



JAPAN RADIO TEST REPORT

Equipment : M2.COM LoRa IoT Node
Brand Name : Advantech
Model Name : WISE-1510
Applicant : Advantech Co., Ltd.
No.1, Alley 20, Lane 26, Rueiguang Rd., Neihu
District, Taipei City, Taiwan, R.O.C.
Manufacturer : Advantech Co., Ltd.
No.1, Alley 20, Lane 26, Rueiguang Rd., Neihu
District, Taipei City, Taiwan, R.O.C.
Standard : MIC Certification Rule, Article 2 Paragraph 1 Item 8

The product was received on Mar. 06, 2017, and testing was started from Mar. 06, 2017 and completed on Oct. 02, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in MIC Notice No.88 and shown compliance with the applicable MIC Ordinance Regulating Radio Equipment Article 49.14 and ARIB STD-T108 technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Appendix A. Test Photos

Appendix B. Test Results

Photographs of EUT v01



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB Ver1.0

Page Number : 3 of 29
Issued Date : Jan. 08, 2019
Report Version : 01

Summary of Test Result

Report Clause	Ref Std. Clause (Notice 88)	Ref Std. Clause (ARIB STD-T108)	Test Items	Result (PASS/FAIL)	Remark
3.1	Appendix 20 1st	3.2.4	Frequency Tolerance	PASS	-
3.2	Appendix 20 1st	3.2.6	Occupied Bandwidth	PASS	-
3.3	Appendix 1	3.2.8	Unwanted Emission Strength	PASS	-
3.4	Appendix 20 1st	3.2.7	Adjacent Channel Leakage Power	PASS	-
3.5	Appendix 20 1st	3.2.1	Antenna Power	PASS	-
3.6	Appendix 20 1st	3.2.2 (1)	Secondarily Emitted Radio Wave Strength (RX Spurious)	PASS	-
3.7	-	3.4.4	Interference Prevention Function	PASS	-
3.8	Appendix 20 1st	3.4.2	Carrier Sensing Function	PASS	-
3.9	Note 1	-	Construction Protection Confirmation	PASS	-

Note 1: MIC Ordinance Regulating Radio Equipment Section 4.17 of Article 49.20.

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Cliff Chang
Report Producer: Wendy Pan

1 General Description

1.1 Information

1.1.1 RF General Information

Product Details – for Antenna Power $\leq$ 20mW						
Modulation	LoRa Mode	Operating Frequency (MHz)	Channel Spacing (MHz)	Channel Number	Declaration Output Power (mW)	EIRP Power (mW)
FSK	FSK	920.6-928.0	0.2	24-61 [38]	17.022	25.763
CSS	125 kHz	920.6-928.0	0.2	24-61 [38]	17.498	26.485
	250 kHz	920.7-927.9	0.4	24-61 [37]	16.788	25.410
	500 kHz	920.8-927.8	0.6	24-61 [36]	17.388	26.422

EUT Power Type	From host system
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1.1.2 Antenna Information

Ant.	Brand	Model Name (P/N)	Antenna Type	Connector	Gain (dBi)	Remark
1	SInBOn	TH-915i	Dipole Antenna	SMA (Male)	1.8	1TX/1RX
2	Cortec	AN0915-9207BSM	Dipole Antenna	SMA (Male)	0.96	1TX/1RX
3	Cortec	AB0915-88H01BSM	Dipole Antenna	SMA (Male)	1.35	1TX/1RX
4	PSA	1750008650-01	Dipole Antenna	I-PEX	1.71	1TX/1RX

Note: 1. There are multiple sets of antenna provided to this EUT and all of them can be used as transmitting and receiving antenna.

2. Because Ant.1 ~ Ant.4 are the same type antennas, only the higher gain antenna "Ant.1" was tested.

3. The above information was declared by manufacturer.

1.2 Table for Slight Change

This product is an extension of original one reported under Sporton project number: JR690609AA

Below is the illustration for the change of the product with respect to the original one.

Detail	Gist	Modifications
Report No.		
JR690609-02AA	The total antennas amounted to 4 sets.	There is no hardware or electrical modification made to the applying modular transmitter itself. Adding 1 sets of Dipole antenna and with lower gain than the original Certificate and it is not necessary to verify for test. Please refer to the 1.1.2 section for Antenna Information detail.



1.3 Accessories

N/A

1.4 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E4300	DoC
2	Test fixture	Advantech	WISE-ED20	N/A

1.5 Testing Location Information

Testing Location				
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973		
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085		
Test Condition		Test Site No.	Test Engineer	Test Environment
RF Conducted		TH01-CB	Serway Li	23°C / 62%
				Mar. 06, 2017~ Oct. 02, 2018

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

The Worst Case Modulation Configuration			
LoRa Mode	Channel Frequency (MHz)	Nr. Transmitter Outputs	Modulation
FSK	920.6, 925.0, 928.0	1TX	FSK
125 kHz	920.6, 925.0, 928.0	1TX	CSS
250 kHz	920.7, 925.1, 927.9	1TX	CSS
500 kHz	920.8, 925.0, 927.8	1TX	CSS
Note1: If the equipment supports different modulations and/or data rates, comparison measurements of RF output power across all modulations and/or data rates need to be performed to define the worst case modulation/data rate which has to be used for the conformance testing.			
Note2: nTX, n is the number of Transmitter Outputs (e.g. 3TX – three transmitter outputs)			

2.2 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration	
LoRa Mode	Channel Frequency (MHz)
FSK	920.6, 925.0, 928.0
125 kHz	920.6, 925.0, 928.0
250 kHz	920.7, 925.1, 927.9
500 kHz	920.8, 925.0, 927.8

2.3 Test Worst Case Power Setting Parameter

Test Worst Case Power Setting Parameter			
Test Software Version	Console UART		
LoRa Mode	Channel Frequency (MHz)		
FSK	920.6	925.0	928.0
	13	13	13
125 kHz	920.6	925.0	928.0
	13	13	13
250 kHz	920.7	925.1	927.9
	13	13	13
500 kHz	920.8	925.0	927.8
	13	13	13



2.4 EUT Operation during Test

During the test, "Console UART" under WIN 7 was executed the test program to control the EUT continuously transmit/receive RF signal.

3 Test Result

3.1 Frequency Tolerance

3.1.1 Limit of Frequency Tolerance

Frequency Tolerance Limit
within 20×10^{-6}

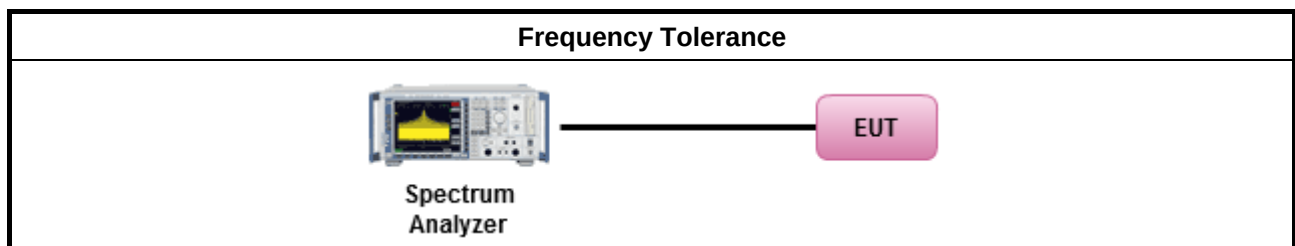
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

1. Setting of SA is following as: RB: 1kHz/VB: 1kHz/SPAN: 1MHz
2. Centre Frequency: The centre frequency of testing for EUT
3. Sweep time: Auto
4. Sweep mode: Continuous sweep
5. Detect mode: Positive peak
6. EUT have transmitted absence of modulation signal and fixed channelize. f is using the mark cursor to mark the peak frequency value, f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm

3.1.4 Test Setup



3.1.5 Test Result of Frequency Tolerance

Reference Documents	Test Result
Appendix B Test Results	Complied

3.2 Occupied Bandwidth

3.2.1 Limit of Occupied Bandwidth

Occupied Bandwidth Limit
(200 x n) kHz
Notes: 1. For center frequency is from 928.15 MHz to 929.65 MHz, it shall be (100 x n) kHz or less. 2. n = 5 (n is a number of unit radio channels constituting the radio channel and is an integer from 1 to 5.).

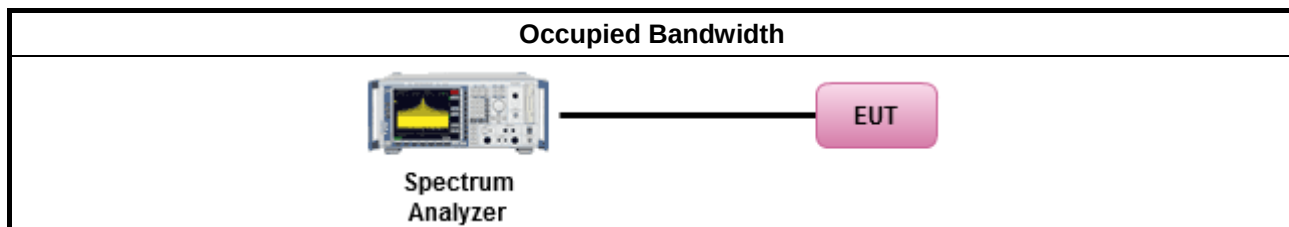
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

- Setting of SA is following as: RBW:3kHz / VBW:3kHz / SPAN: 1MHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
- EUT have transmitted the maximum modulation signal and fixed channelize (For DSSS or OFDM Device) or continuous maximum power of hopping mode(For FHSS Device). SA set to 99% of occupied bandwidth to measure occupied bandwidth.

