W-LAN Module Data Sheet

Cypress WLAN Chipset + STMicro MCU

Sample P/N : LBWB1ZZYDZ-TEMP

MP P/N : LBWB1ZZYDZ-740

Preliminary
< Specification may be changed by Murata without notice >
Murata Manufacturing Co., Ltd.

The revision history of the product specification

Issued Date	Revision Code	Revision Page	Changed Items	Change Reason
Apr.18.2013			First Issue	
Aug.11.2014	A	13 14	10.2 Schematic 10.3. Boot mode selection	
Aug.27.2014	B	13	10.2 Schematic	

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Please be aware that an important notice concerning availability, standard warranty and use in critical applications of Murata products and disclaimers thereto appears at the end of this specification sheet.

1. Scope

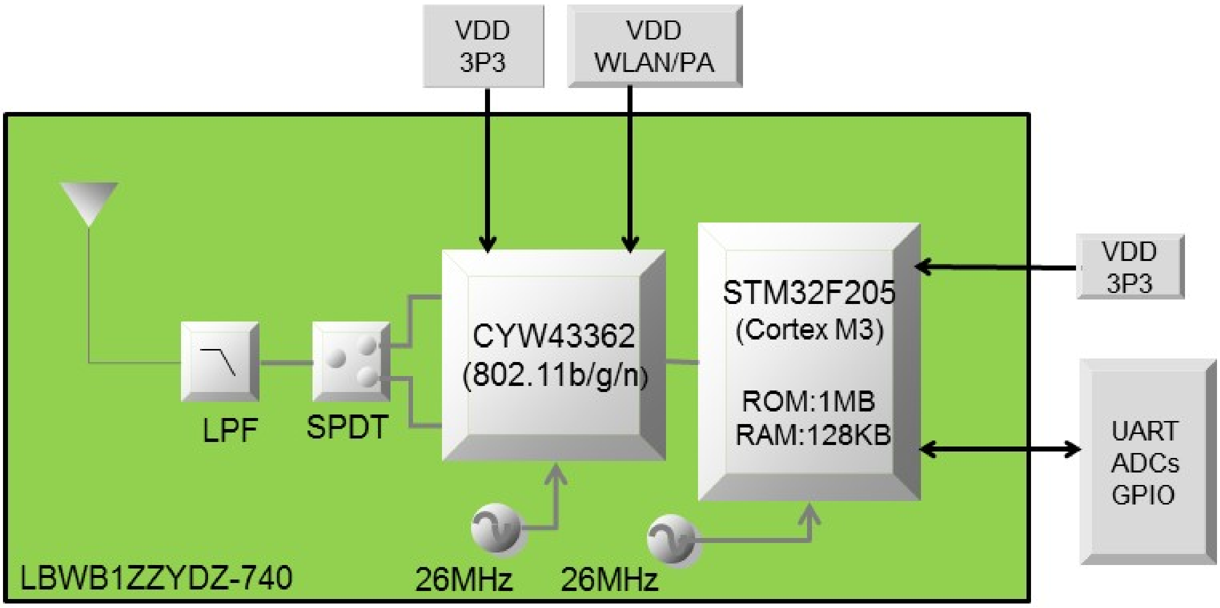
This specification is applied to the IEEE802.11b/g/n W-LAN + STM32F205 MCU complete module (WLAN smart module).

- Interface	: UART
- IC	: Cypress/CYW43362 + STMicro/STM32F205
- RoHS	: This module is compliant with the RoHS directive.

2. Part Number

Sample Part Number	MP Part Number
LBWB1ZZYDZ-TEMP	LBWB1ZZYDZ-740

3. Block Diagram


VDD
3P3
VDD
WLAN/PA
LPF
SPDT
CYW43362
(802.11b/g/n)
STM32F205
(Cortex M3)
ROM:1MB
RAM:128KB
VDD
3P3
UART
ADCs
GPIO
LBWB1ZZYDZ-740
26MHz
26MHz

4. Certification Information

4.1. FCC/IC

FCC ID is VPYLBYD. And IC ID is 772C-LBYD.

FCC/IC ID is not marked on the module.
To make FCC/IC certification of the module valid on the customer's product, please refer to these documents.
- Installation Manual of LBWA1ZVYDZ Certification.pdf
- LBWA1ZVYDZ Antenna Specification.pdf

