

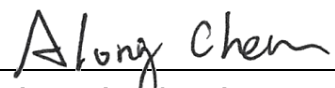
CE Test Report

Equipment : Bluetooth 5.2 BLE + 802.15.4 + NFC Module
Model No. : BL5340PA Series
Brand Name : Laird Connectivity
Applicant : Laird Connectivity LLC
Address : W66N220 Commerce Court, Cedarburg, WI
53012 United States Of America
Standard : EN 300 328 V2.2.2 (2019-07)
Received Date : Feb. 01, 2023
Tested Date : Apr. 21 ~ May 24, 2023

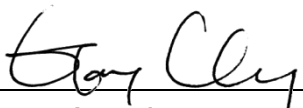
We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Approved by:



Along Chen / Assistant Manager



Gary Chang / Manager

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Appendix A. RF Output Power

Appendix B. Power Spectral Density

Appendix C. Occupied Channel Bandwidth

Appendix D. Transmitter Unwanted Emissions In The Out-Of-Band Domain

Appendix E. Transmitter Spurious Emissions

Appendix F. Receiver Spurious Emissions

Appendix G. Receiver Blocking

Release Record

Report No.	Version	Description	Issued Date
ER1O0405-01AE	Rev. 01	Initial issue	Jun. 20, 2023

Summary of Test Results

Ref. Std. Clause	Test Items	Measured	Result
4.3.2.2	RF Output Power	9.93 dBm.	Pass
4.3.2.3	Power Spectral Density	Meet the requirement of limit.	Pass
4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap	Only for non-adaptive equipment.	N/A
4.3.2.5	Medium Utilisation (MU) factor	Only for non-adaptive equipment.	N/A
4.3.2.6	Adaptivity	The RF Output power is less than 10 dBm e.i.r.p. This item is not applicable.	N/A
4.3.2.7	Occupied Channel Bandwidth	Meet the requirement of limit.	Pass
4.3.2.8	Transmitter unwanted emissions in the out of band domain	Meet the requirement of limit.	Pass
4.3.2.9	Transmitter unwanted emissions in the spurious domain	Meet the requirement of limit.	Pass
4.3.2.10	Receiver spurious emissions	Meet the requirement of limit.	Pass
4.3.2.11	Receiver Blocking	Meet the requirement of limit.	Pass
4.3.2.12	Geo-location Capability	The device has no this capability.	N/A

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.

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number	Data Rate
2400-2483.5	LE	2402-2480	0-39 [40]	125 kbps
				500 kbps
				1 Mbps
				2 Mbps
Note: Bluetooth LE (Low energy) uses GFSK modulation.				

1.1.2 Antenna Details

Ant. No.	Brand	Model	Type	Connector	2400-2500MHz	2400-2480MHz	Remarks
					Gain (dBi)		
1	Laird	NanoBlue	PCB Dipole	IPEX MHF4	2	---	External
2	Laird	FlexPIFA	PCB Dipole	IPEX MHF4	---	2	External
3	Mag.Layers	EDA-8709-2G4C1-B27-CY	Dipole	IPEX MHF4	2	---	External
4	Laird	mFlexPIFA	PIFA	IPEX MHF4	---	2	External
5	Laird	Laird NFC	spiral	---	---	---	Internal + External
6	Laird	BL5340 onboard printed PCB Trace antenna	Printed PCB	---	1.49	---	Internal
7	Laird	i-FlexPIFA	Inverted Ground Flexible Planar Inverted F Antenna (i-FlexPIFA)	---	---	3.1	External

1.1.3 EUT Operational Condition

Power Supply Type	3.3Vdc from host		
SW Version	bl5340pa_radio_test_v0.0.4		
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (105°C)	☒ Tmin (-40°C)
Operational Voltage	☒ Vnom (3.30 Vdc)	☒ Vmax (3.60 Vdc)	☒ Vmin (3.00 Vdc)

1.1.4 Accessories

N/A

1.1.5 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
37	2402	12	2430	26	2458
0	2404	13	2432	27	2460
1	2406	14	2434	28	2462
2	2408	15	2436	29	2464
3	2410	16	2438	30	2466
4	2412	17	2440	31	2468
5	2414	18	2442	32	2470
6	2416	19	2444	33	2472
7	2418	20	2446	34	2474
8	2420	21	2448	35	2476
9	2422	22	2450	36	2478
10	2424	23	2452	39	2480
38	2426	24	2454	---	---
11	2428	25	2456	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	Command	
Modulation Mode	Duty Cycle Of Test Signal (%)	Duty Factor (dB)
BT-LE(125kbps)	100.00%	0.00
BT-LE(500kbps)	100.00%	0.00
BT-LE(1Mbps)	100.00%	0.00
BT-LE(2Mbps)	100.00%	0.00

1.1.7 Power Index of Test Tool

External antenna

Modulation Mode	Test Frequency (MHz)					
	2402		2440		2480	
	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)
GFSK/125kbps	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)
GFSK/500kbps	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)
GFSK/1Mbps	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)
Modulation Mode	2404		2440		2478	
	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)
	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)
GFSK/2Mbps	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)	neg16dBm	23(Gain=18)

Internal antenna

Modulation Mode	Test Frequency (MHz)					
	2402		2440		2480	
	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)
BT-LE(125kbps)	neg16dBm	24(Gain=19)	neg16dBm	23(Gain=18)	neg16dBm	24(Gain=19)
BT-LE(500kbps)	neg16dBm	24(Gain=19)	neg16dBm	23(Gain=18)	neg16dBm	24(Gain=19)
BT-LE(1Mbps)	neg16dBm	24(Gain=19)	neg16dBm	23(Gain=18)	neg16dBm	24(Gain=19)
Modulation Mode	2404		2440		2478	
	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)
	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)	Main chip (nRF5340)	FEM chip (nRF21540)
BT-LE(2Mbps)	neg16dBm	24(Gain=19)	neg16dBm	23(Gain=18)	neg16dBm	24(Gain=19)

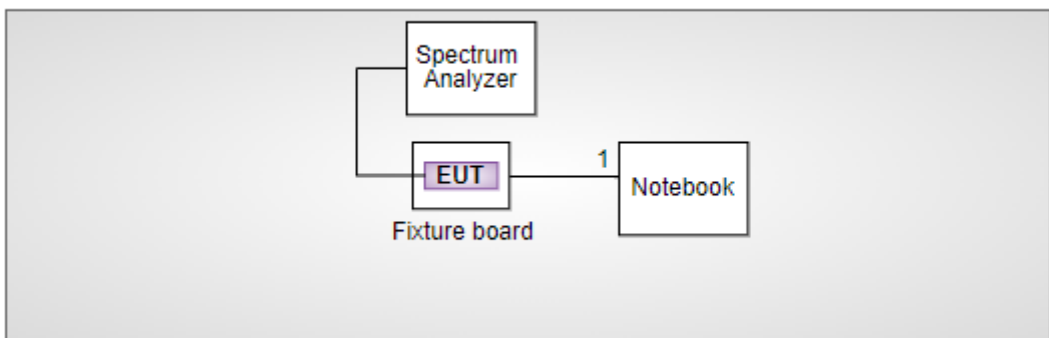
Note:

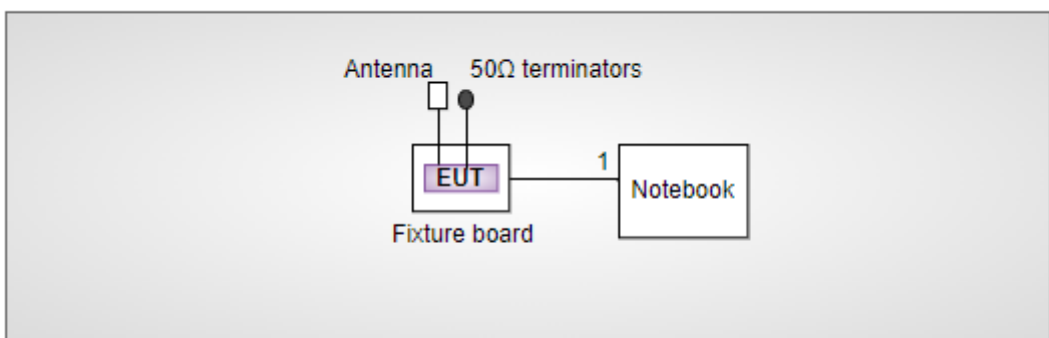
BL5340PA modules certified with FIXED default nRF21540 TX_Gain=POUTA_PROD=20dB±0.5dB (which is the TX_Gain value stored in the nRF21540 chip production by Nordic per chip to chip to hit the TX_Gain=POUTA_PROD=20dB±0.5dB). This particular certification sample had Nordic calibrated and stored TX_Gain value in decimal of 25.” “BL5340PA consists of nRF5340 chip RF driving the nRF21540 Front end module (FEM) which is used in 20dB FIXED TX_Gain mode.

1.2 Local Support Equipment List

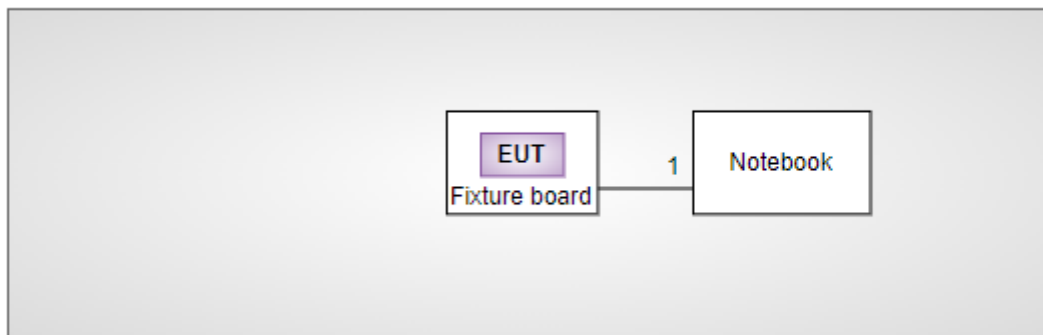
Support Equipment List					
No.	Equipment	Brand	Model	S/N	Remarks
1	Notebook	DELL	Latitude 3400	GKZLWZ2	---
2	50Ω terminators	---	---	---	Provided by applicant
3	Fixture board	---	---	---	---

1.3 Test Setup Chart

Test Setup Diagram (Conducted, External antenna)	
	
No.	Signal cable / Length (m)
1	USB, 1m shielded.

Test Setup Diagram (Radiated, External antenna)	
	
No.	Signal cable / Length (m)
1	USB, 1m shielded.

Test Setup Diagram (Radiated, Internal antenna)



No.	Signal cable / Length (m)
1	USB, 1m shielded.

1.4 Test Equipment List and Calibration Data

Test Item	Radiated Emissions				
Test Site	Fully-anechoic chamber 1 / (05CH01-WS)				
Test Date	Apr. 21 ~ Apr. 25, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	Agilent	N9010A	MY54200247	Oct. 24, 2022	Oct. 23, 2023
Bilog Antenna 30-1000MHz	SCHWARZBECK	VULB9168	9168-524	Dec. 20, 2022	Dec. 19, 2023
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	9120 D 1094	Nov. 04, 2022	Nov. 03, 2023
Preamplifier	Agilent	83017A	MY39501310	Nov. 07, 2022	Nov. 06, 2023
Preamplifier	EMC	EMC02325	980146	Oct. 26, 2022	Oct. 25, 2023
RF cable-1M	EMC	EMC104-35M-35M-1000	S/N:210904	Oct. 11, 2022	Oct. 10, 2023
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY16609/4	Oct. 11, 2022	Oct. 10, 2023
RF cable-4M	HUBER+SUHNER	SUCOFLEX104	MY15686/4	Oct. 11, 2022	Oct. 10, 2023
LF cable-3M	Woken	CFD400NL-LW	CFD400NL-005	Oct. 11, 2022	Oct. 10, 2023
LF cable-10M	Woken	CFD400NL-LW	CFD400NL-006	Oct. 11, 2022	Oct. 10, 2023
Measurement Software	AUDIX	e3	6.120210g	NA	NA

Note: Calibration Interval of instruments listed above is one year.

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Test Date	May 04 ~ May 22, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101486	Mar. 03, 2023	Mar. 02, 2024
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Jun. 22, 2022	Jun. 21, 2023
Power Sensor	Agilent	U2021XA	MY53480019	Mar. 07, 2023	Mar. 06, 2024
Power Sensor	Agilent	U2021XA	MY53510003	Mar. 07, 2023	Mar. 06, 2024
Power Sensor	Agilent	U2021XA	MY54070003	Mar. 27, 2023	Mar. 26, 2024
Power Sensor	Agilent	U2021XA	MY54060013	Mar. 27, 2023	Mar. 26, 2024
RF cable	EMC	EMC104-35M-35M-1000	210928	Oct. 14, 2022	Oct. 13, 2023
RF Cable	EMC	EMC104-35M-35M-1000	210929	Oct. 14, 2022	Oct. 13, 2023
RF Cable	EMC	EMC104-35M-35M-1000	210930	Oct. 14, 2022	Oct. 13, 2023
RF Cable	EMC	EMC104-35M-35M-1000	210931	Oct. 14, 2022	Oct. 13, 2023
Measurement Software	Sporton	SENSE	5.10.7	NA	NA
Measurement Software	Agilent	EN RF test	1.1501125	NA	NA

Note: Calibration Interval of instruments listed above is one year.

Test Item	Receiver Blocking				
Test Site	(05CH02-WS)				
Test Date	May 24, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Signal Generator	ROHDE&SCHWARZ	SMBV100A	263146	Feb. 06, 2023	Feb. 05, 2024
RF Cable	HUBER+SUHNER	SUCOFLEX_104	500202/4	Oct. 13, 2022	Oct. 12, 2023
RF Cable	HUBER+SUHNER	SUCOFLEX_104	296088/4	Oct. 13, 2022	Oct. 12, 2023
RF Cable	HUBER+SUHNER	SUCOFLEX_104	329023/4	Oct. 13, 2022	Oct. 12, 2023
Combiner(1X2)	WOKEN	2WAYDIV	12101200003	Oct. 13, 2022	Oct. 12, 2023
Note: Calibration Interval of instruments listed above is one year.					

1.5 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

EN 300 328 V2.2.2 (2019-07)

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty		
Parameters	Uncertainty	Limit
Occupied Channel Bandwidth	±0.0034 %	±5 %
RF output power, conducted	±0.592 dB	±1.5 dB
Power Spectral Density, conducted	±0.583 dB	±3 dB
Unwanted Emissions, conducted	±2.715 dB	±3 dB
All emissions, radiated	±3.14 dB	±6 dB
Temperature	±0.4 °C	±3 °C
Supply voltages	±0.15 %	±3 %
Time	±0.1 %	±5 %

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	TH01-WS, 05CH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)
Test Site	05CH02-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

2.2 The Worst Test Modes and Channel Details

2.3

Test item	Modulation Mode	Test Frequency (MHz)	Conducted / Radiated measurement	TX/RX	Test Configuration
RF Output Power Power Spectral Density	BT-LE(125kbps) BT-LE(500kbps) BT-LE(1Mbps) BT-LE(2Mbps)	2402 / 2440 / 2480 2402 / 2440 / 2480 2402 / 2440 / 2480 2402 / 2440 / 2480	Conducted	TX	1, 2
Occupied Channel Bandwidth Transmitter unwanted emissions in the out of band domain	BT-LE(125kbps) BT-LE(500kbps) BT-LE(1Mbps) BT-LE(2Mbps)	2402 / 2480 2402 / 2480 2402 / 2480 2402 / 2480	Conducted	TX	1, 2
Transmitter Spurious Emissions	BT-LE(125kbps) BT-LE(500kbps) BT-LE(1Mbps) BT-LE(2Mbps)	2402 / 2480 2402 / 2480 2402 / 2480 2402 / 2480	Conducted	TX	1, 2
Receiver Spurious Emissions	BT-LE(125kbps) BT-LE(500kbps) BT-LE(1Mbps) BT-LE(2Mbps)	2402 / 2480 2402 / 2480 2402 / 2480 2402 / 2480	Conducted	RX	1, 2
Transmitter Spurious Emissions	BT-LE(125kbps) BT-LE(500kbps) BT-LE(1Mbps) BT-LE(2Mbps)	2402 / 2480 2402 / 2480 2402 / 2480 2402 / 2480	Radiated	TX	1 ^{Note3} , 2
Receiver Spurious Emissions	BT-LE(125kbps) BT-LE(500kbps) BT-LE(1Mbps) BT-LE(2Mbps)	2402 / 2480 2402 / 2480 2402 / 2480 2402 / 2480	Radiated	RX	1 ^{Note3} , 2
Receiver Blocking	BT-LE(125kbps)	2402 / 2480	Conducted	RX	1, 2

NOTE:

- The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Z-plane** result was found as the worst case and was shown in this report.
- Test configurations are listed as below:
 - Configuration 1: Power index of External antenna (Model: i-FlexPIFA) + Laird NFC
 - Configuration 2: Power index of Internal antenna + Laird NFC
- The 50Ω terminators are connected to antenna port of EUT for radiated emission measurement.
- nRF5340 chipset DCDC convertor Mode A : VREGRADIO DCDC on / VRERGMMAIN DCDC on / VREGH DCDC on
nRF5340 chipset DCDC convertor Mode B : VREGRADIO DCDC off / VRERGMMAIN DCDC off / VREGH DCDC off
Mode A is the worst case

3 Transmitter Test Results

3.1 RF Output Power

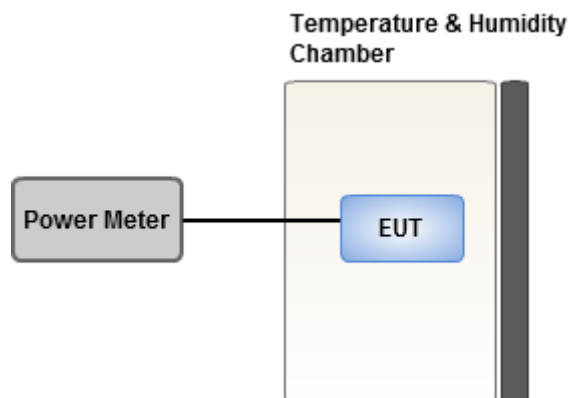
3.1.1 Limit of RF Output Power

The maximum RF output power shall be 20 dBm.

3.1.2 Test Procedures

Reference to clause 5.4.2.2 of ETSI EN 300 328 V2.2.2 (2019-07).

3.1.3 Test Setup



3.1.4 Test Results

Ambient Condition	19-22°C / 61-64%	Tested By	Alan Tang
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Refer to Appendix A.

3.2 Power Spectral Density

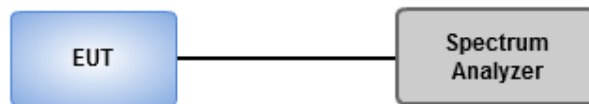
3.2.1 Limit of Power Spectral Density

The maximum Power Spectral Density is limited to 10 dBm per MHz.

3.2.2 Test Procedures

Reference to clause 5.4.3.2 of ETSI EN 300 328 V2.2.2 (2019-07).

3.2.3 Test Setup



3.2.4 Test Results

Ambient Condition	19-22°C / 61-64%	Tested By	Alan Tang
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Refer to Appendix B.

3.3 Occupied Channel Bandwidth

3.3.1 Limit of Occupied Channel Bandwidth

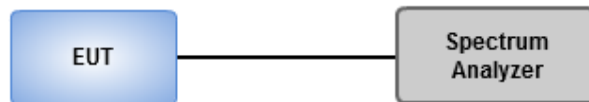
The Occupied Channel Bandwidth shall fall completely within 2.4~2.4835 GHz.

In addition, for non-adaptive equipment using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

3.3.2 Test Procedures

Reference to clause 5.4.7.2 of ETSI EN 300 328 V2.2.2 (2019-07).