3.2.4 Test Setup



3.2.5 Test Result of Occupied Bandwidth

Reference Documents	Test Result
Appendix B Test Results	Complied

3.3 Unwanted Emission Strength

3.3.1 Limit of Unwanted Emission Strength

Frequencies (MHz)	Limit (dBm)	RBW
$f \leq 710 \text{ MHz}$	-36	100 kHz
$710 \text{ MHz} < f \leq 900 \text{ MHz}$	-55	1 MHz
$900 \text{ MHz} < f \leq 915 \text{ MHz}$	-55	100 kHz
$915 \text{ MHz} < f \leq 930 \text{ MHz}^*$ (Except for $ f-f_c \leq (200+100 \times n) \text{ kHz}$ if bandwidth of unit radio channel is 200 kHz, except for $ f-f_c \leq (100+50 \times n) \text{ kHz}$ if bandwidth of unit radio channel is 100 kHz. Except for $ f-f_c \leq (100+100 \times n) \text{ kHz}$ If frequency band is $915.9 \text{ MHz} \leq f \leq 916.9 \text{ MHz}$ and $920.5 \text{ MHz} \leq 922.3 \text{ MHz}$. Where n is a number of unit radio channels constituting the radio channel and is an integer from 1 to 5)	-36	100 kHz
$930 \text{ MHz} < f \leq 1000 \text{ MHz}$	-55	100 kHz
$1000 \text{ MHz} < f \leq 1,215 \text{ MHz}$	-45	1 MHz
$1,215 \text{ MHz} < f$	-30	1 MHz

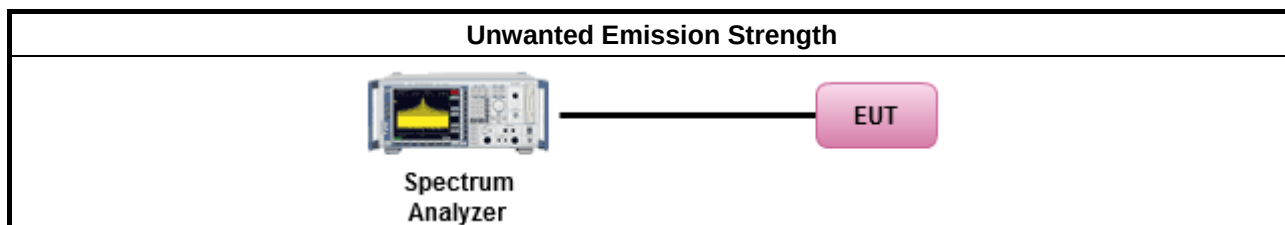
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

1. EUT have transmitted the maximum modulation signal and fixed channelize.
2. Setting of SA is following as section 3.3.1 table , Then to mark peak reading value + cable loss shall be complies limits.

3.3.4 Test Setup





3.3.5 Test Result of Unwanted Emission Strength

Reference Documents	Test Result
Appendix B Test Results	Complied

3.4 Adjacent Channel Leakage Power

3.4.1 Limit of Adjacent Channel Leakage Power

Adjacent Channel Leakage Power Limit	
Frequencies (MHz) 915.9 MHz to 916.9 MHz	Limit
Radio Channel Both Ends	-20dBm
Adjacent Unit Channel	-26dBm
Frequencies (MHz) 920.5 MHz to 922.3 MHz	Limit
Radio Channel Both Ends	-7dBm
Adjacent Unit Channel	-15dBm or less (*) *If antenna power is reduced by 1mW or less, each adjacent channel leakage power is 26dBm or less.
Frequencies (MHz) 922.3 MHz to 928.1 MHz (Antenna power is 1mW or less)	Limit
Adjacent Unit Channel	-26dBm or less
Frequencies (MHz) 922.3 MHz to 928.1 MHz (Antenna power is more than 1mW and 20mW or less.)	Limit
Adjacent Unit Channel	-15dBm or less
Frequencies (MHz) 928.1 MHz to 929.7 MHz	Limit
Adjacent Unit Channel	-26dBm or less

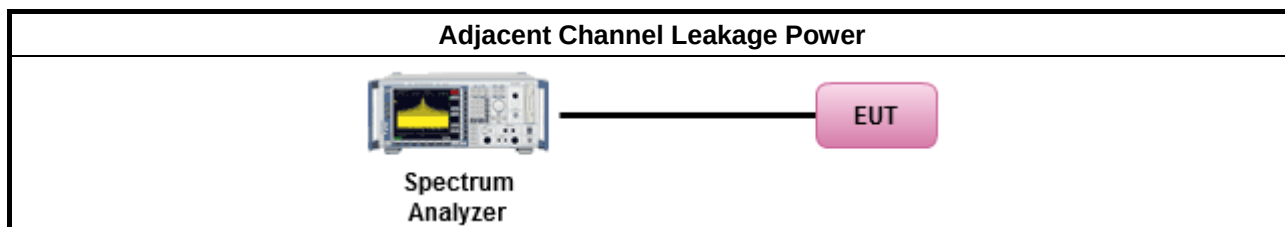
3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

- Conditions of EUT
 - EUT is modulated with a standard code test signal and is operated in continuous transmission.
- Measurement procedure
 - The spectrum analyzer settings are:
Frequency span: 1 MHz
RBW: 3 kHz
 - Bands measured are as follows by considering RBW of 3 kHz:
922.3 – 928.1 MHz(Antenna power is more than 1mW and 20mW or less.):
These measurements request maximum leakage electric levels in side bands within CF+/- (200xn)-200kHz Where, CF is the center frequency.

3.4.4 Test Setup



3.4.5 Test Result of Adjacent Channel Leakage Power

Reference Documents	Test Result
Appendix B Test Results	Complied

3.5 Antenna Power

3.5.1 Limit of Antenna Power

Antenna Power Limit
Antenna power shall be 20 mW or less. 920.5~923.5MHz: 250mW or less. Radio channels consisting of at least one of unit radio channels whose center frequencies are located from 916.0 MHz to 916.8 MHz or from 928.15 MHz to 929.65 MHz shall be 1 mW or less. Tolerance of antenna power shall be +20% (upper value) and -80% (lower value).

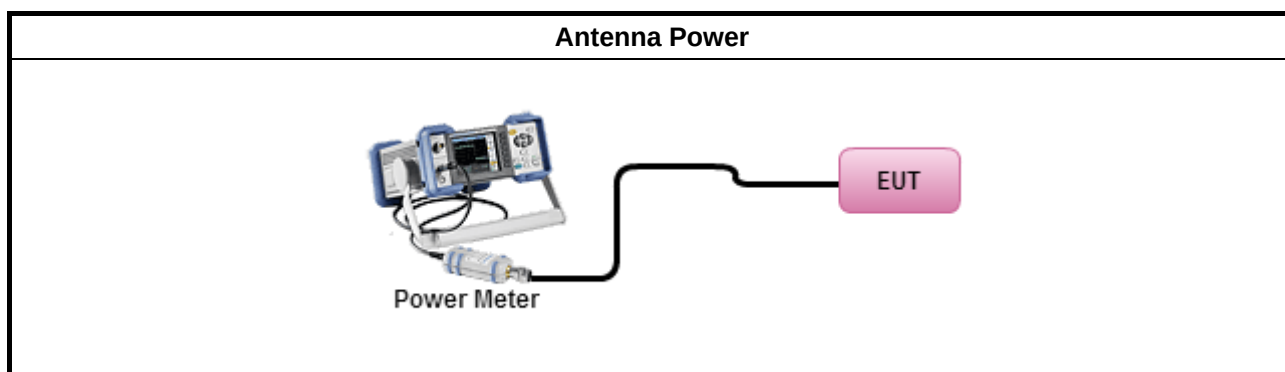
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

1. The EUT shall be configured to operate at the maximum stated transmitter output power level.
2. A power meter is connected on the antenna port of the EUT.

3.5.4 Test Setup



3.5.5 Test Result of Antenna Power

Reference Documents	Test Result
Appendix B Test Results	Complied

3.6 Secondly Emitted Radio Wave Strength (RX Spurious)

3.6.1 Limit of Secondly Emitted Radio Wave Strength (RX Spurious)

Frequencies (MHz)	Limit (dBm)	RBW
30.0 to 710.0 MHz	-54	100 kHz
710.0 to 900.0 MHz	-55	1 MHz
900.0 to 915.0 MHz	-55	100 kHz
915.0 to 930.0 MHz	-54	100 kHz
930.0 to 1000.0 MHz	-55	100 kHz
1.0 to 5.0 GHz	-47	1 MHz

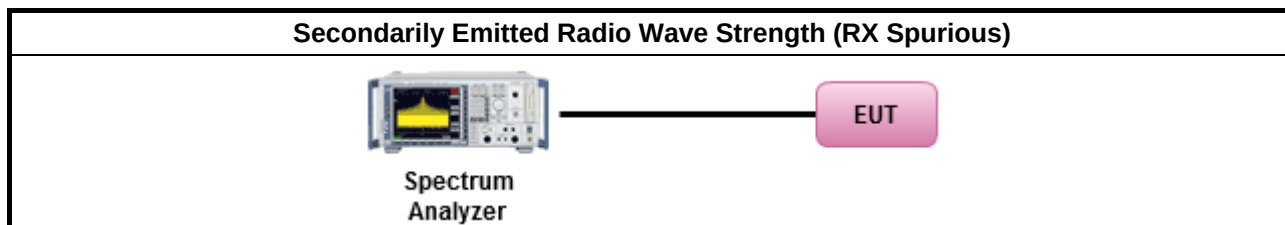
3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

1. EUT have transmitted the maximum modulation signal and fixed channelize.
2. Setting of SA is following as section 3.6.1 table , Then to mark peak reading value + cable loss shall be complies limits.

3.6.4 Test Setup



3.6.5 Test Result of Secondly Emitted Radio Wave Strength (RX Spurious)

Reference Documents	Test Result
Appendix B Test Results	Complied

3.7 Interference Prevention Function

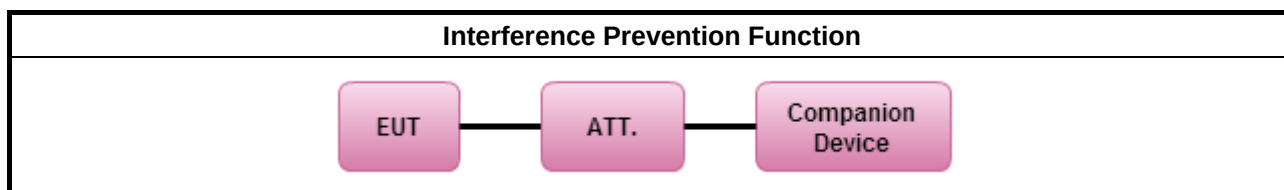
3.7.1 Limit of Interference Prevention Function

N/A

3.7.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.7.3 Test Setup



3.7.4 Test Result of Interference Prevention Function

Reference Documents	Test Result
Appendix B Test Results	Complied

3.8 Carrier Sensing Function

3.8.1 Limit of Carrier Sensing Function

Carrier Sensing Function Limit
EUT stop RF transmission signal after carrier inject to EUT.