4.2. TELEC

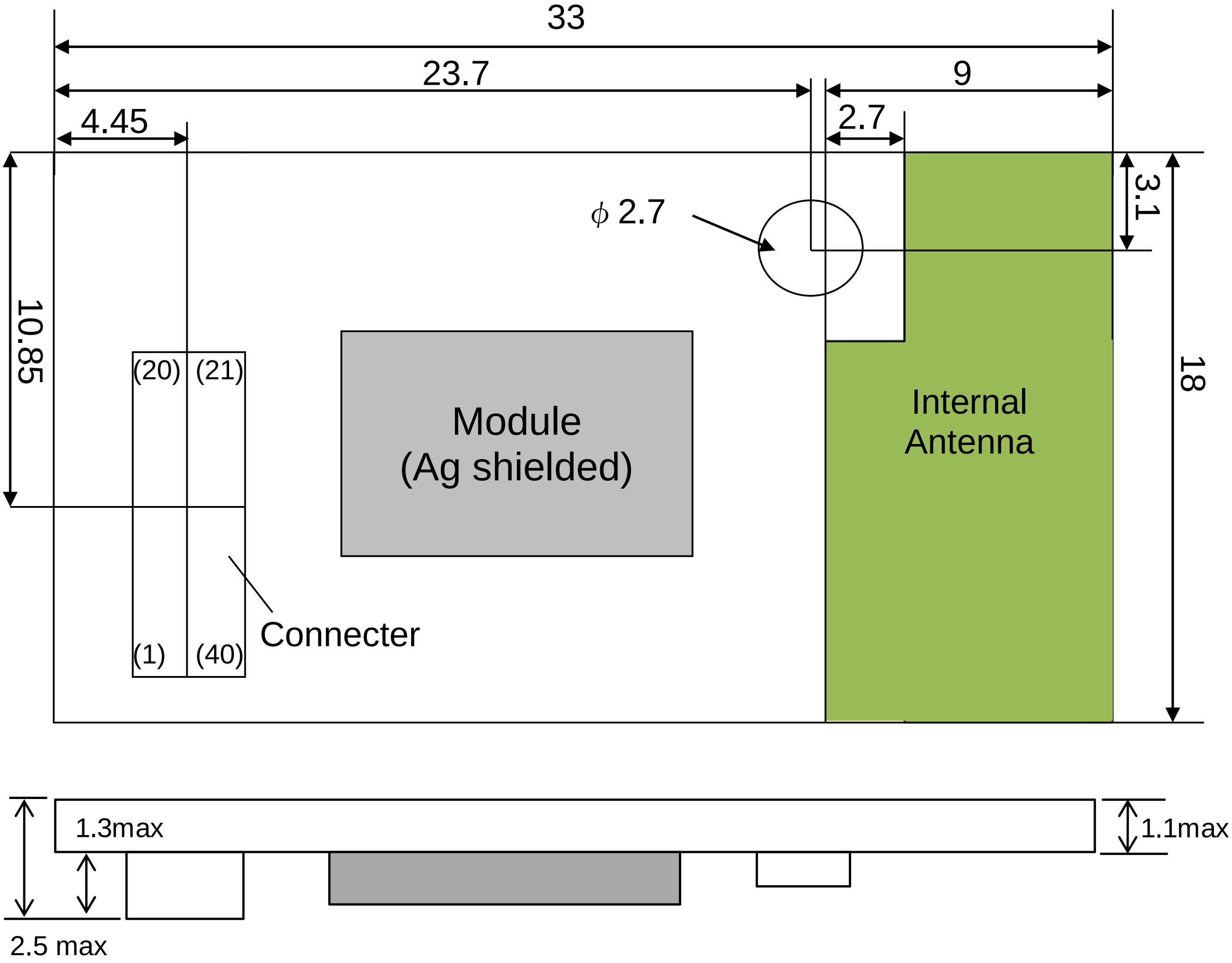
TELEC ID is 001-P00408 and marked on the module.

4.3. R&TTE

EN300328 v1.7.1 conducted test report is prepared.

5. Dimensions, Marking and Terminal Configurations

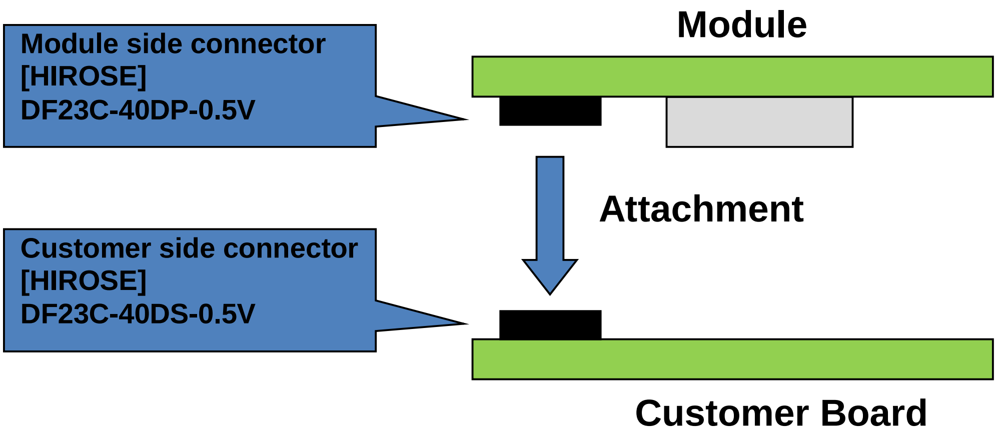
5.1. Dimension


33
23.7
9
4.45
2.7
ϕ 2.7
3.1
10.85
18
(20)
(21)
(1)
(40)
Module
(Ag shielded)
Internal
Antenna
Connecter
1.3max
1.1max
2.5 max

(unit : mm)

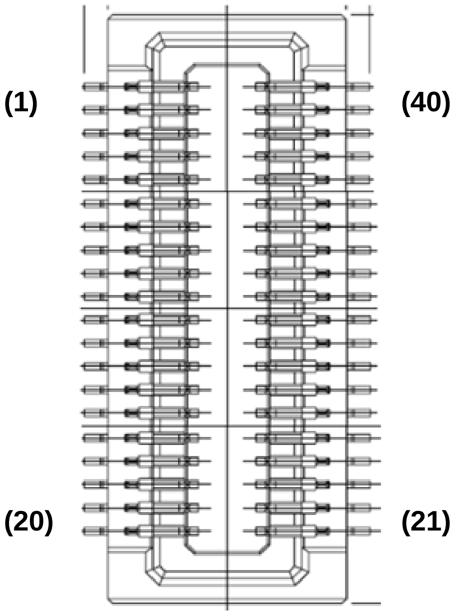
5.2. Connector

P/N: DF23C-40DP-0.5V (mounted on Murata module)
P/N: DF23C-40DS-0.5V (mounted on Customer board)
Maker: HIROSE Electric


