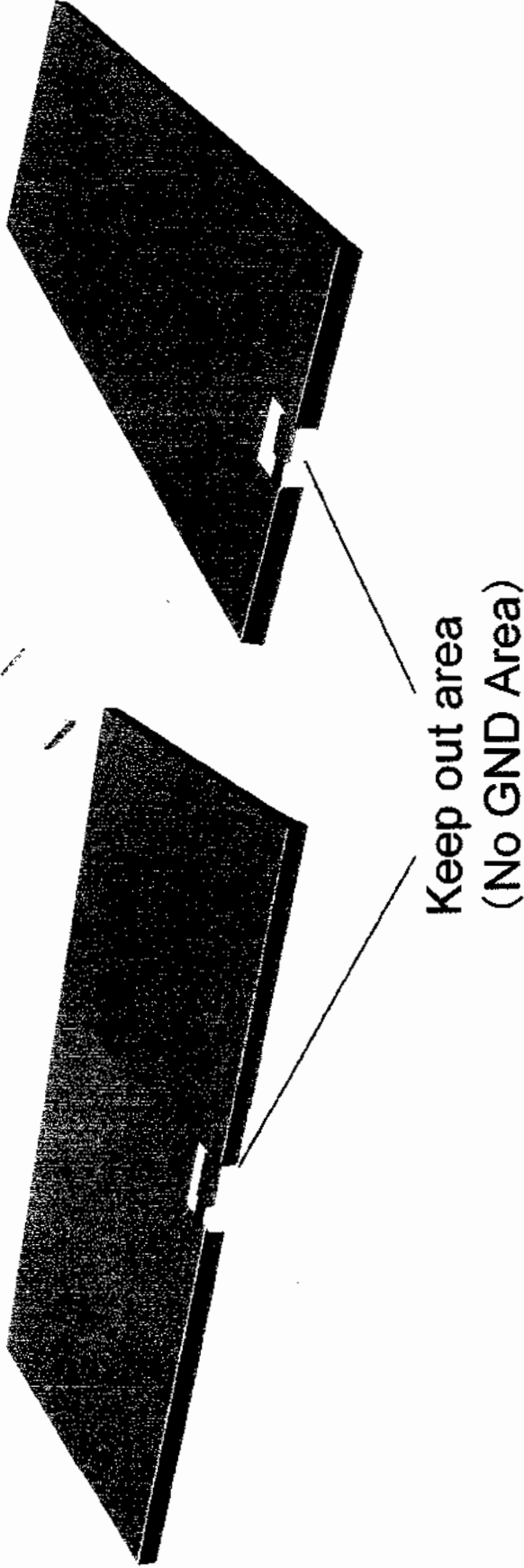


## Radiation Pattern



# 2.4GHz RadiEdge Antenna

2.4GHz: AH 316M245001



**Keep Out Area**  
(No GND Area)

**Recommended Size**  
5 x 6 mm (30mm<sup>2</sup>)

(This minimal area provides the best performance)

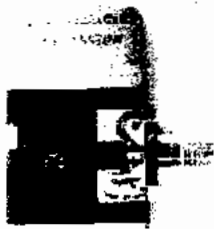
**Antenna Layout**

Middle of PCB Edge

# Data Sheet

## Shapes

L= 3.2 ± 0.15 mm  
 W= 1.6 ± 0.15 mm  
 T= 0.5 ± 0.1 mm



\*on Taiyo Yuden's Evaluation Board  
 ( 45 x 20 mm )

\*antenna keep out area : 6 x 5 mm

## Feature

- \* Ultra Small
- \* Low Profile
- \* High Performance
- \* Small Keep-out Area

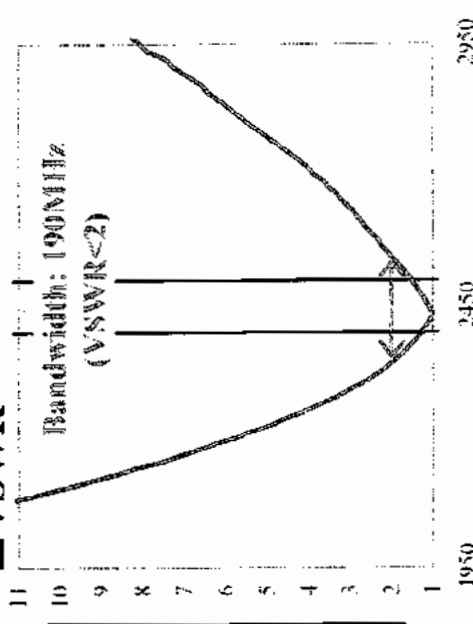
Actual data

Efficiency : -1.3dB ( 73% )  
 Peak Gain : 1.9dBi  
 Average Gain : 0.0dBi (ZX plane-Vertical polarization)  
 @2.450MHz

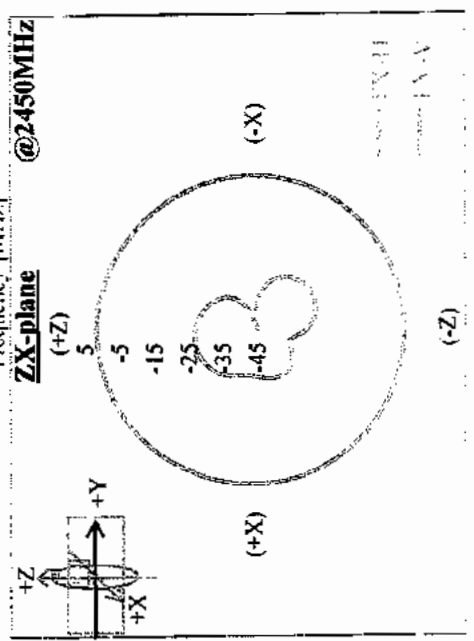
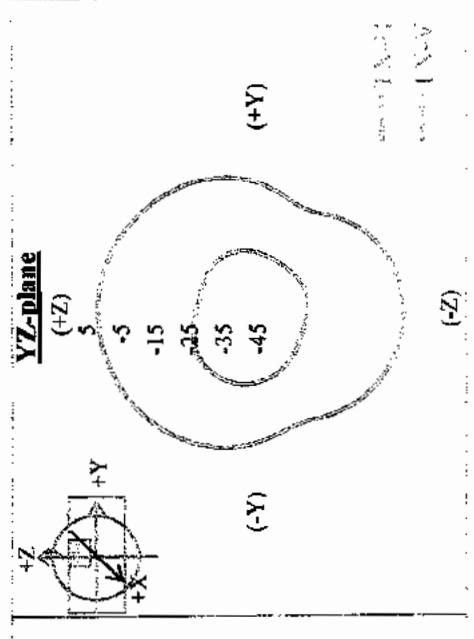
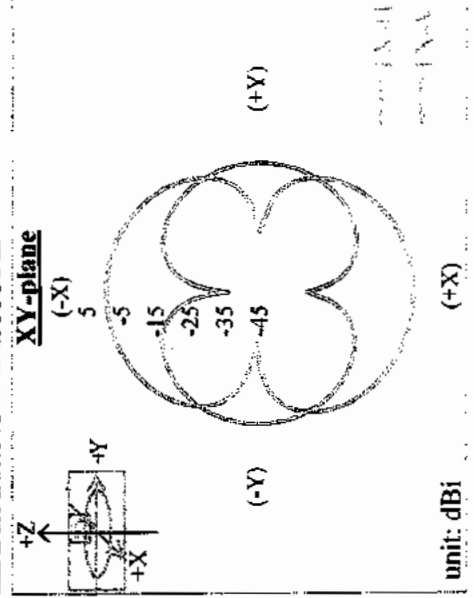
## Electrical Characteristics

|                 | 2400MHz       | 2450MHz       | 2500MHz       |
|-----------------|---------------|---------------|---------------|
| Efficiency [dB] | -1.4<br>(73%) | -1.3<br>(73%) | -1.4<br>(73%) |
| Peak gain [dBi] | 1.9           | 1.9           | 1.6           |
| Average gain    |               |               |               |
| XY-plane        | EX+1          | -3.2          | -3.0          |
| YZ-plane        | EX-V          | -9.7          | -10.4         |
| ZX-plane        | EX+1          | -2.1          | -2.3          |
| XY-plane        | EX-V          | -26.3         | -25.4         |
| YZ-plane        | EX+1          | -19.2         | -21.9         |
| ZX-plane        | EX-V          | -8.1          | 0.0           |

## VSWR



## Radiation Pattern

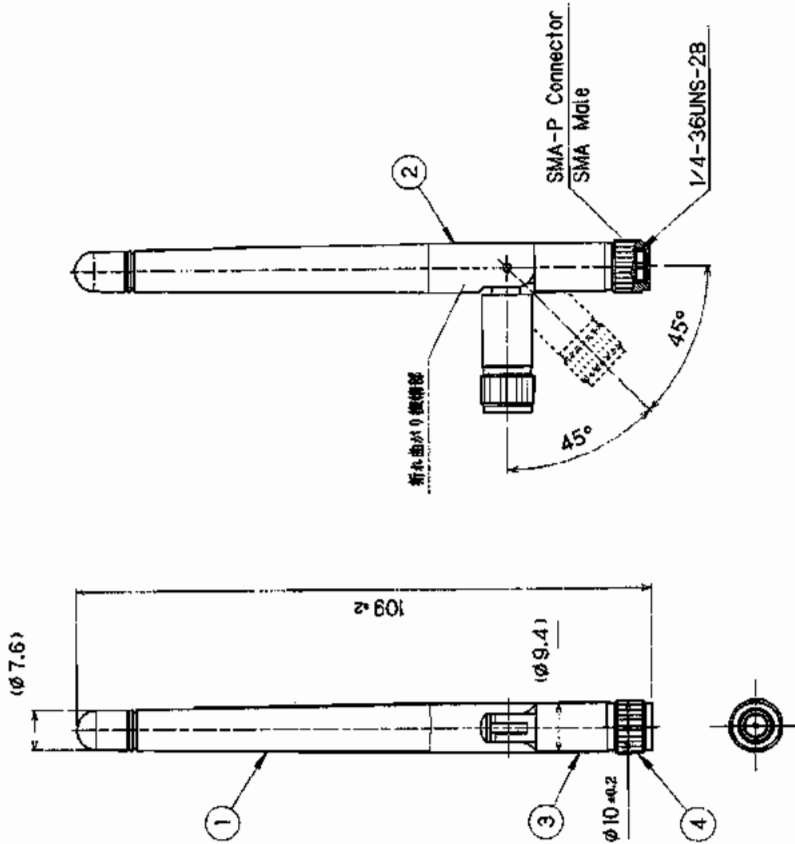


空中線仕様書

|             |                    |
|-------------|--------------------|
| 項目          | 内容                 |
| 1 空中線形式     | 無指向性ダイポール型アンテナ     |
| 2 型名        | AA2402SPU          |
| 3 使用周波数範囲   | 2400 ~ 2500 MHz    |
| 4 用途        | 機器取付用              |
| 5 利得        | 公称 2 dBi           |
| 6 定在差比      | 2.0 以下             |
| 7 最大入力電力    | 1 W                |
| 8 入力インピーダンス | 公称 50 Ω            |
| 9 接続        | SMA-P 型 (SMA-Male) |
| 10 外形寸法     | 約 φ10 × 109 mm     |
| 11 重量       | 約 9 g              |
| 12 備考       |                    |

AT1156

|        |        |      |                         |         |      |
|--------|--------|------|-------------------------|---------|------|
| 0.5 以上 | 12 以下  | ±0.1 | 120 以上                  | 300 以下  | ±0.5 |
| 12 以上  | 30 以下  | ±0.2 | 300 以上                  | 1000 以下 | ±1.0 |
| 30 以上  | 120 以下 | ±0.3 | Antenna Technology 特別仕様 |         |      |

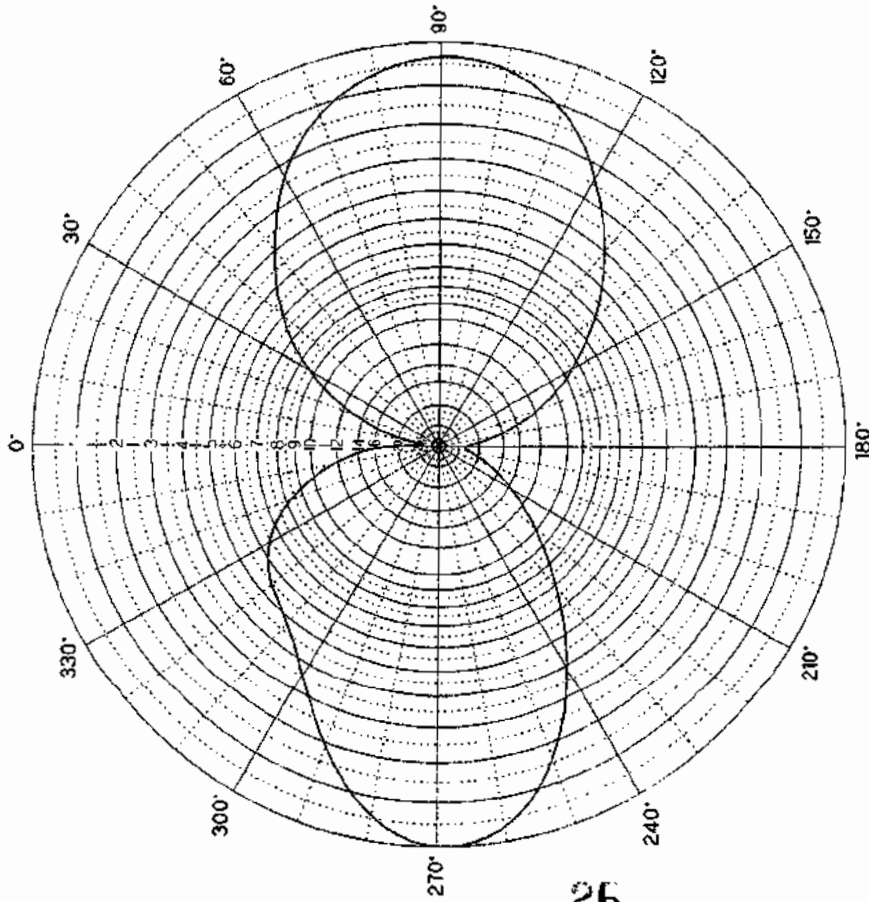


| No | DESCRIPTION | Q.TY | MATERIAL/FINISH |
|----|-------------|------|-----------------|
| 1  | アンテナ本体      | 1    | TPEE 黒          |
| 2  | サポーター       | 1    | ABS 黒           |
| 3  | ホルダー        | 1    | POM 黒           |
| 4  | SMA-Pコネクタ   | 1    | 8s/電鍍銀 黒        |

|      |           |                |     |           |            |        |       |          |
|------|-----------|----------------|-----|-----------|------------|--------|-------|----------|
| 図番   | DRW.No.   | 10K68-SS-01-01 | 日付  | DATE      | 2013.11.22 | 尺取     | SCALE | 1/1      |
| 品名   | MODEL.No. | AA2402SPU      | 三角法 | 3RD ANGLE | PROJ.      | 単位     | UNIT  | mm       |
| 名称   | TITLE     | 外観図            | 設計  | DESIGNED  | 製図         | DRAWN  | 承認    | APPROVED |
| 材質   | MATERIAL  |                |     | Watanabe  |            | Nomoto |       | Watanabe |
| 表面処理 | FINISH    |                |     |           |            |        |       |          |