3.3.3 Test Setup



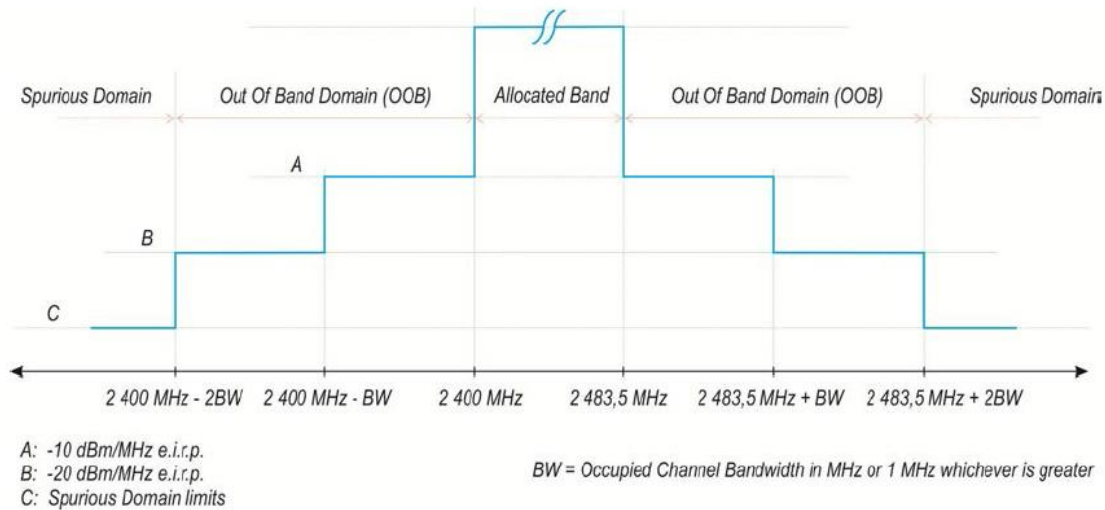
3.3.4 Test Results

Ambient Condition	19-22°C / 61-64%	Tested By	Alan Tang
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Refer to Appendix C.

3.4 Transmitter Unwanted Emissions in the Out-Of-Band Domain

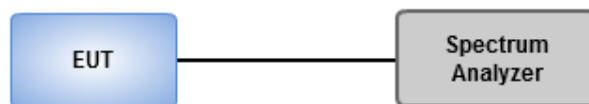
3.4.1 Limit of Transmitter Unwanted Emissions in the Out-Of-Band Domain



3.4.2 Test Procedures

Reference to clause 5.4.8.2 of ETSI EN 300 328 V2.2.2 (2019-07).

3.4.3 Test Setup



3.4.4 Test Results

Ambient Condition	19-22°C / 61-64%	Tested By	Alan Tang
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Refer to Appendix D.

3.5 Transmitter Unwanted Emissions in the Spurious Domain

3.5.1 Limit of Transmitter Unwanted Emissions in the Spurious Domain

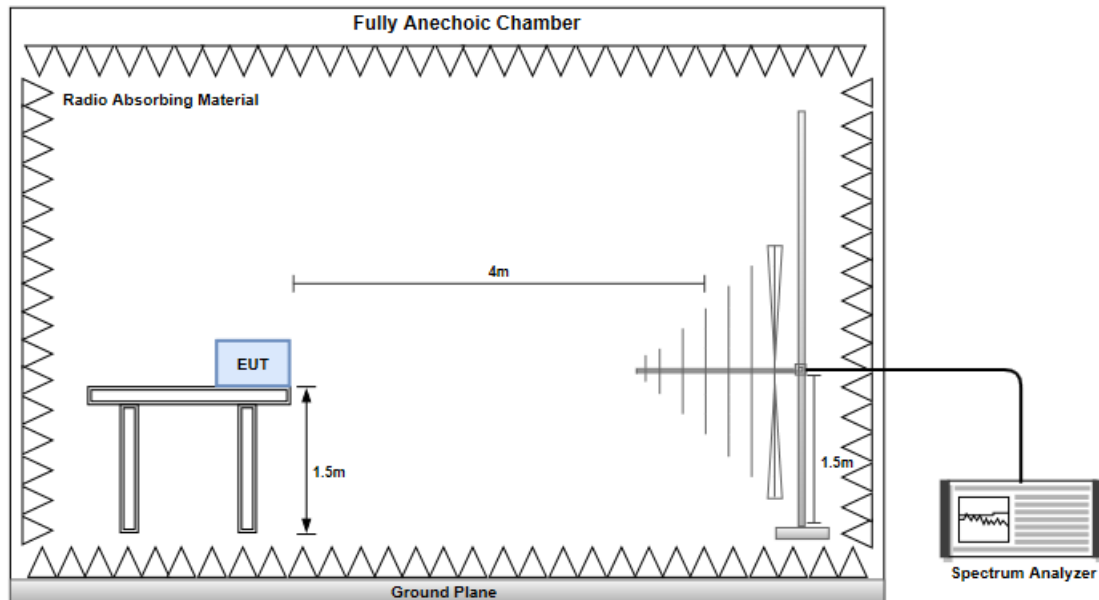
Frequency Range (MHz)	Maximum power (dBm)	Bandwidth (kHz)
30 to 47	-36	100
47 to 74	-54	100
74 to 87,5	-36	100
87,5 to 118	-54	100
118 to 174	-36	100
174 to 230	-54	100
230 to 470	-36	100
470 to 694	-54	100
694 to 1000	-36	100
1000 to 12750	-30	1000

3.5.2 Test Procedures

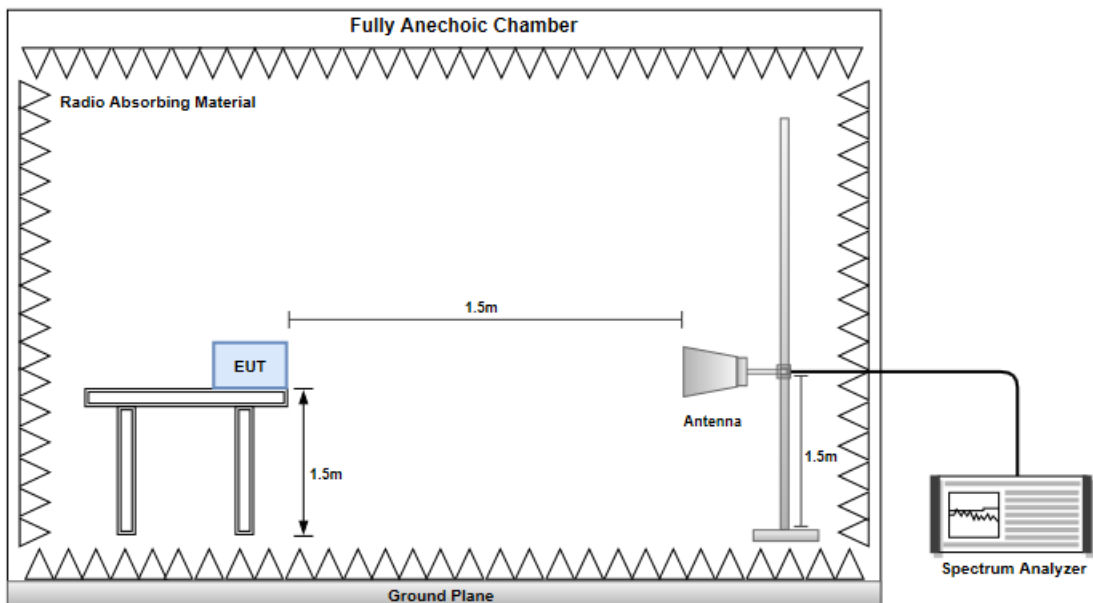
Reference to clause 5.4.9.2 of ETSI EN 300 328 V2.2.2 (2019-07).

3.5.3 Test Setup

Below 1GHz



Above 1 GHz



3.5.4 Test Results

Refer to Appendix E.

4 Receiver Test Results

4.1 Receiver Spurious Emissions

4.1.1 Limit of Receiver Spurious Emissions

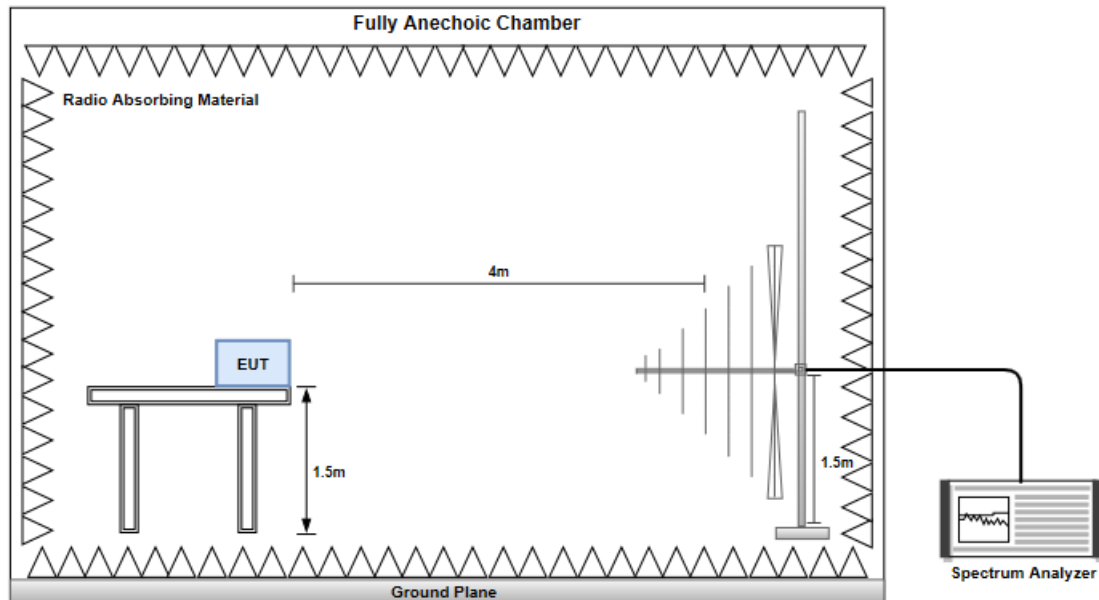
Frequency Range	Maximum power (dBm)	Measurement bandwidth (kHz)
30 MHz to 1 GHz	-57	100
Above 1 GHz to 12,75 GHz	-47	1000

4.1.2 Test Procedures

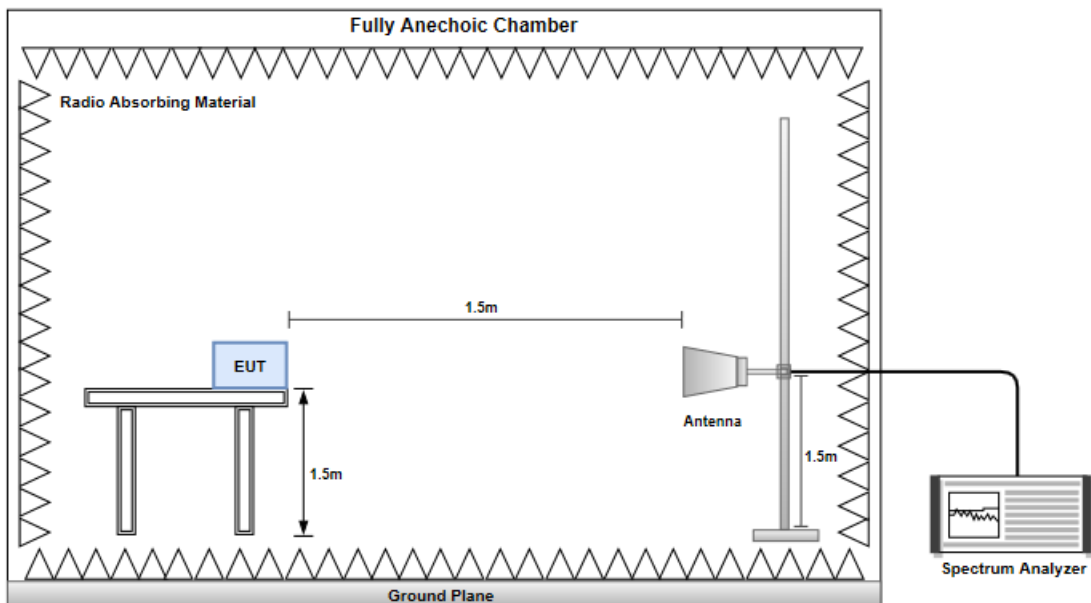
Reference to clause 5.4.10.2 of ETSI EN 300 328 V2.2.2 (2019-07).

4.1.3 Test Setup

Below 1GHz



Above 1 GHz



4.1.4 Test Results

Refer to Appendix F.

5 Receiver Blocking Test Results

5.1 Receiver Blocking

5.1.1 Limit of Receiver Blocking

Receiver Blocking Parameters for Receiver Category 1 Equipment Limit			
Wanted Signal Mean Power from Companion Device (dBm) (see notes 1 and 4)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (see note 4)	Type of Blocking Signal
(-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		
Note 1: OCBW is in Hz. Note 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. Note 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. Note 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned.			

Receiver Blocking Parameters for Receiver Category 2 Equipment Limit

Wanted Signal Mean Power from Companion Device (dBm) (see notes 1 and 3)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (see note 3)	Type of Blocking Signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

Note 1: OCBW is in Hz.

Note 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 26 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

Note 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned.

Receiver Blocking Parameters for Receiver Category 3 Equipment Limit

Wanted Signal Mean Power from Companion Device (dBm) (see notes 1 and 3)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (see note 3)	Type of Blocking Signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB})$ or $(-74 \text{ dBm} + 20 \text{ dB})$ whichever is less	2 380 2 504 2 300 2 584	-34	CW

Note 1: OCBW is in Hz.

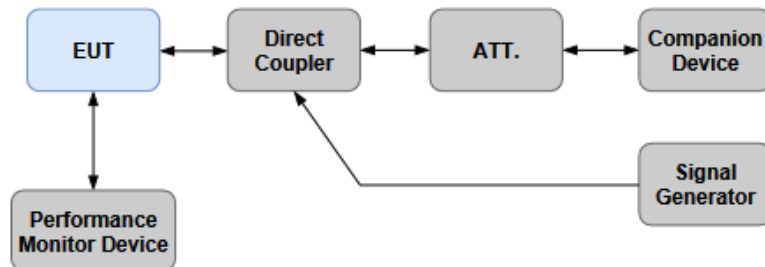
Note 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative the test may be performed using a wanted signal up to $P_{\min} + 30 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

Note 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned.

5.1.2 Test Procedures

Reference to clause 5.4.11.2 of ETSI EN 300 328 V2.2.2 (2019-07).

5.1.3 Test Setup



5.1.4 Test Results

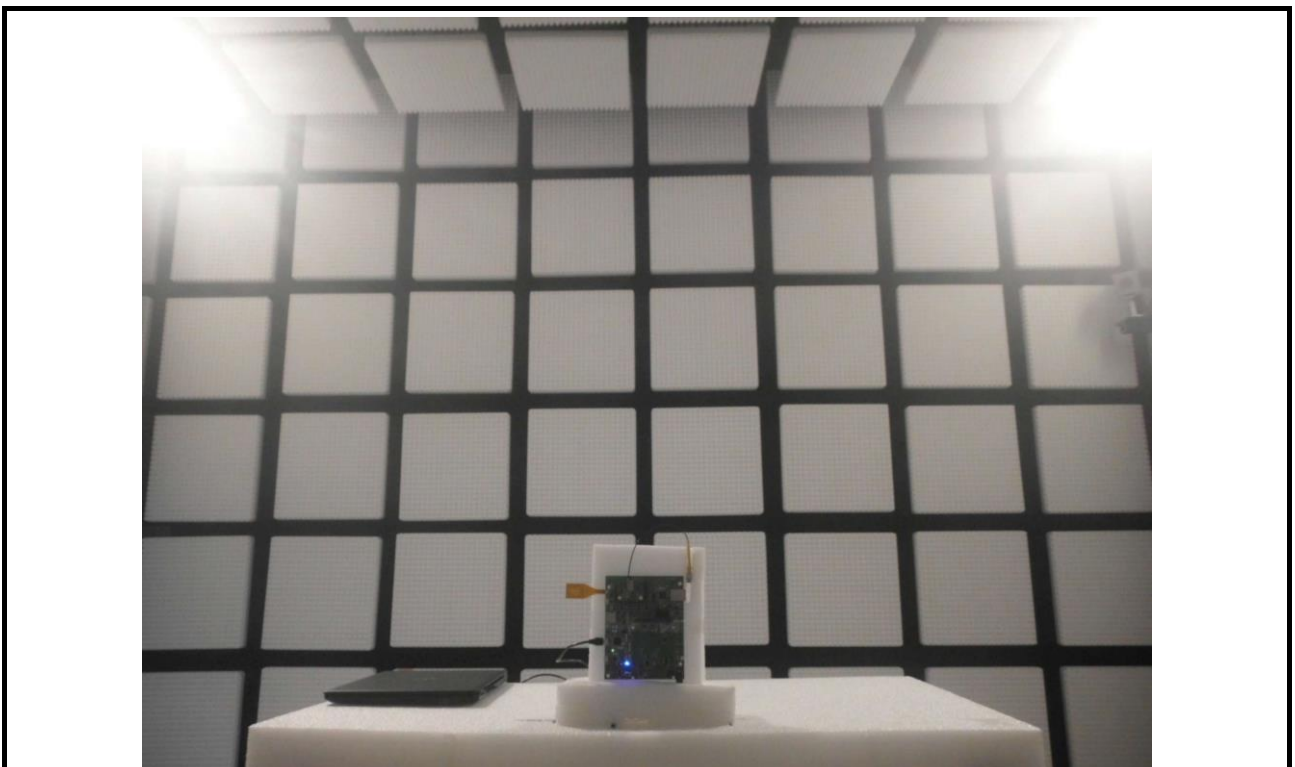
Ambient Condition	25°C / 65%	Tested By	Hugo Zhen
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Refer to Appendix G.