Module
Module side connector
[HIROSE]
DF23C-40DP-0.5V
Attachment
Customer side connector
[HIROSE]
DF23C-40DS-0.5V
Customer Board

5.3. Terminal Configurations

Terminal Configuration looked from a board implementation side of the customer



No.	Terminal Name	Type	Connection to MCU	Connection to WLAN IC	Description
1	GND	-	GND	GND	Ground
2	NRST	I	NRST		MCU reset Internally pulled up.
3	RTC_AF1	I/O	PC13		Do not connect.
4	OSC32_IN	I/O	PC14		Do not connect
5	OSC32_OUT	I/O	PC15		Do not connect
6	GND	-	GND	GND	Ground
7	GPIO11	I/O	PB14		GPIO.
8	GPIO10	I/O	PB15		GPIO
9	GPIO9	I/O	PB13		GPIO
10	GND	-	GND	GND	Ground
11	UART1_TX	O	PA9		UART Tx
12	UART1_RX	I	PA10		UART Rx
13	GND	-	GND	GND	Ground
14	GND	-	GND	GND	Ground
15	JTMS	I	PA13		JTAG Test Mode.

16	NJTRST	I	PB4		JTAG Test Reset.
17	JTDO	I	PB3		JTAG Test data Out.
18	JTDI	O	PA15		JTAG Test data In.
19	JTCK	I	PA14		JTAG Test Clock.
20	VDD_WLAN	PI	-	SR_VDDBAT1/ SR_VDDBAT2	Power supply for WLAN IC
21	VDD_PA	PI	-	WRF_PA_VDD/ WRF_PADRV_ VDD	Power supply for Internal Power Amplifier
22	VDD_PA	PI	-		
23	VDD_3P3	PI	VDD	VDDIO/VDDIO_ SD	Power supply for MCU VDD and Digital IO
24	BOOT0	I	BOOT0		See [10.3. Boot mode selection]
25	UART1_CTS	I	PA11		UART CTS. Test pad if not in use
26	UART1_RTS	O	PA12		UART RTS. Test pad if not in use
27	GND	-	GND	GND	Ground
28	GND	-	GND	GND	Ground
29	GND	-	GND	GND	Ground
30	BOOT1	I	PB2/BOOT1		See [10.3. Boot mode selection]
31	GPIO8	I/O	PA5		GPIO
32	GPIO7	I/O	PA7		GPIO
33	GPIO6	I/O	PA6		GPIO
34	GPIO5	I/O	PA4		GPIO.
35	GPIO2	I/O	PA0-WKUP		Indicate the connection state. ※ See [10.2. S2W and STW Mode Selection]
36	GPIO1	I/O	PA2		S2W and STW mode selection ※ See [10.2. S2W and STW Mode Selection]
37	GPIO3	I/O	PA3		GPIO.
38	GPIO4	I/O	PA1		GPIO.
39	GND	-	GND		Ground
40	GND	-	GND		Ground

6. Absolute Maximum Rating

		min.	max.	unit
Storage Temperature		-40	85	deg.C
Supply Voltage	VDD_3P3	-0.3	4	V
	VDD_PA	-0.3	6	V
	VDD_WLAN	-0.3	6	V

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability. No damage assuming only one parameter is set at limit at a time with all other parameters is set within operating condition.

7. Operating Condition

		min.	typ.	max.	unit
Operating Temperature Range(*1)		-40		85	deg.C
Specification Temperature Range		-20		70	deg.C
Supply Voltage	VDD_3P3	2.4	3.3	3.6	V
	VDD_PA	2.3(*2)	3.3	4.8(*2) (*3)	V
	VDD_WLAN	2.3(*2)	3.3	4.8(*2) (*3)	V

[Note] All RF characteristics in this datasheet are defined by Specification Temperature Range

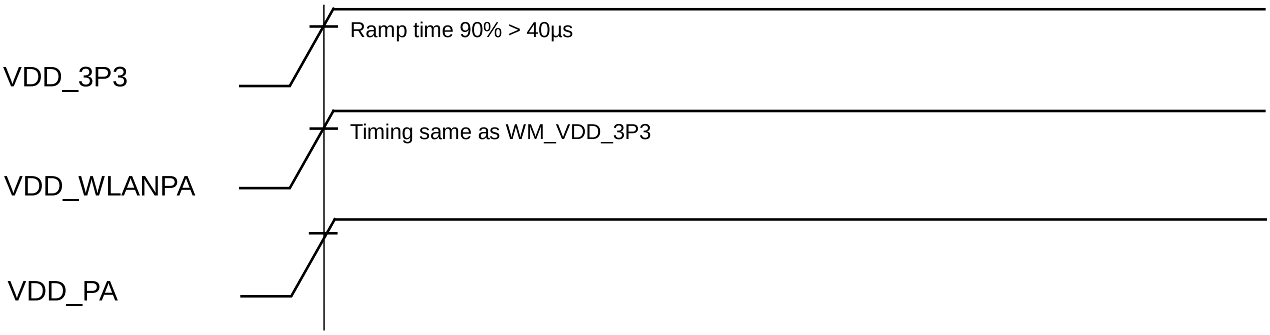
(*1) Functionality is guaranteed but specifications require derating at extreme temperatures.

(*2) The CYW43362 is functional across this range of voltage. RF performance is guaranteed only 3.0V < VDD_PA/WLAN < 4.8V

(*3) The maximum continuous voltage is 4.8V. Voltages up to 5.5V for up to 10 seconds, cumulative duration, over the lifetime of the device are allowed voltages as high 5.0V for up to 250 seconds, cumulative duration, over the lifetime of the device are allowed.