[ dBdB指向性 ]  
Radiation Pattern in dB Scale



|               |            |
|---------------|------------|
| 名称 Title      | 指向性 E面     |
| 品名 Model.No.  | AA2402SPU  |
| 周波数 Frequency | 2450MHz    |
| 日付 Date       | 2011.06.15 |

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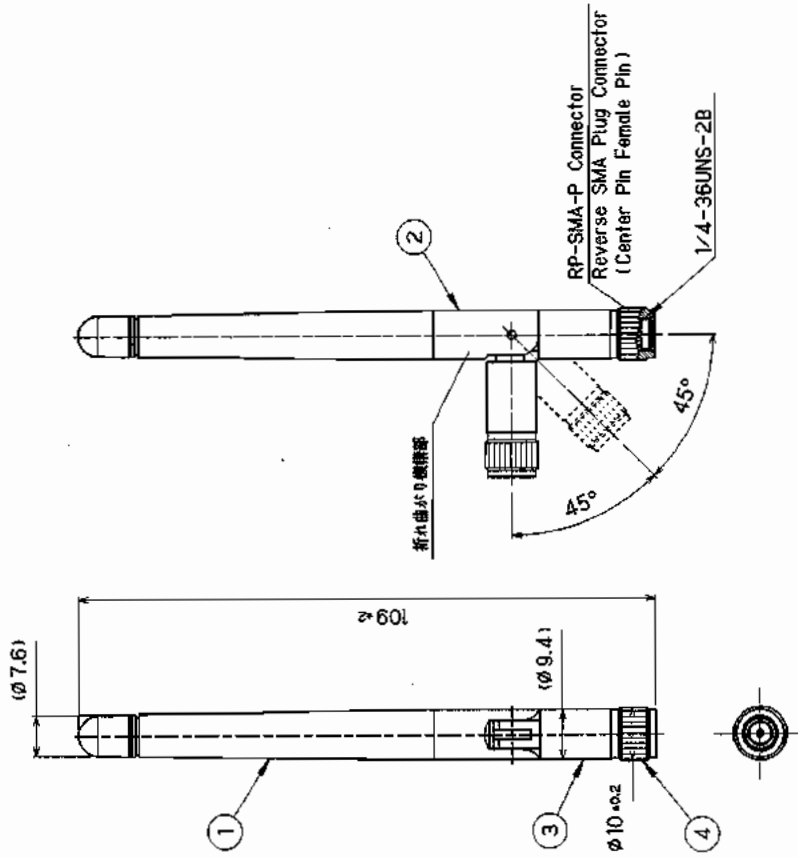
AT168

空中線仕様書

| 項目          | 内容  |
|-------------|---|
| 1 空中線形式     | 兼指向性ダイポール型アンテナ                                      |
| 2 型名        | AA2402RSPU  |
| 3 使用周波数範囲   | 2400 ~ 2500 MHz                                     |
| 4 用途        | 機器取付用   |
| 5 利得        | 公称 2 dBi  |
| 6 定在波比      | 2.0 以下  |
| 7 最大入力電力    | 1 W   |
| 8 入力インピーダンス | 公称 50 Ω   |
| 9 接続        | RP-SMA-P 型 (RP-SMA-Male)                            |
| 10 外形寸法     | 約 φ10×109 mm  |
| 11 重量       | 約 9 g   |
| 12 備考       | 【 RP-SMA-P の RP はリバーシブルポリティ(REVERSE POLARITY)の略です 】 |

AT1218

|        |        |      |                          |         |      |
|--------|--------|------|--------------------------|---------|------|
| 0.5 以上 | 12 以下  | ±0.1 | 120 を越え                  | 300 以下  | ±0.5 |
| 12 を越え | 30 以下  | ±0.2 | 300 を越え                  | 1000 以下 | ±1.0 |
| 30 を越え | 120 以下 | ±0.3 | Antenna Technology 方法特許権 |         |      |

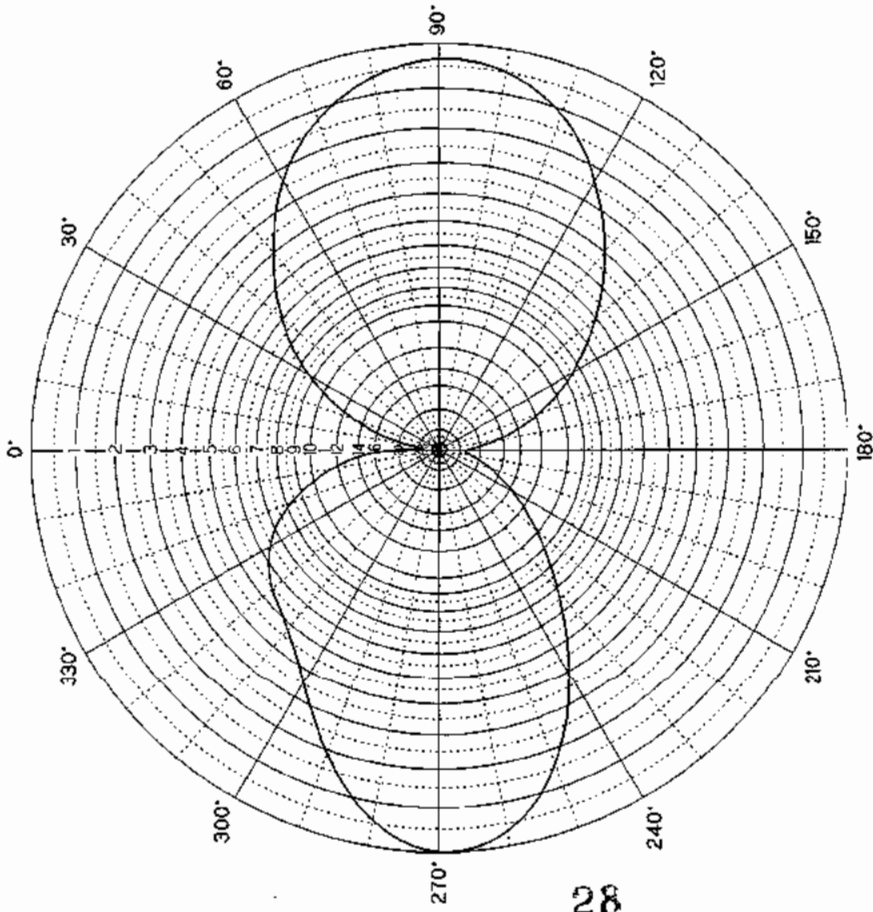


| No | DESCRIPTION   | Q.TY | MATERIAL/FINISH |
|----|---------------|------|-----------------|
| 1  | アンテナカバ-       | 1    | TPEE 黒          |
| 2  | サポ-           | 1    | ABS 黒           |
| 3  | ホルダ-          | 1    | PCM 黒           |
| 4  | RP-SMA-Pコネクタ- | 1    | BS/電着塗装 黒 他     |

|      |           |                |          |             |            |          |          |             |
|------|-----------|----------------|----------|-------------|------------|----------|----------|-------------|
| 図番   | DRW.No.   | 11K34-SS-01-01 | 日付       | DATE        | 2013.11.22 | 尺数       | SCALE    | 1/1         |
| 品名   | MODEL.No. | AA2402RSPU     | 三軸       | 3RD ANGLE   | PROJ.      | 単位       | UNIT     | mm          |
| 名称   | TITLE     | 外観図            | 設計       | DESIGNED    | 制図         | DRAWN    | 承認       | APPROVED    |
| 材質   | MATERIAL  |                | 設計者      | DESIGNED BY | 制図者        | DRAWN BY | 承認者      | APPROVED BY |
| 表面処理 | FINISH    |                | Watanabe |             | Nomoto     |          | Watanabe |             |

[ dB 磁指向性 ]  
Radiation Pattern in dB Scale



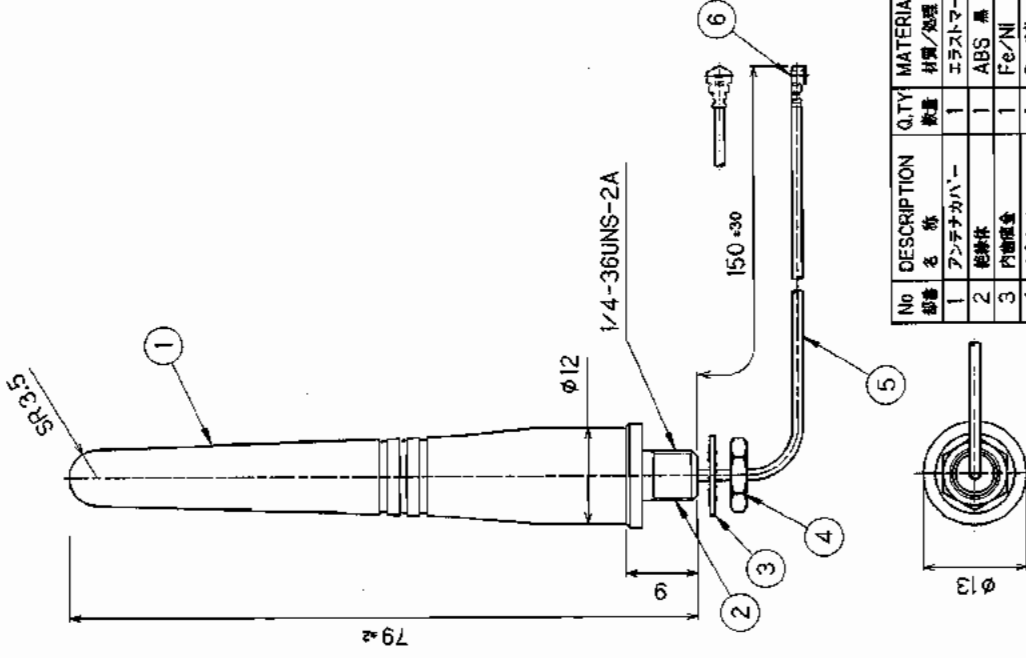
|               |            |
|---------------|------------|
| 名称 Title      | 指向性 E面     |
| 品名 Model.No.  | AA2402RSPU |
| 周波数 Frequency | 2450MHz    |
| 日付 Date       | 2011.06.15 |

空中線仕様書

| 項目          | 内容                                   |
|-------------|--------------------------------------|
| 1 空中線形式     | 1/2λスリプ型アンテナ                         |
| 2 型名        | AA2402A-UFLLP                        |
| 3 使用周波数範囲   | 2400 ~ 2500 MHz                      |
| 4 用途        | 機器取付用                                |
| 5 利得        | 公称 2 dBi                             |
| 6 定在波比      | 2.0 以下                               |
| 7 最大入力電力    | 1 W                                  |
| 8 入力インピーダンス | 公称 50 Ω                              |
| 9 接続ケーブル    | U.FL-LP-066 (同軸ケーブル φ1.32 約 150mm 付) |
| 10 全長       | 79 mm ± 2mm                          |
| 11 重量       | 約 7 g                                |
| 12 備考       |                                      |