6 Photographs of the Test Configuration

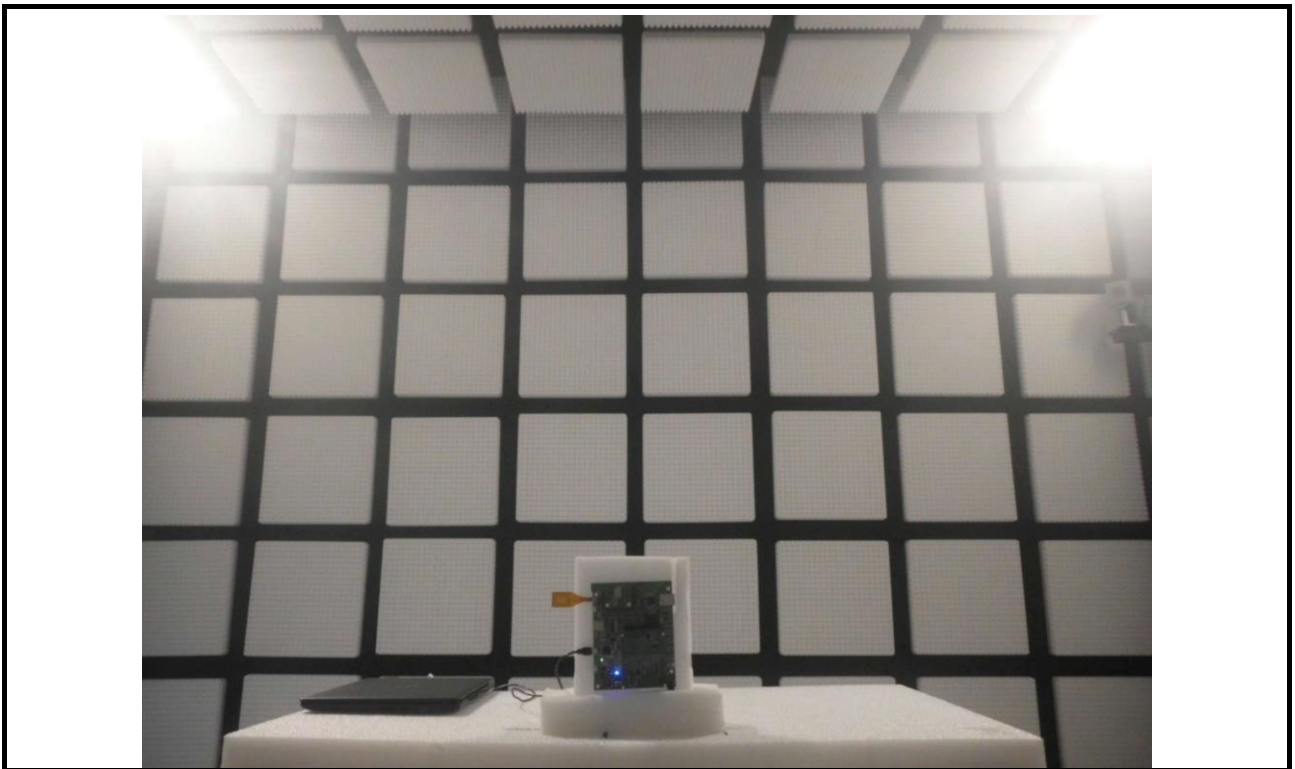
External Antenna

Spurious Emission Test (Radiated)

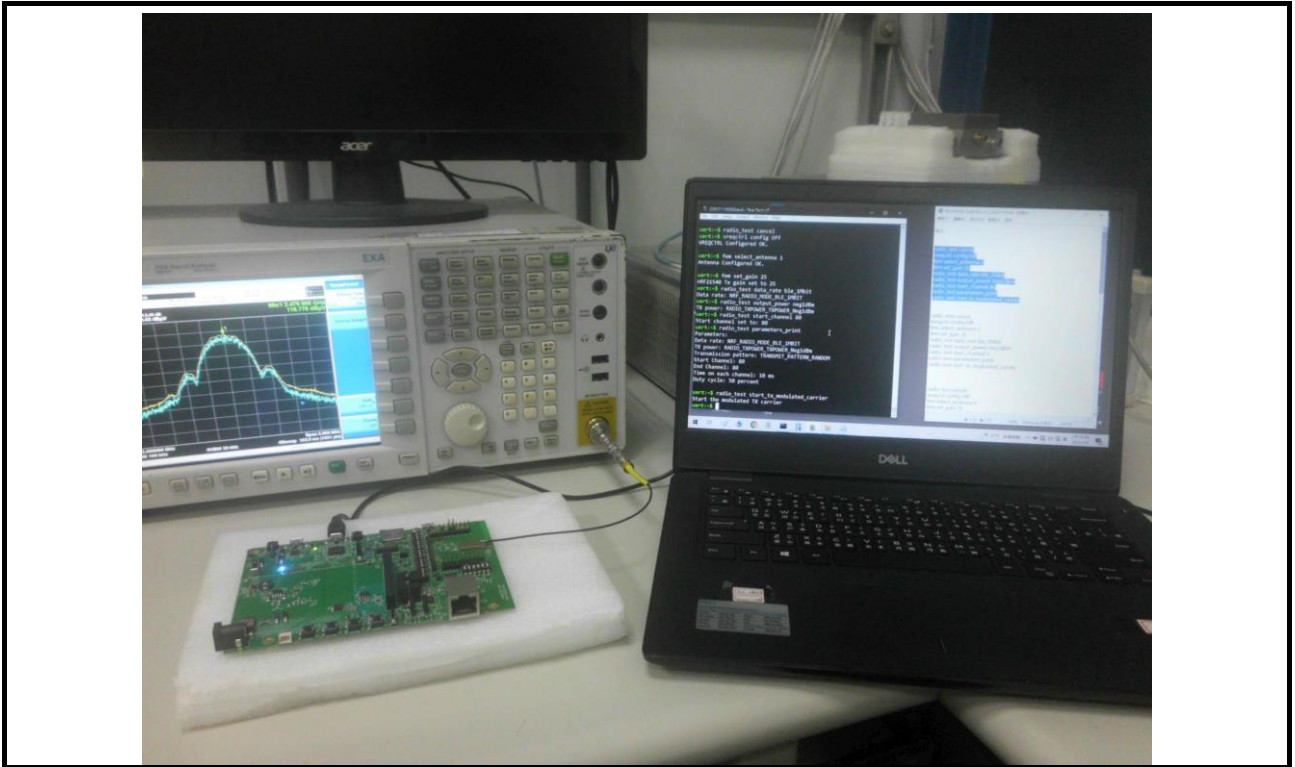


Internal Antenna

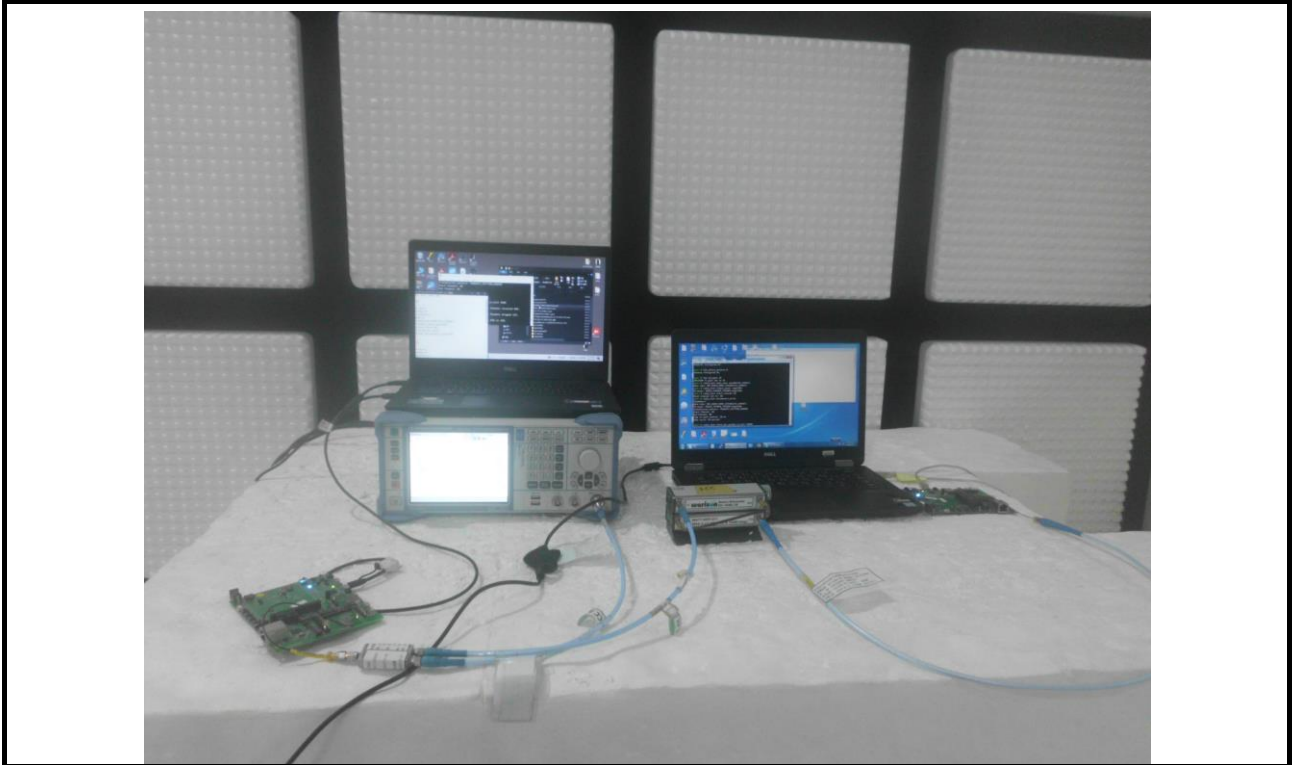
Spurious Emission Test



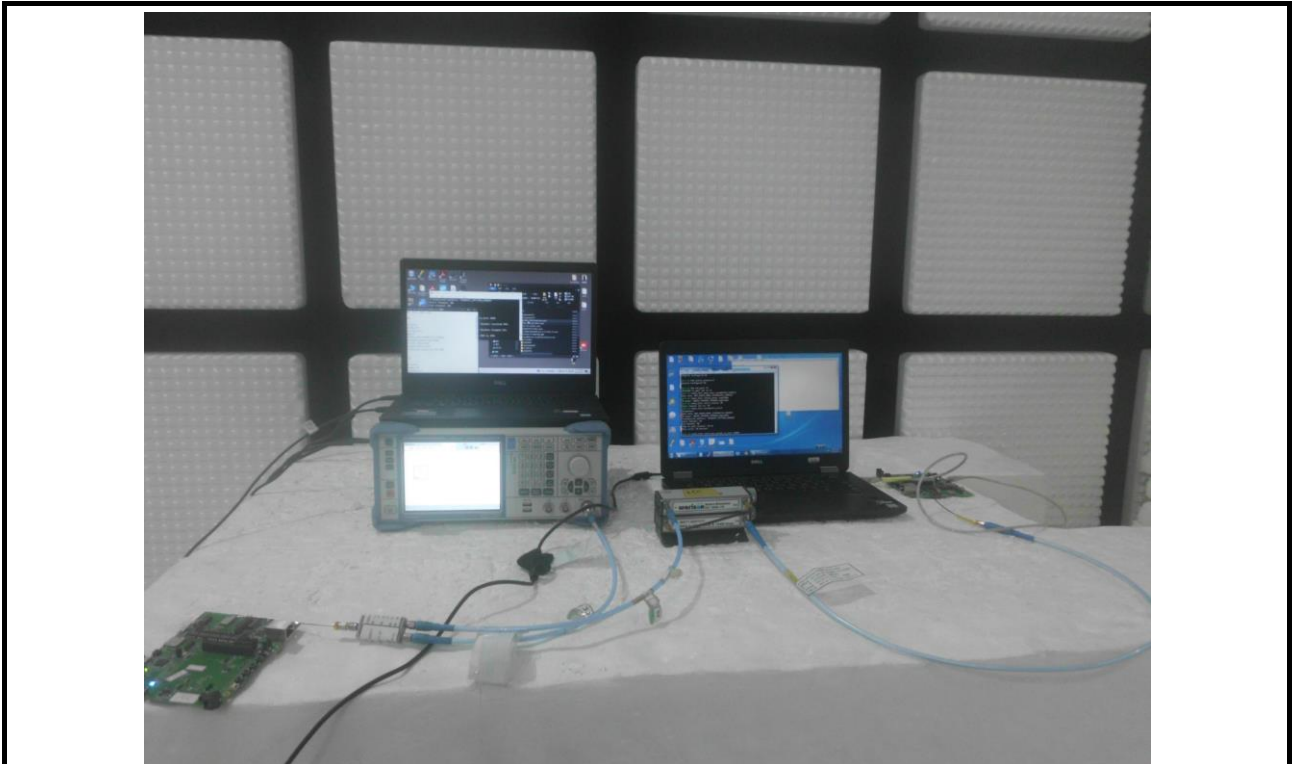
Spurious Emission Test (Conducted)



Receiver Blocking Test (*External Antenna*)



Receiver Blocking Test (*Internal Antenna*)



7 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan
(R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC_Service@icertifi.com.tw

==END==

External Antenna

RF Output Power (dBm)					
Condition	Modulation Mode	Freq. (MHz)	EIRP Power (dBm)	Limit (dBm)	Results
T _{nom} V _{nom}	BT-LE(125kbps)	2402	6.76	20	Pass
T _{min} V _{nom}	BT-LE(125kbps)	2402	9.28	20	Pass
T _{max} V _{nom}	BT-LE(125kbps)	2402	3.05	20	Pass
T _{nom} V _{nom}	BT-LE(125kbps)	2440	7.62	20	Pass
T _{min} V _{nom}	BT-LE(125kbps)	2440	9.89	20	Pass
T _{max} V _{nom}	BT-LE(125kbps)	2440	3.77	20	Pass
T _{nom} V _{nom}	BT-LE(125kbps)	2480	6.97	20	Pass
T _{min} V _{nom}	BT-LE(125kbps)	2480	9.11	20	Pass
T _{max} V _{nom}	BT-LE(125kbps)	2480	3.00	20	Pass
T _{nom} V _{nom}	BT-LE(500kbps)	2402	6.75	20	Pass
T _{min} V _{nom}	BT-LE(500kbps)	2402	9.29	20	Pass
T _{max} V _{nom}	BT-LE(500kbps)	2402	3.03	20	Pass
T _{nom} V _{nom}	BT-LE(500kbps)	2440	7.63	20	Pass
T _{min} V _{nom}	BT-LE(500kbps)	2440	9.82	20	Pass
T _{max} V _{nom}	BT-LE(500kbps)	2440	3.71	20	Pass
T _{nom} V _{nom}	BT-LE(500kbps)	2480	6.95	20	Pass
T _{min} V _{nom}	BT-LE(500kbps)	2480	9.06	20	Pass
T _{max} V _{nom}	BT-LE(500kbps)	2480	2.92	20	Pass

Note:

- 1) Test method is conducted.
- 2) EIRP = Measured conducted power + Antenna gain. (3.10dBi)

RF Output Power (dBm)					
Condition	Modulation Mode	Freq. (MHz)	EIRP Power (dBm)	Limit (dBm)	Results
T _{nom} V _{nom}	BT-LE(1Mbps)	2402	6.75	20	Pass
T _{min} V _{nom}	BT-LE(1Mbps)	2402	9.21	20	Pass
T _{max} V _{nom}	BT-LE(1Mbps)	2402	2.97	20	Pass
T _{nom} V _{nom}	BT-LE(1Mbps)	2440	7.64	20	Pass
T _{min} V _{nom}	BT-LE(1Mbps)	2440	9.87	20	Pass
T _{max} V _{nom}	BT-LE(1Mbps)	2440	3.72	20	Pass
T _{nom} V _{nom}	BT-LE(1Mbps)	2480	6.98	20	Pass
T _{min} V _{nom}	BT-LE(1Mbps)	2480	9.08	20	Pass
T _{max} V _{nom}	BT-LE(1Mbps)	2480	2.98	20	Pass
T _{nom} V _{nom}	BT-LE(2Mbps)	2402	6.76	20	Pass
T _{min} V _{nom}	BT-LE(2Mbps)	2402	9.27	20	Pass
T _{max} V _{nom}	BT-LE(2Mbps)	2402	3.03	20	Pass
T _{nom} V _{nom}	BT-LE(2Mbps)	2440	7.64	20	Pass
T _{min} V _{nom}	BT-LE(2Mbps)	2440	9.93	20	Pass
T _{max} V _{nom}	BT-LE(2Mbps)	2440	3.78	20	Pass
T _{nom} V _{nom}	BT-LE(2Mbps)	2480	6.97	20	Pass
T _{min} V _{nom}	BT-LE(2Mbps)	2480	9.18	20	Pass
T _{max} V _{nom}	BT-LE(2Mbps)	2480	3.05	20	Pass

Note:

- 1) Test method is conducted.
- 2) EIRP = Measured conducted power + Antenna gain. (3.10dBi)

Internal Antenna

RF Output Power (dBm)					
Condition	Modulation Mode	Freq. (MHz)	EIRP Power (dBm)	Limit (dBm)	Results
T _{nom} V _{nom}	BT-LE(125kbps)	2402	7.50	20	Pass
T _{min} V _{nom}	BT-LE(125kbps)	2402	9.66	20	Pass
T _{max} V _{nom}	BT-LE(125kbps)	2402	4.00	20	Pass
T _{nom} V _{nom}	BT-LE(125kbps)	2440	7.25	20	Pass
T _{min} V _{nom}	BT-LE(125kbps)	2440	9.36	20	Pass
T _{max} V _{nom}	BT-LE(125kbps)	2440	3.56	20	Pass
T _{nom} V _{nom}	BT-LE(125kbps)	2480	7.40	20	Pass
T _{min} V _{nom}	BT-LE(125kbps)	2480	9.54	20	Pass
T _{max} V _{nom}	BT-LE(125kbps)	2480	3.72	20	Pass
T _{nom} V _{nom}	BT-LE(500kbps)	2402	7.51	20	Pass
T _{min} V _{nom}	BT-LE(500kbps)	2402	9.63	20	Pass
T _{max} V _{nom}	BT-LE(500kbps)	2402	4.00	20	Pass
T _{nom} V _{nom}	BT-LE(500kbps)	2440	7.26	20	Pass
T _{min} V _{nom}	BT-LE(500kbps)	2440	9.37	20	Pass
T _{max} V _{nom}	BT-LE(500kbps)	2440	3.58	20	Pass
T _{nom} V _{nom}	BT-LE(500kbps)	2480	7.39	20	Pass
T _{min} V _{nom}	BT-LE(500kbps)	2480	9.54	20	Pass
T _{max} V _{nom}	BT-LE(500kbps)	2480	3.68	20	Pass

Note:

- 1) Test method is conducted.
- 2) EIRP = Measured conducted power + Antenna gain. (1.49dBi)

RF Output Power (dBm)					
Condition	Modulation Mode	Freq. (MHz)	EIRP Power (dBm)	Limit (dBm)	Results
T _{nom} V _{nom}	BT-LE(1Mbps)	2402	7.51	20	Pass
T _{min} V _{nom}	BT-LE(1Mbps)	2402	9.69	20	Pass
T _{max} V _{nom}	BT-LE(1Mbps)	2402	4.02	20	Pass
T _{nom} V _{nom}	BT-LE(1Mbps)	2440	7.25	20	Pass
T _{min} V _{nom}	BT-LE(1Mbps)	2440	9.32	20	Pass
T _{max} V _{nom}	BT-LE(1Mbps)	2440	3.54	20	Pass
T _{nom} V _{nom}	BT-LE(1Mbps)	2480	7.40	20	Pass
T _{min} V _{nom}	BT-LE(1Mbps)	2480	9.58	20	Pass
T _{max} V _{nom}	BT-LE(1Mbps)	2480	3.71	20	Pass
T _{nom} V _{nom}	BT-LE(2Mbps)	2402	7.51	20	Pass
T _{min} V _{nom}	BT-LE(2Mbps)	2402	9.71	20	Pass
T _{max} V _{nom}	BT-LE(2Mbps)	2402	4.03	20	Pass
T _{nom} V _{nom}	BT-LE(2Mbps)	2440	7.24	20	Pass
T _{min} V _{nom}	BT-LE(2Mbps)	2440	9.36	20	Pass
T _{max} V _{nom}	BT-LE(2Mbps)	2440	3.56	20	Pass
T _{nom} V _{nom}	BT-LE(2Mbps)	2480	7.41	20	Pass
T _{min} V _{nom}	BT-LE(2Mbps)	2480	9.47	20	Pass
T _{max} V _{nom}	BT-LE(2Mbps)	2480	3.74	20	Pass

Note:

- 1) Test method is conducted.
- 2) EIRP = Measured conducted power + Antenna gain. (1.49dBi)

External Antenna -125kbps
Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(125kbps)	7.54

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(125kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	3.10	3.60	6.70	10.00
2440MHz_Tnom	Pass	3.10	4.44	7.54	10.00
2480MHz_Tnom	Pass	3.10	3.81	6.91	10.00

RBW=1MHz;

Port X = Port X power density;

External Antenna -500kbps
Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(500kbps)	7.55

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(500kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	3.10	3.57	6.67	10.00
2440MHz_Tnom	Pass	3.10	4.45	7.55	10.00
2480MHz_Tnom	Pass	3.10	3.79	6.89	10.00

RBW=1MHz;

Port X = Port X power density;

External Antenna -1Mbps
Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(1Mbps)	7.56

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(1Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	3.10	3.57	6.67	10.00
2440MHz_Tnom	Pass	3.10	4.46	7.56	10.00
2480MHz_Tnom	Pass	3.10	3.80	6.90	10.00

RBW=1MHz;

Port X = Port X power density;

External Antenna -2Mbps
Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(2Mbps)	6.37

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(2Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	3.10	2.43	5.53	10.00
2440MHz_Tnom	Pass	3.10	3.27	6.37	10.00
2480MHz_Tnom	Pass	3.10	2.58	5.68	10.00

RBW=1MHz;

Port X = Port X power density;

Internal Antenna-125kbps
Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(125kbps)	7.44

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(125kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	1.49	5.95	7.44	10.00
2440MHz_Tnom	Pass	1.49	5.70	7.19	10.00
2480MHz_Tnom	Pass	1.49	5.85	7.34	10.00

RBW=1MHz;

Port X = Port X power density;

Internal Antenna-500kbps
Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(500kbps)	7.45

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(500kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	1.49	5.96	7.45	10.00
2440MHz_Tnom	Pass	1.49	5.71	7.20	10.00
2480MHz_Tnom	Pass	1.49	5.84	7.33	10.00

RBW=1MHz;

Port X = Port X power density;