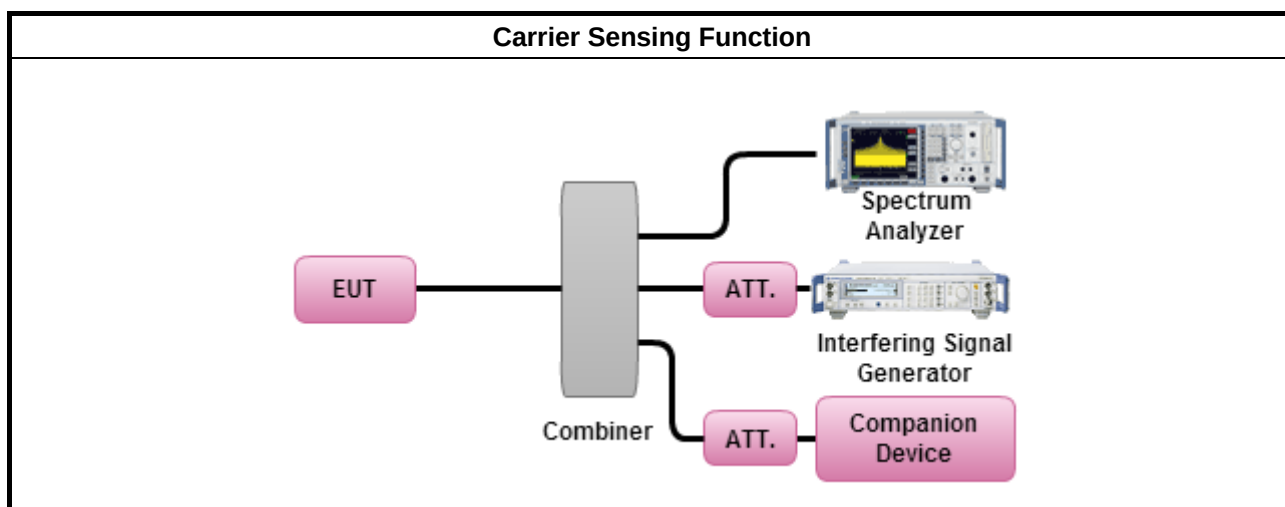
3.8.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.8.3 Test Procedures

1. SSG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SSG and power level is up to -80dBm. Then turn off the RF signal of SSG.
2. EUT have transmitted the maximum modulation signal and fixed channelize.
3. Setting of SA is following as: RBW:100kHz / VBW:300kHz / SPAN: 1MHz Sweep Mode: Continuous sweep / Detect mode: Positive peak.
4. SSG RF Signal On.
5. EUT shall be stop the transmitted any signal and SSG RF Signal Off. Then EUT will be continuous transmitted signal.