AT1286

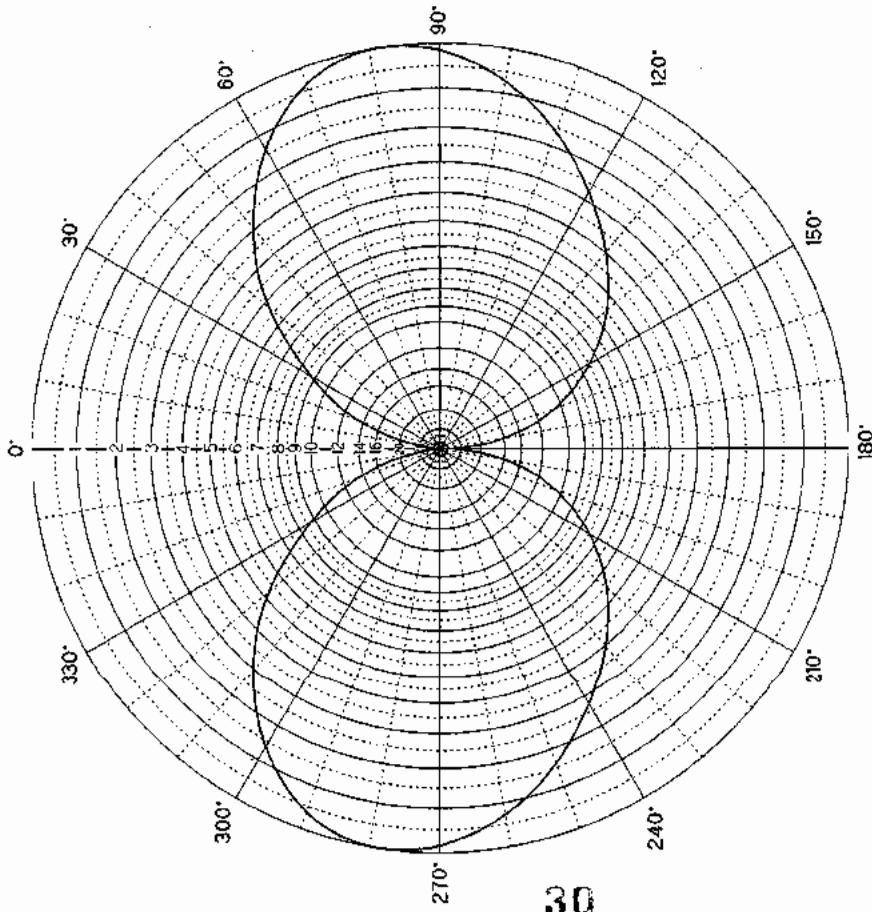
|        |        |      |                          |         |      |
|--------|--------|------|--------------------------|---------|------|
| 0.5 以上 | 12 以下  | ±0.1 | 120 未満                   | 300 以下  | ±0.5 |
| 12 未満  | 30 以下  | ±0.2 | 300 未満                   | 1000 以下 | ±1.0 |
| 30 未満  | 120 以下 | ±0.3 | Antenna Technology 方法許容値 |         |      |



| No | DESCRIPTION | QTY | MATERIAL/FINISH       |
|----|-------------|-----|-----------------------|
| 1  | アンテナカバ-     | 1   | エラストマー グレー            |
| 2  | 絶縁体         | 1   | ABS 黒                 |
| 3  | 内歯皿金        | 1   | Fe/Ni                 |
| 4  | 六角ナット       | 1   | Bs/Ni                 |
| 5  | 同軸ケーブル      | 1   | φ1.32                 |
| 6  | U.FLコネクタ    | 1   | U.FL-LP-066 エポキシ樹脂(黒) |

|      |           |               |        |           |            |       |       |          |
|------|-----------|---------------|--------|-----------|------------|-------|-------|----------|
| 図番   | DRW.No.   | 12K14-SS-01   | 日付     | DATE      | 2012.04.16 | 尺数    | SCALE | FREE     |
| 品名   | MODEL.No. | AA2402A-UFLLP | 三角法    | 3RD ANGLE | PROJ.      | 単位    | UNIT  | mm       |
| 名称   | TITLE     | 外觀図           | 設計     | DESIGNED  | 製図         | DRAWN | 承認    | APPROVED |
| 材質   | MATERIAL  |               |        |           |            |       |       |          |
| 表面処理 | FINISH    |               |        |           |            |       |       |          |
|      |           | Watandbe      | Nomoto |           | Watandbe   |       |       |          |

[ dBi 指向性 ]  
Radiation Pattern in dB Scale



30

|                |               |
|----------------|---------------|
| 名称 Title       | 指向性 E面        |
| 品名 Model No.   | AA2402A-UFLLP |
| 周波数 Frequency  | 2450MHz       |
| 日付 Date        | 2012.04.16    |
| アンテナテクノロジー株式会社 |               |
| AT1286         |               |

空中線仕様書

| 項目          | 内容                                    |
|-------------|---------------------------------------|
| 1 空中線形式     | 1/2λスリープ型アンテナ                         |
| 2 型名        | AA2402AU-UFLLP                        |
| 3 使用周波数範囲   | 2400 ~ 2500 MHz                       |
| 4 用途        | 機器取付用                                 |
| 5 利得        | 公称 2 dBi                              |
| 6 定在波長      | 2.0 以下                                |
| 7 最大入力電力    | 1 W                                   |
| 8 入力インピーダンス | 公称 50 Ω                               |
| 9 接続        | U, FL-LP-066 (同軸ケーブル φ1.32 約 150mm 付) |
| 10 全長       | 104.3 mm ± 2mm (アンテナ部)                |
| 11 重量       | 約 7 g                                 |
| 12 備考       |                                       |

AT1285

Antenna Technology Inc.

|           |                 |                |                |      |            |       |          |
|-----------|-----------------|----------------|----------------|------|------------|-------|----------|
| 図番        | 12K13-SS-01-R01 | 図名             | AA2402AU-UFLLP | 設計者  | Watanabe   | 承認者   | Watanabe |
| MODEL No. | AA2402AU-UFLLP  | 3rd ANGLE PROJ | mm             | DATE | 2013.04.30 | SCALE | 1/1      |
| TITLE     | 外観図             |                |                |      |            |       |          |
| MATERIAL  | 材質              |                |                |      |            |       |          |
| FINISH    | 表面処理            |                |                |      |            |       |          |

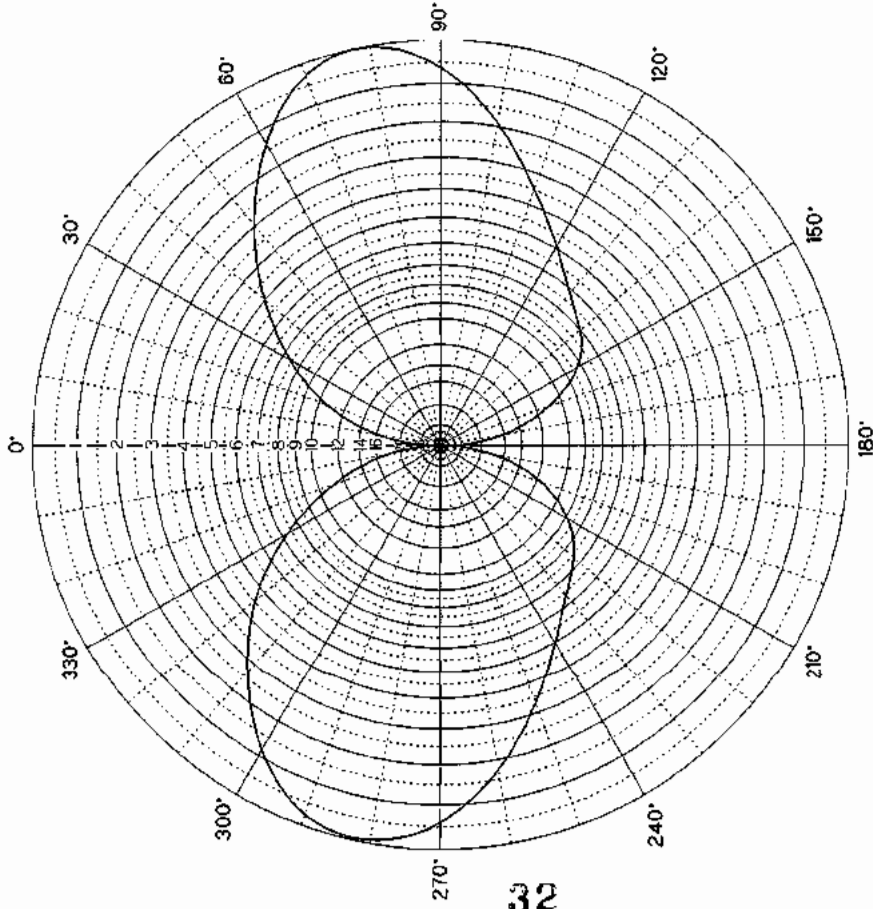
| No | DESCRIPTION   | QTY | MATERIAL/FINISH    |
|----|---------------|-----|--------------------|
| 1  | Cover         | 1   | TPU Black          |
| 2  | Hinge A       | 1   | ABS Black          |
| 3  | Hinge B       | 1   | ABS Black          |
| 4  | Hinge Pin     | 2   | Br/Black           |
| 5  | Coaxial Cable | 1   | φ1.32              |
| 6  | Connector     | 1   | U,FL-LP-066 同軸ケーブル |
| 7  | Holder        | 1   | PC Black           |

|        |      |         |      |
|--------|------|---------|------|
| 0.5 以下 | ±0.1 | 120 以下  | ±0.1 |
| 12 以下  | ±0.2 | 300 以下  | ±1.0 |
| 30 以下  | ±0.3 | 1000 以下 | ±1.0 |

Antenna Technology 株式会社

[ 0dB目盛指向性 ]  
Radiation Pattern in dB Scale



32

|               |                |
|---------------|----------------|
| 名称 Title      | 指向性 E面         |
| 品名 Model.No.  | AA2402AU-UFLLP |
| 周波数 Frequency | 2450MHz        |
| 日付 Date       | 2012.04.16     |

アンテナテクノロジー株式会社

A71285

# 屋外対応用アンテナ 2.4GHz帯

STAF corporation

## 電気特性

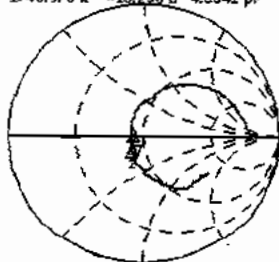
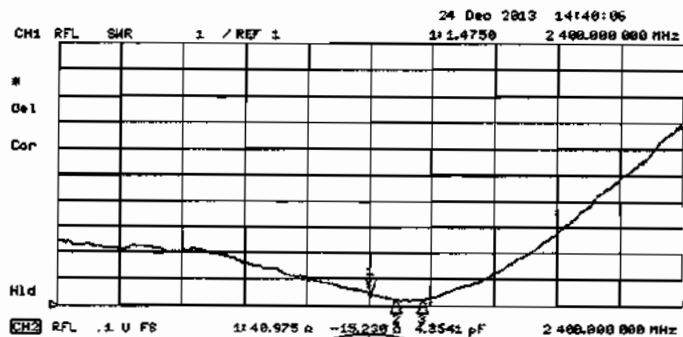
|           |                  |          |          |          |
|-----------|------------------|----------|----------|----------|
| 周波数帯域     | 2400~2483.5MHz   |          |          |          |
| 入力インピーダンス | 50Ω              |          |          |          |
| 型式        | 単一型 λ/2モノポールアンテナ |          |          |          |
| 最大利得      | 2.14dBi          |          |          |          |
| 偏波        | 直線偏波             |          |          |          |
| 指向性       | 無指向性             |          |          |          |
| VSWR      | 2.5以下            |          |          |          |
| SMAコネクタ   | ストレート            |          | L型       |          |
|           | スタンダード           | リバース     | スタンダード   | リバース     |
| 型番        | 1019-016         | 1019-017 | 1019-018 | 1019-019 |

## 機械特性

|      |             |
|------|-------------|
| 動作温度 | -20° ~ 70°  |
| 保存温度 | -20° ~ 70°  |
| 環境仕様 | IP67 / RoHS |

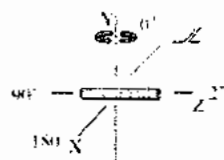


インピーダンス  
/VSWR

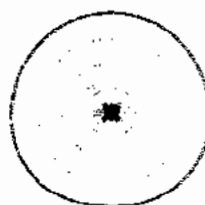
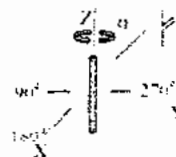


指向性

E面水平偏波



H面垂直偏波



スタッフ株式会社

[Http://www.staf.co.jp/](http://www.staf.co.jp/)