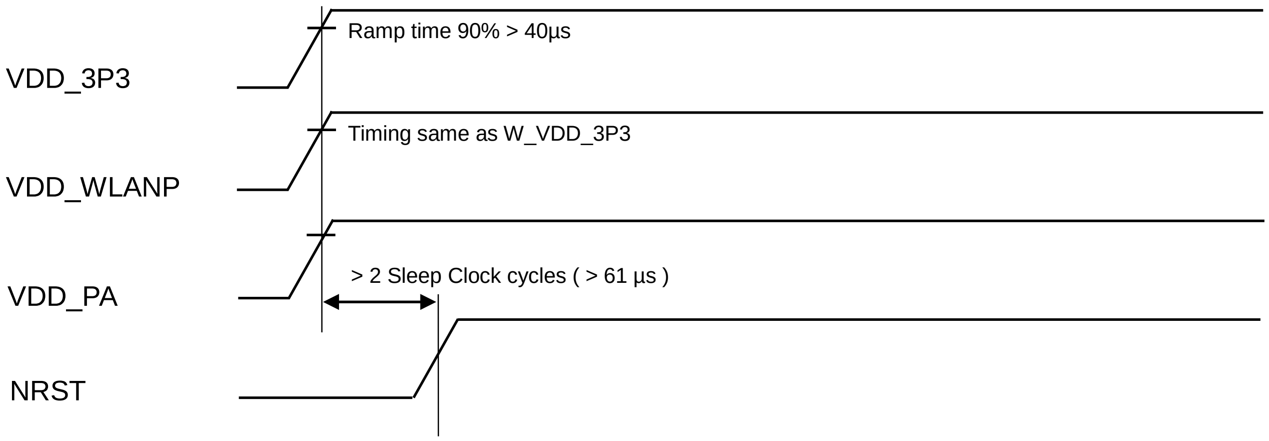
8. Power Up Sequence

8.1. Without NRST control



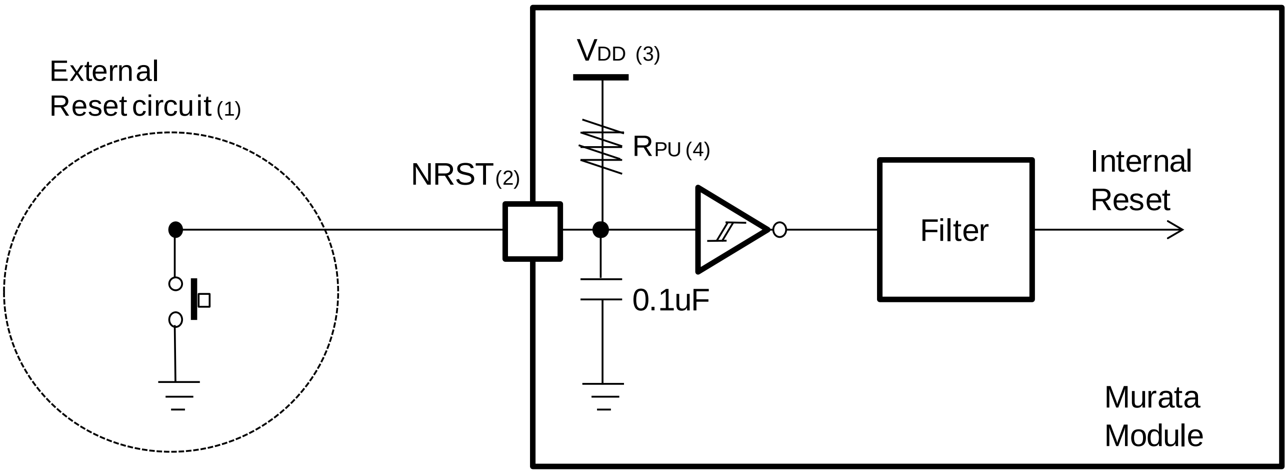
*Power down sequence is opposite sequence of power up.

8.2. With NRST control


VDD_3P3
Ramp time 90% > 40µs
VDD_WLANP
Timing same as W_VDD_3P3
VDD_PA
> 2 Sleep Clock cycles (> 61 µs)
NRST

*Power down sequence is opposite sequence of power up.

8.2.1. NRST circuit


External
Reset circuit (1)
NRST(2)
VDD (3)
RPU (4)
0.1uF
Filter
Internal
Reset
Murata
Module

(1) The reset network protects the device against parasitic resets.
(2) The use must ensure that the level on the NRST pin can go below the $V_{IL(NRST)}$ max level specified in below table. Otherwise the reset is not taken into account by the device.
(3) Vdd=3.3V(for the 1.8≦Vdd≦3.6 voltage range)
(4) RPU=40k ohm (for the 30≦RPU≦50kohm range)