Internal Antenna-1Mbps

Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(1Mbps)	7.44

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(1Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	1.49	5.95	7.44	10.00
2440MHz_Tnom	Pass	1.49	5.70	7.19	10.00
2480MHz_Tnom	Pass	1.49	5.85	7.34	10.00

RBW=1MHz;

Port X = Port X power density;

Internal Antenna-2Mbps

Summary

Mode	EIRP PD (dBm/MHz)
2.4-2.4835GHz	-
BT-LE(2Mbps)	6.27

RBW=1MHz

Result

Mode	Result	Gain (dBi)	PD (dBm/MHz)	EIRP PD (dBm/MHz)	EIRP PD Limit (dBm/MHz)
BT-LE(2Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	1.49	4.78	6.27	10.00
2440MHz_Tnom	Pass	1.49	4.53	6.02	10.00
2480MHz_Tnom	Pass	1.49	4.68	6.17	10.00

RBW=1MHz;

Port X = Port X power density;

**External Antenna -125kbps****Summary**

Mode	OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-
BT-LE(125kbps)	1.054M	1M05F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	fl-OBW (Hz)	fh-OBW (Hz)	OBW (Hz)
BT-LE(125kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.401462G	2.402512G	1.05M
2440MHz_Tnom	Pass	2.4-2.4835G	2.43946G	2.440512G	1.051M
2480MHz_Tnom	Pass	2.4-2.4835G	2.479458G	2.480512G	1.054M

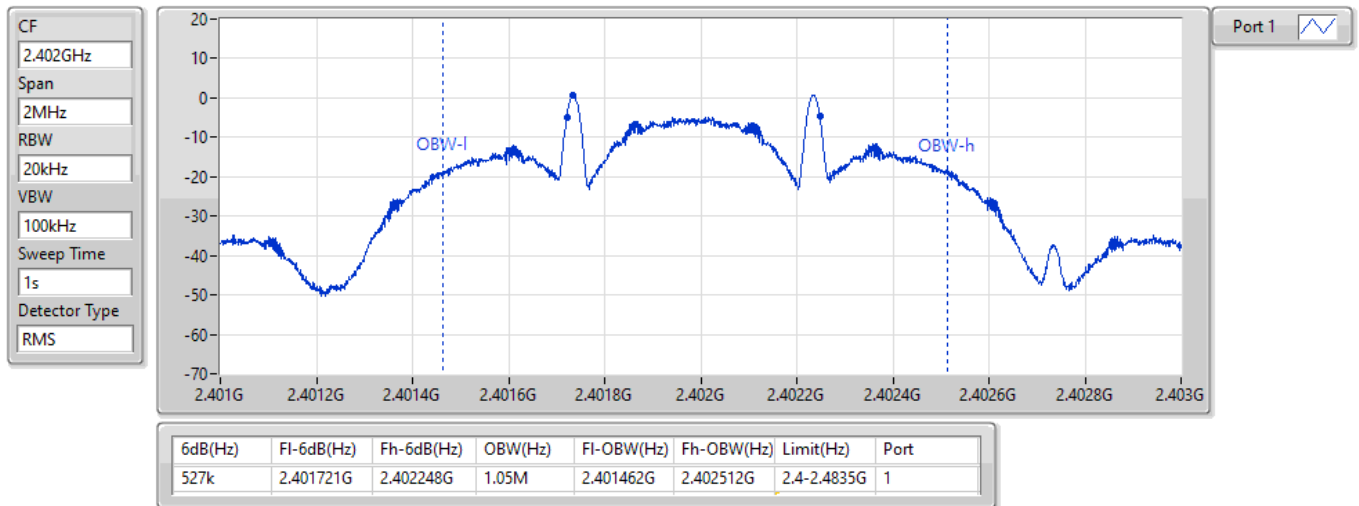
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(125kbps)

EBW-DTS

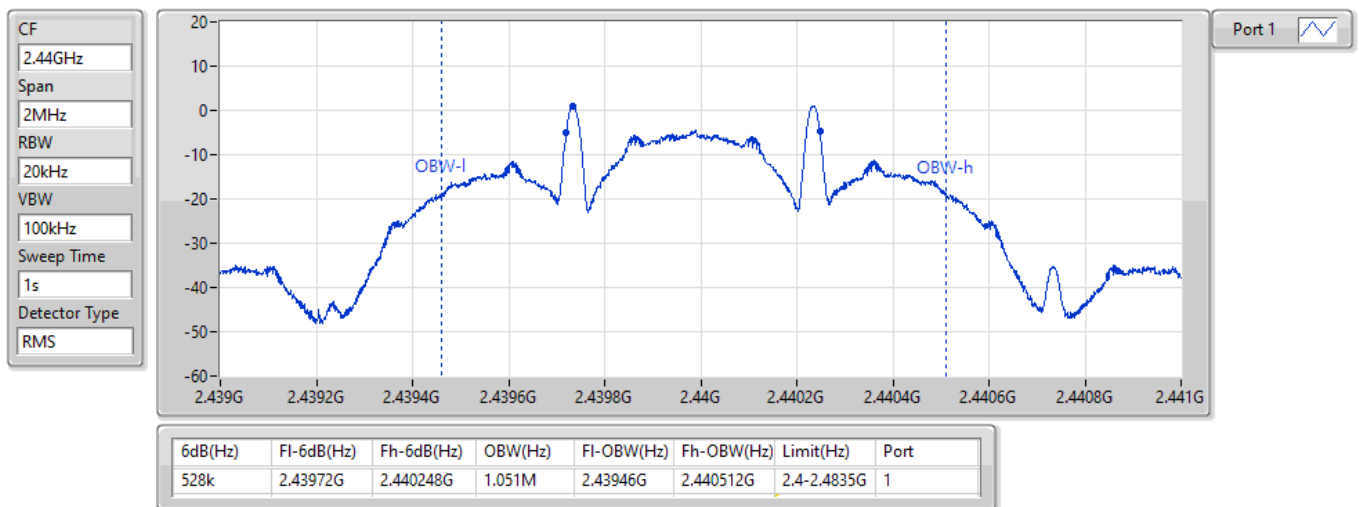
2402MHz



BT-LE(125kbps)

EBW-DTS

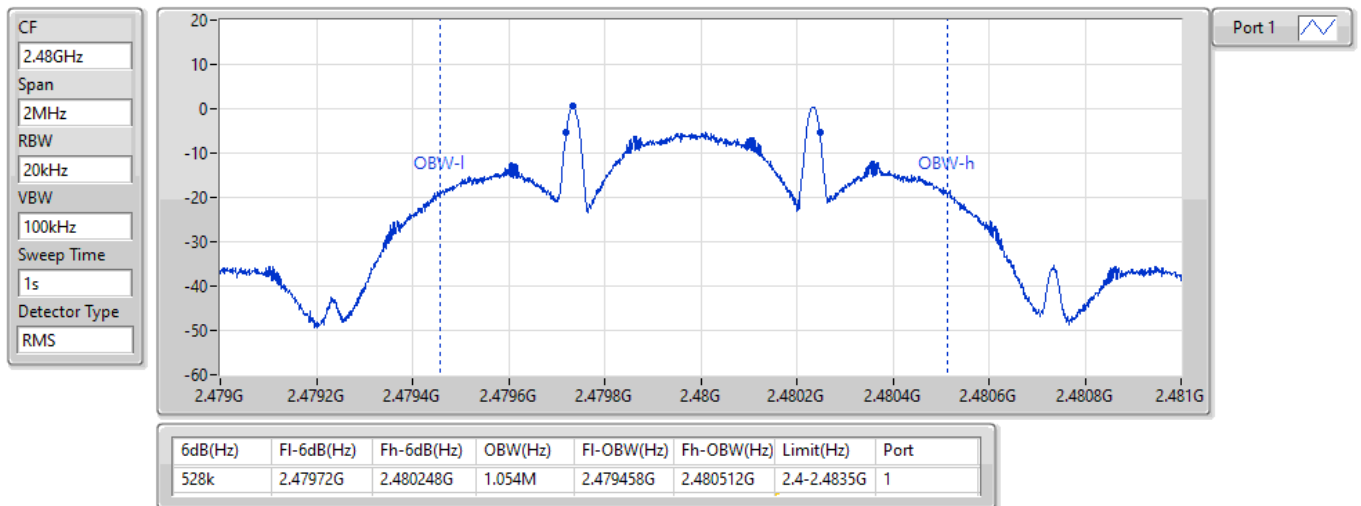
2440MHz



BT-LE(125kbps)

EBW-DTS

2480MHz



**External Antenna -500kbps****Summary**

Mode	OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-
BT-LE(500kbps)	1.037M	1M04F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	fl-OBW (Hz)	fh-OBW (Hz)	OBW (Hz)
BT-LE(500kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.401468G	2.402499G	1.031M
2440MHz_Tnom	Pass	2.4-2.4835G	2.439467G	2.440501G	1.034M
2480MHz_Tnom	Pass	2.4-2.4835G	2.479465G	2.480502G	1.037M

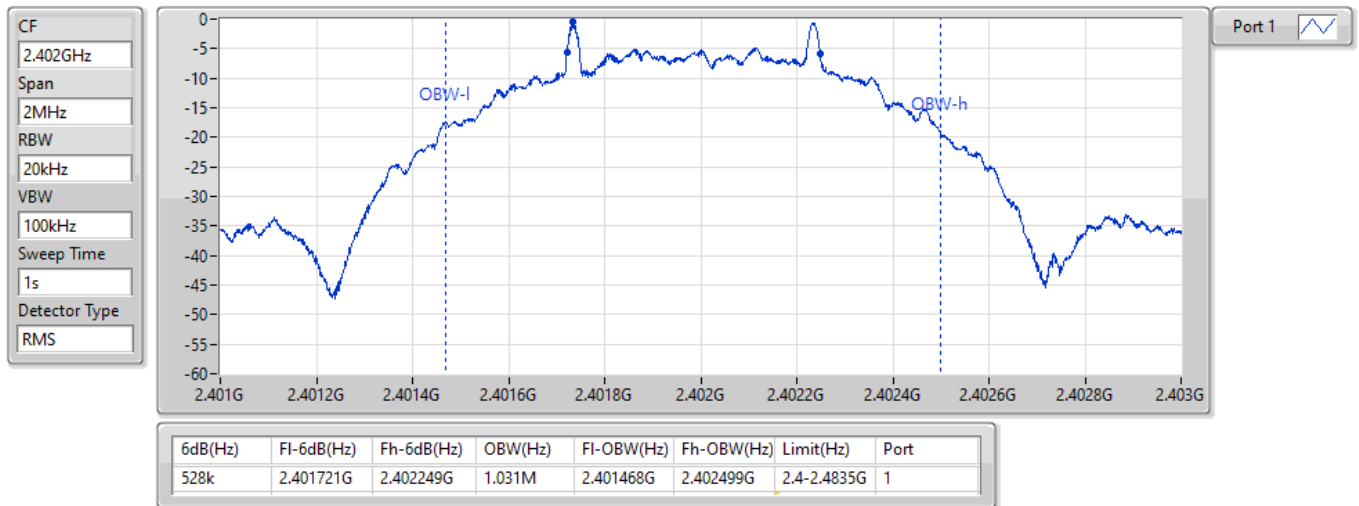
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(500kbps)

EBW-DTS

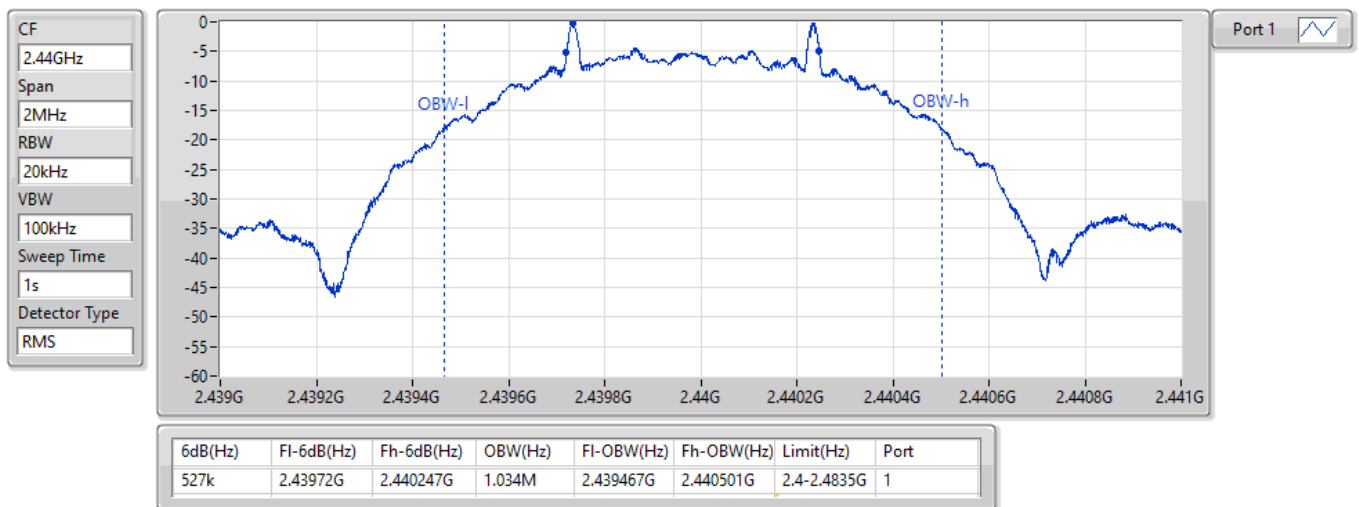
2402MHz



BT-LE(500kbps)

EBW-DTS

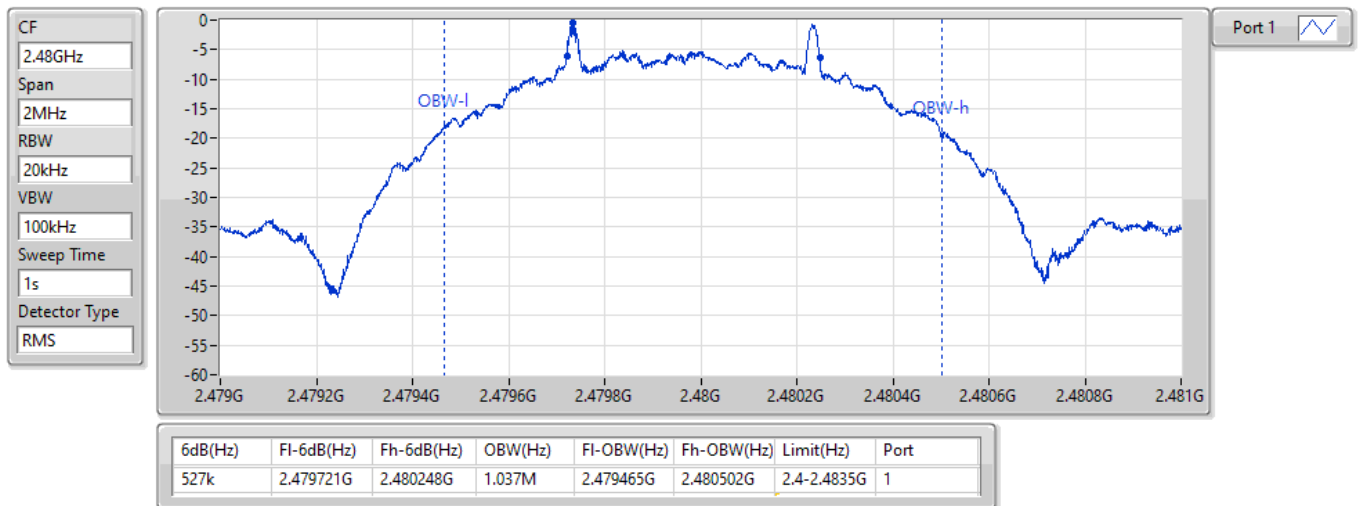
2440MHz



BT-LE(500kbps)

EBW-DTS

2480MHz



External Antenna -1Mbps

Summary

Mode	OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	1.078M	1M08F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	fl-OBW (Hz)	fh-OBW (Hz)	OBW (Hz)
BT-LE(1Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.40144G	2.402509G	1.069M
2440MHz_Tnom	Pass	2.4-2.4835G	2.439455G	2.440521G	1.066M
2480MHz_Tnom	Pass	2.4-2.4835G	2.479441G	2.480519G	1.078M

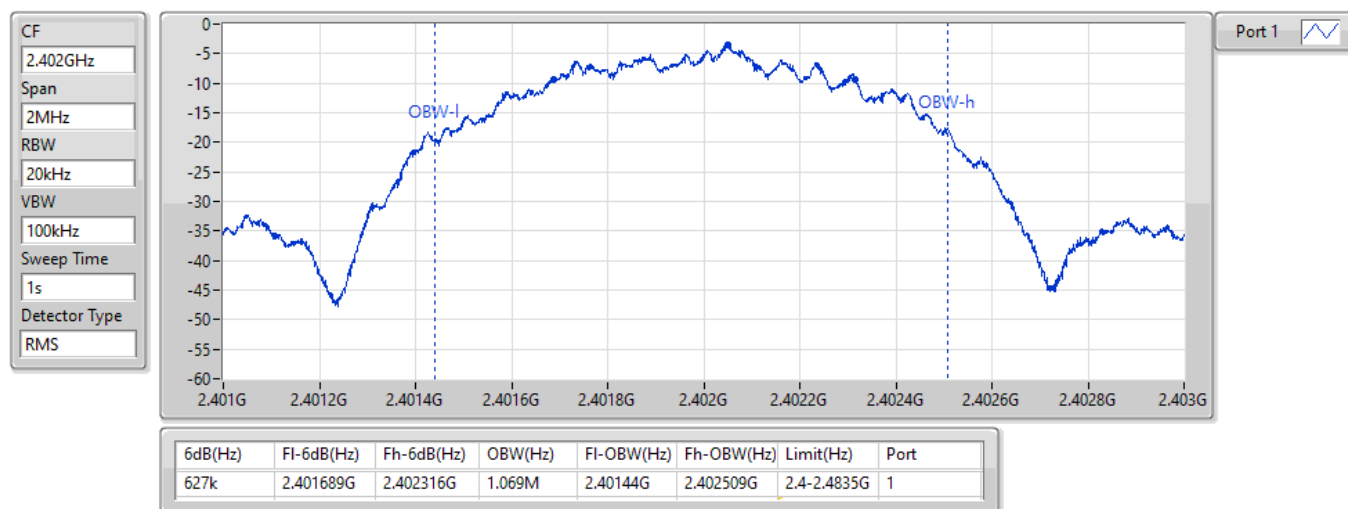
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(1Mbps)

EBW-DTS

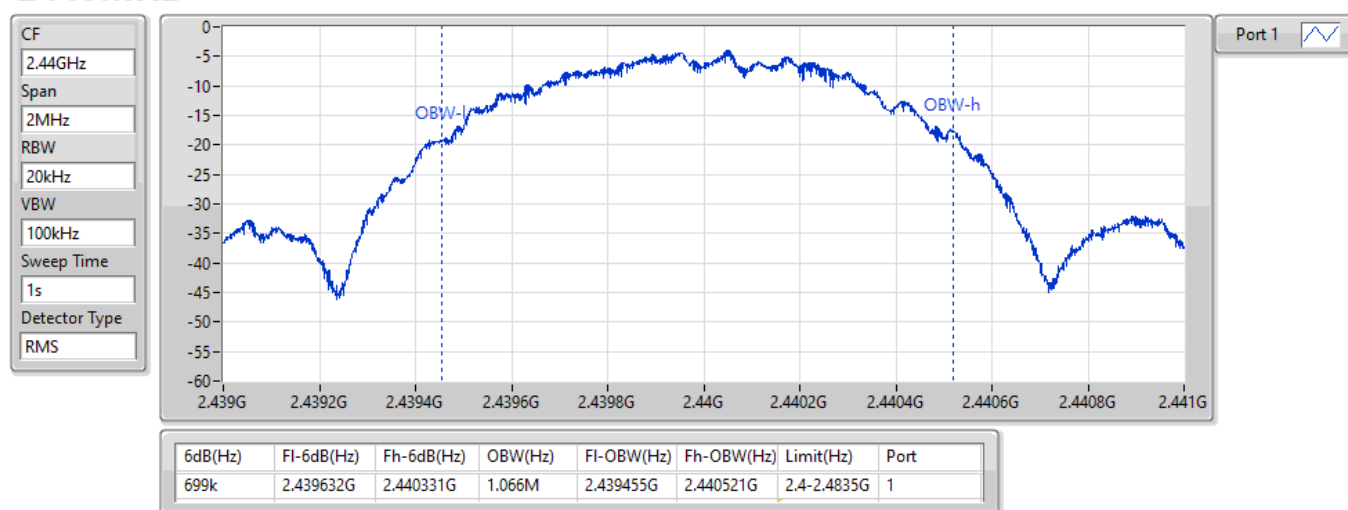
2402MHz



BT-LE(1Mbps)