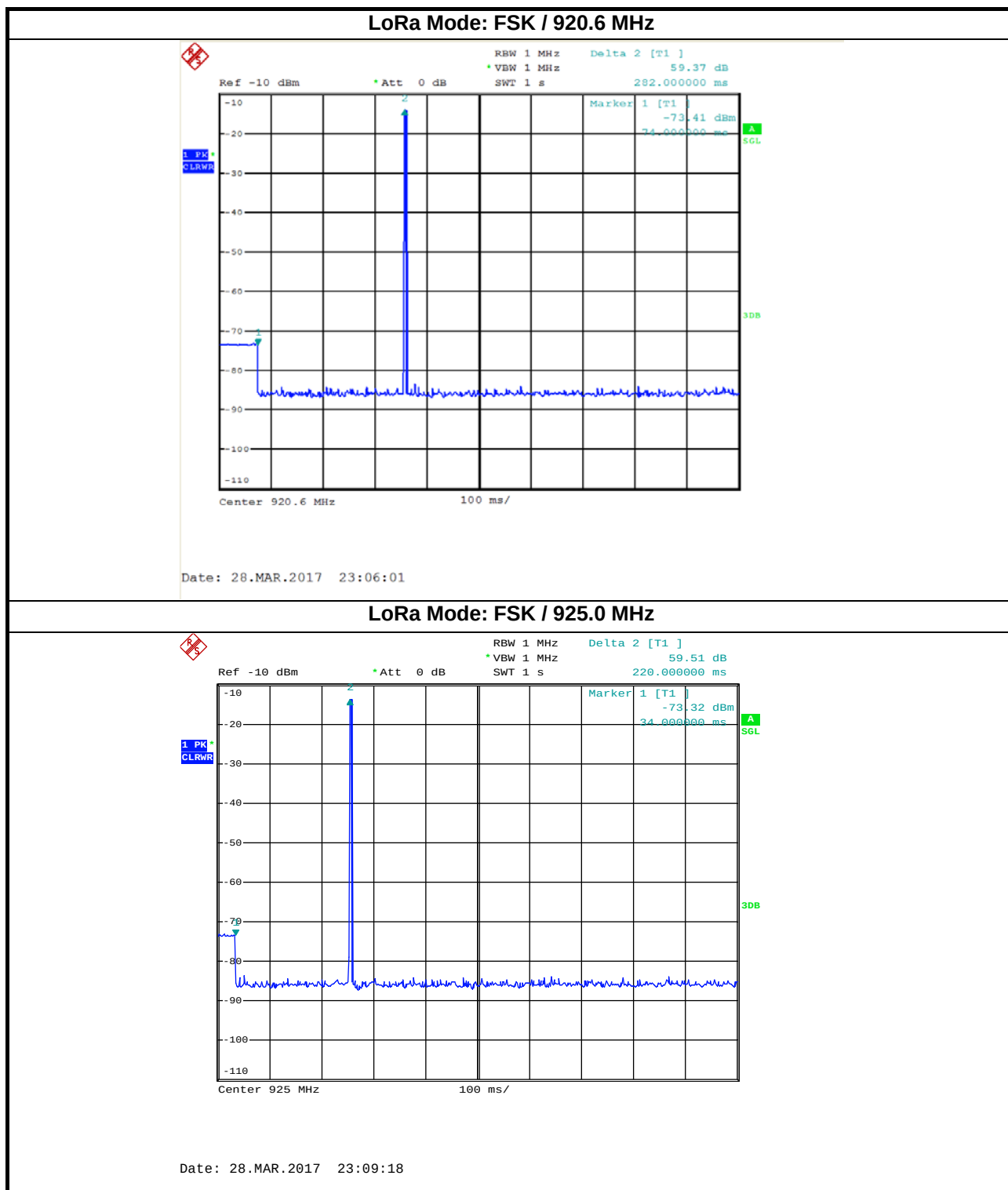
3.8.4 Test Setup

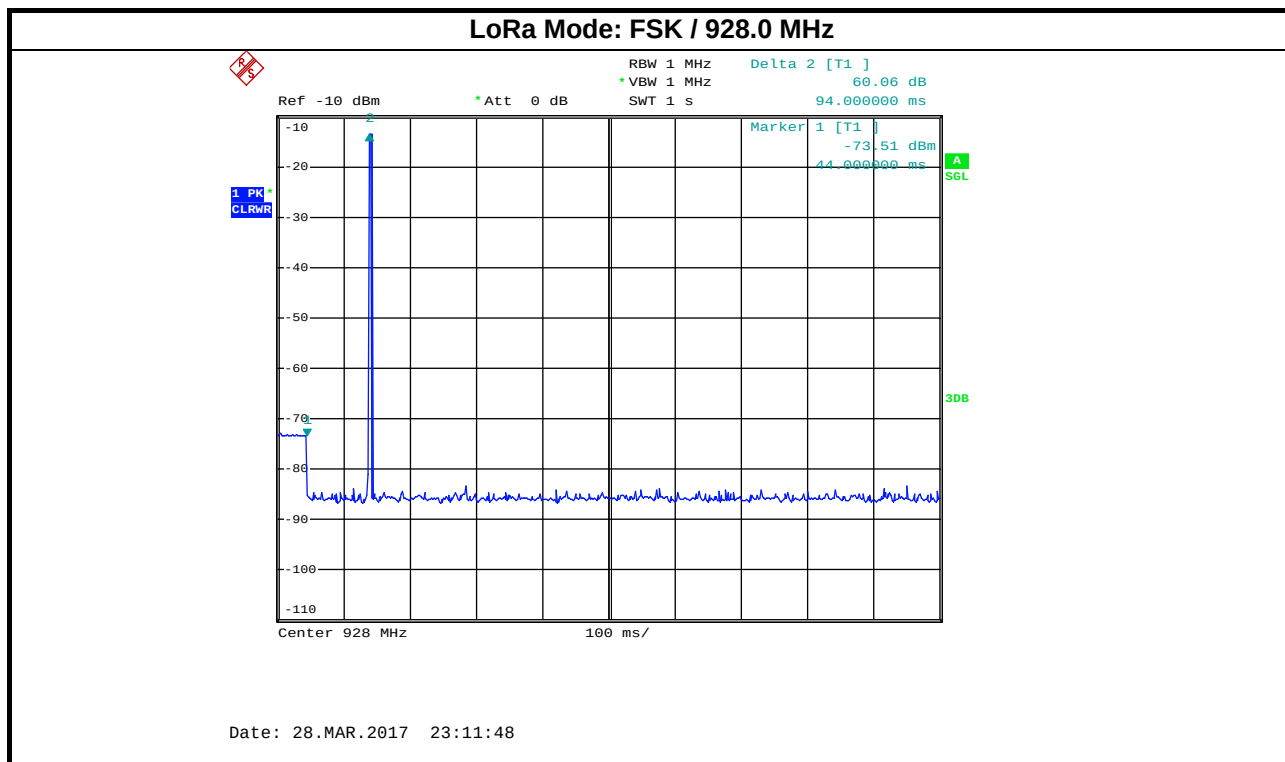


3.8.5 Test Result of Carrier Sensing Function

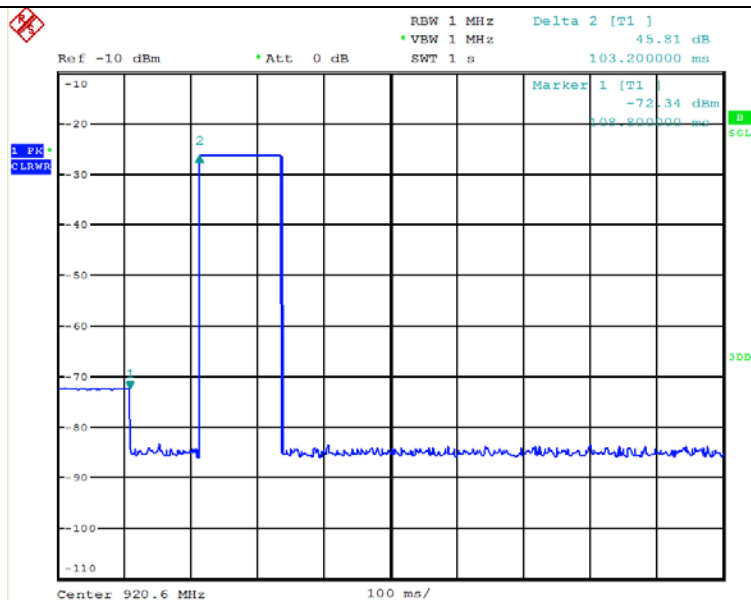
Reference Documents	Test Result
Appendix B Test Results	Complied