9. RF Characteristics

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

Conditions: 25deg.C, VDD_3P3=VDD_WLAN= 3.3V

Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS / CCK			
Frequency	2400 - 2483.5MHz			
Data rate	1, 2, 5.5, 11Mbps			
Target Max Output Power	17.0dBm			
- DC Characteristics -	min.	Typ.	max.	Unit
1. DC current				
1) Tx mode (1024byte, 20usec interval)	-	365	440	mA
2) Rx mode	−	110	160	mA
- Tx Characteristics -	min.	Typ.	max.	Unit
2. Power Levels	15.0	17.0	19.0	dBm
3. Spectrum Mask				
1) 1st side lobes	-	-40	-30	dBr
2) 2nd side lobes	-	-55	-50	dBr
4. Power-on and Power-down ramp	-		2.0	usec
5. RF Carrier Suppression	15	23	-	dB
6. Modulation Accuracy (EVM)	-	23	35	%
7. Outband Spurious Emissions				
1) 30MHz to 1GHz (BW=100kHz)	-	-	-36	dBm
2) 1GHz to 12.75GHz (BW=100kHz)	-	-	-30	dBm
3) 1.8GHz to 1.9GHz (BW=100kHz)	-	-	-47	dBm
4) 5.15GHz to 5.3GHz (BW=100kHz)	-	-	-47	dBm
- Rx Characteristics -	min.	typ.	max.	Unit
8. Minimum Input Level Sensitivity				
1) 11Mbps (FER ≤ 8%)	-	-87	-76	dBm
9. Maximum Input Level (FER ≤ 8%)	-10	-	-	dBm
10. Adjacent Channel Rejection (FER ≤ 8%)	35	-	-	dB

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

Conditions: 25deg.C, VDD_3P3=VDD_WLAN =3.3V

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM			
Frequency	2400 - 2483.5MHz			
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps			
Target Max Output Power	13.0dBm			
- DC Characteristics -	min.	Typ.	max.	Unit
1. DC current				
1) Tx mode (1024byte, 20usec interval)	-	280	360	mA
2) Rx mode	−	110	160	mA
- Tx Characteristics -	min.	typ.	max.	unit
2. Power Levels	11.0	13.0	15.0	dBm
3. Spectrum Mask				
1) 9MHz to 11MHz (0dB ~ -20dB)		-40	-20	dBr
2) 11MHz to 20MHz (-20dB ~ -28dB)		-43	-28	dBr
3) 20MHz to 30MHz (-28dB ~ -40dB)		-50	-40	dBr
4) 30MHz to 33MHz (-40dB)		-49	-40	dBr
4. Constellation Error (EVM)	-	-28.5	-25	dB
5. Outband Spurious Emissions				
1) 30MHz to 1GHz (BW=100kHz)	-	-	-36	dBm
2) 1GHz to 12.75GHz (BW=100kHz)	-	-	-30	dBm
3) 1.8GHz to 1.9GHz (BW=100kHz)	-	-	-47	dBm
4) 5.15GHz to 5.3GHz (BW=100kHz)	-	-	-47	dBm
- Rx Characteristics -	min.	typ.	max.	Unit
6. Minimum Input Level Sensitivity				
1) 54Mbps (PER ≤ 10%)	-	-73	-65	dBm
7. Maximum Input Level (PER ≤ 10%)	-20	-	-	dBm
8. Adjacent Channel Rejection (PER ≤ 10%)	-1	-	-	dB

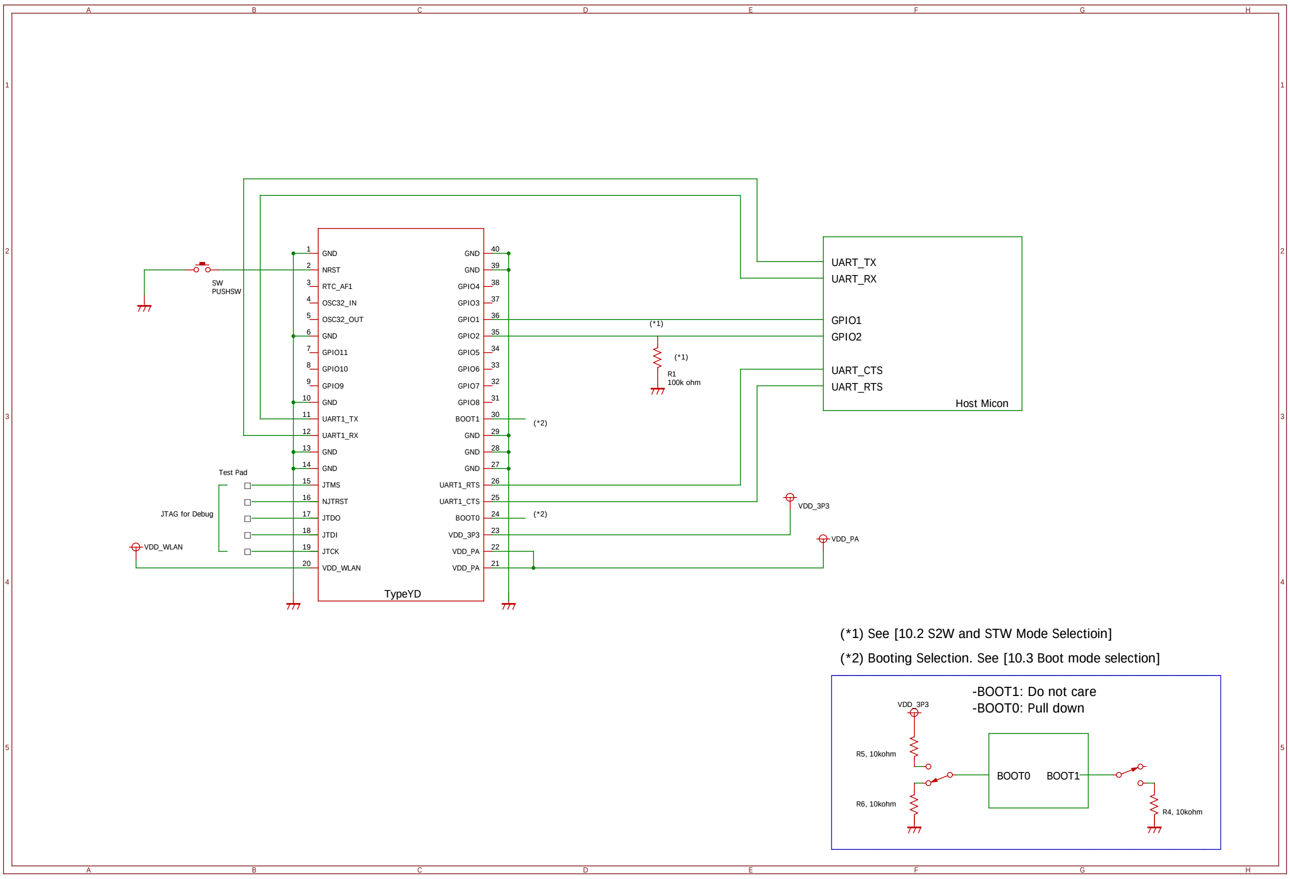
9.3. RF Characteristics for IEEE802.11n (65Mbps(MCS7) mode unless otherwise specified.)