〒222-0033 神奈川県横浜市港北区新横浜2-6-12  
TEL:045-471-1371 FAX:045-471-1983



Model: MEIWX-2411SAXX-2400

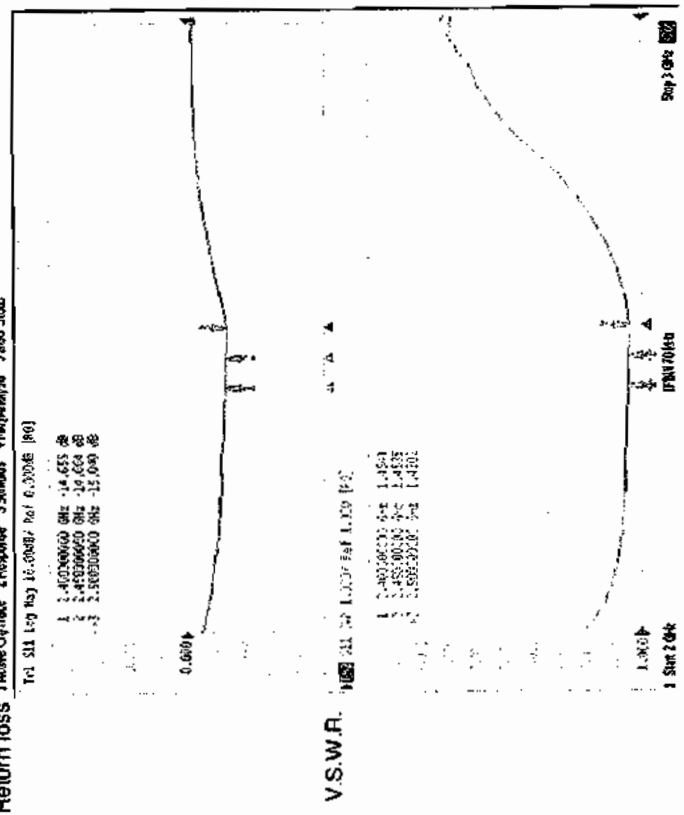
Test Report

Return loss/V.S.W.R

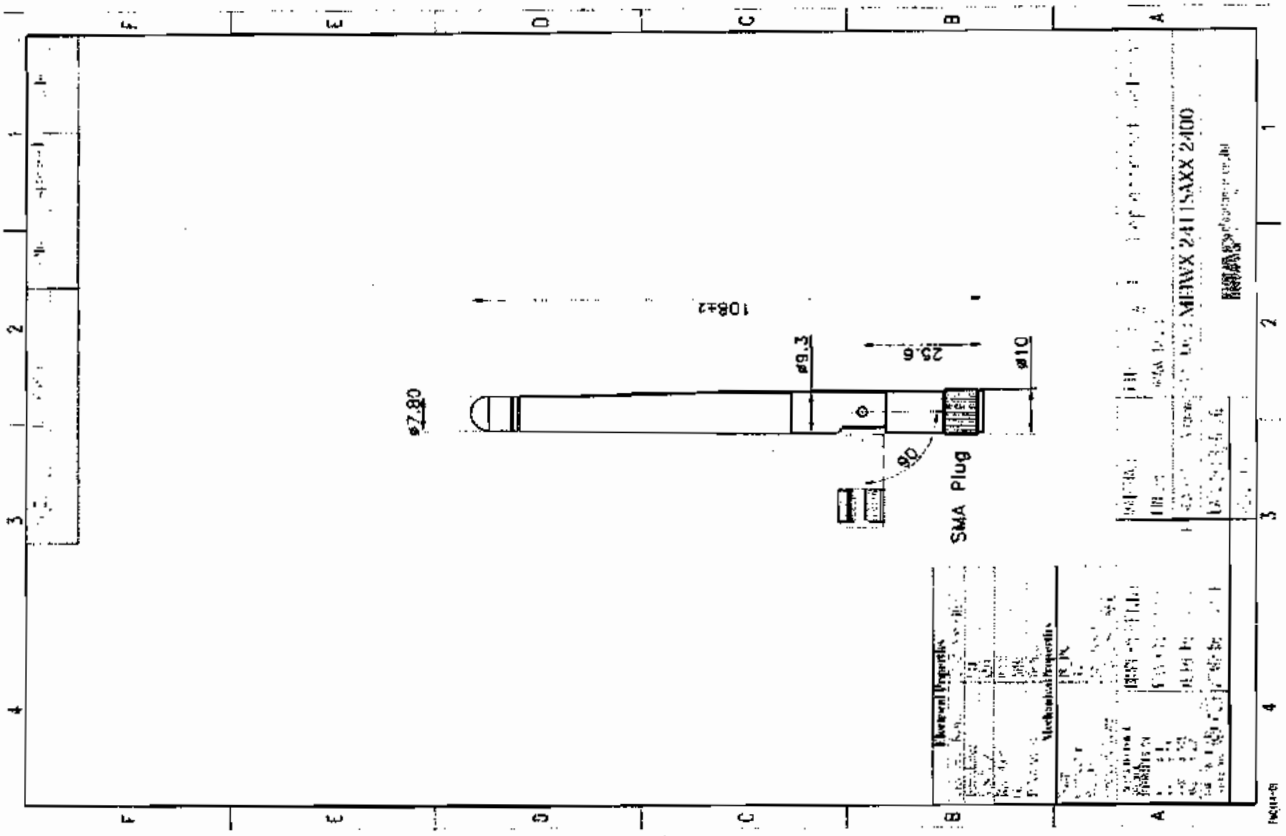
Return loss 1 Mode On/line 2 Response 3 Simult 4 High/Low 5 Step Size

Tri: S11 Log Mag 10.00dB Ref: 6.00dB [dB]

|   |           |     |        |    |
|---|-----------|-----|--------|----|
| 1 | 1.4020000 | 0Hz | 14.655 | dB |
| 2 | 1.4100000 | 0Hz | 14.664 | dB |
| 3 | 1.4180000 | 0Hz | 15.000 | dB |



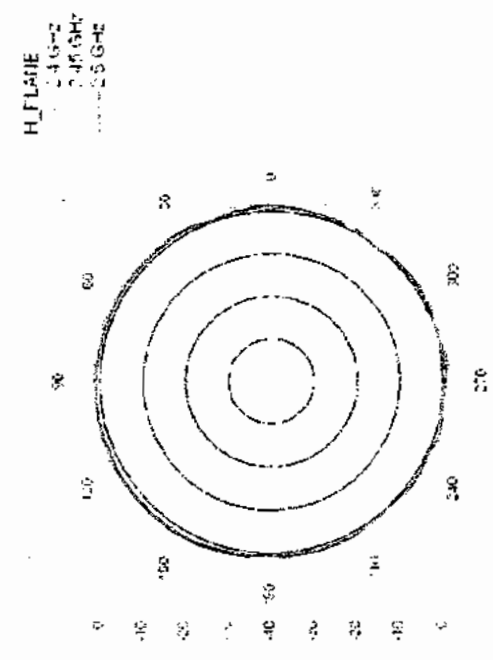
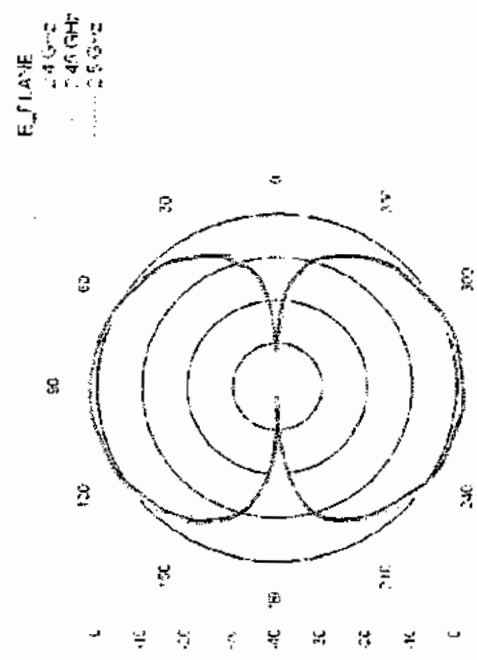
V.S.W.R.



Model: MEIWX2411SAXX-2400

Test Report

Pattern



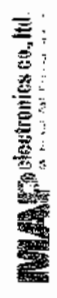
SMA

Connector

- Specification
- 1) Impedance: 50 ohm
  - 2) Frequency Range: 0-66 GHz
  - 3) V.S.W.R.: 1.5
  - 4) Working Voltage: 250 Vrms
  - 5) Dielectric Withstanding: 600Vrms
  - 6) Voltage Insulation Resistance: 2000 Mega ohm
  - 7) Contact Resistance: Center contact: 3.0 Milliohms (Max.)  
Outer contact: 2.0 Milliohms (Max.)
  - 8) Recommended coupling nut torque: 4.0-8.8 in. lbs (0.45-0.99Nm)
  - 9) Coupling nut retention force: 50 lbs (222N)
  - 10) Contact captivation force: 5 lbs (22.2N)
  - 11) Durability (mating): 500 cycles
- Environmental Data
- 1) Operating Temperature: 65 C ~ -1165 C
  - 2) Thermal Shock: MIL-STD-202, Method 107, Condition B
  - 3) Corrosion: MIL-STD-202, Method 101, Condition B
  - 4) Shock: MIL-STD-202, Method 213, Condition I
  - 5) Vibration: MIL-STD-202, Method 204, Condition D
  - 6) Moisture Resistance: MIL-STD-202, Method 106

- Material Specifications
- 1) Body: Brass
  - 2) Contact: Brass
  - 3) Insulator: Teflon or Delrin

- Material
- 1) Body: Brass
  - 2) Contact: Brass
  - 3) Insulator: Teflon or Delrin



Model. MEIWX 2411RSXX 2400

Test Report

Electrical Test

Investigation Number: J-1004-4110-01-0001-0001

Return loss

V.S.W.R.

1. 2. 3. 4.

Fig. 3 Sh. 1-20

0.250



0.250

Reverse Side View

| Electrical Properties |               |
|-----------------------|---------------|
| Frequency Range       | 2.4724835 GHz |
| Impedance             | 50Ω           |
| V.S.W.R.              | 2.0           |
| Radiation             | Omn           |
| Gain                  | 2dBi          |
| Polarization          | Vertical      |
| Mechanical Properties |               |
| Whip                  | PJ/PC         |
| Connector             | Bay           |
| Weight                | 85 g (est)    |
| Operating Temp        | 20°C ~ +65°C  |

Replacement Drawing

MEIWX 2411RSXX 2400

2006/10/26

00

4

5

6

7

8

9

0

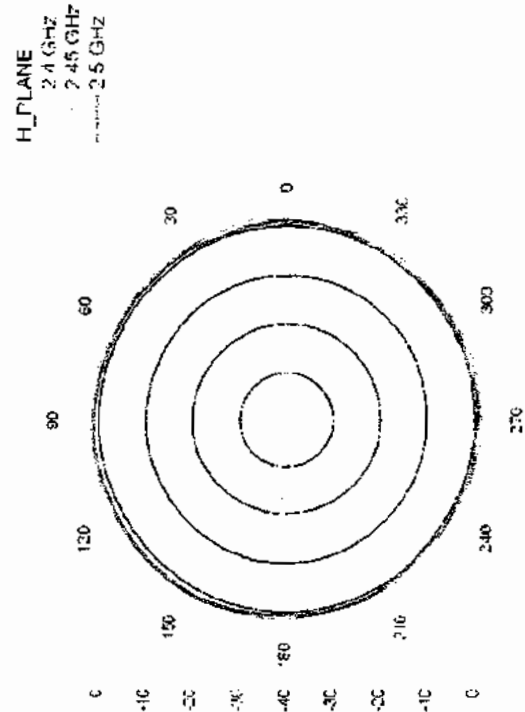
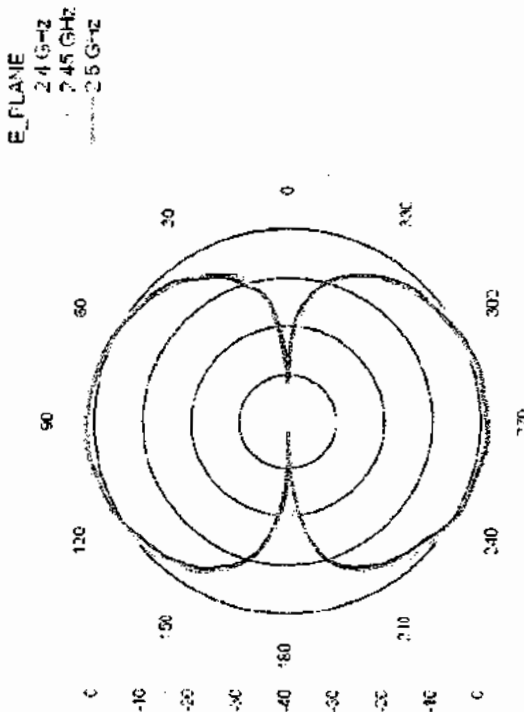
1

2

3

Test Report

Pattern Test



37

Connector

Reverse SMA Plug

This is a reverse SMA plug join on the antenna.

Electrical Properties

- 1) Impedance 50 ohm
- 2) Frequency Range 0 - 6 GHz
- 3) V.S.W.R. 1.5 (Max.)
- 4) Working Voltage  $\leq 250$  Vrms
- 5) Dielectric Withstanding  $\leq 670$  Vrms
- 6) Voltage Insulation Resistance  $\geq 2000$  Megohm
- 7) Contact Resistance Center contact: 3.0 Milliohm (Max.)  
Outer contact: 2.0 Milliohm (Max.)
- 8) Insertion Loss(2.4GHz) 0.3 dB

Mechanical Properties

- 1) Recommended coupling nut torque 4.0 in. lbs.  $\sim$  8.8 in. lbs.
- 2) Coupling nut retention force  $\geq 50$  lbs.
- 3) Contact capacitance axial  $\geq 5$  lbs.

Environmental Ratings

- 1) Operating Temperature  $-65^{\circ}\text{C} \sim +165^{\circ}\text{C}$
- 2) Thermal Shock MIL-STD-202, Method 107, Condition B
- 3) Corrosion MIL-STD-202, Method 101, Condition B
- 4) Shock MIL-STD-202, Method 213, Condition I
- 5) Vibration MIL-STD-202, Method 204, Condition D
- 6) Moisture Resistance MIL-STD-202, Method 106

Material Specifications

| Material Data     | Material         | Plating |
|-------------------|------------------|---------|
| 1) Body           | Brass            | Black   |
| 2) Center contact | Phosphor Bronze  | Gold    |
| 3) Insulator      | Teflon or Delrin |         |

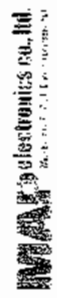
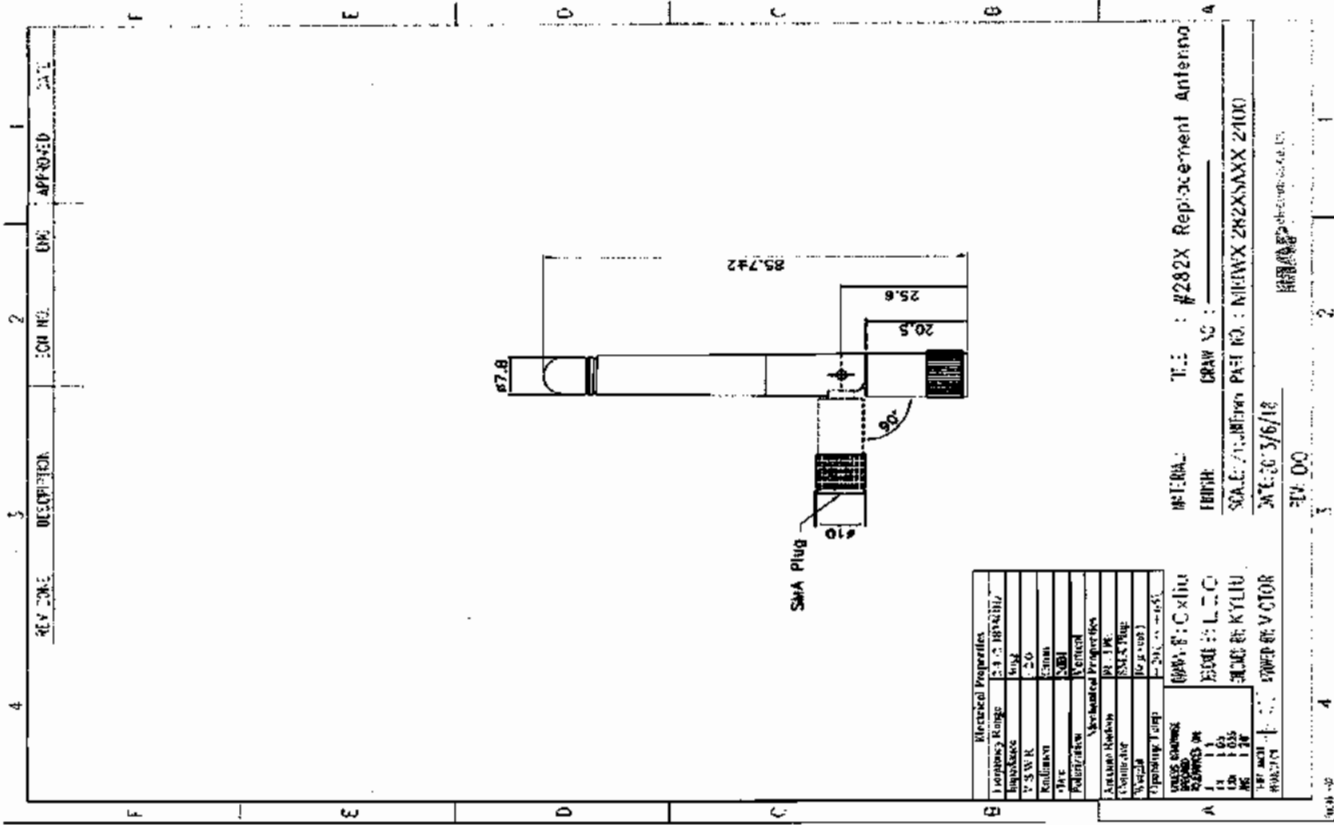
# SMA