3.8.6 Test Plot of Carrier Sensing Function



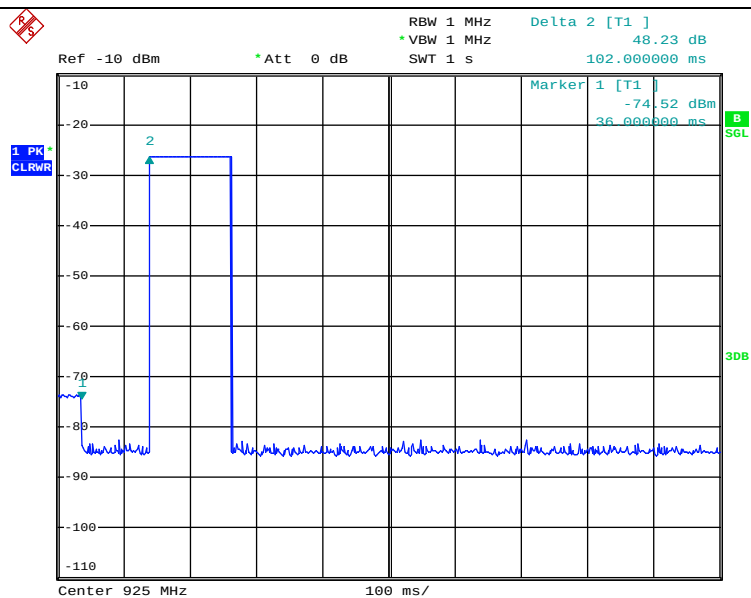


LoRa Mode: 125 kHz / 920.6 MHz

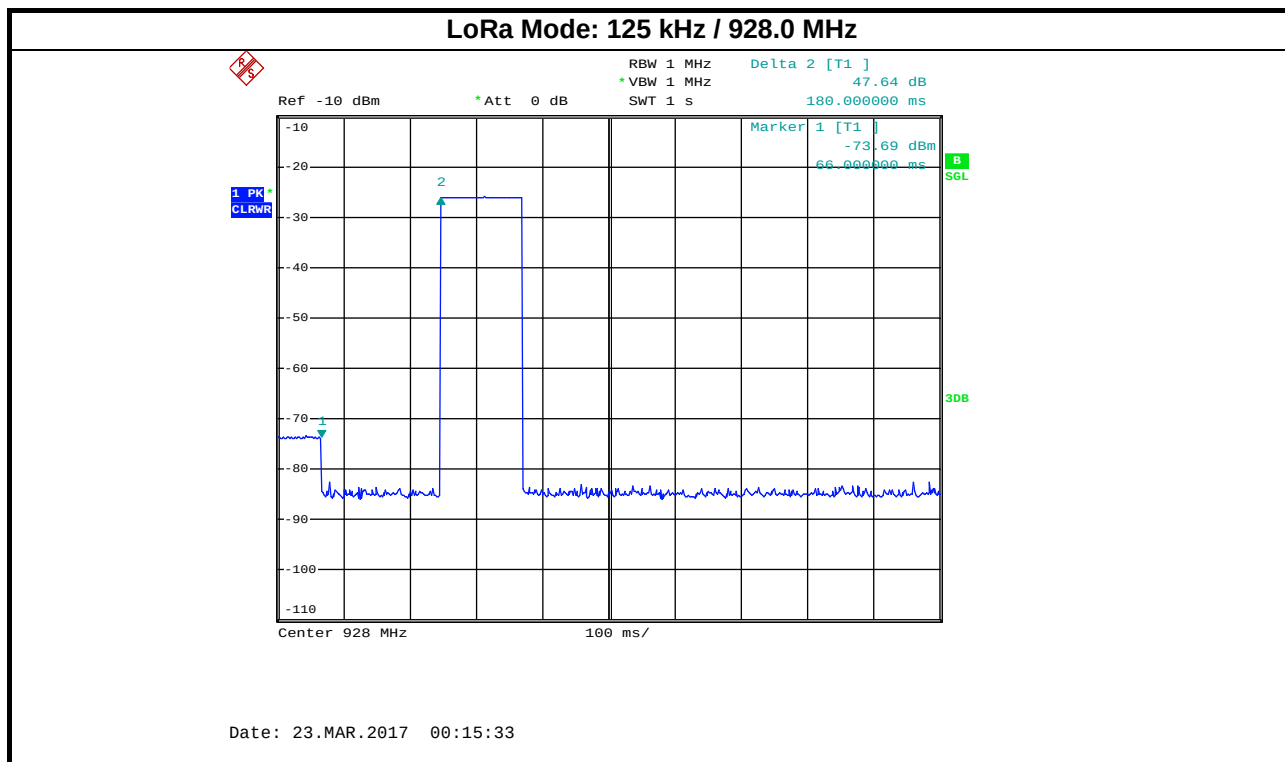


Date: 23.MAR.2017 00:06:39

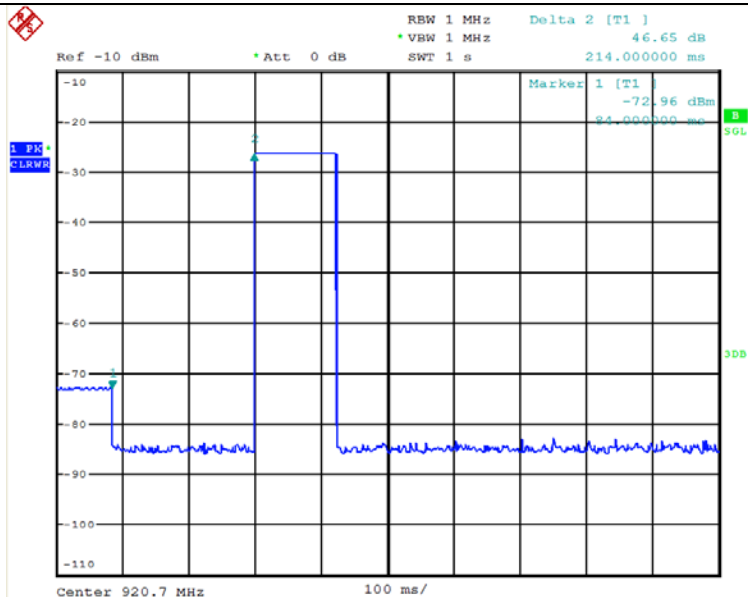
LoRa Mode: 125 kHz / 925.0 MHz



Date: 23.MAR.2017 00:11:55

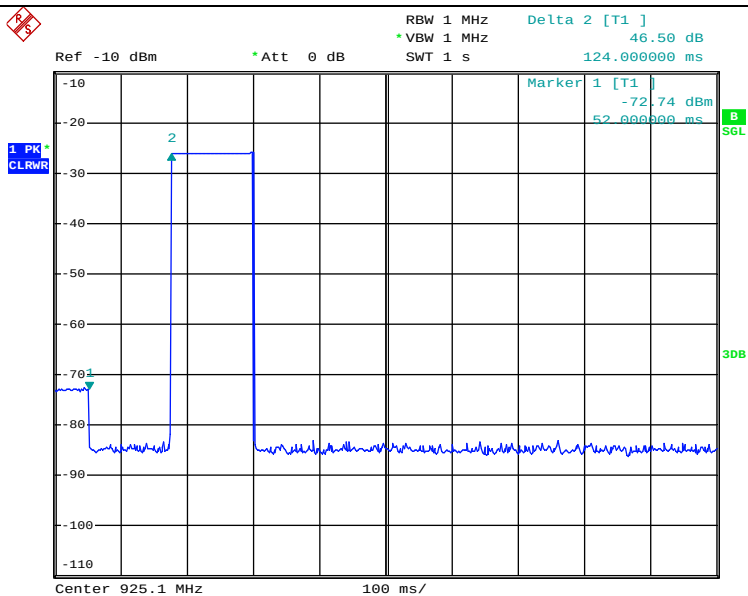


LoRa Mode: 250 kHz / 920.7 MHz

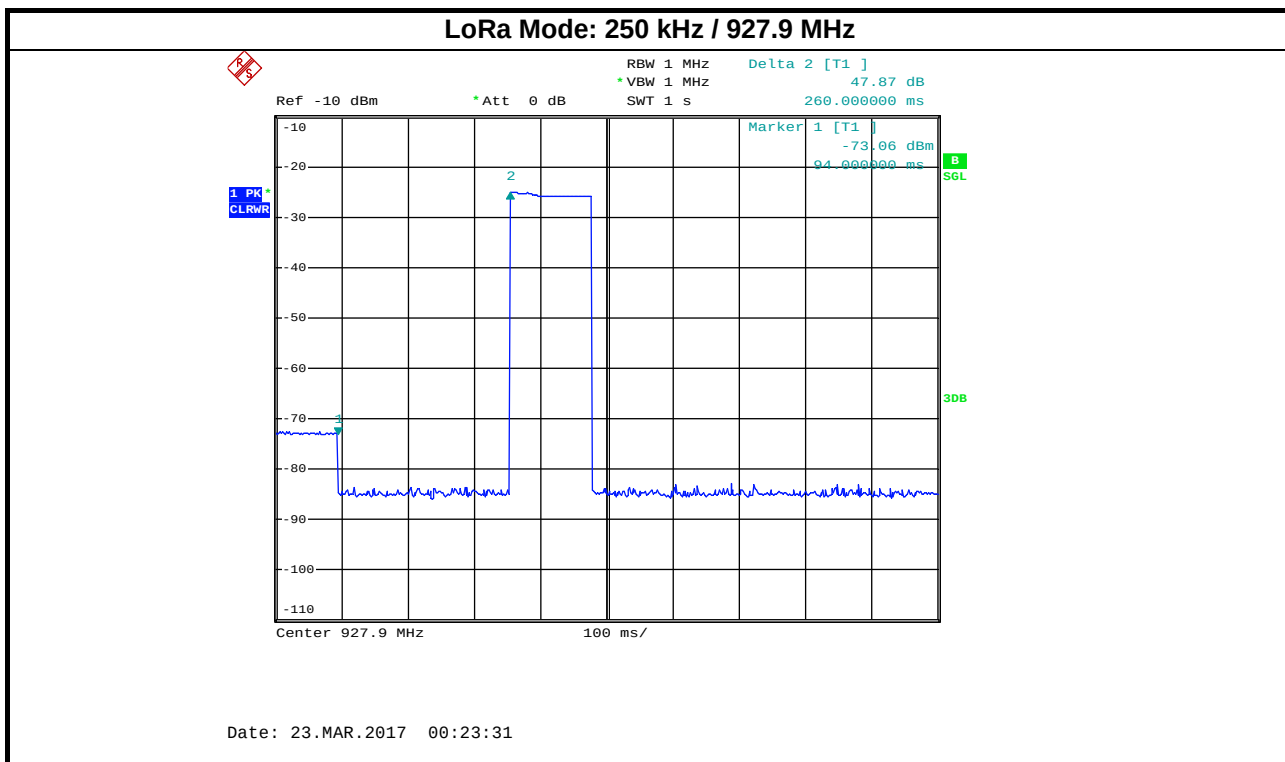


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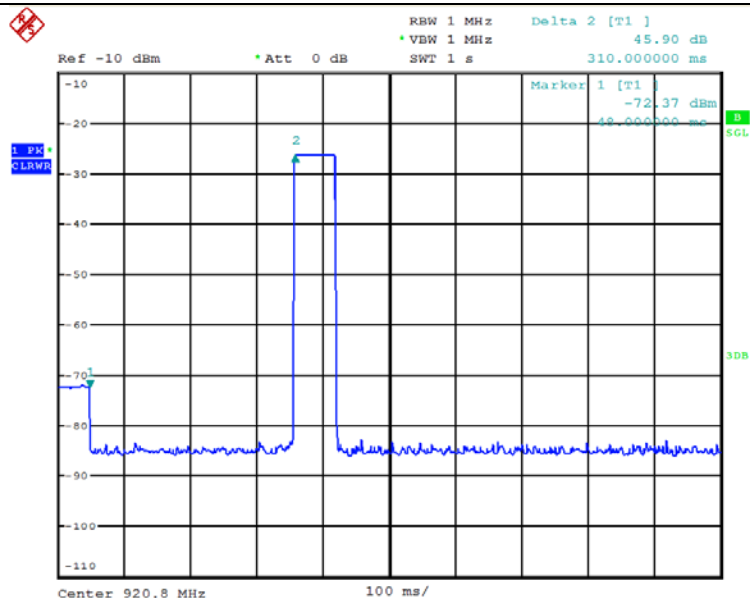
LoRa Mode: 250 kHz / 925.1 MHz



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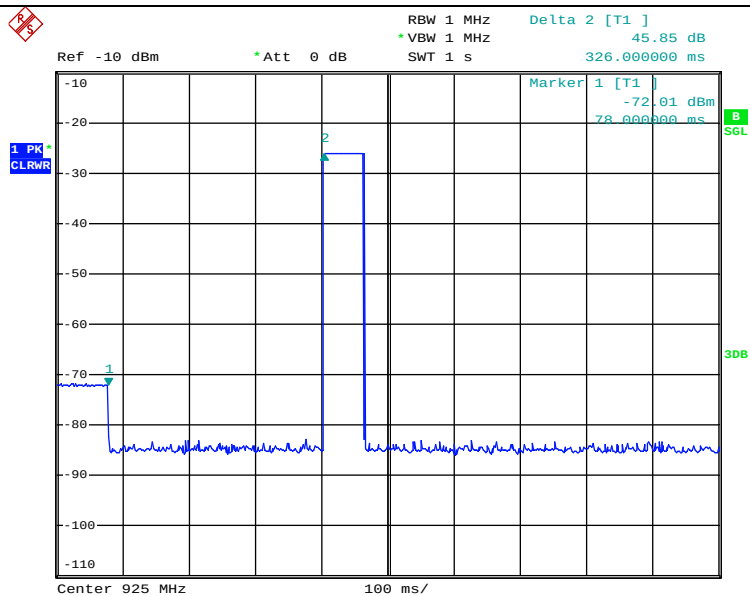


LoRa Mode: 500 kHz / 920.8 MHz

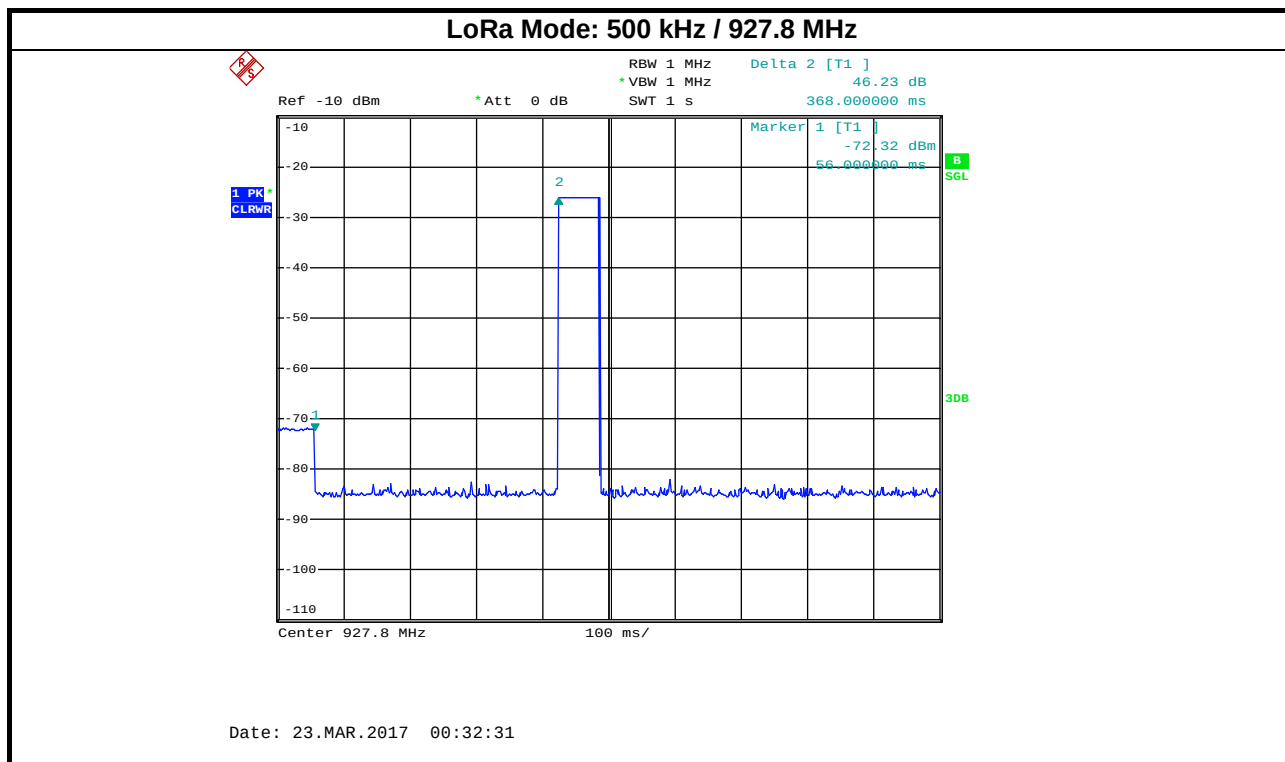


Date: 23.MAR.2017 00:27:30

LoRa Mode: 500 kHz / 925.0 MHz



Date: 23.MAR.2017 00:29:32



3.9 Construction Protection Confirmation Method

3.9.1 Limit of Construction Protection Confirmation Method

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

3.9.2 Confirmation Method

The RF and modulation portions are protected against illegal modification as following method:

Protected Method	Description
Shielding Case	RF and Modulation components are covered with shielding case and this shielding case is soldered