Conditions: 25deg.C, VDD_3P3=VDD_WLAN=3.3V

Items	Contents			
Specification	IEEE802.11n			
Mode	OFDM			
Frequency	2400 - 2483.5MHz			
Data rate	6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps			
Target Max Output Power	12.0dBm			
- DC Characteristics -	min.	Typ.	max.	Unit
1. DC current				
1) Tx mode (1024byte, 20usec interval)	-	265	340	mA
2) Rx mode	−	110	160	mA
- Tx Characteristics -	min.	typ.	max.	Unit
2. Power Levels	10.0	12.0	14.0	dBm
3. Spectrum Mask				
1) 9MHz to 11MHz (0dB ~ -20dB)		-40	-20	dBr
2) 11MHz to 20MHz (-20dB ~ -28dB)		-43	-28	dBr
3) 20MHz to 30MHz (-28dB ~ -45dB)		-50	-45	dBr
4) 30MHz to 33MHz (-45dB)		-49	-45	dBr
4. Constellation Error (EVM)	-	-31	-27	dB
5. Outband Spurious Emissions				
1) 30MHz to 1GHz	-	-	-36	dBm
2) 1GHz to 12.75GHz	-	-	-30	dBm
3) 1.8GHz to 1.9GHz	-	-	-47	dBm
4) 5.15GHz to 5.3GHz	-	-	-47	dBm
- Rx Characteristics -	min.	typ.	max.	Unit
6. Minimum Input Level Sensitivity				
1) 65Mbps (PER ≦ 10%)	-	-70	-64	dBm
7. Maximum Input Level (PER ≦ 10%)	-20	-	-	dBm
8. Adjacent Channel Rejection (PER ≦ 10%)	-2	-	-	dB

10. Reference Circuit

10.1. Schematic

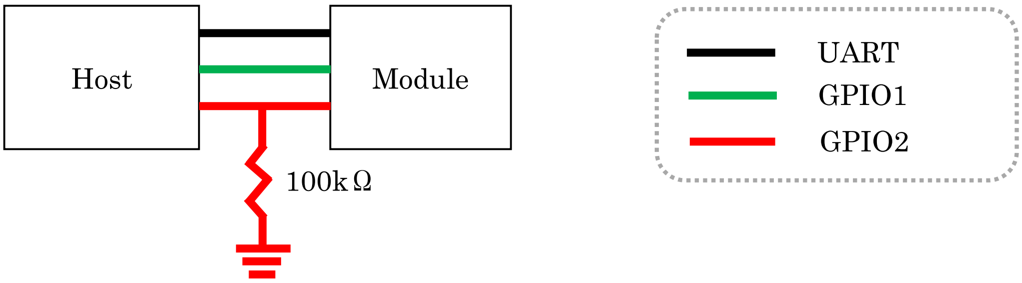

SW
PUSHSW
GND
NRST
RTC_AF1
OSC32_IN
OSC32_OUT
GND
GPIO11
GPIO10
GPIO9
GND
UART1_TX
UART1_RX
GND
GND
JTMS
NJTRST
JTDO
JTDI
JTCK
VDD_WLAN
GND
GND
GPIO4
GPIO3
GPIO1
GPIO2
GPIO5
GPIO6
GPIO7
GPIO8
BOOT1
GND
GND
GND
UART1_RTS
UART1_CTS
BOOT0
VDD_3P3
VDD_PA
VDD_PA
TypeYD
Test Pad
JTAG for Debug
VDD_WLAN
(*1)
(*1)
R1
100k ohm
(*2)
(*2)
VDD_3P3
VDD_PA
UART_TX
UART_RX
GPIO1
GPIO2
UART_CTS
UART_RTS
Host Micon
(*1) See [10.2 S2W and STW Mode Selectioin]
(*2) Booting Selection. See [10.3 Boot mode selection]
-BOOT1: Do not care
-BOOT0: Pull down
VDD_3P3
R5, 10kohm
R6, 10kohm
BOOT0
BOOT1
R4, 10kohm

10.2. S2W and STW Mode Selection

Serial-Through-WiFi is a feature realized by combining Command Mode and Through Mode operations. Command Mode supports all the Serial Interface commands described in the prior sections of the document.

In particular, the STW provisioning commands are used to configure the connectivity parameters for the module, including the WiFi and TCP/IP configurations. Those parameters are used in the Through Mode to establish TCP connections over WiFi with a peer to enable serial data to flow transparently between the UART interface of the module and the target.

The module determines the particular Mode of operation by sampling GPIO1 at power up. GPIO2 is used in Through Mode to indicate the connection state between the module and its peer. A block diagram of the hardware interface is shown below.


Host
Module
100kΩ
UART
GPIO1
GPIO2

GPIO1	Usage
High	S2W(Command mode) mode
Down	STW(Through Mode) Mode

Please refer to [murata SNIC Serial Interface Specfication.pdf] for more information.