## Connector

- Specification Data
- 1) Impedance = 50 ohm
  - 2) Frequency Range = 0-66 GHz
  - 3) V.S.W.R. = 1.5
  - 4) Working Voltage = 250 Vrms
  - 5) Dielectric Withstanding = 670Vrms
  - 6) Voltage Insulation Resistance = 2000 Mega ohm
  - 7) Contact Resistance = Center contact: 3.0 Milliohms (Max.)  
Outer contact: 2.0 Milliohms (Max.)
  - 8) Recommended coupling nut torque = 4.0-8.8 in. lbs (0.45-0.99Nm)
  - 9) Coupling nut retention force = 50 lbs (222N)
  - 10) Contact captivation force = 5 lbs (22.2N)
  - 11) Durability (mating) = 500 cycles

- Environmental Data
- 1) Operating Temperature = 65 C ~ -116S C
  - 2) Thermal Shock = MIL-STD-202, Method 107, Condition E
  - 3) Corrosion = MIL-STD-202, Method 101, Condition E
  - 4) Shock = MIL-STD-202, Method 213, Condition I
  - 5) Vibration = MIL-STD-202, Method 204, Condition F
  - 6) Moisture Resistance = MIL-STD-202, Method 105

- Material Specifications
- 1) Body = Material: Brass
  - 2) Contact = Material: Brass
  - 3) Insulator = Teflon or Delrin

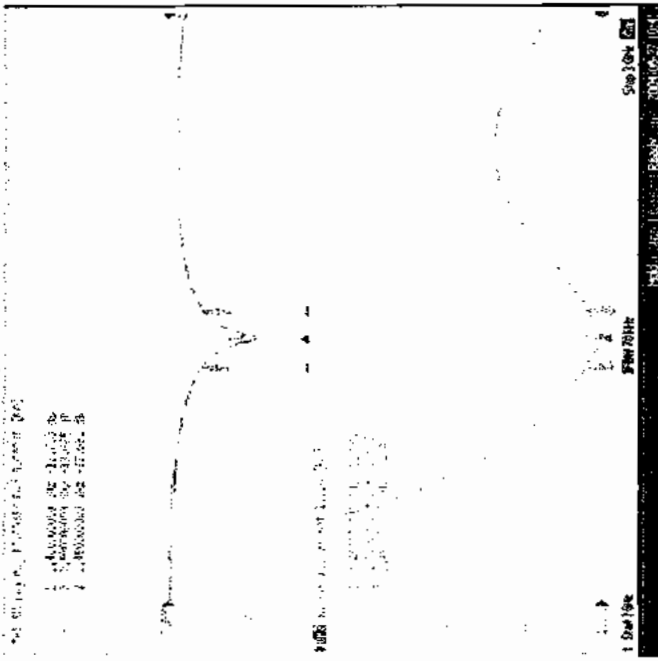


Model. MEIWX-282XSAXX-2400

Test Report

Return loss/V.S.W.R

Return loss [Antenna] [Resonance 350MHz] [1 Port] [100kHz] [500mV] [500mV]



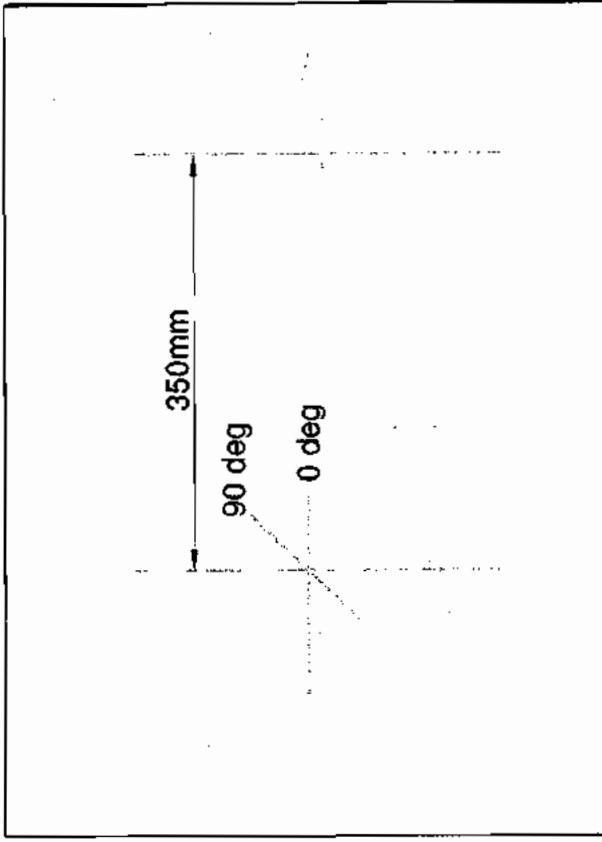
V.S.W.R. [Antenna] [Resonance 350MHz] [1 Port] [100kHz] [500mV] [500mV]

[Antenna] [Resonance 350MHz] [1 Port] [100kHz] [500mV] [500mV]

Model. MEIWX-282XSAXX-2400

2D Pattern Test Instrument

Pattern Test



Test Equipment

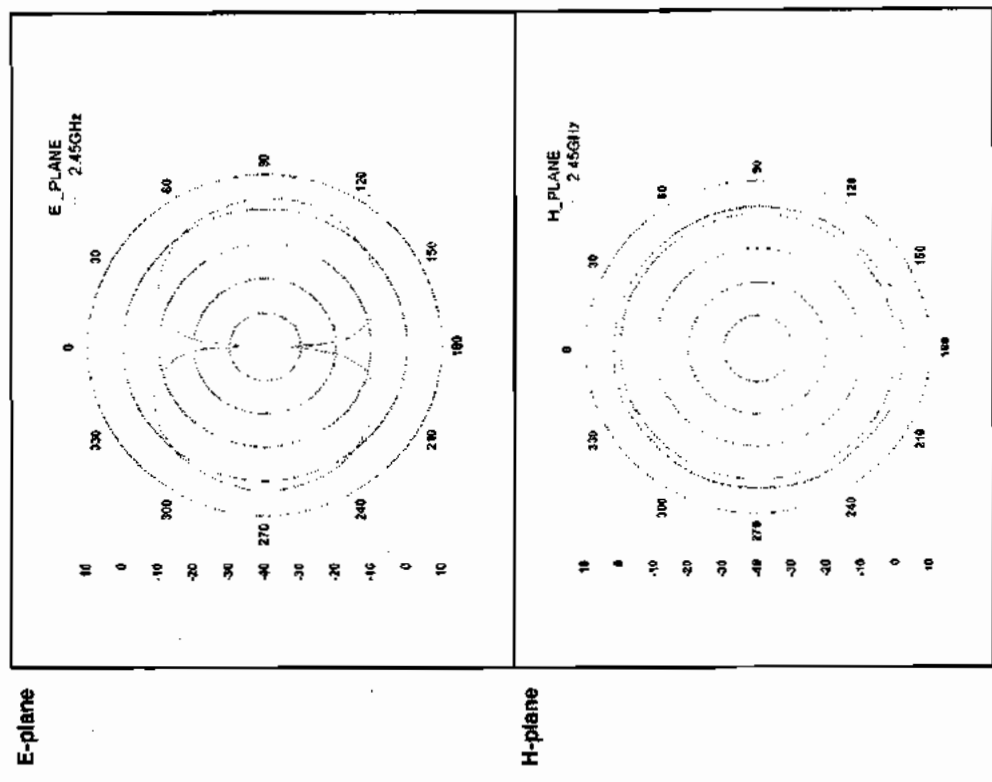
Anechoic chamber: 100MHz~6GHz 8\*6\*6m (\* 1m Quiet zone at 800MHz)

Scure Antenna: ETS-3164 Dual Polarized Horn

Network Analyzer: Agilent E5071B 100kHz~8.5GHz

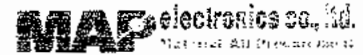
Model. MEJWX-282XSAXX-2400

2D Patterns Pattern Test

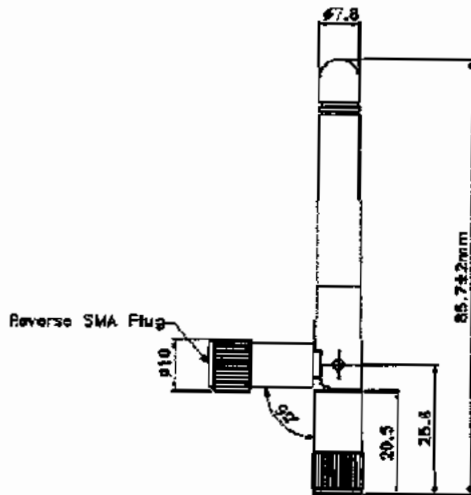


**WiFi/Swivel Type, Replacement Antenna**

**Model No.: MEIWX-282XRSXX-2400**



**Mechanical Drawing:**



**Electrical Specification:**

|                  |                         |
|------------------|-------------------------|
| Frequency Range  | 2.4~2.5GHz              |
| Impedance        | 50Ω                     |
| V.S.W.R.         | 2.0                     |
| Radiation        | Omni-directional        |
| Gain             | 2 dBi                   |
| Polarization     | Vertical                |
| HPBW±3dB@E Plane | -                       |
| HPBW±3dB@H Plane | 360°@2.4~2.5GHz@H Plane |

**Mechanical Specification:**

|              |                             |    |
|--------------|-----------------------------|----|
| Connector    | SMA Plug (Reverse Polarity) |    |
| Cable        | -                           |    |
| Bushing Type | Swivel 0°, 45°, 90°         |    |
| Water Proof  | -                           |    |
| Material     | Cover                       | PU |
|              | Base                        | PU |
| Weight(g)    | 10                          |    |

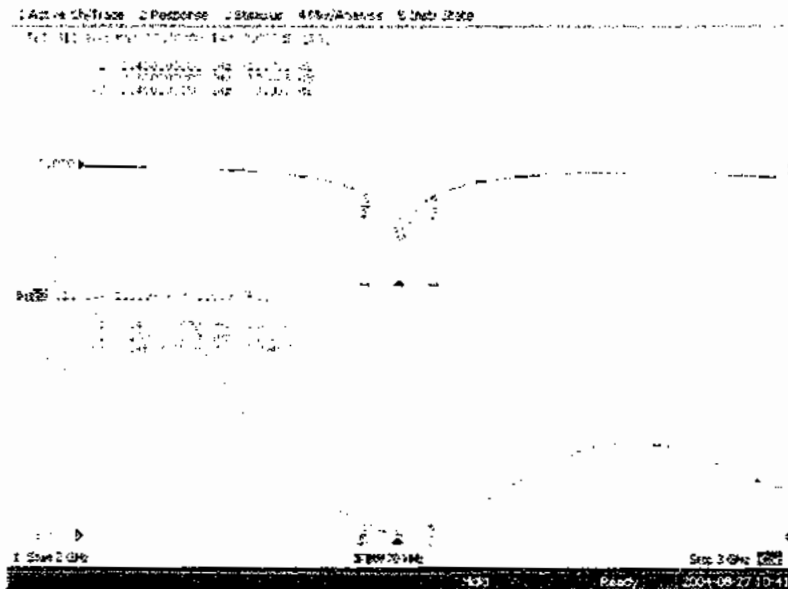
**Environmental Specification:**

|                |               |
|----------------|---------------|
| Operating Temp | -20 ~ +65 °C  |
| Storage Temp   | -30 ~ +100 °C |

Unit:mm  
DIM:Reference

Return loss

V.S.W.R.