EBW-DTS

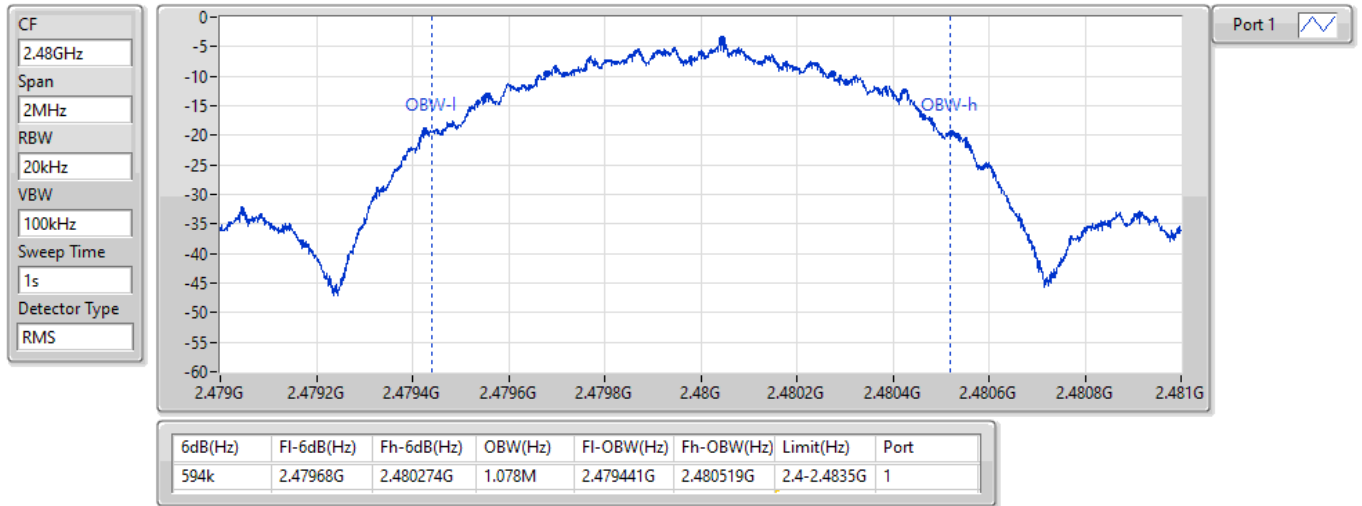
2440MHz



BT-LE(1Mbps)

EBW-DTS

2480MHz



**External Antenna -2Mbps****Summary**

Mode	OBW	ITU-Code
	(Hz)	
2.4-2.4835GHz	-	-
BT-LE(2Mbps)	2.152M	2M15F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit	fl-OBW	fh-OBW	OBW
		(Hz)	(Hz)	(Hz)	(Hz)
BT-LE(2Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.400905G	2.403057G	2.152M
2440MHz_Tnom	Pass	2.4-2.4835G	2.438914G	2.441048G	2.134M
2480MHz_Tnom	Pass	2.4-2.4835G	2.47891G	2.481058G	2.147M

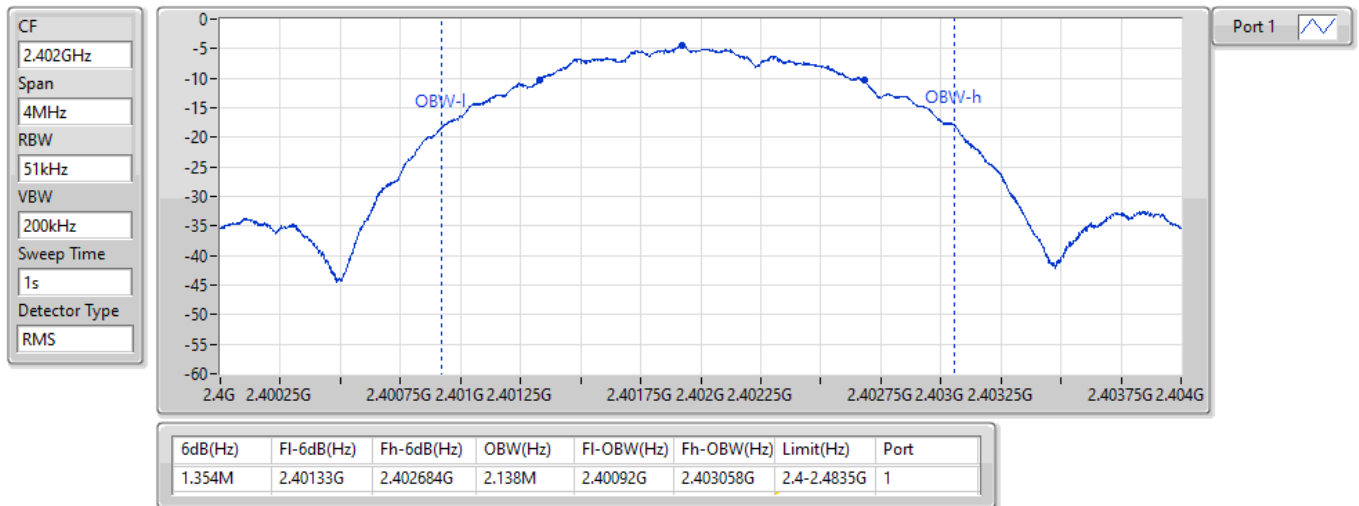
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(2Mbps)

EBW-DTS

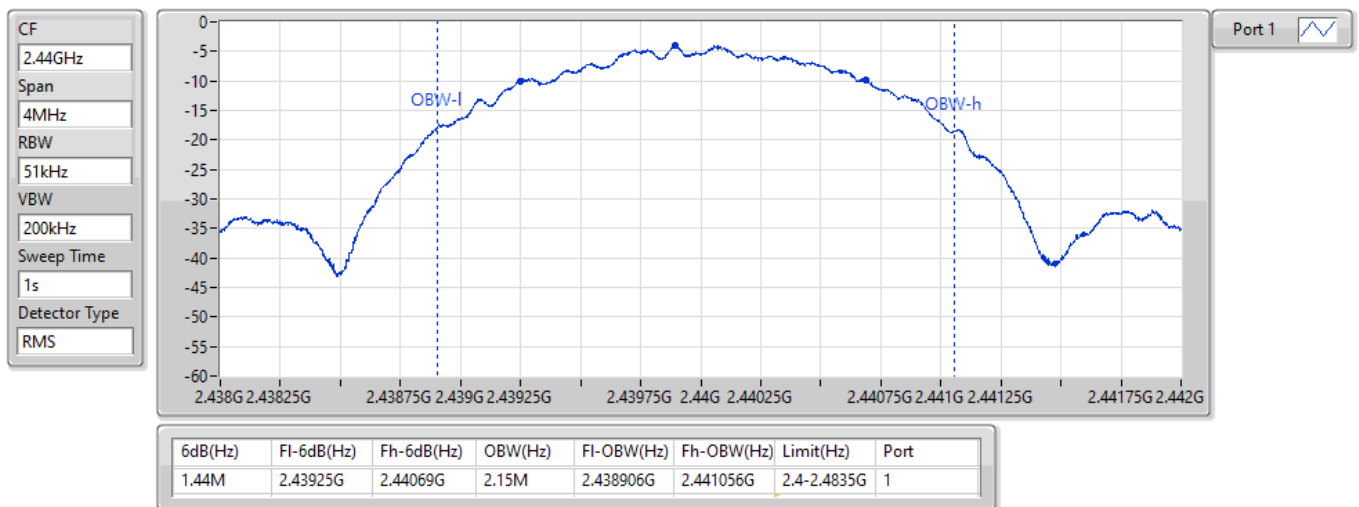
2402MHz



BT-LE(2Mbps)

EBW-DTS

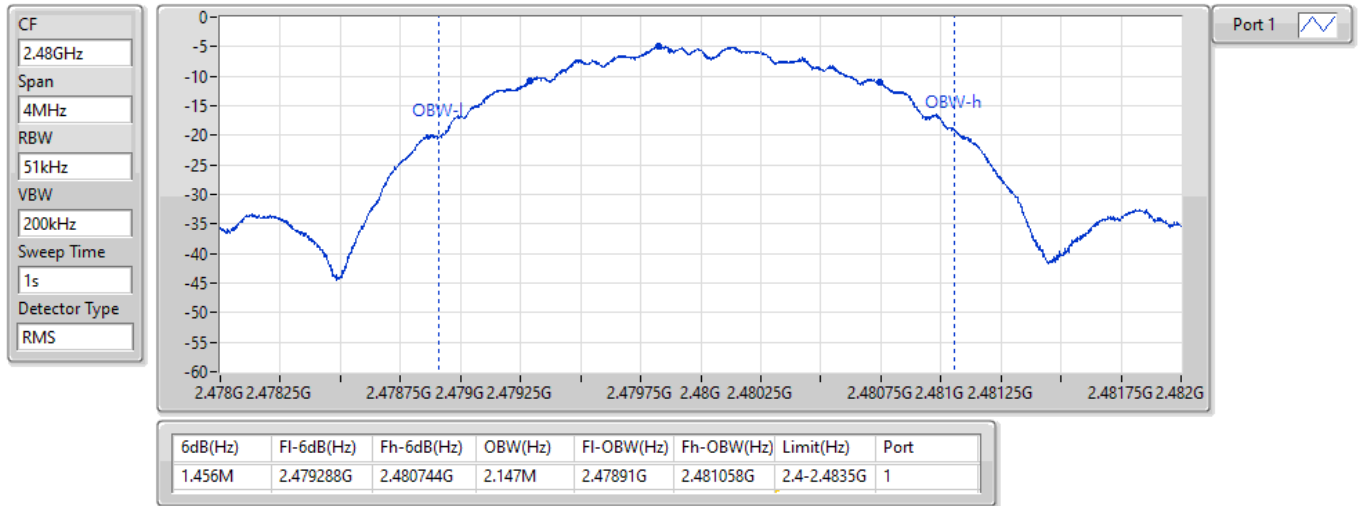
2440MHz



BT-LE(2Mbps)

EBW-DTS

2480MHz



Internal Antenna-125kbps

Summary

Mode	OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-
BT-LE(125kbps)	1.059M	1M06F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	fl-OBW (Hz)	fh-OBW (Hz)	OBW (Hz)
BT-LE(125kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.401463G	2.402513G	1.051M
2440MHz_Tnom	Pass	2.4-2.4835G	2.439457G	2.440516G	1.059M
2480MHz_Tnom	Pass	2.4-2.4835G	2.479459G	2.480513G	1.054M

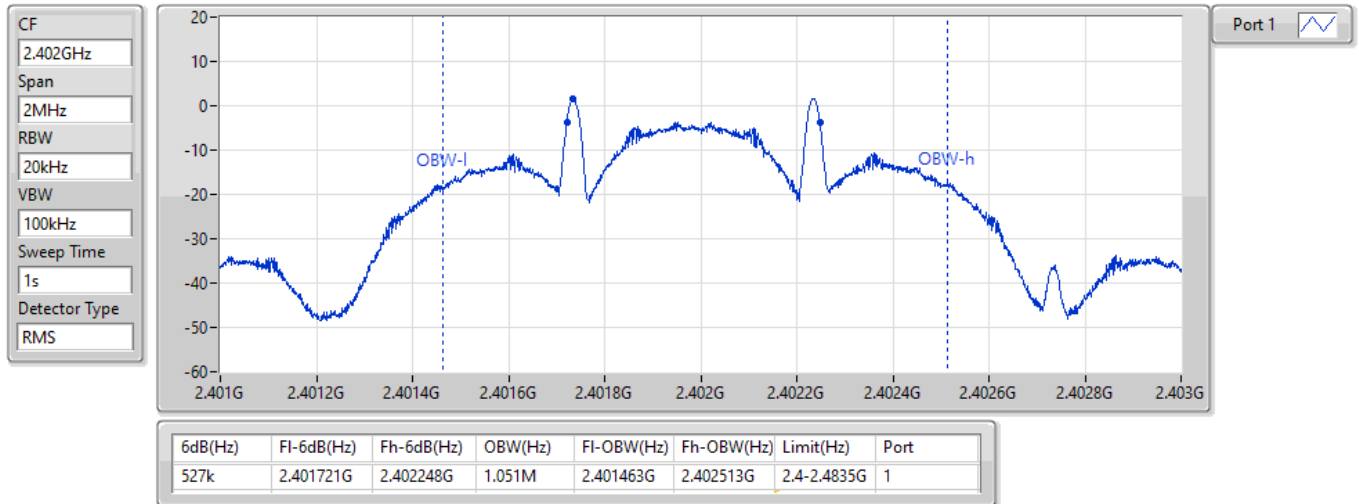
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(125kbps)

EBW-DTS

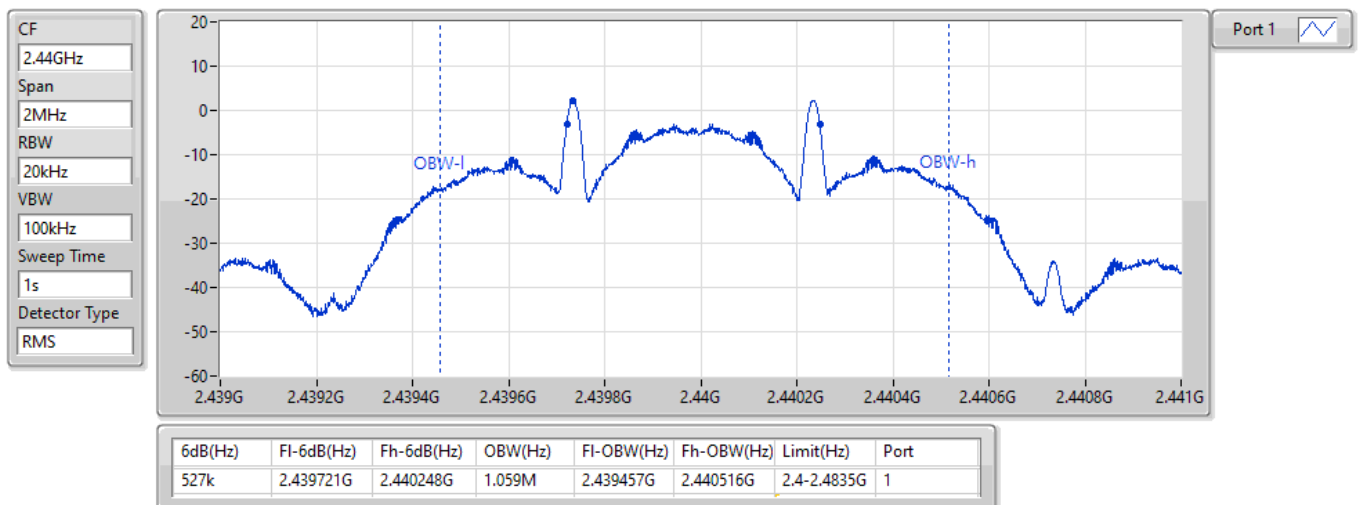
2402MHz



BT-LE(125kbps)

EBW-DTS

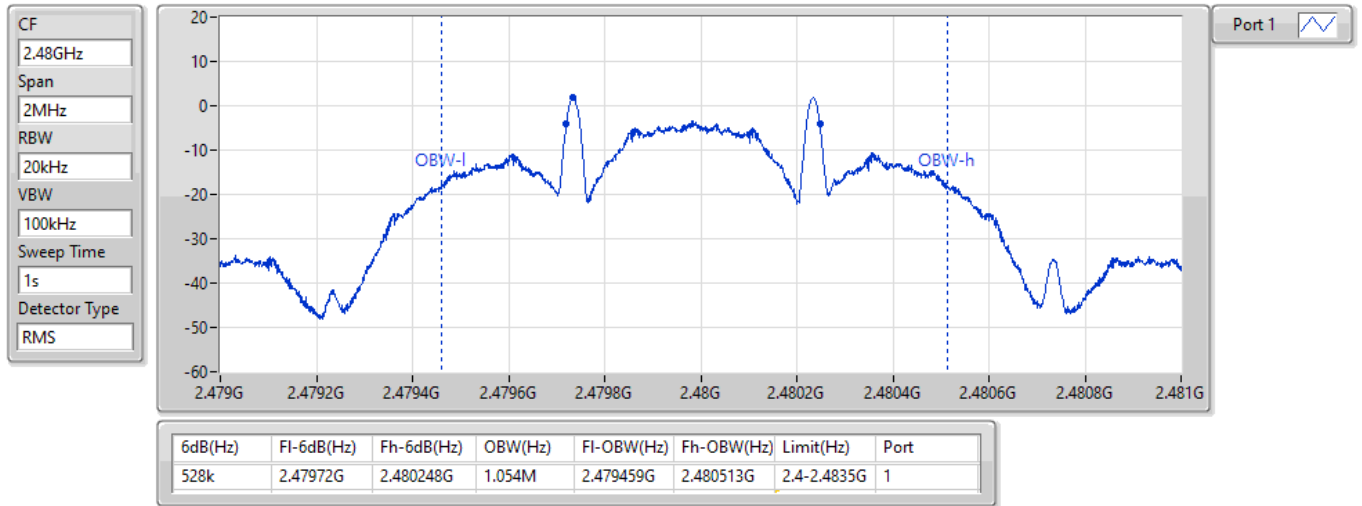
2440MHz



BT-LE(125kbps)

EBW-DTS

2480MHz



Internal Antenna-500kbps

Summary

Mode	OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-
BT-LE(500kbps)	1.047M	1M05F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	fl-OBW (Hz)	fh-OBW (Hz)	OBW (Hz)
BT-LE(500kbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.401468G	2.402507G	1.039M
2440MHz_Tnom	Pass	2.4-2.4835G	2.439462G	2.440509G	1.047M
2480MHz_Tnom	Pass	2.4-2.4835G	2.479465G	2.480511G	1.046M

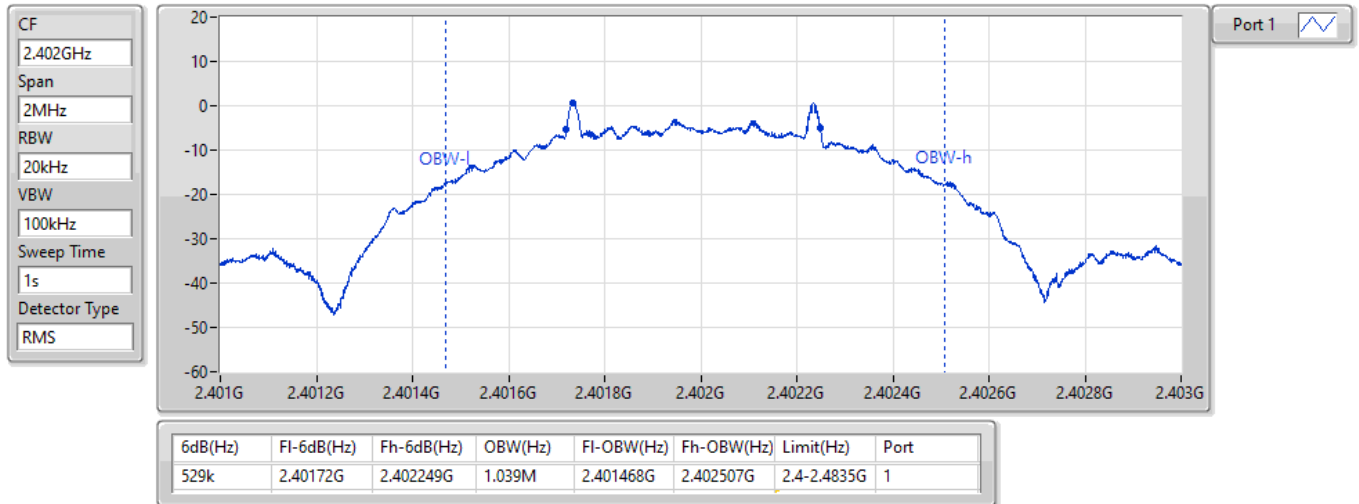
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(500kbps)

