

## **SPECIFICATIONS**

**PRODUCT NAME : Dual Band 2T2R MIMO Wi-Fi Module**

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**MODEL NAME : TWFM-B005D**

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This module will be installed in only TV for Wi - Fi communication.



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**SPECIFICATION**

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## 1. Features

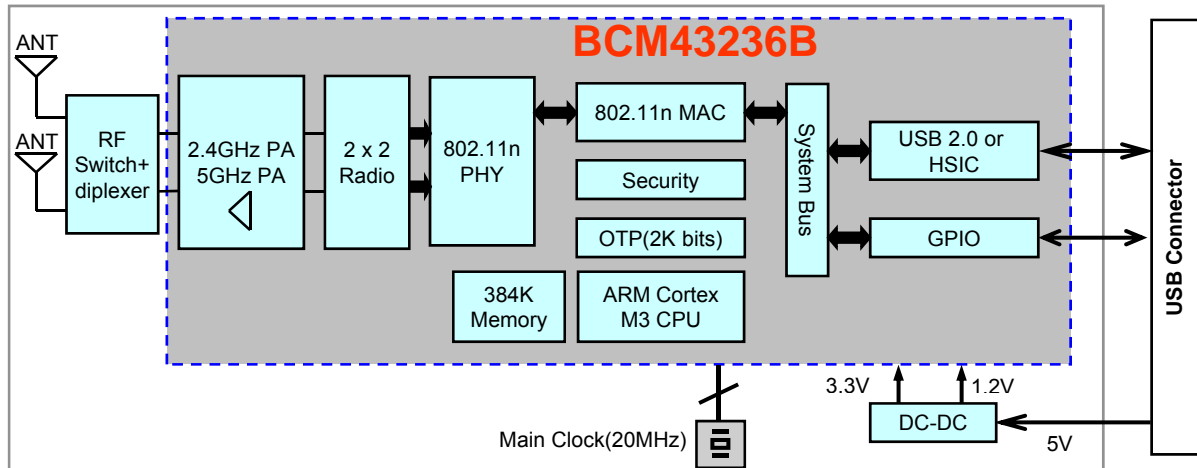
TWFM-B005D is the small size and low power module for IEEE 802.11a/b/g/n wireless LAN. TWFM-B005D is based on Broadcom BCM43236B solution.

- IEEE 802.11 a/b/g/n Dual Band WLAN infrastructure
- Size : 90mm x 16mm x 6.45mm
- 2.4GHz and 5GHz internal PA
- Two stream spatial multiplexing up to 300Mbps
- PIFA ANT (2T2R MIMO)
- Use on-chip OTP (One-Time Programmable)
- USB 2.0
- Supports drivers for Windows Vista, 2000, XP, Linux
- Security : WPA,WPA2,AES(TKIP) ,IEEE 802.1X
- Application: DTV, DVR, HD DVD Player, Blue-ray Disk Player, STB

## 2. Ordering Information

Model	Description
TWFM-B005D	Wi-Fi Module, Dual Band 2T2R MIMO

### 3. Block Diagram



< Fig.1 Hardware Block Diagram >

### 4. Absolute Maximum Ratings

**Caution** : The specifications in Table 1 define levels at which permanent damage to the device can occur. Function operation is not guaranteed under these conditions.

Operating at absolute maximum conditions for extend periods can adversely affect the long-term reliability of the device.

Parameter	Min	Max	Unit
Storage Temperature	-10	+80	°C
Storage Humidity (40°C)	-	90	%

< Table 1 Absolute Maximum Ratings >

. Other conditions

- 1) Do not use or store modules in the corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are contained.  
Also, avoid exposure to moisture.
- 2) Store the modules where the temperature and relative humidity do not exceed 5 to 40°C and 20 to 60%.
- 3) Assemble the modules within 6 months.  
Check the soldering ability in case of 6 months over.

## 5. Operating Conditions

Parameter		Min	Typ	Max	Unit
Operating Temperature		-10	-	+60	°C
Operating Humidity		-	-	85	%
Supply Voltage	VDD_5V	4.5	5.0	5.5	Vdc

## 6. Standard Test Conditions

The Test for electrical specification shall be performed under the following condition unless otherwise specified.

1). Ambient condition

- . Temperature :  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$
- . Humidity :  $65\% \pm 5\% \text{ R.H.}$

2). Power supply voltages

- . 5V ( $\pm 5\%$ ) input power at the Module

3). Current consumption over recommended range of supply voltage and operating conditions is like below.

When it's tested, it must be supplied more than 2 times of maximal current.

FCC (Federal Communications Commission)

WARNING: This equipment may generate or use radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

This device complies with Part 15 of the FCC's Rules. Operation is subject to the following two Conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesirable operation.

To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end product.