10.3. Boot mode selection

Default pin setting is applied as below,
-BOOT1 is don’t care
-BOOT0 is 10k ohm pull down
because software embedded module is supplied.

Also pin setting are available for other purpose as below.

10.3.1. UART Interface usage for software writing

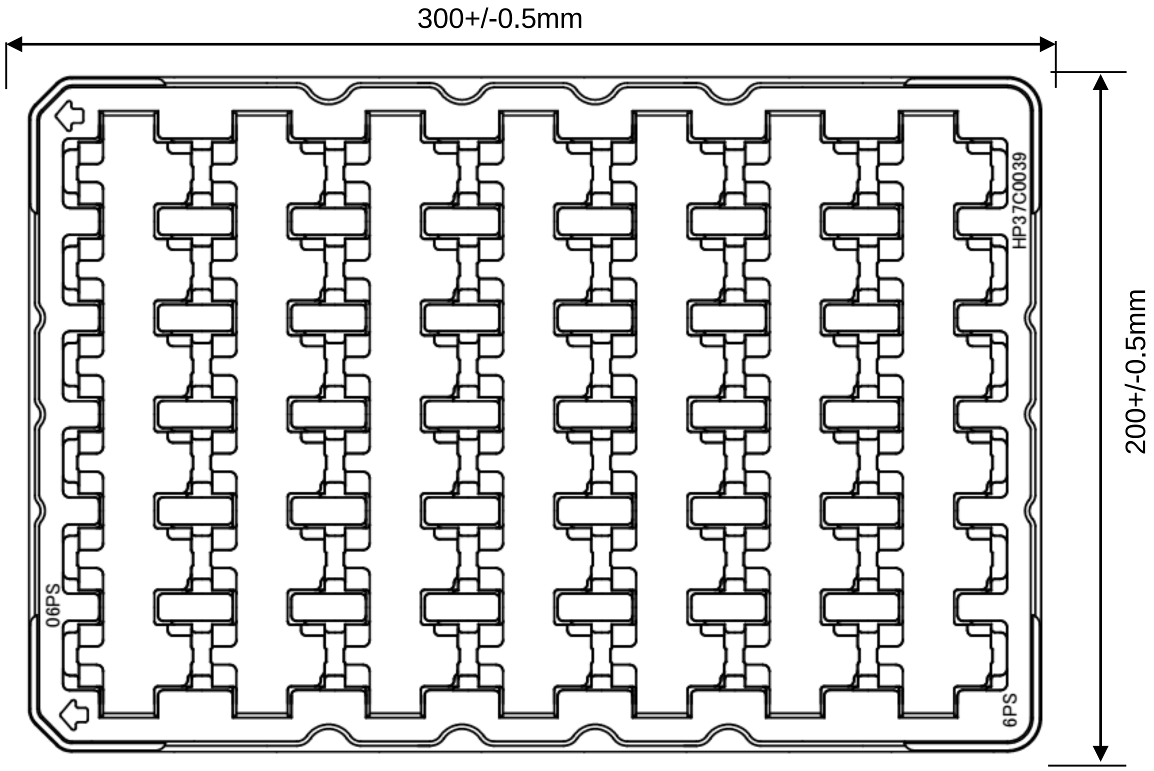
Boot mode selection pins		Usage	Aliasing
BOOT1	BOOT0		
10kohm pull down	10kohm pull up	Software Writing	These pins must be set as left condition if use UART for software writing.
Don’t care	10kohm pull down	System start up	These pins must be set as left condition for system start up after software writing.

10.3.2. JTAG usage for software writing

Boot mode selection pins		Usage	Aliasing
BOOT1	BOOT0		
Don’t care	10kohm pull down	Software Writing	If JTAG used for software writing, there is no need to change a pin setting for system start up after software writing.
Don’t care	10kohm pull down	System start up	