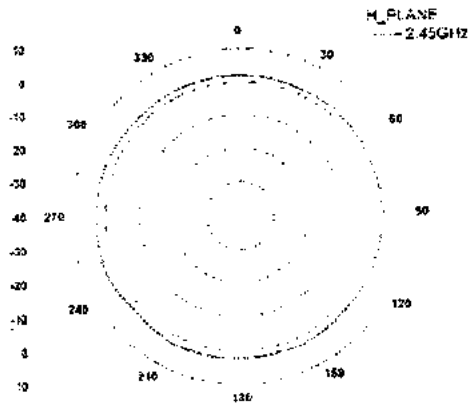
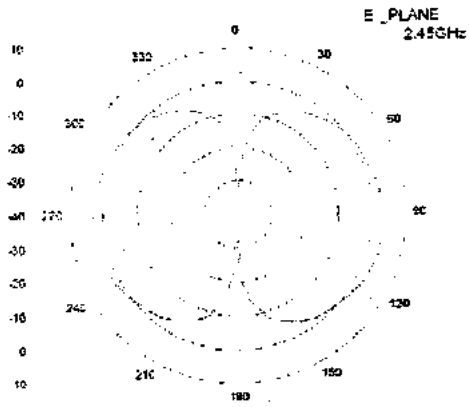
**WiFi/Swivel Type, Replacement Antenna**

**Model No.: MEIWX-282XRSXX-2400**



PATTERN





**Index.**

Item

**1. Drawing**

**2. Test report**

- Electrical test
- Pattern test

**3. Specification**

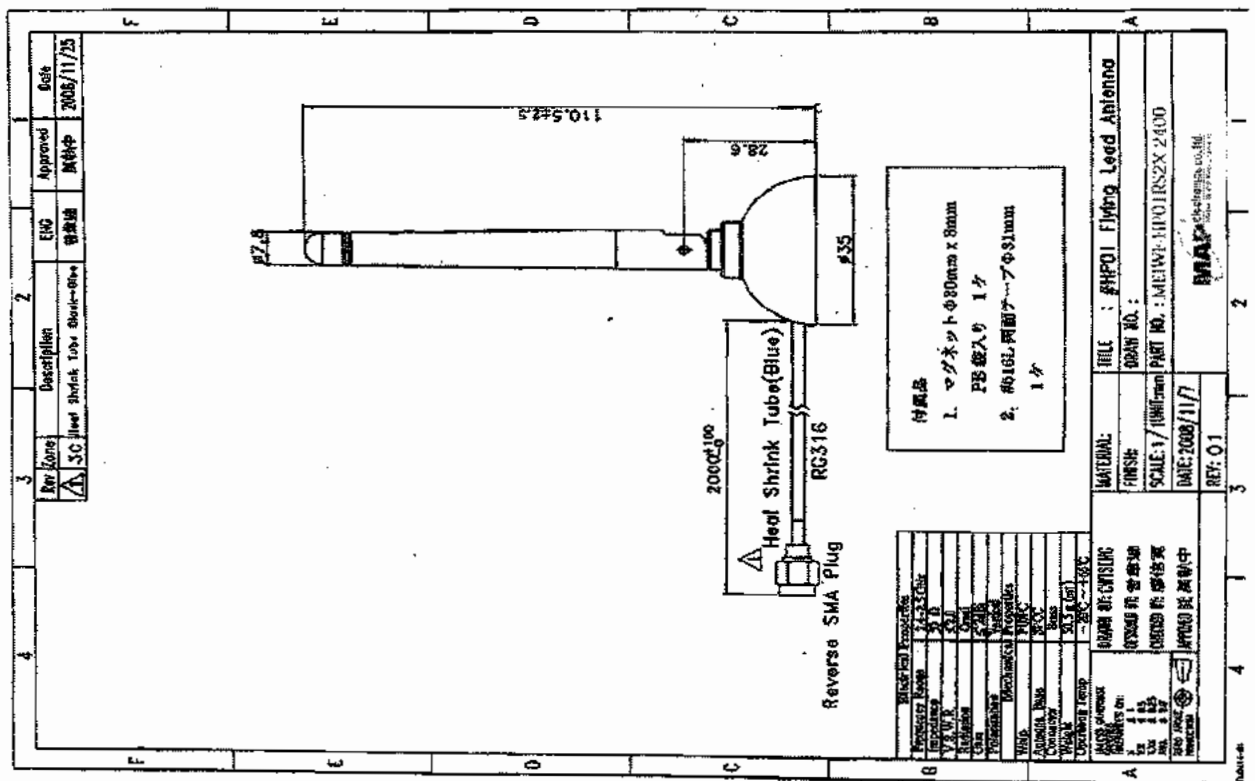
- Connector

**4. Packing**

- PE Bag
- Carton

**Modification History:**

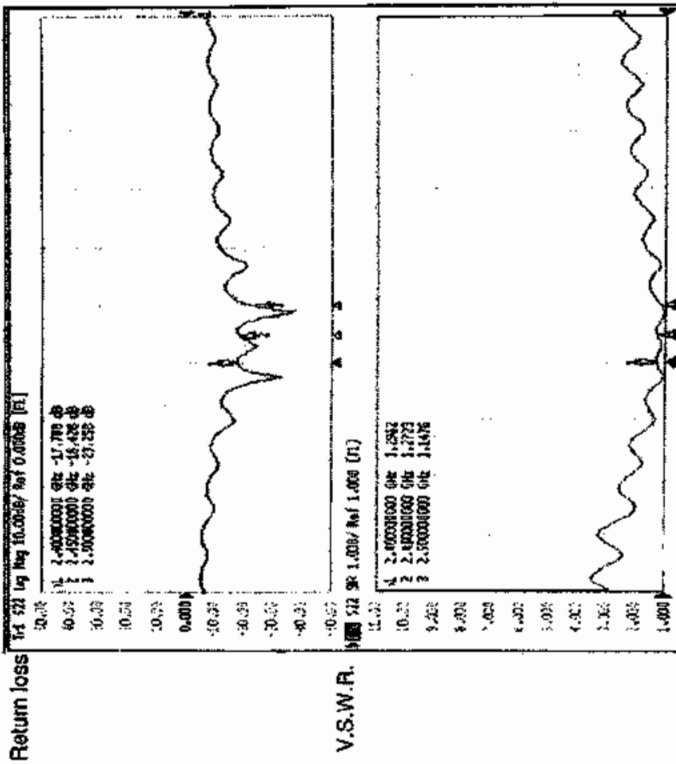
| Rev. | Date      | Content |
|------|-----------|---------|
| 00   | 2011/2/10 |         |



Model. MEIWF-HP01RS2X-2400

Test Report

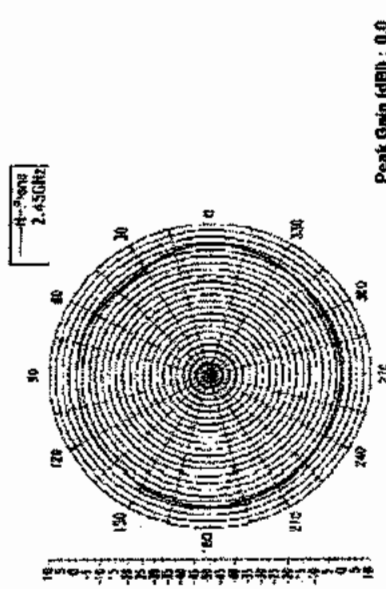
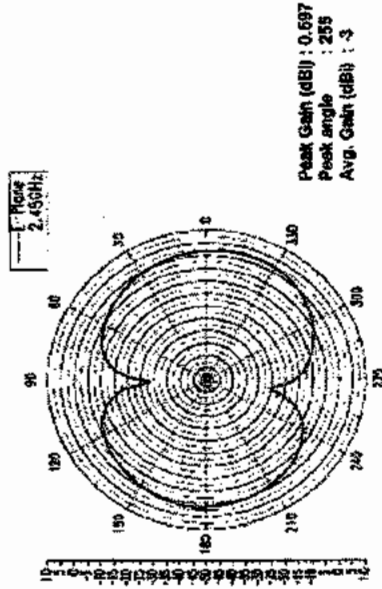
Return loss/V.S.W.R



Model. MEIWF-HP01RS2X-2400

Test Report

Pattern



Model. MEIWF-HP01RS2X 2400

Connector

Reverse SMA

- Specification
- Impedance 50 ohm
  - Frequency Range 0-6GHz
  - V.S.W.R.  $\leq 1.5$
  - Working Voltage  $\leq 250$  Vrms
  - Dielectric Withstanding  $\leq 670$  Vrms
  - Voltage Insulation Resistance  $\geq 2000$  Mega ohm
  - Contact Resistance Center contact: 3.0 Milliohms (Max.)  
Outer contact: 2.0 Milliohms (Max.)
  - Recommended crimping nut torque 4.0-8.8 in. lbs (0.45-0.99Nm)
  - Coupling nut retention force  $\geq 50$  lbs (222N)
  - Contact crimpation force  $\geq 5$  lbs (22.2N)
  - Durability (mating)  $\geq 500$  cycles

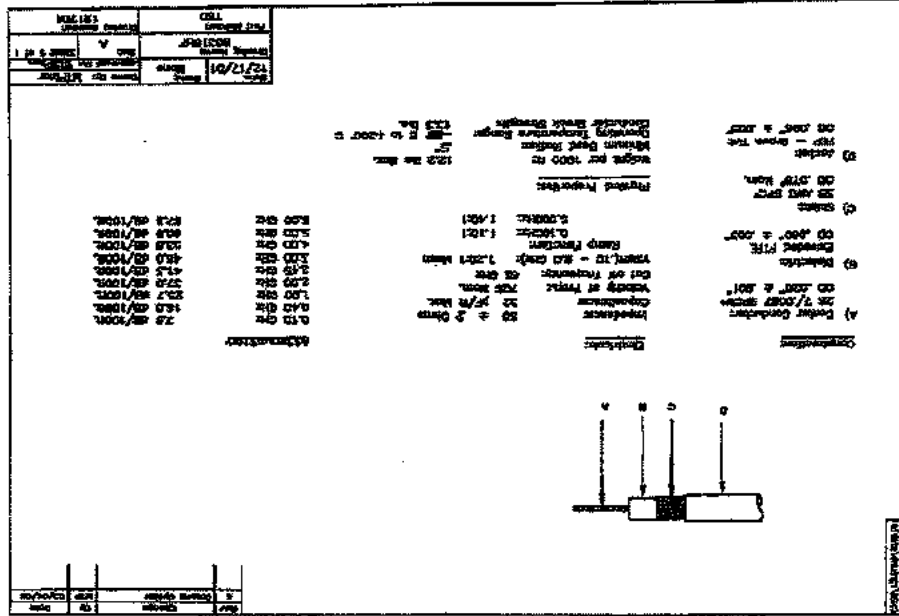
- Environmental Data
- Operating Temperature  $-65^{\circ}\text{C}$  ~  $+165^{\circ}\text{C}$   
MIL-STD-202, Method 107, Condition B
  - Thermal Shock MIL-STD-202, Method 101, Condition B
  - Corrosion MIL-STD-202, Method 213, Condition I
  - Shock MIL-STD-202, Method 204, Condition D
  - Vibration MIL-STD-202, Method 106
  - Moisture Resistance

- Material Specifications
- Material Data
- Body Brass
  - Contact Brass
  - Insulator Teflon or Delrin

Model. MEIWF-HP01RS2X-2400

Cable

RG316



# 確認方法書

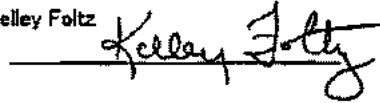
## Quality Control Documents

## 確認方法書

平成28年 7月 日

一般財団法人テレコムエンジニアリングセンター 殿

|        |  |
|--------|--|
| 申込者    |  |
| 郵便番号   | TX 7524                                  |
| 住所(本社) | 12500 TI Boulevard, Dallas, USA          |
| 法人名    | Texas Instruments Incorporated           |
| 役職代表者名 | ECS Business Unit Manager, Mattias Lange |
| 担当部署   | TIEP EVM Planning Manager                |
| 責任者名   | Kelley Foltz                             |



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**BUREAU VERITAS**  
Certification



## **TEXAS INSTRUMENTS, INC**

HQ: 12500 TI Boulevard, Dallas, TX 75243 USA

This is a multi-site certificate. Additional site details are listed in the appendix to this certificate.

*Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the Management System standards detailed below.*

## **ISO 9001:2008**

*Scope of certification*

**Design, manufacture, and marketing of integrated circuits, systems and software**

Certification cycle start date: **11 November 2015**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **15 September 2018**

Original certification date: **12 August 1996**

Certificate no.: **US008277-1**

**Signed on behalf of BVCH SAS - UK Branch**

Certification body address: 66 Prescott Street, London, E1 8HG, United Kingdom  
Local Office: 390 Benmar Drive, Houston, Texas, USA



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Further clarifications regarding the scope of this certificate and the applicability of the Management System requirements may be obtained by consulting the organization. To check this certificate validity, please call +(800) 937-9311.

**BUREAU VERITAS**  
Certification



## TEXAS INSTRUMENTS, INC

### ISO 9001:2008

#### Certified Locations

| Site                                   | Address  | Scope  |
|--|--|--|
| HQ : TEXAS INSTRUMENTS, INC            | 12500 TI Boulevard,<br>Dallas, TX 75243 USA  | Policy Making, Strategic Planning, Design, Engineering, Laboratory |
| TEXAS INSTRUMENTS, INC-CHENGDU, CHINA  | No. 8-8 and No. 8-10, Kexin Road, West Zone of Chengdu Hi-Tech Industrial Development Zone, 611731-Chengdu City-Sichuan Province-China | Design, development and manufacturing of integrated circuits       |
| TEXAS INSTRUMENTS, INC-SHANGHAI SALES  | 30-31-32 36/F No. 1568 Century Ave, Pudong New Area, Shanghai, China   | Sales, Marketing   |
| TEXAS INSTRUMENTS, INC-SHANGHAI LAB    | 4F, Building 2, 615 NingQiao Rd., Pudong New Area, Shanghai, 201206, China   | Laboratory   |
| TEXAS INSTRUMENTS, INC-SHANGHAI DESIGN | 2,3F No.72 Liangxiu Road, Zhangjiang High-tech Park, Shanghai, China   | Design, Engineering  |
| TEXAS INSTRUMENTS, INC-TMEX, MEXICO    | Jesus Rivera Franco #507 CD Industrial, 20197, Aguascalientes, Mexico  | Manufacturing of integrated circuits                               |
| TEXAS INSTRUMENTS, INC-RFAB            | 300 Renner Road, Richardson, TX 75080 USA  | Design, development and manufacturing of integrated circuits       |

*Signed on behalf of BVCH SAS - UK Branch*

Certification body address: 66 Prescott Street, London, E1 8HG, United Kingdom  
Local Office: 390 Benmar Drive, Houston, Texas, USA



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## TEXAS INSTRUMENTS, INC

### ISO 9001:2008

#### Certified Locations

| Site                         | Address   | Scope  |
|------------------------------|---|--|
| TEXAS INSTRUMENTS, INC-DBUMP | 13532 N. Central Expressway, Dallas, TX 75243 USA | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-DFAB  | 13536 N. Central Expressway, Dallas, TX 75243 USA | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-DMOS5 | 13353 TI Blvd, Dallas, TX 75243 USA               | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-DMOS6 | 13011 TI Blvd, Dallas, TX 75243 USA               | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-SFAB  | 6412 Highway 75 South, Sherman, TX 75090 USA      | Design, development and manufacturing of integrated circuits |