Contains Transmitter module FCC ID: YZP - TWFMB005D

The antenna must be installed such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. End users cannot modify this transmitter device. Any Unauthorized modification could void the user's authority to operate this device.

## 7. Electrical Specifications

### 1) DC Characteristics

Current Consumption	Min.	Typ.	Max.	Unit
TX Mode ( MCS7)	-	470	-	mA
Idle and Associated state	-	215	-	
Radio disabled state	-	100	-	

### 2) RF Characteristics for IEEE802.11b ( 11Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS/CCK			
Channel frequency	2400 ~ 2483 MHz			
Data rate	1,2,5.5,11Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	13	15	17	dBm
Spectrum Mask				
1 <sup>st</sup> side lobes ( to fc $\pm$ 11MHz)	-	-43	-30	dBr
2 <sup>nd</sup> side lobes ( to fc $\pm$ 22MHz)	-	-58	-50	dBr
Modulation Accuracy (EVM)	-	30	35	%
Power On/Off ramp	-	0.5	2.0	usec
Freq. Tolerance	-25	-	25	ppm
Chip Clock Freq. Tolerance	-25	-	25	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (FER $\leq$ 8%)		-88	-76	dBm
Maximum Input Level (FER $\leq$ 8%)	-10	-	-	dBm

\* Normal Condition : 25°C, VDD=5V.

**3) RF Characteristics for IEEE802.11g ( 54Mbps mode unless otherwise specified)**

Items	Contents			
Specification	IEEE502.11g			
Mode	OFDM			
Channel frequency	2400 ~ 2483.5 MHz			
Data rate	6,9,12,18,24,36,48,54Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	13	15	17	dBm
Spectrum Mask				
at $f_c \pm 11\text{MHz}$	-	-32	-20	dBr
at $f_c \pm 20\text{MHz}$	-	-43	-28	dBr
at $f_c \geq \pm 30\text{MHz}$	-	-48	-40	dBr
Constellation Error (EVM)	-	-34	-25	dB
Freq. Tolerance	-20	-	20	ppm
Chip Clock Freq. Tolerance	-20	-	20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (PER $\leq$ 10%)	-	-75	-65	dBm
Maximum Input Level (PER $\leq$ 10%)	-20	-	-	dBm

\* Normal Condition : 25°C, VDD=5V.



**4) RF Characteristics for IEEE802.11a ( 54Mbps mode unless otherwise specified)**

Items	Contents			
Specification	IEEE802.11a			
Mode	OFDM			
Channel frequency	5150~5250MHz, 5725 ~ 5850MHz			
Data rate	6,9,12,18,24,36,48,54Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	11	13	15	dBm
Spectrum Mask				
at $f_c \pm 11\text{MHz}$	-	-32	-20	dBr
at $f_c \pm 20\text{MHz}$	-	-43	-28	dBr
at $f_c \geq \pm 30\text{MHz}$	-	-48	-40	dBr
Constellation Error (EVM)	-	-34	-25	dB
Freq. Tolerance	-20	-	20	ppm
Chip Clock Freq. Tolerance	-20	-	20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (PER $\leq$ 10%)	-	-72	-65	dBm
Maximum Input Level (PER $\leq$ 10%)	-30	-	-	dBm

\* Normal Condition : 25°C, VDD=5V.

**5) RF Characteristics for IEEE802.11an (MCS7 mode unless otherwise specified)**

Items	Contents			
Specification	IEEE802.11n – 5GHz			
Mode	OFDM			
Channel frequency	5150~5250MHz, 5725 ~ 5850MHz			
Data rate	~135Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (HT20 / HT40 : MCS7)	11	13	15	dBm
Spectrum Mask (HT20)				
at $f_c \pm 11\text{MHz}$	-	-32	-20	dBr
at $f_c \pm 20\text{MHz}$	-	-35	-28	dBr
at $f_c \pm 30\text{MHz}$	-	-45	-40	dBr
Constellation Error (EVM)	-	-32	-28	dB
Freq. Tolerance	-20	-	20	ppm
Chip Clock Freq. Tolerance	-20	-	20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (HT20, PER $\leq 10\%$ )	-	-71	-64	dBm
Minimum Input Level Sens. (HT40, PER $\leq 10\%$ )	-	-68	-61	dBm
Maximum Input Level (PER $\leq 10\%$ )	-30	-	-	dBm

\* Normal Condition : 25°C, VDD=5V.