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Calibration Method	Calibration Agent Name	Remark
Spectrum Analyzer	Rohde&Schwarz	FSV30	101026	9kHz ~ 30GHz	Jan. 03, 2017	Jan. 02, 2018	c)	C	Conducted (TH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 21, 2017	Dec. 20, 2018	c)	C	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2016	Jun. 02, 2017	c)	A	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 01, 2018	May 31, 2019	c)	A	Conducted (TH01-CB)
LCR Meter	Lutron	LCR-9083	I.289487	N/A	Oct. 21, 2016	Oct. 20, 2017	c)	A	Conducted (TH01-CB)
LCR Meter	Lutron	LCR-9083	I.402812	N/A	Oct. 20, 2017	Oct. 19, 2018	c)	A	Conducted (TH01-CB)
Signal Generator	R&S	SMR40	100302	10MHz-40GHz	Dec. 21, 2016	Oct. 20, 2017	c)	C	Conducted (TH01-CB)
Signal Generator	R&S	SMR40	100302	10MHz-40GHz	Dec. 01, 2017	Nov. 30, 2018	c)	C	Conducted (TH01-CB)
RF Power Divider	ANAREN	2 Way	DFS-01-DV-02	1GHz ~ 6GHz	Oct. 24, 2016	Oct. 20, 2017	N/A	N/A	Conducted (TH01-CB)
RF Power Divider	ANAREN	2 Way	DFS-01-DV-02	1GHz ~ 6GHz	Oct. 11, 2017	Oct. 10, 2018	N/A	N/A	Conducted (TH01-CB)
RF Power Divider	MTJ	2 Way	DFS-01-DV-03	1GHz ~ 6GHz	Oct. 24, 2016	Oct. 20, 2017	N/A	N/A	Conducted (TH01-CB)
RF Power Divider	MTJ	2 Way	DFS-01-DV-03	1GHz ~ 6GHz	Oct. 11, 2017	Oct. 10, 2018	N/A	N/A	Conducted (TH01-CB)
RF Power Divider	ANAREN	4 Way	DFS-01-DV-01	1GHz ~ 6GHz	Oct. 24, 2016	Oct. 20, 2017	N/A	N/A	Conducted (TH01-CB)
RF Power Divider	ANAREN	4 Way	DFS-01-DV-01	1GHz ~ 6GHz	Oct. 11, 2017	Oct. 10, 2018	N/A	N/A	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 22, 2016	Nov. 21, 2017	c)	A	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 20, 2017	Nov. 19, 2018	c)	A	Conducted (TH01-CB)

Note:

1. Calibration Interval of instruments listed above is one year.
2. N.C.R. means Non-Calibration required.
3. Calibration Agent Name: Describe calibration agent name with its country name, and symbols in "Calibration Agent Name" shows the agent names as follows,
 - A: Electronics Testing Center, Taiwan.
 - B: Sporton International Inc., Taiwan.
 - C: ROHDE&SCHWARZ., Taiwan.
4. Calibration Method
 - a) : Calibration conducted by the National Institute of Information and Communications Technology or a designated calibration agency under Article 102-18 paragraph (1)
 - b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)
 - c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1)
 - d) : Calibration conducted by using other equipment that listed above from a) to c)



5 Measurement Uncertainty

Test Items	Uncertainty	Remark
Conducted Emission	1.7 dB	Confidence levels of 95%
Radio frequency	6.6×10^{-8} MHz	Confidence levels of 95%

1. APPENDIX B. FSK 920.6MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	17.022	mW
E.I.R.P	25.763	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
1	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		FSK(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

1.1 TEST Results

Measurement Frequency		MHz	920.6	Result	NOTES
Reading Frequency		MHz	920.6182	-----	
Frequency Tolerance		ppm	19.76972	PASS	
Occupied Bandwidth		kHz	116.00	PASS	
RF Output Power		mW	17.02	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.31	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-16.85	PASS	
	CF+(200xn)+200kHz	dBm	-16.42	PASS	

1.2 TEST Results

Measurement Frequency		MHz	920.6	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-57.07	PASS	
		MHz	606.18	-----	
	710-900MHz	dBm/MHz	-56.26	PASS	
		MHz	770.08	-----	
	900-915MHz	dBm/100kHz	-58.12	PASS	
		MHz	905.31	-----	
	915 - 920.3 MHz	dBm/3kHz	-39.78	PASS	
		MHz	920.26	-----	
	920.9 - 930 MHz	dBm/3kHz	-38.11	PASS	
		MHz	920.91	-----	
	930 -1000MHz	dBm/100kHz	-56.49	PASS	
		MHz	961.6600	-----	
	1 - 1.215GHz	dBm/MHz	-48.67	PASS	
		MHz	1154.48	-----	
1.215 - 5GHz	dBm/MHz	-45.06	PASS		
	MHz	4717.9	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-98.1524	PASS	
		MHz	500.5600	-----	
	710-900MHz	dBm/MHz	-93.5487	PASS	
		MHz	799.3000	-----	
	900-915MHz	dBm/100kHz	-94.5494	PASS	
		MHz	907.6200	-----	
	915-930MHz	dBm/100kHz	-97.4059	PASS	
		MHz	919.2000	-----	
	930-1GHz	dBm/100kHz	-95.1657	PASS	
		MHz	939.5200	-----	
1 - 5GHz	dBm/MHz	-78.8173	PASS		
	MHz	1848.0000	-----		
Transmission Time		ms	3.24	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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2. APPENDIX B. FSK 925MHz Test Results

Environment of Test Room	Temperature	23 °C
	Humidity	62 %

Peak Antenna Gain	1.80	dBi
Declaration Output Power	16.788	mW
E.I.R.P	25.410	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
1	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		FSK(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test	
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.	

2.1 TEST Results

Measurement Frequency		MHz	925	Result	NOTES
Reading Frequency		MHz	925.0183	-----	
Frequency Tolerance		ppm	19.78378	PASS	
Occupied Bandwidth		kHz	116.00	PASS	
RF Output Power		mW	16.79	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.25	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-15.62	PASS	
	CF+(200xn)+200kHz	dBm	-15.29	PASS	

2.2 TEST Results

Measurement Frequency		MHz	925	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-60.6823	PASS	
		MHz	229.92	-----	
	710-900MHz	dBm/MHz	-63.0595	PASS	
		MHz	714.94	-----	
	900-915MHz	dBm/100kHz	-60.4652	PASS	
		MHz	914.67	-----	
	915 - 924.7 MHz	dBm/3kHz	-39.7400	PASS	
		MHz	924.6418	-----	
	925.3 - 930 MHz	dBm/3kHz	-36.1200	PASS	
		MHz	925.3094	-----	
	930 -1000MHz	dBm/100kHz	-60.2767	PASS	
		MHz	984.04	-----	
	1 - 1.215GHz	dBm/MHz	-62.3920	PASS	
		MHz	1076.5	-----	
	1.215 - 5GHz	dBm/MHz	-55.0860	PASS	
		MHz	3132.5	-----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-97.9939	PASS	
		MHz	54.4800	-----	
	710-900MHz	dBm/MHz	-93.8951	PASS	
		MHz	722.1600	-----	
	900-915MHz	dBm/100kHz	-97.9058	PASS	
		MHz	903.1500	-----	
	915-930MHz	dBm/100kHz	-97.9209	PASS	
		MHz	920.3400	-----	
	930-1GHz	dBm/100kHz	-97.8875	PASS	
		MHz	932.9400	-----	
	1 - 5GHz	dBm/MHz	-85.3356	PASS	
		MHz	3224.0000	-----	
Transmission Time		ms	3.24	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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3. APPENDIX B. FSK 928MHz Test Results

Environment of Test Room	Temperature	23 °C
	Humidity	62 %

Peak Antenna Gain	1.80	dBi
Declaration Output Power	16.904	mW
E.I.R.P	25.586	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
1	

Tested Circit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		FSK(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test	
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.	

3.1 TEST Results

Measurement Frequency		MHz	928	Result	NOTES
Reading Frequency		MHz	928.0182	-----	
Frequency Tolerance		ppm	19.61207	PASS	
Occupied Bandwidth		kHz	120.00	PASS	
RF Output Power		mW	16.90	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.28	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-15.19	PASS	
	CF+(200xn)+200kHz	dBm	-15.80	PASS	

3.2 TEST Results

Measurement Frequency		MHz	928	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-60.6400	PASS	
		MHz	137.4400	----	
	710-900MHz	dBm/MHz	-62.9070	PASS	
		MHz	892.4	----	
	900-915MHz	dBm/100kHz	-60.5108	PASS	
		MHz	906.81	----	
	915 - 927.7 MHz	dBm/3kHz	-45.2700	PASS	
		MHz	926.4808	----	
	928.3 - 930 MHz	dBm/3kHz	-36.6100	PASS	
		MHz	928.3	----	
	930 -1000MHz	dBm/100kHz	-60.4508	PASS	
		MHz	930.42	----	
	1 - 1.215GHz	dBm/MHz	-62.5407	PASS	
		MHz	1204	----	
	1.215 - 5GHz	dBm/MHz	-55.4495	PASS	
		MHz	3252.5	----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-98.2047	PASS	
		MHz	285.6800	----	
	710-900MHz	dBm/MHz	-93.9901	PASS	
		MHz	716.8400	----	
	900-915MHz	dBm/100kHz	-98.0280	PASS	
		MHz	910.5600	----	
	915-930MHz	dBm/100kHz	-97.8477	PASS	
		MHz	924.0600	----	
	930-1GHz	dBm/100kHz	-97.9458	PASS	
		MHz	942.3200	----	
1 - 5GHz	dBm/MHz	-85.7007	PASS		
	MHz	3040.0000	----		
Transmission Time		ms	3.24	PASS	
Carrier Sensing Function		----	good	PASS	
Interference Prevention Function		----	good	PASS	

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4. APPENDIX B. 125kHz 920.6MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	17.338	mW
E.I.R.P	26.242	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
1	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		125KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

4.1 TEST Results

Measurement Frequency		MHz	920.6	Result	NOTES
Reading Frequency		MHz	920.6182	-----	
Frequency Tolerance		ppm	19.76972	PASS	
Occupied Bandwidth		kHz	125.91	PASS	
RF Output Power		mW	17.34	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.39	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-47.68	PASS	
	CF+(200xn)+200kHz	dBm	-42.05	PASS	