*Signed on behalf of BVCH SAS - UK Branch*

Certification body address: 66 Prescott Street, London, E1 8HG, United Kingdom  
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## TEXAS INSTRUMENTS, INC

### ISO 9001:2008

#### Certified Locations

| Site                                     | Address  | Scope  |
|--|--|--|
| TEXAS INSTRUMENTS, INC-FFAB, GERMANY     | Haggertystrasse 1, Freising Bayern, Germany, 85356                             | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-TIPI, PHILIPPINES | PEZA, Loakan Road, 2600, Baguio City, Philippines                              | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-TIEM, MALAYSIA    | Batu Berendam Free Trade Zone, Melaka, Malaysia 75350                          | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-TICL, PHILIPPINES | Clark Freeport Zone, Gil Puyat Avenue, Angeles City, Pampanga 2009 Philippines | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-TIM, MALAYSIA     | No. 1 Lorong Enggang 33, Empang Ulu Kelang, Kuala Lumpur, Malaysia 54200       | Design, development and manufacturing of integrated circuits |

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### ISO 9001:2008

#### Certified Locations

| Site                                  | Address   | Scope  |
|---------------------------------------|---|--|
| TEXAS INSTRUMENTS, INC-TITL, TAIWAN   | SEC1, 142 Hsin Nan Road, Chung-Ho District 235, New Taipei City, Taiwan/ROC | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-AIZU, JAPAN    | 2 Takaku, Kogyo-danchi, Aizuwakamatsu, Fukushima, Japan 965-0060            | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-GFAB, SCOTLAND | Larkfield Industrial Estate, Greenock, Scotland PA16 0EQ, United Kingdom    | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-MaineFAB       | 5 Foden Rd. South Portland, ME 04106 USA                                    | Design, development and manufacturing of integrated circuits |
| TEXAS INSTRUMENTS, INC-MIHO, JAPAN    | 350 Kihara, Mihomura, Inashiki, Ibaraki, Japan 300-0496                     | Design, development and manufacturing of integrated circuits |

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Certification body address: 66 Prescott Street, London, E1 8HG, United Kingdom

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Certification



## TEXAS INSTRUMENTS, INC

### ISO 9001:2008

#### Certified Locations

| Site                                      | Address   | Scope   |
|---|---|---|
| TEXAS INSTRUMENTS,<br>INC-SHINJUKU, JAPAN | Nishi-Shinjuku 6-24-1 Mitsui Bldg.<br>160-8366 Shinjuku-ku,<br>Tokyo, Japan | Sales, Marketing  |
| TEXAS INSTRUMENTS,<br>INC-DLP             | 6550 Chase Oaks,<br>Plano TX 75023 USA                                      | Design, order entry, customer service of<br>integrated circuits |

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Certification body address: 66 Prescot Street, London, E1 8HG, United Kingdom  
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| Data Converters              | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>                       |
| DLP® Products                | <a href="http://www.dlp.com">www.dlp.com</a>   |
| DSP                          | <a href="http://dsp.ti.com">dsp.ti.com</a>   |
| Clocks and Timers            | <a href="http://www.ti.com/clocks">www.ti.com/clocks</a>                             |
| Interface                    | <a href="http://interface.ti.com">interface.ti.com</a>                               |
| Logic                        | <a href="http://logic.ti.com">logic.ti.com</a>                                       |
| Power Mgmt                   | <a href="http://power.ti.com">power.ti.com</a>                                       |
| Microcontrollers             | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a>                   |
| RFID                         | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>                                 |
| OMAP Applications Processors | <a href="http://www.ti.com/omap">www.ti.com/omap</a>                                 |
| Wireless Connectivity        | <a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a> |

### Applications

|                               |  |
|-------------------------------|--|
| Automotive and Transportation | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>                         |
| Communications and Telecom    | <a href="http://www.ti.com/communications">www.ti.com/communications</a>                 |
| Computers and Peripherals     | <a href="http://www.ti.com/computers">www.ti.com/computers</a>                           |
| Consumer Electronics          | <a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>                   |
| Energy and Lighting           | <a href="http://www.ti.com/energy">www.ti.com/energy</a>                                 |
| Industrial                    | <a href="http://www.ti.com/industrial">www.ti.com/industrial</a>                         |
| Medical                       | <a href="http://www.ti.com/medical">www.ti.com/medical</a>                               |
| Security                      | <a href="http://www.ti.com/security">www.ti.com/security</a>                             |
| Space, Avionics and Defense   | <a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a> |
| Video and Imaging             | <a href="http://www.ti.com/video">www.ti.com/video</a>                                   |
| <b>TI E2E Community</b>       | <a href="http://e2e.ti.com">e2e.ti.com</a>   |

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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## 特性試験結果資料

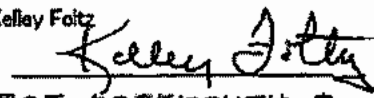
### Specific Test Documents

## 特性試験結果資料

平成28年7月 日

一般財団法人テレコムエンジニアリングセンター殿

申込者  
 (注1)郵便番号 TX 7524  
 住所(本社) 12500 TI Boulevard, Dallas, USA  
 法人名 Texas Instruments Incorporated  
 役職代表者名 ECS Business Unit Manager, Mattias Lange  
 担当部署 T.I. EP EVM Planning Manager  
 責任者名 Kelley Foitz



特定無線設備の試験を実施したので提出します。試験に関する結果のデータの責任については、申込者側にあります。

記

|                           |   |  |
|---------------------------|---|--|
| 1 特定無線設備の種別               | 証明規則第2条第1項第19号 の無線設備  |  |
| 2 型式又は名称                  | CC3200MODR1M2AM0B   |  |
| 3 製造者名                    | Texas Instruments Incorporated  |  |
| 4 製造番号                    | 444M203DE16   |  |
| 5 試験を行った特定無線設備の数          | 1台  |  |
| 6 特定無線設備の電波の型式、周波数及び空中線電力 | G1D: 2412~2472MHz (5MHz 間隔) 0.007 W/MHz<br>D1D, G1D: 2412~2472MHz (5MHz 間隔) 0.004 W/MHz |  |
| 7 実施した試験法(注2)             | 総務大臣の試験法<br>(TELEC 試験法 TELEC-T401 (第 8.1 版))  |  |
| 8 特性試験結果を取得した者(注3)        | 別添参照  |  |
| 9 試験結果(注4、注5)             | 別紙  |  |
| 10 備考                     |   |  |

- 注1 法人又は団体の場合は、その商号又は名称並びに代表者の役職名及び氏名を記載し、印は責任者のものとしてください。
- 注2 実施した試験法は、総務大臣が告示した試験法であればその旨を記入してください。
- 注3 特性試験結果を取得した者は、次の(1)から(4)のいずれかに該当する必要がありますが、該当する内容と取得した者の所属する法人名と氏名等を記載してください。
- (1) 電波法第24条の2に基づく登録点検事業者の点検員である者
  - (2) 電波法第24条の2の別表第一に掲げる条件のいずれかに適合している者
  - (3) ISO17025の認証を取得している試験機関において、試験業務に携わっている者
  - (4) ISO9000シリーズの認証を取得している申込者又は製造工場において、試験業務に携わっている者
- 注4 特性試験結果は、証明規則別表第一号(3)に掲げる項目ごとに数値等で記載して下さい。
- 注5 特性試験の測定に使用した測定器について、較正年月日、較正機関名、型式、名称、製造者名及び製造番号を記載して下さい。

28年 7月 12日

## 特性試験結果を取得した者

特性試験結果を取得した者等は、下記の1に該当するものです。

(注) 下記の1～4

に該当する番号を記載

記

- 1 電波法第24条の2に基づく登録点検事業者の点検員が試験したもので、測定した者の所属する登録点検事業者及び登録番号及び氏名は次のとおり。

- ① 登録点検事業者名 データトラック株式会社
- ② 登録番号 関特第 0045号
- ③ 氏名 佐久間 晃裕

- 2 電波法第24条の2の別表第一に掲げる条件のいずれかに適合している者が測定したもので、測定した者の所属する法人及び資格又は経歴及び氏名は次のとおり。

- ① 法人名
- ② 資格又は経歴 (注)
- ③ 氏名

- 3 ISO17025 の認証を取得している試験機関において、試験業務に携わっている者が測定したもので、測定した者の所属する試験機関及び氏名は次のとおり。

- ① 試験機関名
- ② 氏名

- 4 ISO9000 シリーズ等の認証を取得している申込者又は製造工場において、試験業務に携わっている者が測定したもので、測定した者の所属する法人及び氏名は次のとおり。

- ① 法人名
- ② 氏名

(日本工業規格A列4番)



## 認証に係る特性試験の結果・測定器等

Test Results / Test Equipment

## Test Parameters & Settings

Manufacturer Texas Instruments Incorporated  
Product Name CC3200MODR1M2AMOB  
Serial Number 444M203DE16  
Test Date 5 - 26 July 2016  
Test Location Datatrak Co., Ltd. 5-3-12-404 Toranomom, Minato-ku, Tokyo 105-0001  
Tested by Akihiro SAKUMA

Input Voltage 3.3 VDC

Input Voltage Stability Test

| 電圧変動    |          |    |
|---------|----------|----|
| 入力電圧    | RF部入力※電圧 | 偏差 |
| 3.300 V |          |    |
| 3.630 V |          |    |
| 2.970 V |          |    |

(該当なし)

電圧変動試験を行いました。

Test Environment

Temperature 26 - 27 °C

Humidity 62 - 68 %RH

Antenna Max. Gain 2.50 dBi

Test Cable Loss

| F (GHz) | Loss (dB) |
|---------|-----------|
| 1GHz    | 0.24      |
| 2.4GHz  | 0.34      |
| 5GHz    | 0.53      |
| 8GHz    | 0.80      |
| 20GHz   | 2.31      |

Other

Sample Cable Loss

| F (GHz) | Loss (dB) |
|---------|-----------|
|         |           |
| 2.4GHz  | 0.80      |
| 5GHz    | 1.10      |
|         |           |

Connector Loss 0.4dB

|                 |                                  |       |                              |
|-----------------|----------------------------------|-------|------------------------------|
| 型式又は名称          | CC3200MODR1M2AMOB                | 点検年月日 | 5 - 26 July 2016             |
| 製造番号            | 444M203DE16                      | 点検場所  | 〒105-0001 東京都港区虎ノ門5-3-12-404 |
| 電波の型式・周波数・空中線電力 | G1D : 2412 ~ 2472MHz (5MHz間隔13波) | 備考    | 0.007 W/MHz                  |

| 測定器等                               | 型式又は名称 | 製造番号       | 製造社名                 | 校正年月日     | 校正機関  | 備考                 |
|------------------------------------|--------|------------|----------------------|-----------|-------|--------------------|
| Spectrum Analyzer E4407B           |        | US39390617 | Hewlett Packard      | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Power Meter E4418B                 |        | MY40513126 | Agilent Technologies | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Power Sensor E9300A                |        | US39211743 | Agilent Technologies | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Multimeter 189 True RMS Multimeter |        | 77460133   | Fluke Corporation    | 2016/5/13 | TELEC | 電波法第24条の2第4項第2号(イ) |

| 試験電圧    | V      | 常圧-10%(+2.97VDC) |           | 常圧(+3.3VDC) |           | 常圧+10%(+3.63VDC) |           | 備考                                   |
|---------|--------|------------------|-----------|-------------|-----------|------------------|-----------|--------------------------------------|
|         |        | 2412.000         | 2442.000  | 2412.000    | 2442.000  | 2412.000         | 2442.000  |                                      |
| 試験周波数   | MHz    | 2412.000         | 2442.000  | 2412.000    | 2442.000  | 2412.000         | 2442.000  | 試験周波数は低、中、高とします。                     |
| 周波数の偏差  | MHz    | 2411.9830        | 2441.9810 | 2411.9820   | 2441.9830 | 2411.9810        | 2441.9800 | 測定結果の最悪値を発生する于一秒速度に設定していません。         |
| 占有周波数帯幅 | MHz    | 13.986           | 14.092    | 14.016      | 14.089    | 14.007           | 13.975    | (DSSS, OFDM <26MHz); (FH, <83.5MHz)  |
| 拡散帯域幅   | MHz    | 9.904            | 9.186     | 9.119       | 9.182     | 9.120            | 9.181     | (DSSS, >500kHz); (FH, >500kHz)       |
| 拡散率     | -      | 7.203            | 6.680     | 6.632       | 6.678     | 6.633            | 6.677     | 1.375MSS/s (CCK), 1.0MSS/s BPSK QPSK |
| 電波特性試験  | uW/MHz | 0.051            | 0.068     | 0.050       | 0.073     | 0.052            | 0.095     | 30MHz-2387MHz (<2.5uW/MHz)           |
| 電波特性試験  | MHz    | 2387.00          | 2366.00   | 2314.00     | 2388.00   | 2335.00          | 2361.00   | 2387MHz-2400MHz (<25uW/MHz)          |
| 電波特性試験  | uW/MHz | 0.297            | 0.047     | 0.061       | 0.060     | 0.070            | 0.054     | 2483.5MHz-2496.5MHz (<25uW/MHz)      |
| 電波特性試験  | MHz    | 2387.26          | 2387.29   | 2395.80     | 2387.34   | 2388.42          | 2396.55   | 2496.5MHz-12.5GHz (<2.5uW/MHz)       |
| 電波特性試験  | uW/MHz | 0.065            | 0.061     | 0.047       | 0.065     | 0.048            | 0.060     | 100% duty cycle power (<10mW/MHz)    |
| 電波特性試験  | MHz    | 2488.54          | 2484.41   | 2487.02     | 2484.15   | 2486.98          | 2485.28   | 10MHz-1GHz (<4nW)                    |
| 電波特性試験  | MHz    | 2527.00          | 2527.00   | 2497.00     | 2597.00   | 2497.00          | 2517.00   | 1GHz-12.5GHz (<20nW)                 |
| 電波特性試験  | mW/MHz | 4.6699           | 6.5040    | 4.3112      | 6.8142    | 4.2792           | 6.5951    | 0.4s 以下、FH 以外は対象外                    |
| 電波特性試験  | %      | -33.3            | -7.1      | -38.4       | -2.7      | -38.9            | -5.8      |                                      |
| 電波特性試験  | nW     | 0.321            | 0.296     | 0.341       | 0.345     | 0.305            | 0.323     |                                      |
| 電波特性試験  | MHz    | 571.30           | 614.30    | 665.50      | 621.80    | 889.10           | 866.00    |                                      |
| 電波特性試験  | nW     | 5.035            | 5.093     | 4.753       | 4.831     | 4.613            | 4.667     |                                      |
| 電波特性試験  | MHz    | 2890.00          | 2890.00   | 2970.00     | 2980.00   | 2980.00          | 2970.00   |                                      |
| 電波特性試験  | sec    | -                | -         | -           | -         | -                | -         |                                      |
| 電波特性試験  | -      | 良                | 良         | 良           | 良         | 良                | 良         |                                      |