EBW-DTS

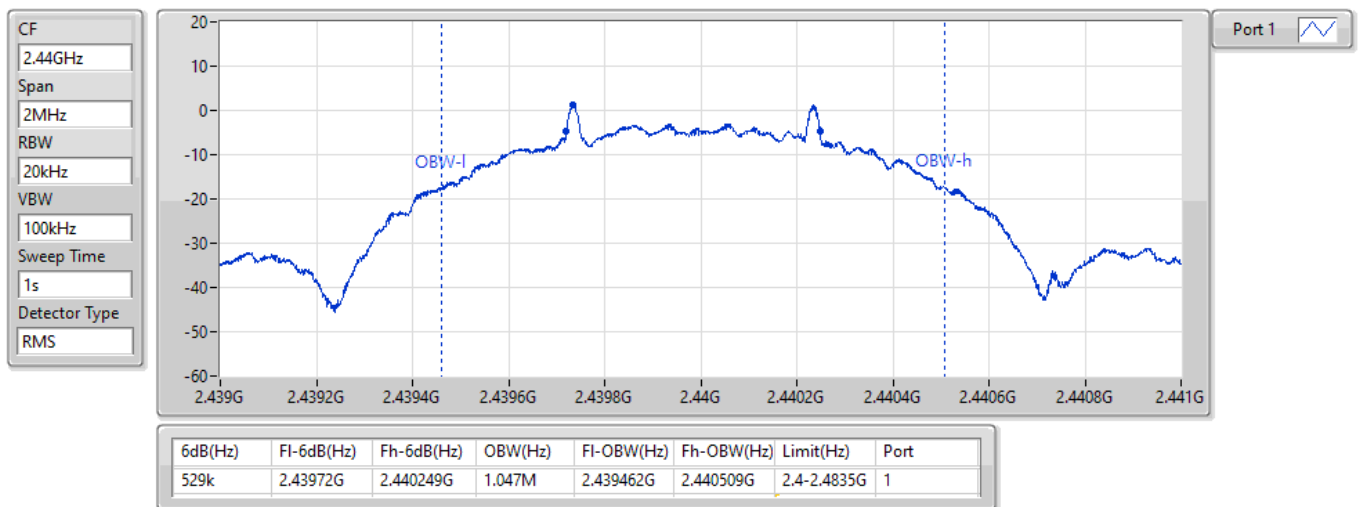
2402MHz



BT-LE(500kbps)

EBW-DTS

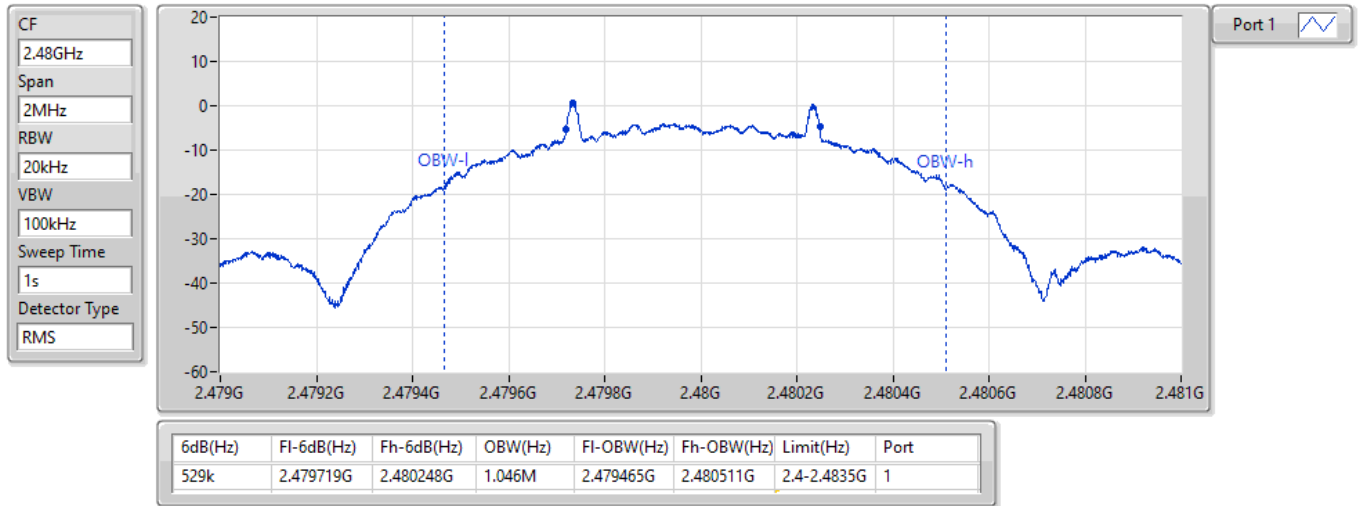
2440MHz



BT-LE(500kbps)

EBW-DTS

2480MHz



Internal Antenna-1Mbps

Summary

Mode	OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	1.07M	1M07F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	fl-OBW (Hz)	fh-OBW (Hz)	OBW (Hz)
BT-LE(1Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.401447G	2.402516G	1.068M
2440MHz_Tnom	Pass	2.4-2.4835G	2.439443G	2.440513G	1.07M
2480MHz_Tnom	Pass	2.4-2.4835G	2.479451G	2.480516G	1.065M

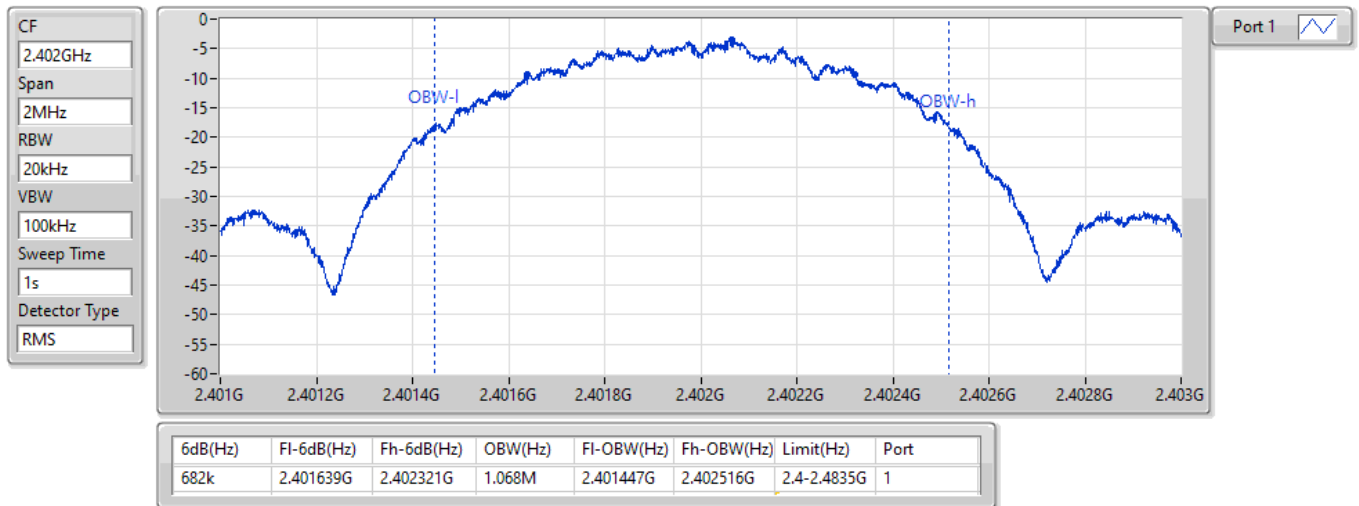
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(1Mbps)

EBW-DTS

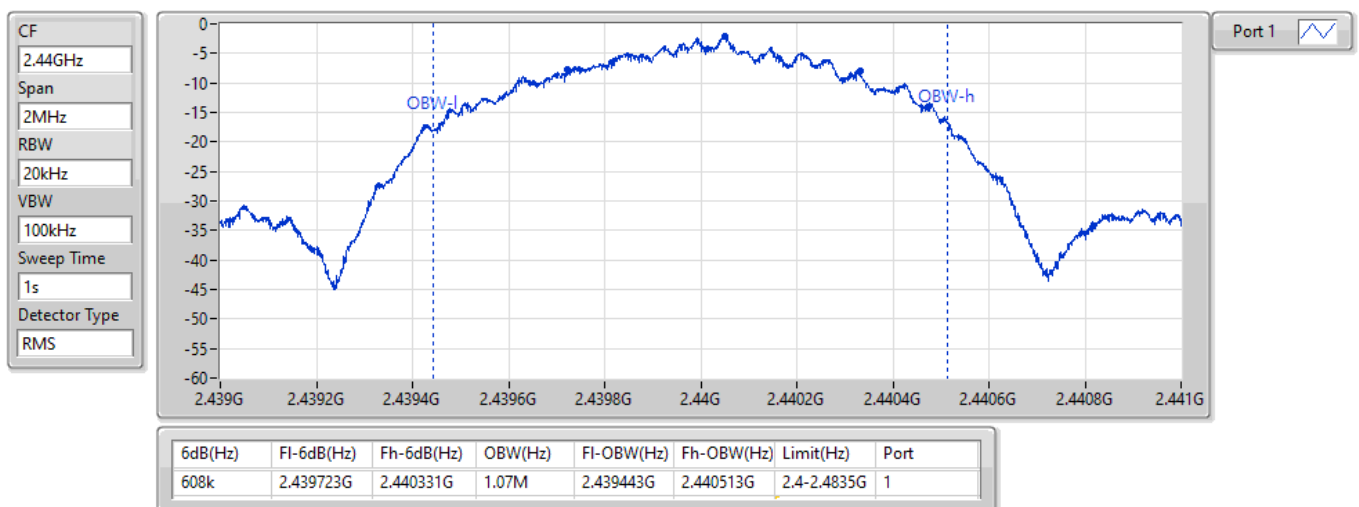
2402MHz



BT-LE(1Mbps)

EBW-DTS

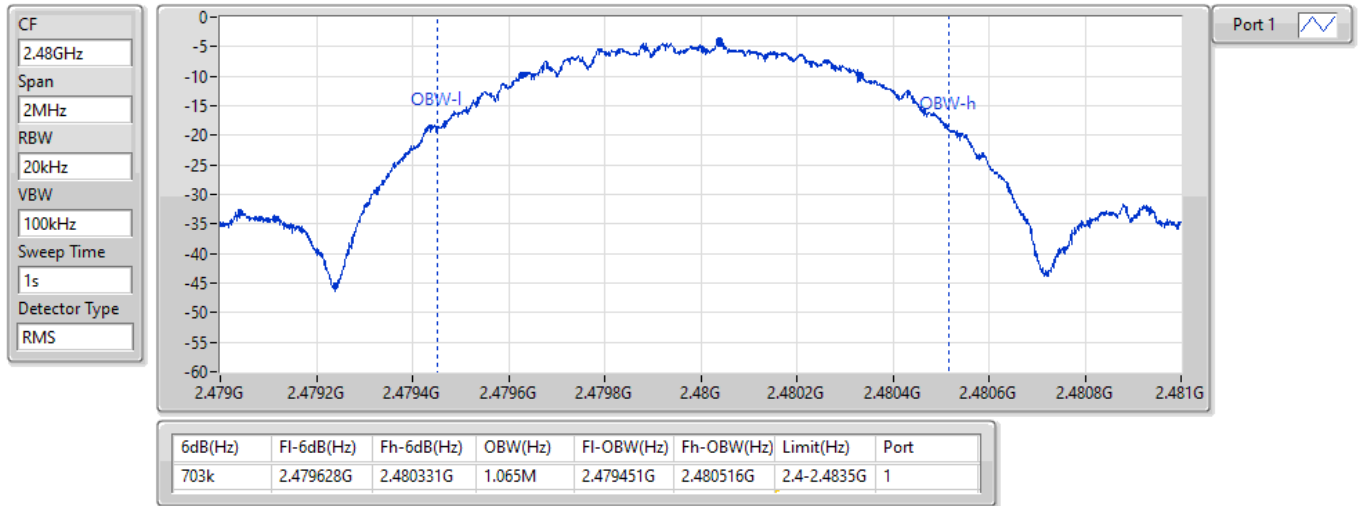
2440MHz



BT-LE(1Mbps)

EBW-DTS

2480MHz



Internal Antenna-2Mbps

Summary

Mode	OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-
BT-LE(2Mbps)	2.147M	2M15F1D

OBW = 99% occupied bandwidth

Result

Mode	Result	Limit (Hz)	fl-OBW (Hz)	fh-OBW (Hz)	OBW (Hz)
BT-LE(2Mbps)	-	-	-	-	-
2402MHz_Tnom	Pass	2.4-2.4835G	2.400911G	2.403058G	2.147M
2440MHz_Tnom	Pass	2.4-2.4835G	2.438906G	2.441052G	2.147M
2480MHz_Tnom	Pass	2.4-2.4835G	2.478911G	2.48104G	2.13M

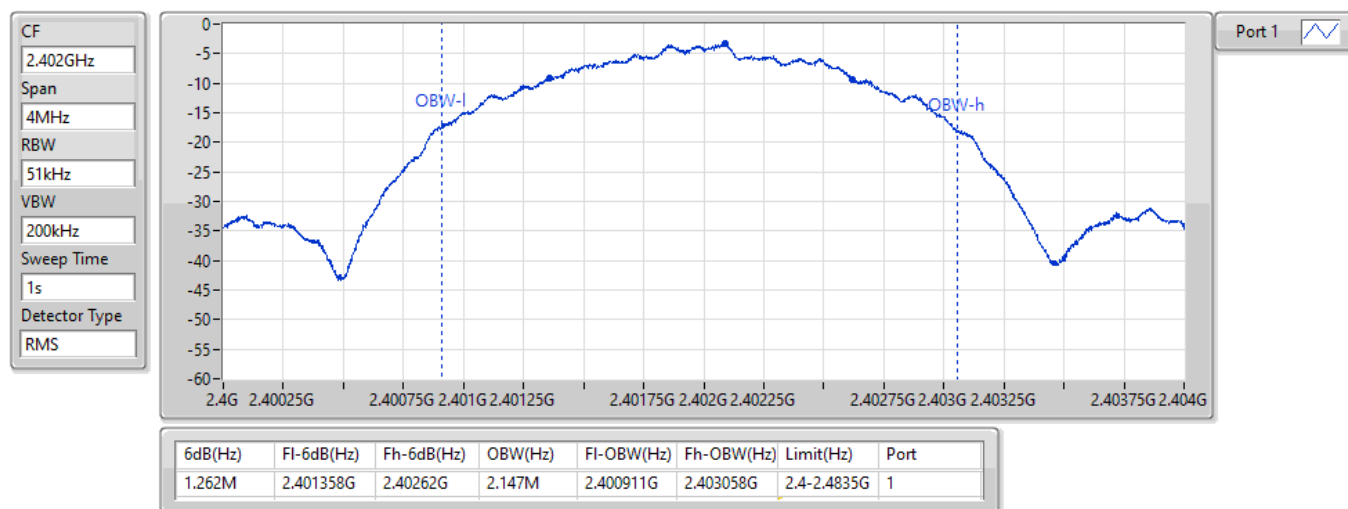
fl-OBW = fl lower edge 99% occupied bandwidth; fh-OBW = fh higher edge 99% occupied bandwidth; OBW = 99% occupied bandwidth;

N dB = 6dB down bandwidth

BT-LE(2Mbps)

EBW-DTS

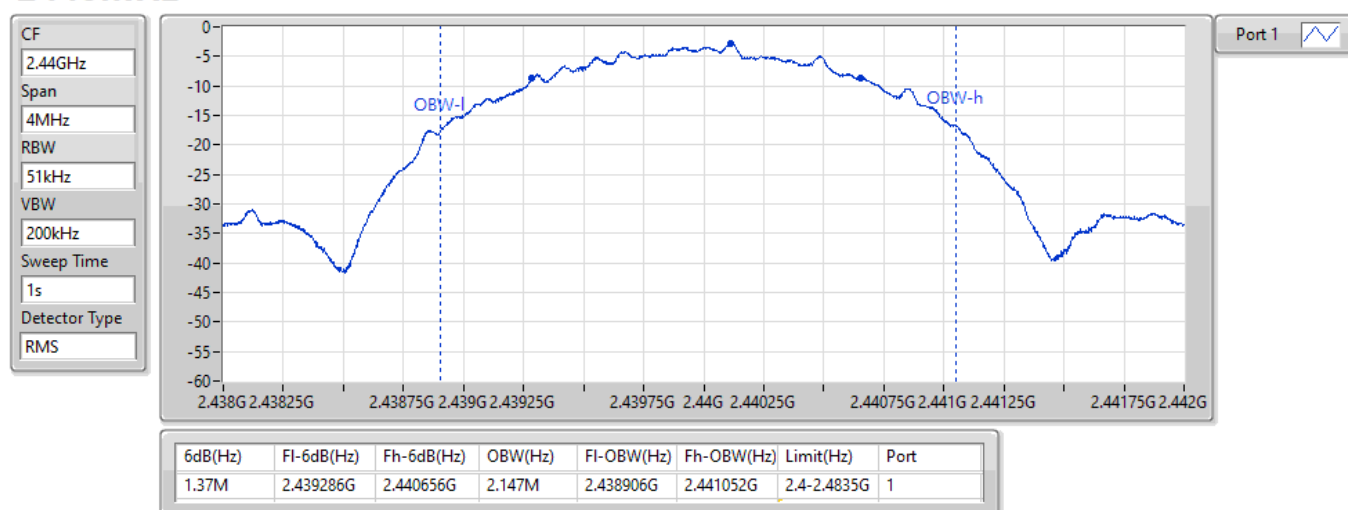
2402MHz



BT-LE(2Mbps)

EBW-DTS

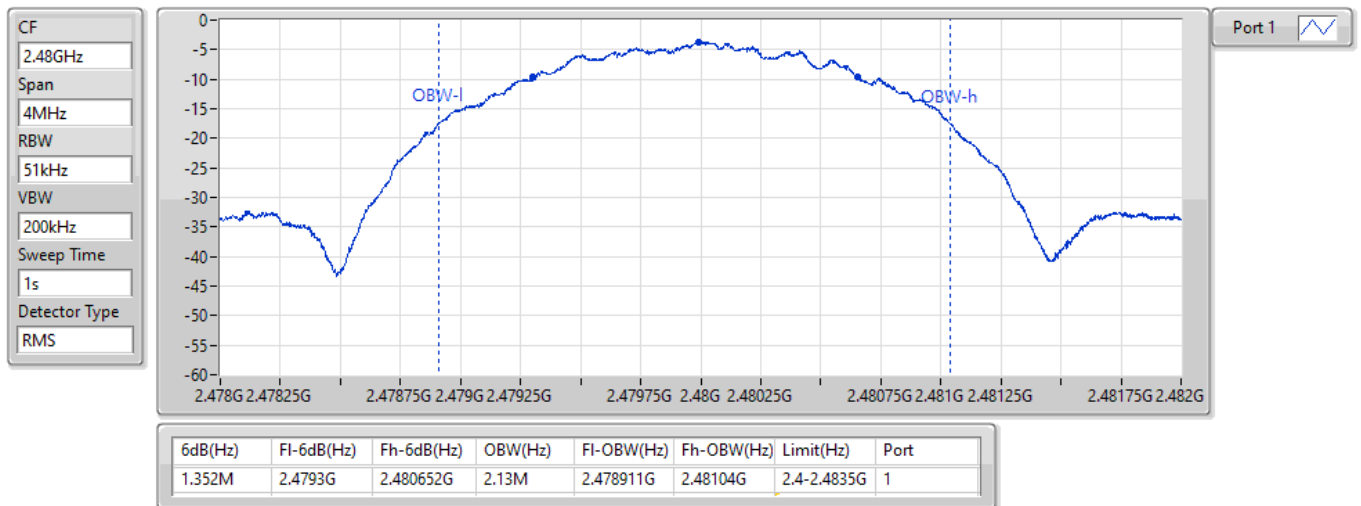
2440MHz



BT-LE(2Mbps)