4.2 TEST Results

Measurement Frequency		MHz	920.6	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-51.5400	PASS	
		MHz	379.84	-----	
	710-900MHz	dBm/MHz	-56.8500	PASS	
		MHz	835.25	-----	
	900-915MHz	dBm/100kHz	-57.3900	PASS	
		MHz	902.31	-----	
	915 - 920.3 MHz	dBm/3kHz	-40.3200	PASS	
		MHz	920.27	-----	
	920.9 - 930 MHz	dBm/3kHz	-43.4600	PASS	
		MHz	920.91	-----	
	930 -1000MHz	dBm/100kHz	-55.5800	PASS	
		MHz	990.9300	-----	
	1 - 1.215GHz	dBm/MHz	-49.0800	PASS	
		MHz	1049.32	-----	
1.215 - 5GHz	dBm/MHz	-44.8300	PASS		
	MHz	4778.25	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-74.4700	PASS	
		MHz	672.1100	-----	
	710-900MHz	dBm/MHz	-68.8800	PASS	
		MHz	877.5900	-----	
	900-915MHz	dBm/100kHz	-75.8700	PASS	
		MHz	905.3940	-----	
	915-930MHz	dBm/100kHz	-75.2700	PASS	
		MHz	929.1430	-----	
	930-1GHz	dBm/100kHz	-74.2200	PASS	
		MHz	931.4700	-----	
	1 - 5GHz	dBm/MHz	-63.6600	PASS	
		MHz	4875.5000	-----	
Transmission Time		ms	248.00	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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5. APPENDIX B. 125kHz 925MHz Test Results

Environment of Test Room	Temperature	23 °C
	Humidity	62 %

Peak Antenna Gain	1.80	dBi
Declaration Output Power	17.498	mW
E.I.R.P	26.485	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
1	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		125KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

5.1 TEST Results

Measurement Frequency		MHz	925	Result	NOTES
Reading Frequency		MHz	925.0183	-----	
Frequency Tolerance		ppm	19.78378	PASS	
Occupied Bandwidth		kHz	128.00	PASS	
RF Output Power		mW	17.50	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.43	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-41.62	PASS	
	CF+(200xn)+200kHz	dBm	-36.31	PASS	

5.2 TEST Results

Measurement Frequency		MHz	925	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-48.1500	PASS	
		MHz	300.64	-----	
	710-900MHz	dBm/MHz	-57.8200	PASS	
		MHz	873.78	-----	
	900-915MHz	dBm/100kHz	-58.5300	PASS	
		MHz	904.17	-----	
	915 - 924.7 MHz	dBm/3kHz	-54.1900	PASS	
		MHz	924.7	-----	
	925.3 - 930 MHz	dBm/3kHz	-55.6300	PASS	
		MHz	925.3	-----	
	930 -1000MHz	dBm/100kHz	-57.8500	PASS	
		MHz	986.28	-----	
1 - 1.215GHz	dBm/MHz	-51.2200	PASS		
	MHz	1102.77	-----		
1.215 - 5GHz	dBm/MHz	-44.2400	PASS		
	MHz	3175.63	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-74.1500	PASS	
		MHz	520.5600	-----	
	710-900MHz	dBm/MHz	-68.3000	PASS	
		MHz	881.7100	-----	
	900-915MHz	dBm/100kHz	-75.4400	PASS	
		MHz	900.2710	-----	
	915-930MHz	dBm/100kHz	-74.8600	PASS	
		MHz	918.3320	-----	
	930-1GHz	dBm/100kHz	-74.2800	PASS	
		MHz	945.2500	-----	
1 - 5GHz	dBm/MHz	-64.4900	PASS		
	MHz	4881.3000	-----		
Transmission Time		ms	248.00	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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6. APPENDIX B. 125kHz 928MHz Test Results

Environment of Test Room	Temperature	23 °C
	Humidity	62 %

Peak Antenna Gain	1.80	dBi
Declaration Output Power	17.458	mW
E.I.R.P	26.424	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
1	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		125KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

6.1 TEST Results

Measurement Frequency		MHz	928	Result	NOTES
Reading Frequency		MHz	928.0182	-----	
Frequency Tolerance		ppm	19.61207	PASS	
Occupied Bandwidth		kHz	128.00	PASS	
RF Output Power		mW	17.46	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.42	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-37.96	PASS	
	CF+(200xn)+200kHz	dBm	-33.15	PASS	

6.2 TEST Results

Measurement Frequency		MHz	928	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-47.7800	PASS	
		MHz	510.0800	-----	
	710-900MHz	dBm/MHz	-58.0500	PASS	
		MHz	854.36	-----	
	900-915MHz	dBm/100kHz	-57.5100	PASS	
		MHz	907.71	-----	
	915 - 927.7 MHz	dBm/3kHz	-54.1800	PASS	
		MHz	927.7	-----	
	928.3 - 930 MHz	dBm/3kHz	-55.2500	PASS	
		MHz	928.3	-----	
	930 -1000MHz	dBm/100kHz	-56.8900	PASS	
		MHz	965.46	-----	
1 - 1.215GHz	dBm/MHz	-51.5400	PASS		
	MHz	1180.67	-----		
1.215 - 5GHz	dBm/MHz	-44.7100	PASS		
	MHz	3281.61	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-74.6600	PASS	
		MHz	708.5200	-----	
	710-900MHz	dBm/MHz	-69.4400	PASS	
		MHz	898.2100	-----	
	900-915MHz	dBm/100kHz	-75.9700	PASS	
		MHz	902.8550	-----	
	915-930MHz	dBm/100kHz	-75.9500	PASS	
		MHz	923.6070	-----	
	930-1GHz	dBm/100kHz	-73.6100	PASS	
		MHz	974.0200	-----	
1 - 5GHz	dBm/MHz	-63.5800	PASS		
	MHz	4806.1000	-----		
Transmission Time		ms	248.00	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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7. APPENDIX B. 250kHz 920.7MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	16.788	mW
E.I.R.P	25.410	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
2	

Tested Circit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		250KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

7.1 TEST Results

Measurement Frequency		MHz	920.7	Result	NOTES
Reading Frequency		MHz	920.7179	-----	
Frequency Tolerance		ppm	19.44173	PASS	
Occupied Bandwidth		kHz	256.94	PASS	
RF Output Power		mW	16.79	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.25	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-21.95	PASS	
	CF+(200xn)+200kHz	dBm	-16.14	PASS	

7.2 TEST Results

Measurement Frequency		MHz	920.7	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-56.8200	PASS	
		MHz	237.15	-----	
	710-900MHz	dBm/MHz	-57.5300	PASS	
		MHz	795.38	-----	
	900-915MHz	dBm/100kHz	-56.9200	PASS	
		MHz	913.75	-----	
	915 - 920.3 MHz	dBm/3kHz	-47.0900	PASS	
		MHz	920.24	-----	
	921.1 - 930 MHz	dBm/3kHz	-38.4900	PASS	
		MHz	921.12	-----	
	930 -1000MHz	dBm/100kHz	-56.1700	PASS	
		MHz	946.2800	-----	
	1 - 1.215GHz	dBm/MHz	-49.2300	PASS	
		MHz	1145.46	-----	
1.215 - 5GHz	dBm/MHz	-44.8900	PASS		
	MHz	4318	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-100.2431	PASS	
		MHz	684.9100	-----	
	710-900MHz	dBm/MHz	-89.9841	PASS	
		MHz	769.5300	-----	
	900-915MHz	dBm/100kHz	-94.0879	PASS	
		MHz	906.6750	-----	
	915-930MHz	dBm/100kHz	-99.8580	PASS	
		MHz	924.1060	-----	
	930-1GHz	dBm/100kHz	-94.1427	PASS	
		MHz	938.6600	-----	
1 - 5GHz	dBm/MHz	-90.8732	PASS		
	MHz	1848.0000	-----		
Transmission Time		ms	123.60	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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8. APPENDIX B. 250kHz 925.1MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	16.444	mW
E.I.R.P	24.889	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
2	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		250KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
-----------------	---

Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

8.1 TEST Results

Measurement Frequency		MHz	925.1	Result	NOTES
Reading Frequency		MHz	925.1183	-----	
Frequency Tolerance		ppm	19.78165	PASS	
Occupied Bandwidth		kHz	250.00	PASS	
RF Output Power		mW	16.44	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.16	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-21.93	PASS	
	CF+(200xn)+200kHz	dBm	-16.57	PASS	

8.2 TEST Results

Measurement Frequency		MHz	925.1	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-70.6065	PASS	
		MHz	652.43	-----	
	710-900MHz	dBm/MHz	-60.4055	PASS	
		MHz	835.25	-----	
	900-915MHz	dBm/100kHz	-69.8064	PASS	
		MHz	904.678	-----	
	915 - 924.7 MHz	dBm/3kHz	-56.3600	PASS	
		MHz	924.7	-----	
	925.5 - 930 MHz	dBm/3kHz	-54.3500	PASS	
		MHz	925.5	-----	
	930 -1000MHz	dBm/100kHz	-69.8724	PASS	
		MHz	997.5200	-----	
	1 - 1.215GHz	dBm/MHz	-61.8227	PASS	
		MHz	1166.24	-----	
1.215 - 5GHz	dBm/MHz	-57.1064	PASS		
	MHz	4970.2	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-100.7244	PASS	
		MHz	341.4600	-----	
	710-900MHz	dBm/MHz	-90.2450	PASS	
		MHz	724.9900	-----	
	900-915MHz	dBm/100kHz	-93.9724	PASS	
		MHz	909.2800	-----	
	915-930MHz	dBm/100kHz	-99.1601	PASS	
		MHz	918.5930	-----	
	930-1GHz	dBm/100kHz	-93.8790	PASS	
		MHz	941.3000	-----	
1 - 5GHz	dBm/MHz	-91.0892	PASS		
	MHz	1848.0000	-----		
Transmission Time		ms	124.20	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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9. APPENDIX B. 250kHz 927.9MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	16.293	mW
E.I.R.P	24.660	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
2	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		250KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
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Comprehensive operation test	
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.	