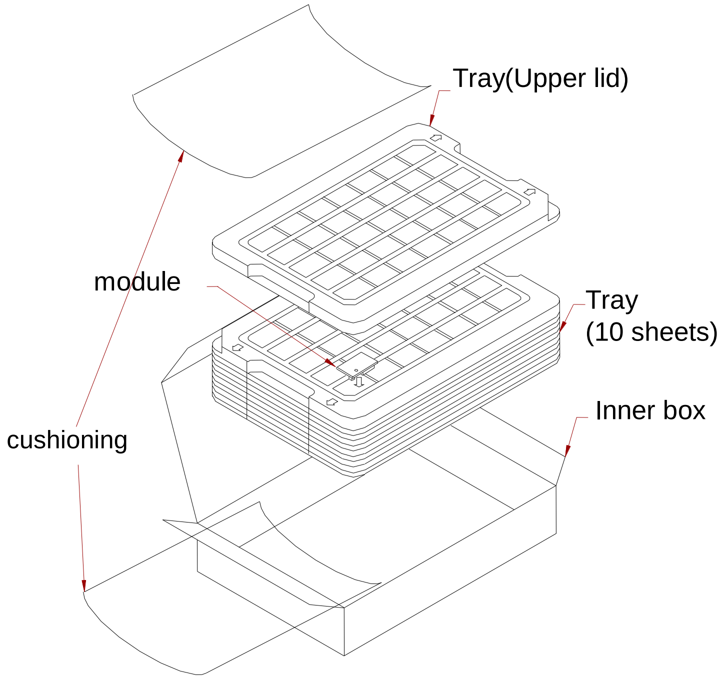
11. Packing

11.1. Tray

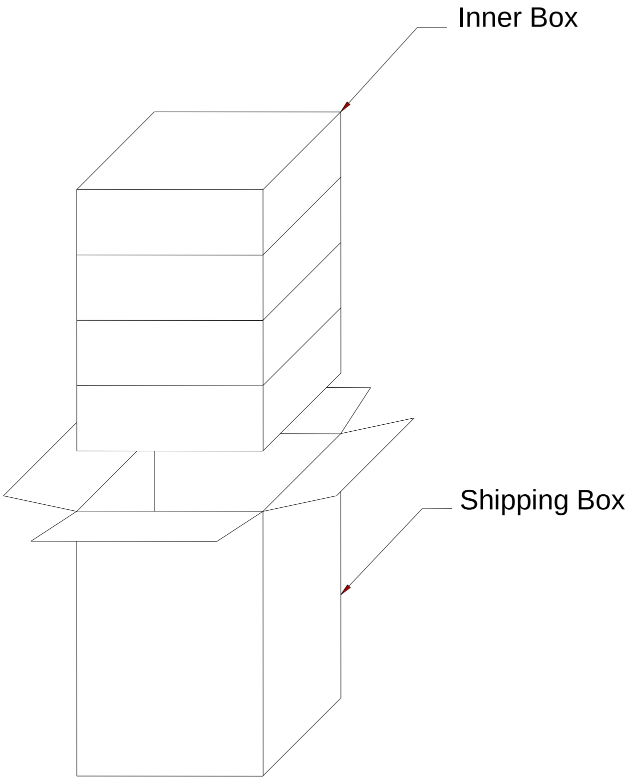


The module is placed in a pocket of the above tray with following rules.
- The module’s metal shield contacts a tray’ indentation
- Its chip antenna on the module is directing to an arrow on a tray.

11.2. Packing in a inner box


Tray(Upper lid)
module
Tray
(10 sheets)
Inner box
cushioning

11.3. Shipping box


Inner Box
Shipping Box

- Please keep any packaging below 40 deg.C until using it up, because a tray is potentially deformed with storage over the temperature.
- Please don’t stack the shipping box over 1.5m height to avoid any physical problem.
- Four inner boxes is general number in a shipping box, but it may be dummy for some of inner boxes.
- One inner box has 420pcs as standard q’ty.
- MOQ is 1680pcs, which are constructed four inner boxes.

12. NOTICE

12.1. Storage Conditions:

- The product shall be stored in non corrosive gas (Cl_2, NH_3, SO_2, No_x, etc.).
- Any excess mechanical shock including, but not limited to, sticking the packing materials by sharp object and dropping the product, shall not be applied in order not to damage the packing materials.
- The product shall be stored without opening the packing under the ambient temperature from 5 to 35 °C and humidity from 20 ~ 70 %RH.
  (Packing materials, in particular, may be deformed at the temperature over 40 °C)

12.2. Handling Conditions:

- Be careful in handling or transporting products because excessive stress or mechanical shock may break products.
- Handle with care if products may have cracks or damages on their terminals, the characteristics of products may change. Do not touch products with bear hands that may result in poor solderability.

12.3. Operational Environment Conditions:

- Products are designed to work for electronic products under normal environmental conditions (ambient temperature, humidity and pressure). Therefore, products have no problems to be used under the similar conditions to the above-mentioned. However, if products are used under the following circumstances, it may damage products and leakage of electricity and abnormal temperature may occur.
  - In an atmosphere containing corrosive gas (Cl2, NH3, SOx, NOx etc.).
  - In an atmosphere containing combustible and volatile gases.
  - Dusty place.
  - Direct sunlight place.
  - Water splashing place.
  - Humid place where water condenses.
  - Freezing place.

- If there are possibilities for products to be used under the preceding clause, consult with Murata before actual use.

- As it might be a cause of degradation or destruction to apply static electricity to products, do not apply static electricity or excessive voltage while assembling and measuring.

12.4. Input Power Capacity:

- Products shall be used in the input power capacity as specified in this specifications.
- Inform Murata beforehand, in case that the components are used beyond such input power capacity range.

13. PRECONDITION TO USE OUR PRODUCTS

Please make sure that your product has been evaluated and confirmed from the aspect of the fitness for the specifications of our product when our product is mounted to your product.

All the items and parameters in this product specification/datasheet/catalog have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment specified in this specification. You are requested not to use our product deviating from the condition and the environment specified in this specification.

Please note that the only warranty that we provide regarding the products is its conformance to the specifications provided herein. Accordingly, we shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this specification.

WE HEREBY DISCLAIMS ALL OTHER WARRANTIES REGARDING THE PRODUCTS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THAT THEY ARE DEFECT-FREE, OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS.

The product shall not be used in any application listed below which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property. You acknowledge and agree that, if you use our products in such applications, we will not be responsible for any failure to meet such requirements.

Furthermore, YOU AGREE TO INDEMNIFY AND DEFEND US AND OUR AFFILIATES AGAINST ALL CLAIMS, DAMAGES, COSTS, AND EXPENSES THAT MAY BE INCURRED, INCLUDING WITHOUT LIMITATION, ATTORNEY FEES AND COSTS, DUE TO THE USE OF OUR PRODUCTS IN SUCH APPLICATIONS.

- Aircraft equipment.
- Aerospace equipment
- Undersea equipment.
- Power plant control equipment
- Medical equipment.
- Transportation equipment (vehicles, trains, ships, elevator, etc.).
- Traffic signal equipment.
- Disaster prevention / crime prevention equipment.
- Burning / explosion control equipment
- Application of similar complexity and/ or reliability requirements to the applications listed in the above.

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