EBW-DTS

2480MHz



External Antenna -125kbps
Summary

Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(125kbps)	-37.63	-10	-43.45	-20

Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(125kbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.3984G	-43.45	-20	2.39945G	-37.63	-10
2402MHz_Tnom	Pass	2.4851G	-53.85	-20	2.484G	-55.62	-10
2480MHz_Tnom	Pass	2.398392G	-55.77	-20	2.399446G	-55.54	-10
2480MHz_Tnom	Pass	2.485054G	-46.73	-20	2.484054G	-44.76	-10

BT-LE(125kbps)

MASK-DTS

2402MHz_Tnom



BT-LE(125kbps)

MASK-DTS

2480MHz_Tnom



External Antenna -500kbps
Summary

Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(500kbps)	-37.11	-10	-43.19	-20

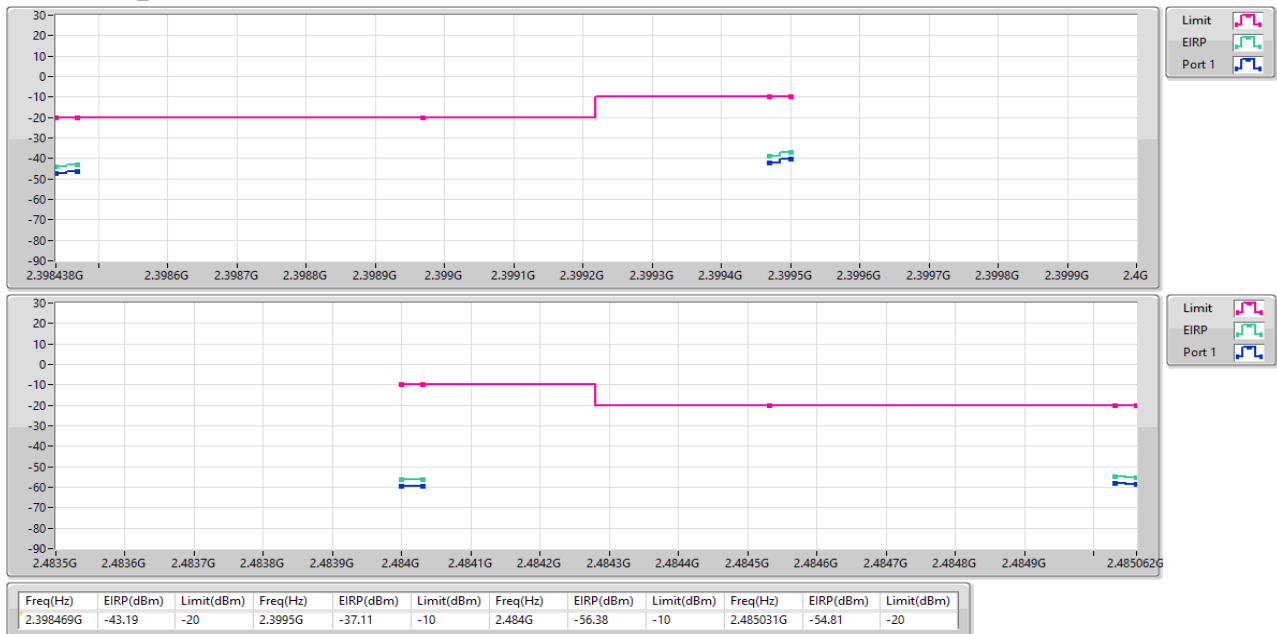
Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(500kbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.398469G	-43.19	-20	2.3995G	-37.11	-10
2402MHz_Tnom	Pass	2.485031G	-54.81	-20	2.484G	-56.38	-10
2480MHz_Tnom	Pass	2.398426G	-55.70	-20	2.3995G	-55.96	-10
2480MHz_Tnom	Pass	2.485037G	-47.30	-20	2.484G	-43.78	-10

BT-LE(500kbps)

MASK-DTS

2402MHz_Tnom



BT-LE(500kbps)

MASK-DTS

2480MHz_Tnom



External Antenna -1Mbps
Summary

Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(1Mbps)	-37.23	-10	-40.44	-20

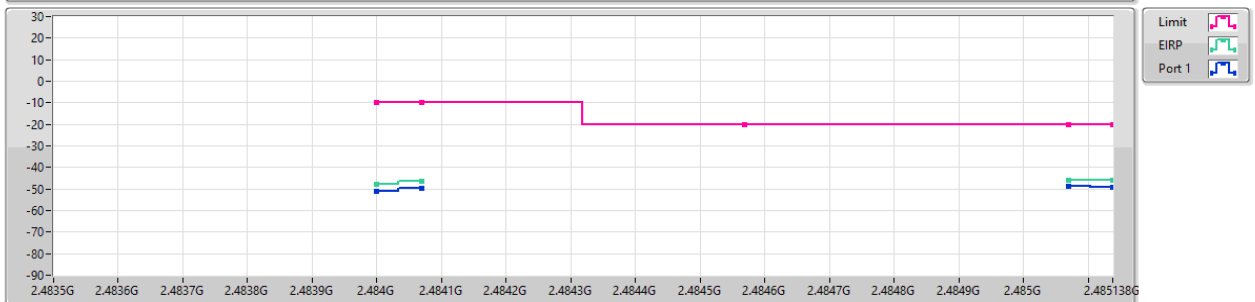
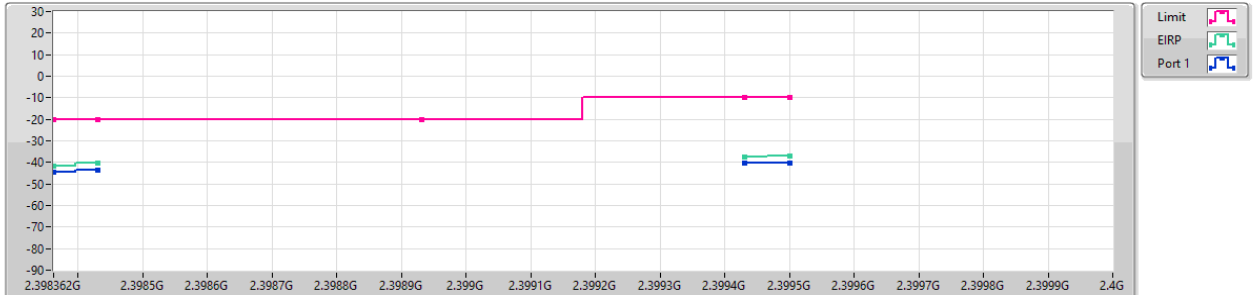
Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(1Mbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.398431G	-40.44	-20	2.3995G	-37.23	-10
2402MHz_Tnom	Pass	2.485069G	-45.74	-20	2.484069G	-46.43	-10
2480MHz_Tnom	Pass	2.398422G	-46.93	-20	2.3995G	-46.36	-10
2480MHz_Tnom	Pass	2.485156G	-43.62	-20	2.484078G	-42.67	-10

BT-LE(1Mbps)

MASK-DTS

2402MHz_Tnom

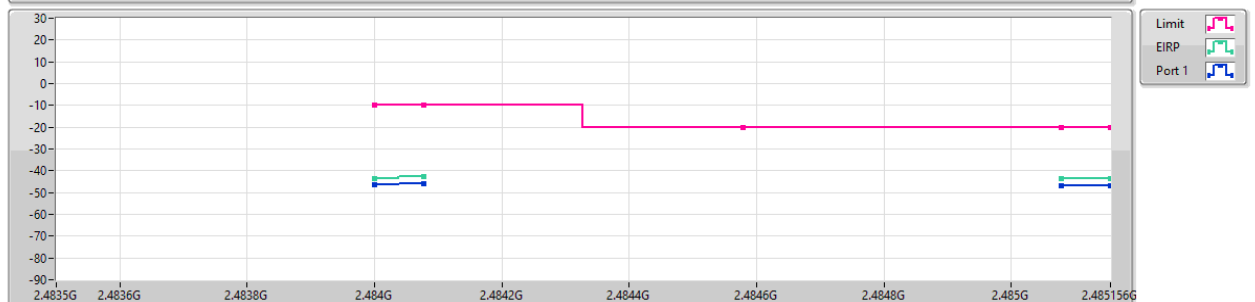
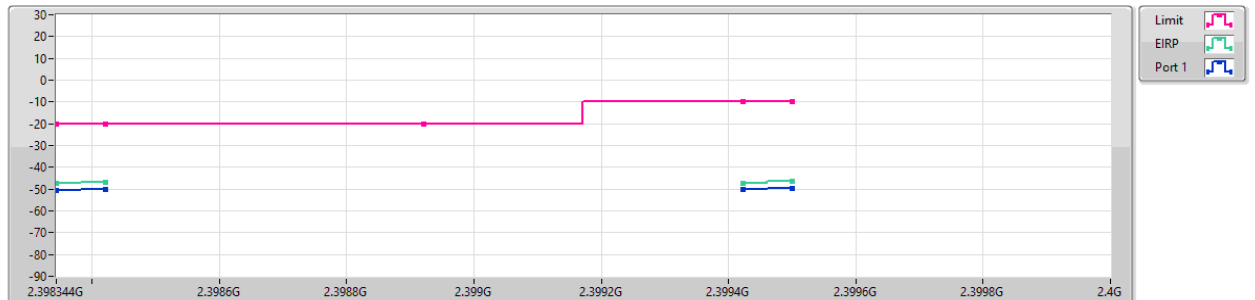


Freq(Hz)	EIRP(dBm)	Limit(dBm)	Freq(Hz)	EIRP(dBm)	Limit(dBm)	Freq(Hz)	EIRP(dBm)	Limit(dBm)	Freq(Hz)	EIRP(dBm)	Limit(dBm)
2.398431G	-40.44	-20	2.3995G	-37.23	-10	2.484069G	-46.43	-10	2.485069G	-45.74	-20

BT-LE(1Mbps)

MASK-DTS

2480MHz_Tnom



Freq(Hz)	EIRP(dBm)	Limit(dBm)	Freq(Hz)	EIRP(dBm)	Limit(dBm)	Freq(Hz)	EIRP(dBm)	Limit(dBm)	Freq(Hz)	EIRP(dBm)	Limit(dBm)
2.398422G	-46.93	-20	2.3995G	-46.36	-10	2.484078G	-42.67	-10	2.485156G	-43.62	-20

External Antenna -2Mbps
Summary

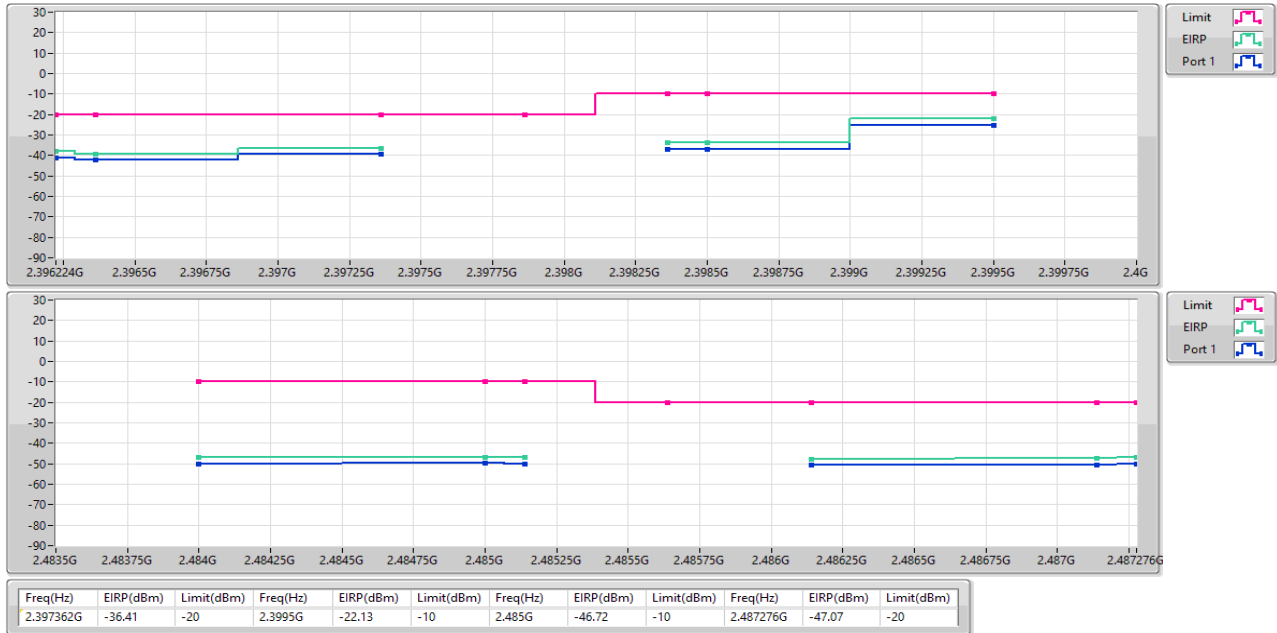
Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(2Mbps)	-22.29	-10	-36.93	-20

Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(2Mbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.397348G	-36.93	-20	2.3995G	-22.29	-10
2402MHz_Tnom	Pass	2.487304G	-47.32	-20	2.484G	-47.00	-10
2480MHz_Tnom	Pass	2.396353G	-46.00	-20	2.3995G	-46.55	-10
2480MHz_Tnom	Pass	2.486147G	-39.03	-20	2.484G	-34.06	-10

BT-LE(2Mbps) 2402MHz_Tnom

MASK-DTS



BT-LE(2Mbps) 2480MHz_Tnom

MASK-DTS



Internal Antenna-125kbps
Summary

Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(125kbps)	-38.71	-10	-44.06	-20

Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(125kbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.398398G	-44.06	-20	2.3995G	-38.71	-10
2402MHz_Tnom	Pass	2.485102G	-57.34	-20	2.484G	-57.13	-10
2480MHz_Tnom	Pass	2.398446G	-56.56	-20	2.3995G	-57.00	-10
2480MHz_Tnom	Pass	2.485054G	-47.11	-20	2.484054G	-44.82	-10

BT-LE(125kbps)

MASK-DTS

2402MHz_Tnom



BT-LE(125kbps)

MASK-DTS

2480MHz_Tnom



Internal Antenna-500kbps
Summary

Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(500kbps)	-38.31	-10	-44.27	-20

Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(500kbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.398461G	-44.27	-20	2.3995G	-38.31	-10
2402MHz_Tnom	Pass	2.485039G	-55.97	-20	2.484039G	-56.04	-10
2480MHz_Tnom	Pass	2.398408G	-56.65	-20	2.3995G	-57.19	-10
2480MHz_Tnom	Pass	2.485092G	-46.45	-20	2.484046G	-44.12	-10

BT-LE(500kbps)

MASK-DTS

2402MHz_Tnom



BT-LE(500kbps)

MASK-DTS

2480MHz_Tnom



Internal Antenna-1Mbps
Summary

Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(1Mbps)	-38.48	-10	-41.78	-20

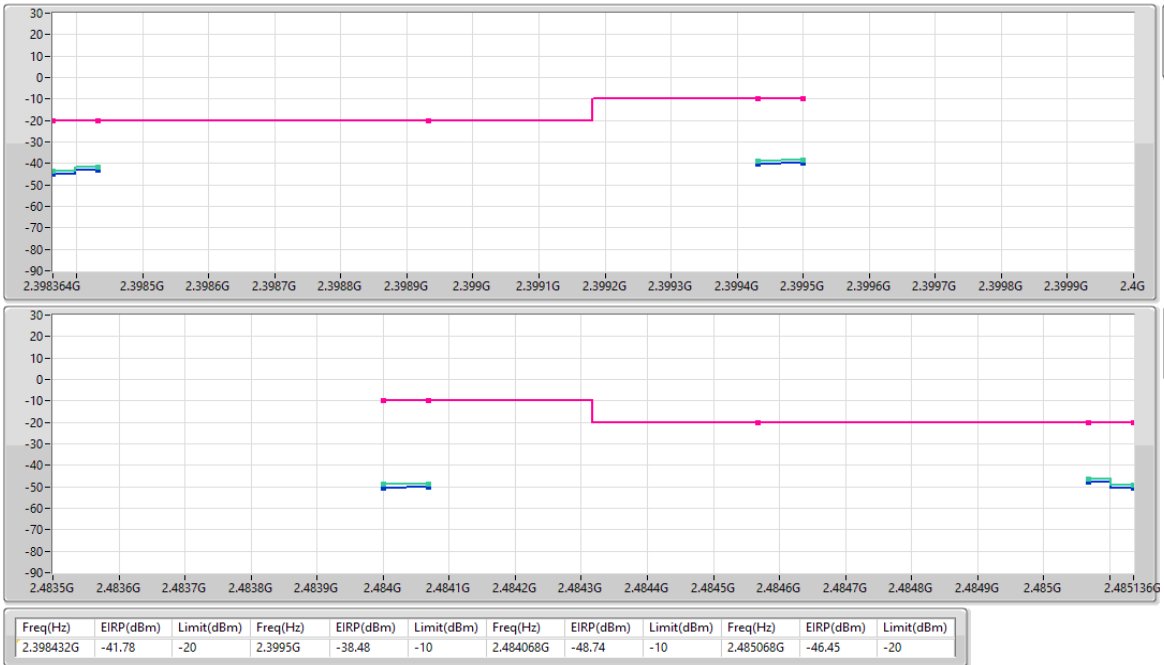
Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(1Mbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.398432G	-41.78	-20	2.3995G	-38.48	-10
2402MHz_Tnom	Pass	2.485068G	-46.45	-20	2.484068G	-48.74	-10
2480MHz_Tnom	Pass	2.39837G	-48.70	-20	2.3995G	-48.90	-10
2480MHz_Tnom	Pass	2.48513G	-44.01	-20	2.484G	-43.41	-10

BT-LE(1Mbps)

MASK-DTS

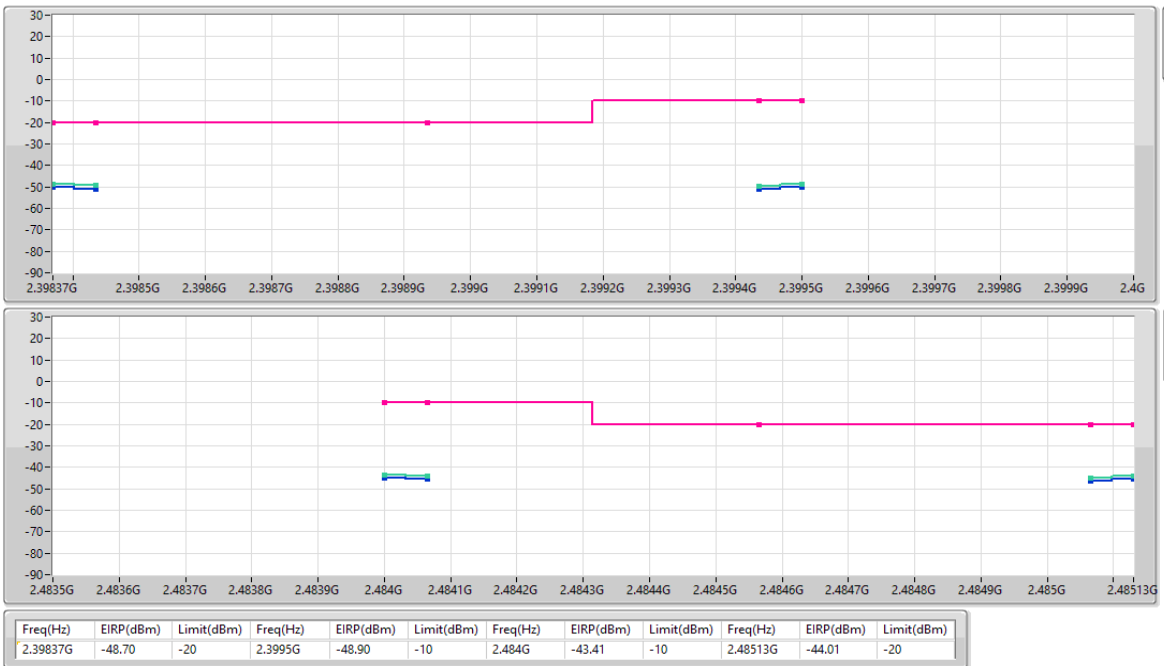
2402MHz_Tnom



BT-LE(1Mbps)