9.1 TEST Results

Measurement Frequency		MHz	927.9	Result	NOTES
Reading Frequency		MHz	927.9182	-----	
Frequency Tolerance		ppm	19.61418	PASS	
Occupied Bandwidth		kHz	250.00	PASS	
RF Output Power		mW	16.29	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.12	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-22.12	PASS	
	CF+(200xn)+200kHz	dBm	-16.62	PASS	

9.2 TEST Results

Measurement Frequency		MHz	927.9	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-70.7754	PASS	
		MHz	342.45	-----	
	710-900MHz	dBm/MHz	-60.1012	PASS	
		MHz	885.01	-----	
	900-915MHz	dBm/100kHz	-69.6890	PASS	
		MHz	904.157	-----	
	915 - 927.5 MHz	dBm/100kHz	-55.7600	PASS	
		MHz	927.5	-----	
	928.3 - 930 MHz	dBm/100kHz	-54.2500	PASS	
		MHz	928.3	-----	
	930 -1000MHz	dBm/100kHz	-69.8765	PASS	
		MHz	965.2000	-----	
	1 - 1.215GHz	dBm/MHz	-61.8171	PASS	
		MHz	1154.31	-----	
1.215 - 5GHz	dBm/MHz	-57.4867	PASS		
	MHz	4905	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-100.7002	PASS	
		MHz	644.5600	-----	
	710-900MHz	dBm/MHz	-89.9289	PASS	
		MHz	850.0900	-----	
	900-915MHz	dBm/100kHz	-94.2385	PASS	
		MHz	912.0590	-----	
	915-930MHz	dBm/100kHz	-99.3345	PASS	
		MHz	924.4320	-----	
	930-1GHz	dBm/100kHz	-95.7728	PASS	
		MHz	944.1300	-----	
	1 - 5GHz	dBm/MHz	-90.7822	PASS	
		MHz	1853.8000	-----	
Transmission Time		ms	124.20	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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10. APPENDIX B. 500kHz 920.8MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	17.338	mW
E.I.R.P	26.242	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
3	

Tested Circit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		500KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
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Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

10.1 TEST Results

Measurement Frequency		MHz	920.8	Result	NOTES
Reading Frequency		MHz	920.806	-----	
Frequency Tolerance		ppm	6.51607	PASS	
Occupied Bandwidth		kHz	556.28	PASS	
RF Output Power		mW	17.34	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.39	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-29.37	PASS	
	CF+(200xn)+200kHz	dBm	-19.42	PASS	

10.2 TEST Results

Measurement Frequency		MHz	920.8	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-57.2400	PASS	
		MHz	635.67	-----	
	710-900MHz	dBm/MHz	-56.7100	PASS	
		MHz	793.45	-----	
	900-915MHz	dBm/100kHz	-57.5700	PASS	
		MHz	907.48	-----	
	915 - 920.3 MHz	dBm/3kHz	-41.7300	PASS	
		MHz	920.28	-----	
	921.3 - 930 MHz	dBm/3kHz	-39.9300	PASS	
		MHz	921.36	-----	
	930 -1000MHz	dBm/3kHz	-60.8700	PASS	
		MHz	945.6500	-----	
	1 - 1.215GHz	dBm/MHz	-47.9600	PASS	
		MHz	1019.76	-----	
	1.215 - 5GHz	dBm/MHz	-44.9600	PASS	
		MHz	4756.2	-----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-97.9764	PASS	
		MHz	701.8400	-----	
	710-900MHz	dBm/MHz	-93.8275	PASS	
		MHz	860.4800	-----	
	900-915MHz	dBm/100kHz	-94.3175	PASS	
		MHz	906.6600	-----	
	915-930MHz	dBm/100kHz	-97.1892	PASS	
		MHz	915.5100	-----	
	930-1GHz	dBm/100kHz	-97.0771	PASS	
		MHz	933.6400	-----	
	1 - 5GHz	dBm/MHz	-93.0043	PASS	
		MHz	1840.0000	-----	
Transmission Time		ms	61.90	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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11. APPENDIX B. 500kHz 925MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	16.711	mW
E.I.R.P	25.293	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
3	

Tested Circit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		500KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
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Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

11.1 TEST Results

Measurement Frequency		MHz	925	Result	NOTES
Reading Frequency		MHz	925.0021	-----	
Frequency Tolerance		ppm	2.27027	PASS	
Occupied Bandwidth		kHz	560.00	PASS	
RF Output Power		mW	16.71	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.23	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-29.29	PASS	
	CF+(200xn)+200kHz	dBm	-18.86	PASS	

11.2 TEST Results

Measurement Frequency		MHz	925	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-60.4026	PASS	
		MHz	572.64	-----	
	710-900MHz	dBm/MHz	-62.8391	PASS	
		MHz	759.02	-----	
	900-915MHz	dBm/100kHz	-60.4746	PASS	
		MHz	909.24	-----	
	915 - 924.5 MHz	dBm/3kHz	-52.8900	PASS	
		MHz	924.5	-----	
	925.5 - 930 MHz	dBm/3kHz	-52.2700	PASS	
		MHz	925.5	-----	
	930 -1000MHz	dBm/100kHz	-60.4357	PASS	
		MHz	935.6000	-----	
	1 - 1.215GHz	dBm/MHz	-62.4419	PASS	
		MHz	1231	-----	
	1.215 - 5GHz	dBm/MHz	-55.2998	PASS	
		MHz	3177.5	-----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-98.2388	PASS	
		MHz	629.7600	-----	
	710-900MHz	dBm/MHz	-93.4499	PASS	
		MHz	800.4400	-----	
	900-915MHz	dBm/100kHz	-98.0835	PASS	
		MHz	901.5600	-----	
	915-930MHz	dBm/100kHz	-98.0071	PASS	
		MHz	915.3600	-----	
	930-1GHz	dBm/100kHz	-98.0150	PASS	
		MHz	955.0600	-----	
	1 - 5GHz	dBm/MHz	-85.7091	PASS	
		MHz	3168.0000	-----	
Transmission Time		ms	61.90	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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12. APPENDIX B. 500kHz 927.8MHz Test Results

Environment of Test Room	Temperature	23	°C
	Humidity	62	%

Peak Antenna Gain	1.80	dBi
Declaration Output Power	16.749	mW
E.I.R.P	25.351	mW
Input Power Voltage	5	VDC

Max Antenna Gain		
TX1	1.80	dBi

Number of Channel	
3	

Tested Circuit Insertion Loss		0.00	dB
Burst	ON TIME	1.0000	sec
	ON +OFF TIME	1.0000	sec
	Ratio	100.00%	%
Modulation Type		500KHz(LoRa)	

Test Category :	920MHz-Band Telemeter,Telecontrol And Data Transmission Radio Equipment
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Comprehensive operation test
: In order to receive constant voltage from NB etc. side, power supply voltage examines only by usual state voltage.

12.1 TEST Results

Measurement Frequency		MHz	927.8	Result	NOTES
Reading Frequency		MHz	927.814	-----	
Frequency Tolerance		ppm	15.08946	PASS	
Occupied Bandwidth		kHz	580.00	PASS	
RF Output Power		mW	16.75	PASS	
RF Output Power Tolerance		%	0.00	PASS	
Real Total Output Power		dBm	12.24	-----	
Adjacent Channel Leakage Power	CF-(200xn)-200kHz	dBm	-29.78	PASS	
	CF+(200xn)+200kHz	dBm	-31.10	PASS	

12.2 TEST Results

Measurement Frequency		MHz	927.8	Result	NOTES
Unwanted Emission Strength	Under 710MHz	dBm/100kHz	-60.6053	PASS	
		MHz	47.68	-----	
	710-900MHz	dBm/MHz	-62.6524	PASS	
		MHz	815.64	-----	
	900-915MHz	dBm/100kHz	-60.4861	PASS	
		MHz	914.55	-----	
	915 - 927.3 MHz	dBm/3kHz	-61.1700	PASS	
		MHz	927	-----	
	928.3 - 930 MHz	dBm/3kHz	-44.5800	PASS	
		MHz	928.3102	-----	
	930 -1000MHz	dBm/100kHz	-60.5037	PASS	
		MHz	936.4400	-----	
	1 - 1.215GHz	dBm/MHz	-62.5834	PASS	
		MHz	1030	-----	
1.215 - 5GHz	dBm/MHz	-55.4147	PASS		
	MHz	3177.5	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 710MHz	dBm/100kHz	-98.0058	PASS	
		MHz	102.0800	-----	
	710-900MHz	dBm/MHz	-93.9781	PASS	
		MHz	729.7600	-----	
	900-915MHz	dBm/100kHz	-93.4405	PASS	
		MHz	911.8800	-----	
	915-930MHz	dBm/100kHz	-97.1360	PASS	
		MHz	919.3200	-----	
	930-1GHz	dBm/100kHz	-93.8261	PASS	
		MHz	943.8600	-----	
	1 - 5GHz	dBm/MHz	-73.5055	PASS	
		MHz	1856.0000	-----	
Transmission Time		ms	61.90	PASS	
Carrier Sensing Function		-----	good	PASS	
Interference Prevention Function		-----	good	PASS	

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13. Appendix B Antenna List Table

MAX VALUE :	1.80 dBi
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ANTENNA			Gain Specification				NOTES (Cable or Others)
No	Type	P/N	Max Gain (dBi)	Polarization (H or V)	Attenuation (dB)	Net Gain (dBi)	
1	Dipole Antenna	TH-915i	1.80		0	1.80	
2	Dipole Antenna	AN0915-9207BSM	0.96		0	0.96	
3	Dipole Antenna	AB0915-88H01BSM	1.35		0	1.35	
4	Dipole Antenna	1750008650-01	1.71		0	1.71	

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14. Appendix B Voltage Fluctuation Test Results

Voltage Fluctuation Test	Normal Voltage	High Voltage + 10% of Normal Voltage	Low Voltage - 10% of Normal Voltage
Input DC Power	3.3	3.63	2.97
Output DC Power	2.85	2.86	2.83
Voltage Variation (%)	-	0.350877	-0.701754
Note: Voltage Variation (%) = (Output High or Low Voltage - Output Normal Voltage)/Output Normal Voltage X 100			
During the input supply voltage to the EUT from the external power source is varied by +/- 10%, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than +/- 1%. Exempt extremely high and low supply voltage condition tests, EUT only operated in normal voltage to test all regulations.			

—————THE END—————