**6) RF Characteristics for IEEE802.11gn ( MCS7 mode unless otherwise specified)**

Items	Contents			
Specification	IEEE802.11n – 2.4GHz			
Mode	OFDM			
Channel frequency	2400 ~ 2483.5 MHz			
Data rate	6.5,13,19.5,26,39,52,58.5,65Mbps			
<b>TX Characteristics</b>	Min.	Typ.	Max.	Unit
Power Level (HT20/HT40 : MCS7)	11	13	15	dBm
Spectrum Mask (HT20)				
at $f_c \pm 11\text{MHz}$	-	-32	-20	dBr
at $f_c \pm 20\text{MHz}$	-	-35	-28	dBr
at $f_c \pm 30\text{MHz}$	-	-45	-40	dBr
Constellation Error (EVM)	-	-32	-28	dB
Freq. Tolerance	-20	-	20	ppm
Chip Clock Freq. Tolerance	-20	-	20	ppm
<b>RX Characteristics</b>	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (HT20,PER $\leq$ 10%)	-	-73	-64	dBm
Minimum Input Level Sens. (HT40,PER $\leq$ 10%)	-	-70	-62	dBm
Maximum Input Level (PER $\leq$ 10%)	-20	-	-	dBm

\* Normal Condition : 25°C, VDD=5V.

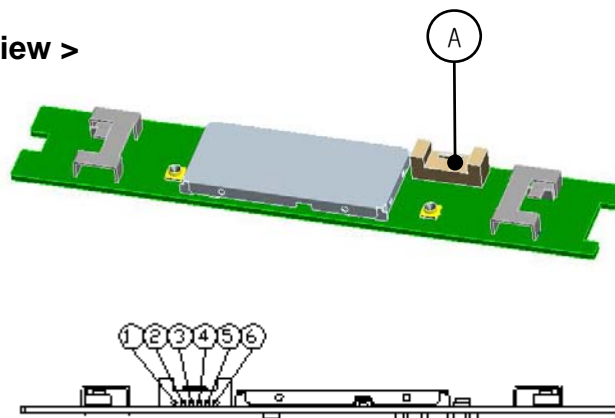
## 8. Environment Tests

Item	Test Conditions	Specifications
Heat Load Test	Initial values are measured at standard test condition. Leave samples in $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for $500 \pm 5$ hours, and in standard test condition for 30 minutes, then take measurements within 1 hour. - Supply voltage : standard $\pm 5\%$ - Supply voltage cycle : 1.5h on, 0.5h off	
Humidity Load Test	Initial values are measured at standard test condition. Leave samples in $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , 90 ~ 95% RH for $96 \pm 5$ hours, and in standard test condition for 30 minutes, then take measurements within 1 hour. - Supply voltage : standard + 5% - Supply voltage cycle : 1.5h on, 0.5h off	•TX Power : $\pm 4\text{dB Max}$  • Min Input Level : $\pm 4\text{dB Max}$
Cold Test	Initial values are measured at standard test condition. Leave samples in $-10^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for $96 \pm 5$ hours, and in standard ambient for 1 hour with standard power Supply then take measurements within 1 hour.	
Temperature Shock	Take measurements in standard test condition. Temp. : $-10^{\circ}\text{C} \sim +80^{\circ}\text{C}$ Duration : 30 min Ramp-up & Ramp-down for 5 min Cycle : 100cycle.	

## 9. Pin Description

Pin No.	Pin Name	I/O	Pin Description
1	VDD	I	VDD 5V
2	USB_DN	I/O	USB Communication signal USB_DN
3	USB_DP	I/O	USB Communication signal USB_DP
4	GND	-	GND
5	WoWLAN	O	Wake-On - Wireless LAN
6	GND	-	GND

< TOP View >



**Note.**

- 1) Recommend a Module install sequence for prevent USB device failure
  - Supply 5V power
  - Connect to data signal (USB\_DP, USB\_DN)
- 2) If remove the module, proceed in reverses sequence
- 3) Connector (A) : A1257WR0-6PS (JWT)

## 10. S/W

The module is controlled by wl command. It is intended for those evaluating and/or testing Broadcom's IC, describes a subset of the commands available in wl, the Broadcom ® WLAN client utility.

### 1) Command Syntax

The syntax is as follows:

```
wl <adapter> [-h] [-d|u|x] <command> [arguments]
```

where

- h this message and command descriptions
- d output format signed integer
- u output format unsigned integer
- x output format hexadecimal

The [h,u] option is only to print help.

Other syntax specifics are as follows:

- Entries within square brackets, such as [arguments], are optional. In the above example, switches within brackets, such as -h, are typed as shown. The |symbol should not be typed, it represents the word or.
- Entries within angle brackets, such as <adapter>, are required and indicate that a value must be inserted in place of the item contained within the angle brackets.
- Entries shown outside of either square or angle brackets are to be typed as shown.

### 2) Command List and Version

#### • CMDS

Syntax: wl cmds

Purpose: Generates a list of available commands.

Parameters:None

Returns: All commands available to the attached 43XX chip.

#### • VER

Syntax: wl ver

Purpose: Generates a list of available commands.

Parameters:None

Returns: All commands available to the attached 43XX chip.

• **Please refer to '80211-TI201-R' technical document of Broadcom to other commands.**

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**11. Assembly Drawing**