別表1: CC3200MODR1M2AMOB 1Mbps BPSK

| 点検の結果 | 電 気 特 性 | 試験電圧<br>V | 常圧 (+2.97VDC)  |              | 常圧 (+3.3VDC) |                | 常圧 +10% (+3.63VDC) |        | 備考     |                                     |
|-------|---------|-----------|----------------|--------------|--------------|----------------|--------------------|--------|--------|-------------------------------------|
|       |         |           | 占有周波数帯幅<br>MHz | 拡散帯域幅<br>MHz | 拡散率          | 占有周波数帯幅<br>MHz | 拡散帯域幅<br>MHz       | 拡散率    |        | 占有周波数帯幅<br>MHz                      |
|       |         |           | 14.018         | 14.108       | 14.000       | 14.004         | 14.104             | 14.008 | 14.012 | [DSSS, OFDM <26MHz]; (FH, <83.5MHz) |
|       |         |           | 9.123          | 9.186        | 9.101        | 9.112          | 9.188              | 9.109  | 9.091  | [DSSS, >500kHz]; (FH, >500kHz)      |
|       |         |           | -              | -            | 9.101        | 9.112          | 9.188              | 9.109  | 9.091  | 1.375MS/s (CCK), 1.0MS/s BPSK QPSK  |

別表2: CC3200MODR1M2AMOB 2Mbps QPSK

| 点検の結果 | 電 気 特 性 | 試験電圧<br>V | 常圧 (+2.97VDC)  |              | 常圧 (+3.3VDC) |                | 常圧 +10% (+3.63VDC) |        | 備考     |                                     |
|-------|---------|-----------|----------------|--------------|--------------|----------------|--------------------|--------|--------|-------------------------------------|
|       |         |           | 占有周波数帯幅<br>MHz | 拡散帯域幅<br>MHz | 拡散率          | 占有周波数帯幅<br>MHz | 拡散帯域幅<br>MHz       | 拡散率    |        | 占有周波数帯幅<br>MHz                      |
|       |         |           | 13.940         | 14.125       | 14.022       | 13.965         | 14.136             | 14.001 | 14.016 | [DSSS, OFDM <26MHz]; (FH, <83.5MHz) |
|       |         |           | 9.144          | 9.226        | 9.197        | 9.101          | 9.225              | 9.182  | 9.121  | [DSSS, >500kHz]; (FH, >500kHz)      |
|       |         |           | -              | -            | 9.197        | 9.101          | 9.225              | 9.182  | 9.121  | 1.375MS/s (CCK), 1.0MS/s BPSK QPSK  |

|                 |  |       |                              |
|-----------------|--|-------|------------------------------|
| 型式又は名称          | CC3200MODR1M2AMOB                                  | 点検年月日 | 5-11 July 2016               |
| 製造番号            | 444M203DE16  | 点検場所  | 〒105-0001 東京都港区虎ノ門5-3-12-404 |
| 電波の型式・周波数・空中線電力 | D1D, G1D : 2412~2472MHz (5MHz間隔13波)<br>0.004 W/MHz | 備考    |                              |

| 測定器等                               | 型式又は名称 | 製造番号       | 製造社名                 | 校正年月日     | 校正機関  | 備考                 |
|------------------------------------|--------|------------|----------------------|-----------|-------|--------------------|
| Spectrum Analyzer E4407B           |        | US3390617  | Hewlett Packard      | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Power Meter E44188                 |        | MY40513126 | Agilent Technologies | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Power Sensor E8300A                |        | US39211743 | Agilent Technologies | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Multimeter 189 True RMS Multimeter |        | 77460133   | Fluke Corporation    | 2016/5/13 | TELEC | 電波法第24条の2第4項第2号(イ) |

| 試験電圧            | V       | 常圧 (+3.3VDC) |           |           | 常圧 +10% (+3.63VDC) |           |           | 備考   |  |
|-----------------|---------|--------------|-----------|-----------|--------------------|-----------|-----------|--|--|
|                 |         | 2412.000     | 2442.000  | 2472.000  | 2412.000           | 2442.000  | 2472.000  |  |  |
| 試験周波数           | MHz     | 2411.9830    | 2441.9810 | 2471.9820 | 2411.9820          | 2441.9830 | 2471.9810 | 試験周波数は低、中、高とします。                                 |  |
| 周波数の偏差          | Ppm     | -7.05        | -7.78     | -7.28     | -7.46              | -6.96     | -7.69     | 測定結果の最悪値を発生する一々速度に設定していま<br>す。<br>-7.69 (<50ppm) |  |
| 占有周波数帯幅         | MHz     | 16.524       | 17.107    | 16.692    | 16.466             | 17.114    | 16.596    | 16.613 (DSSS, OFDM <26MHz); (FH, <83.5MHz)       |  |
| 拡散帯域幅           | MHz     | 13.458       | 13.692    | 13.618    | 13.633             | 13.832    | 13.567    | 13.562 (DSSS, >500kHz); (FH, >500kHz)            |  |
| 拡散率             | -       | -            | -         | -         | -                  | -         | -         | 1.375MS/s (CCK), 1.0MS/s BPSK QPSK               |  |
| 電気特性試験<br>点検の結果 | uW/MHz  | 0.265        | 0.068     | 0.063     | 0.312              | 0.070     | 0.070     | 0.096  |  |
|                 | MHz     | 2387.60      | 2361.00   | 2314.00   | 2387.00            | 2359.60   | 2314.00   | 2361.00  |  |
|                 | uW/MHz  | 11.324       | 0.140     | 0.072     | 13.459             | 0.128     | 0.078     | 0.098  |  |
|                 | MHz     | 2490.30      | 2466.78   | 2464.16   | 2495.86            | 2466.92   | 2484.19   | 2484.18  |  |
| uW/MHz          | 0.041   | 0.049        | 0.899     | 0.040     | 0.062              | 0.733     | 0.062     | 2483.5MHz-2496.5MHz (<25uW/MHz)                  |  |
| MHz             | 2497.00 | 2517.00      | 2497.00   | 2497.00   | 2577.00            | 2497.00   | 2587.00   | 2496.5MHz-12.5GHz (<2.5uW/MHz)                   |  |
| 空中線電力偏差         | mW/MHz  | 1.8091       | 3.3839    | 2.1937    | 1.6682             | 3.2847    | 2.0790    | 2.3087   |  |
| %               |         | -54.8        | -15.4     | -45.2     | -58.3              | -17.9     | -48.0     | -42.3  | 100% duty cycle power (<10mW/MHz)<br>-80% 以上、+20% 以下 |
| nW              |         | 0.321        | 0.295     | 0.341     | 0.330              | 0.345     | 0.305     | 0.316  | 10MHz-1GHz (<4nW)                                    |
| MHz             |         | 571.30       | 614.90    | 656.50    | 592.10             | 621.80    | 688.10    | 836.70   |  |
| nW              |         | 5.035        | 5.093     | 4.753     | 5.070              | 4.831     | 4.613     | 4.786  | 1GHz-12.5GHz (<20nW)                                 |
| MHz             |         | 2990.00      | 2980.00   | 2970.00   | 2980.00            | 2980.00   | 2980.00   | 2980.00  |  |
| sec             |         | -            | -         | -         | -                  | -         | -         | -  | 0.4s 以下、FH以外は対象外                                     |
| 混信防止機能確認試験      |         | 良            | 良         | 良         | 良                  | 良         | 良         | 良  |  |

|                 |                                     |       |                              |
|-----------------|-------------------------------------|-------|------------------------------|
| 型式又は名称          | CC3200MODR1M2AMOB                   | 点検年月日 | 5-11 July 2016               |
| 製造番号            | 444M203DE16                         | 点検場所  | 〒105-0001 東京都港区虎ノ門5-3-12-404 |
| 電波の型式・周波数・空中線電力 | D1D, G1D : 2412~2472MHz (5MHz間隔13波) | 備考    | 0.004 W/MHz                  |

| 測定器等                               | 型式又は名称 | 製造番号       | 製造社名                 | 校正年月日     | 校正機関  | 備考                 |
|------------------------------------|--------|------------|----------------------|-----------|-------|--------------------|
| Spectrum Analyzer E4407B           |        | US39390617 | Hewlett Packard      | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Power Meter E4418B                 |        | MY40513126 | Agilent Technologies | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Power Sensor E9300A                |        | US39211743 | Agilent Technologies | 2016/1/15 | TELEC | 電波法第24条の2第4項第2号(イ) |
| Multimeter 189 True RMS Multimeter |        | 77460133   | Fiuke Corporation    | 2016/5/13 | TELEC | 電波法第24条の2第4項第2号(イ) |

| 試験電圧                    | V                 | 常圧-10% (+2.97VDC) |           |           | 常圧 (+3.3VDC) |           |           | 常圧+10% (+3.83VDC) |           |           | 備考                                  |
|-------------------------|-------------------|-------------------|-----------|-----------|--------------|-----------|-----------|-------------------|-----------|-----------|-------------------------------------|
|                         |                   | 2412.000          | 2442.000  | 2472.000  | 2412.000     | 2442.000  | 2472.000  | 2412.000          | 2442.000  | 2472.000  |                                     |
| 試験周波数                   | MHz               | 2412.9830         | 2441.9810 | 2471.9820 | 2411.9820    | 2441.9830 | 2471.9810 | 2411.9820         | 2441.9800 | 2471.9810 | 試験周波数は低、中、高とします。                    |
| 周波数の偏差                  | Ppm               | -7.05             | -7.78     | -7.28     | -7.46        | -6.96     | -7.69     | -7.46             | -8.19     | -7.69     | 測定結果の最高値を発生する于一秒速度に設定しています。         |
| 占有周波数帯幅                 | MHz               | 17.557            | 17.839    | 17.587    | 17.552       | 17.747    | 17.577    | 17.555            | 17.828    | 17.552    | (DSSS, OFDM <20MHz); (FH, <83.5MHz) |
| 拡散帯域幅                   | MHz               | 14.319            | 14.521    | 14.408    | 14.420       | 14.548    | 14.365    | 14.376            | 14.543    | 14.280    | (DSSS, >500kHz); (FH, >500kHz)      |
| 拡散率                     | -                 | -                 | -         | -         | -            | -         | -         | -                 | -         | -         | 1.375MS/s (CCK), 1.0MS/s BPSK QPSK  |
| 電気特性試験<br>点検の結果         | RF 出力発射の強度<br>および | 0.332             | 0.065     | 0.047     | 0.300        | 0.055     | 0.052     | 0.359             | 0.056     | 0.055     | 30MHz-2387MHz (<2.5uW/MHz)          |
|                         | RF 出力の周波数         | 2387.00           | 2366.00   | 2312.00   | 2387.00      | 2366.00   | 2387.00   | 2387.00           | 2363.00   | 2378.00   |                                     |
|                         |                   | 8.356             | 0.077     | 0.061     | 9.750        | 0.087     | 0.067     | 9.162             | 0.078     | 0.065     | 2387MHz-2400MHz (<25uW/MHz)         |
|                         |                   | 2389.84           | 2399.90   | 2392.98   | 2398.83      | 2400.00   | 2396.20   | 2399.84           | 2399.94   | 2394.02   |                                     |
|                         |                   | 2496.73           | 2483.82   | 2483.60   | 2487.67      | 2483.55   | 2482.36   | 2490.44           | 2484.64   | 2483.86   | 2483.5MHz-2496.5MHz (<25uW/MHz)     |
| 空中線電力偏差                 | mW/MHz            | 0.032             | 0.041     | 1.406     | 0.043        | 0.053     | 1.079     | 0.048             | 0.075     | 0.670     | 2496.5MHz-12.5GHz (<2.5uW/MHz)      |
|                         | MHz               | 2557.00           | 2607.00   | 2497.00   | 2567.00      | 2597.00   | 2497.00   | 2567.00           | 2597.00   | 2497.00   | 100% duty cycle power (<10mW/MHz)   |
|                         | %                 | -65.9             | -38.1     | -57.2     | -65.8        | -38.5     | -58.0     | -66.2             | -38.4     | -58.3     | -80% 以上、+20% 以下                     |
|                         | nW                | 0.321             | 0.295     | 0.341     | 0.330        | 0.345     | 0.305     | 0.330             | 0.323     | 0.316     | 10MHz-1GHz (<4nW)                   |
| 副次的に発する電波等の<br>限度および周波数 | MHz               | 571.30            | 614.90    | 666.50    | 592.10       | 621.80    | 689.10    | 666.50            | 606.00    | 836.70    |                                     |
|                         | nW                | 5.035             | 5.093     | 4.753     | 5.070        | 4.831     | 4.613     | 4.667             | 6.081     | 4.786     | 1GHz-12.5GHz (<20nW)                |
|                         | MHz               | 2980.00           | 2980.00   | 2970.00   | 2980.00      | 2980.00   | 2980.00   | 2960.00           | 2970.00   | 2980.00   |                                     |
| ホッピング周波数帯留時間            | sec               | -                 | -         | -         | -            | -         | -         | -                 | -         | -         | 0.4s 以下、FH 以外は対象外                   |
| 混信防止機能確認試験              | -                 | 良                 | 良         | 良         | 良            | 良         | 良         | 良                 | 良         | 良         |                                     |