MASK-DTS

2480MHz_Tnom



**Internal Antenna-2Mbps****Summary**

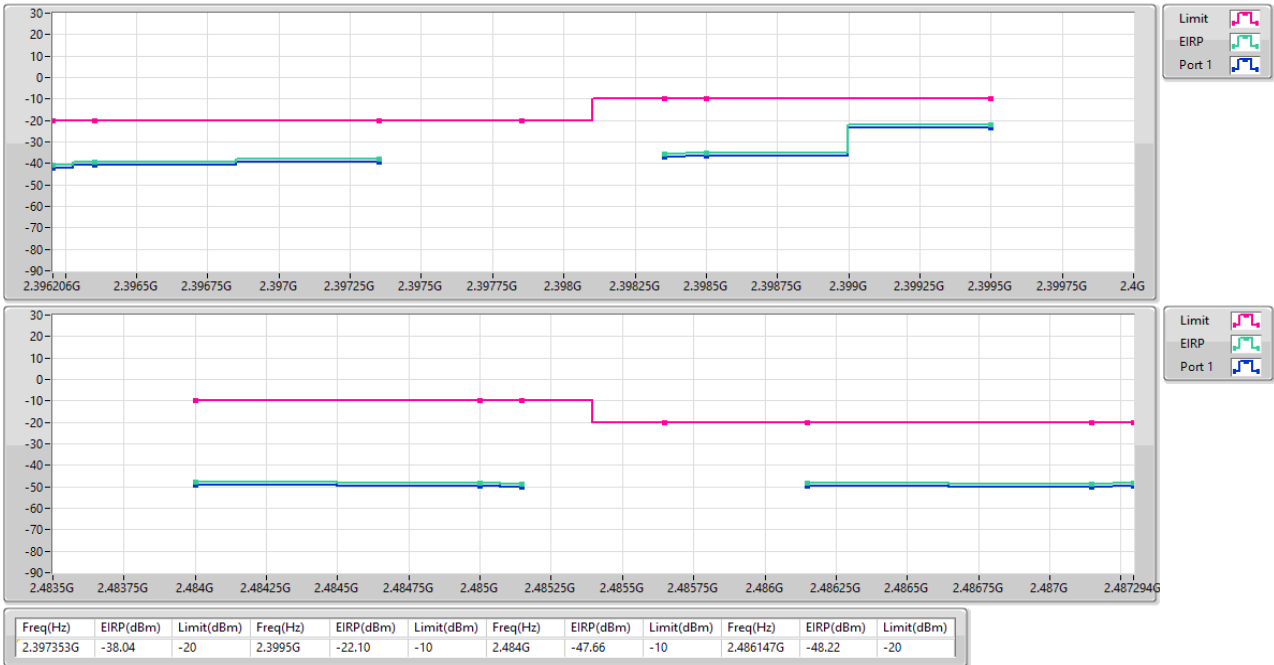
Mode	EIRP-A (dBm)	Limit-A (dBm)	EIRP-B (dBm)	Limit-B (dBm)
2.4-2.4835GHz	-	-	-	-
BT-LE(2Mbps)	-22.1	-10	-38.04	-20

Result

Mode	Result	Freq (Hz)	EIRP (dBm)	Limit (dBm)	Freq (Hz)	EIRP (dBm)	Limit (dBm)
BT-LE(2Mbps)	-	-	-	-	-	-	-
2402MHz_Tnom	Pass	2.397353G	-38.04	-20	2.3995G	-22.10	-10
2402MHz_Tnom	Pass	2.486147G	-48.22	-20	2.484G	-47.66	-10
2480MHz_Tnom	Pass	2.39624G	-47.00	-20	2.3985G	-49.14	-10
2480MHz_Tnom	Pass	2.48613G	-39.99	-20	2.484G	-34.06	-10

BT-LE(2Mbps) 2402MHz_Tnom

MASK-DTS



BT-LE(2Mbps) 2480MHz_Tnom

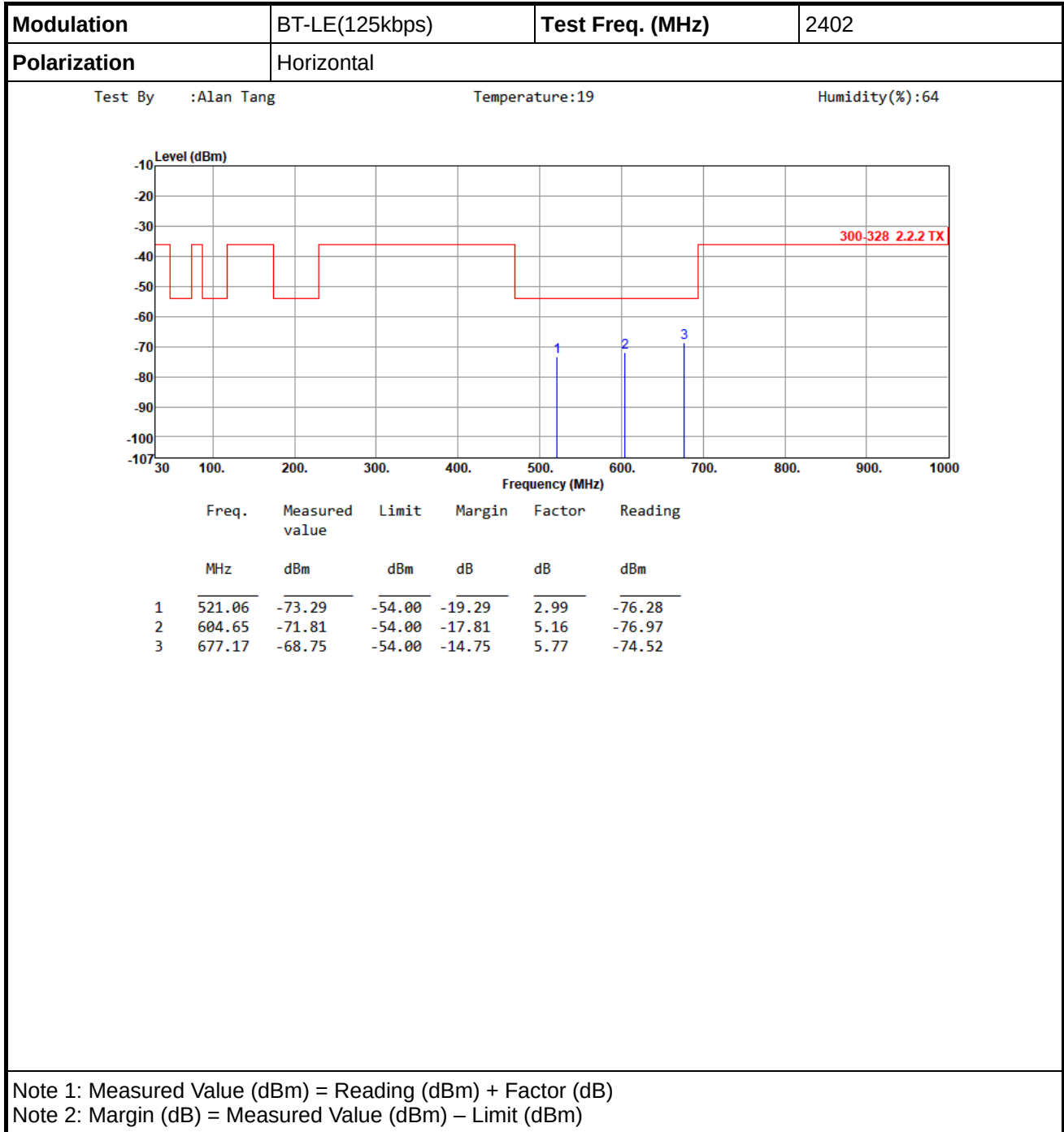
MASK-DTS





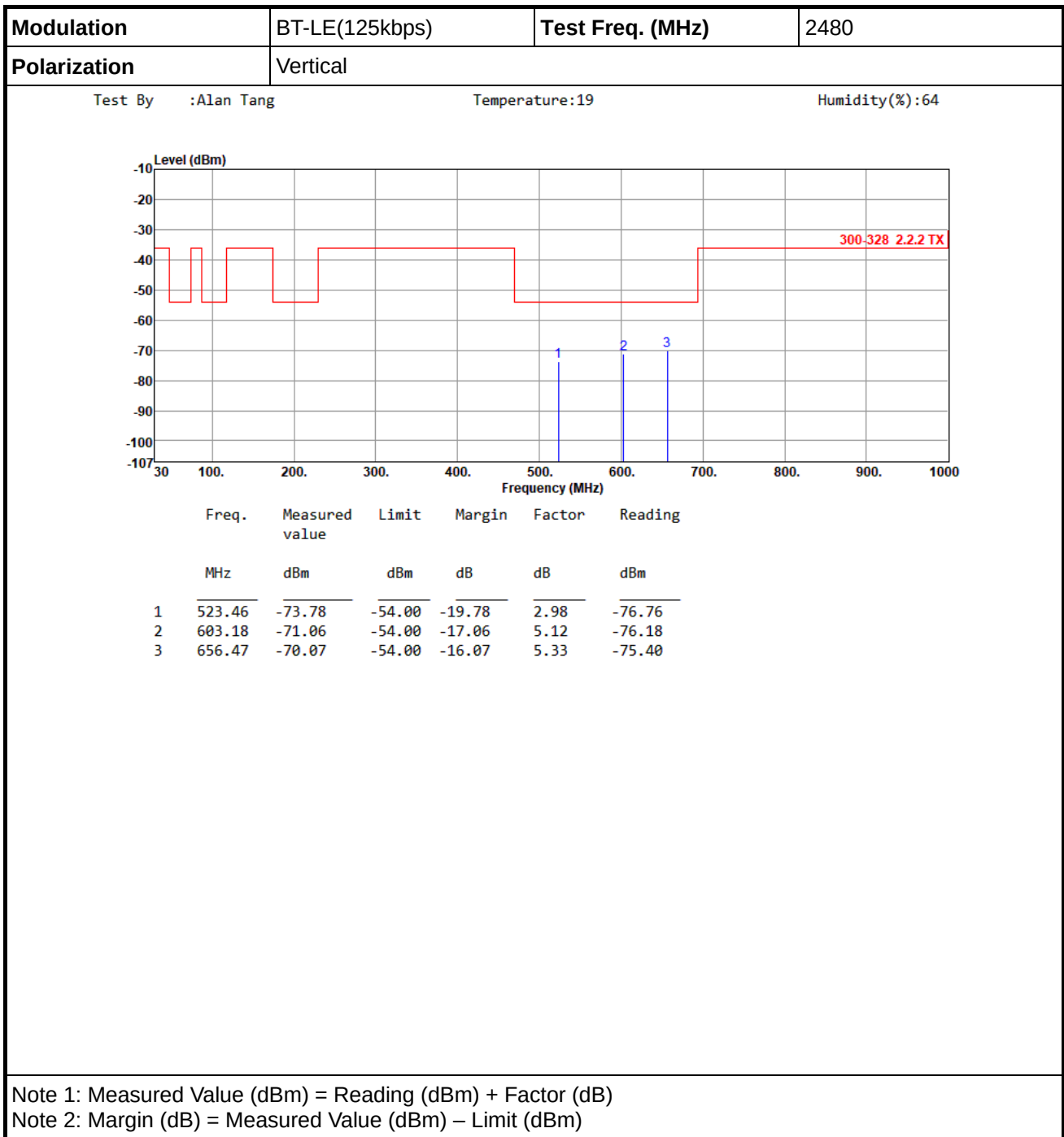
External Antenna

Emissions (Below 1GHz)



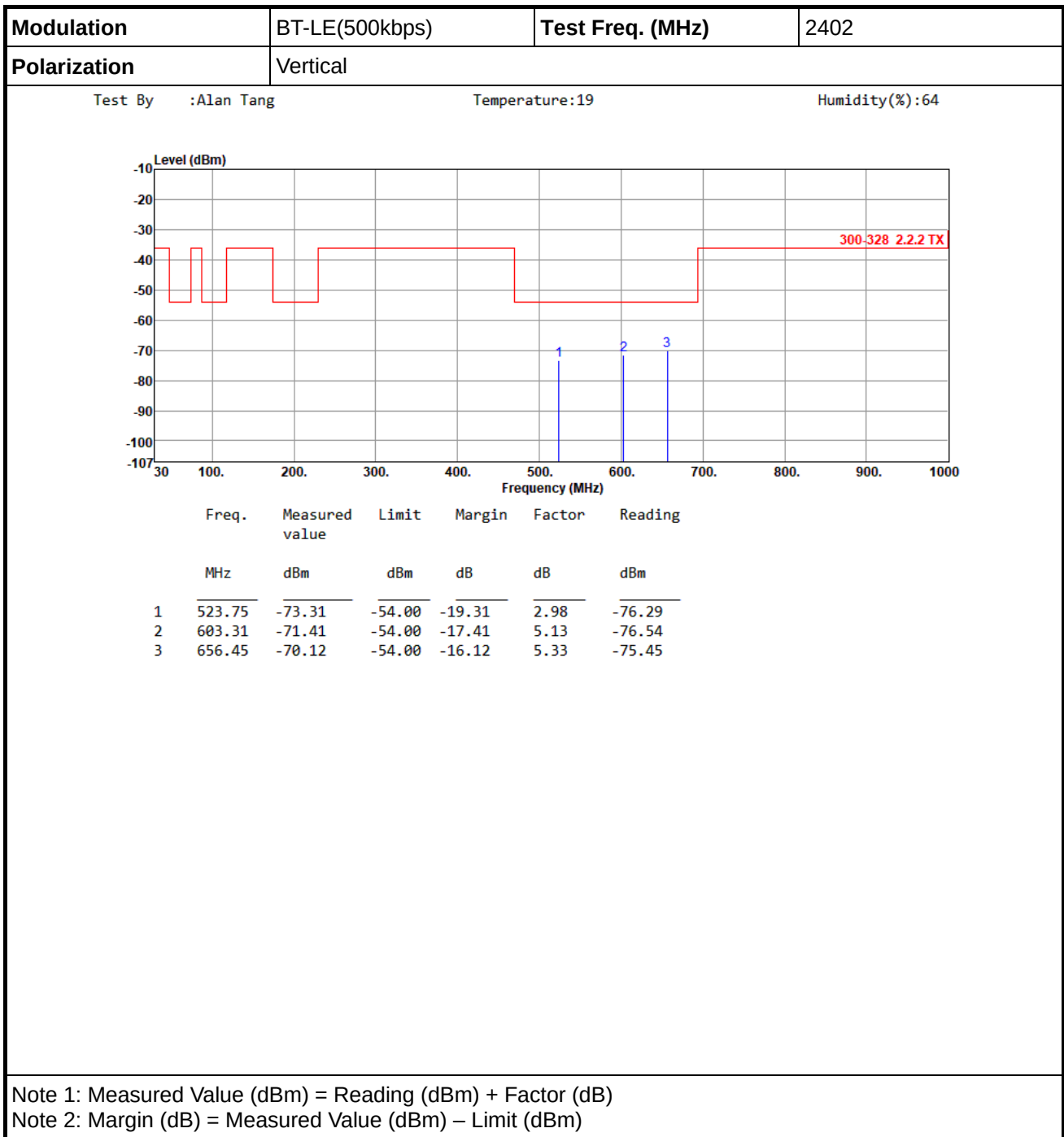
Page No. : 2 of 32

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			





Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.27	-73.72	-54.00	-19.72	2.97	-76.69
2	603.55	-71.34	-54.00	-17.34	5.15	-76.49
3	656.46	-70.14	-54.00	-16.14	5.33	-75.47

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	521.20	-73.42	-54.00	-19.42	2.99	-76.41
2	604.04	-71.42	-54.00	-17.42	5.10	-76.52
3	677.57	-68.42	-54.00	-14.42	5.78	-74.20

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		

Test By : Alan Tang Temperature: 19 Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.29	-73.90	-54.00	-19.90	2.97	-76.87
2	603.50	-71.76	-54.00	-17.76	5.15	-76.91
3	656.25	-70.16	-54.00	-16.16	5.33	-75.49

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
 Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.61	-73.81	-54.00	-19.81	2.98	-76.79
2	603.41	-71.91	-54.00	-17.91	5.14	-77.05
3	656.51	-70.30	-54.00	-16.30	5.33	-75.63

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

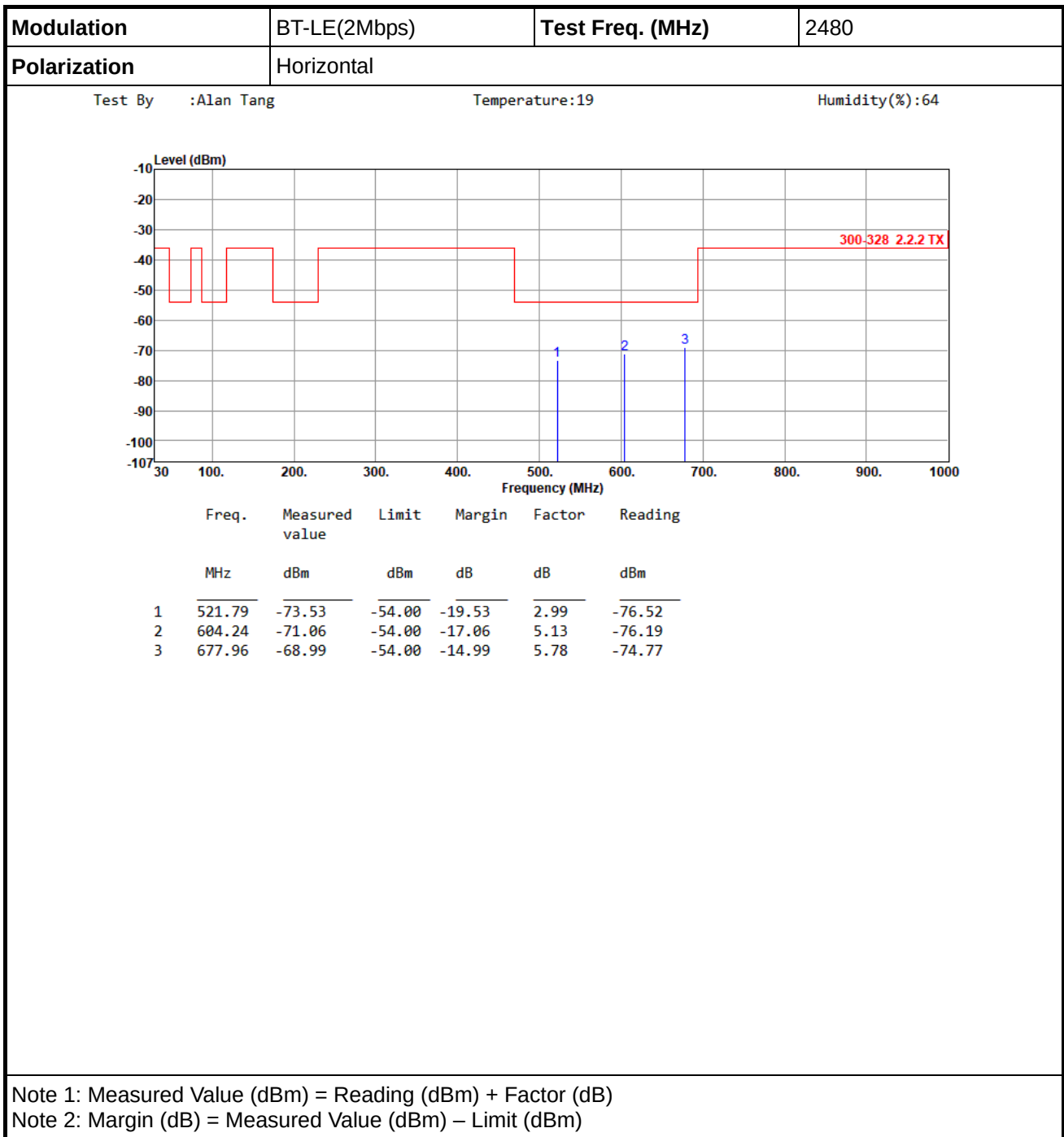
Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		

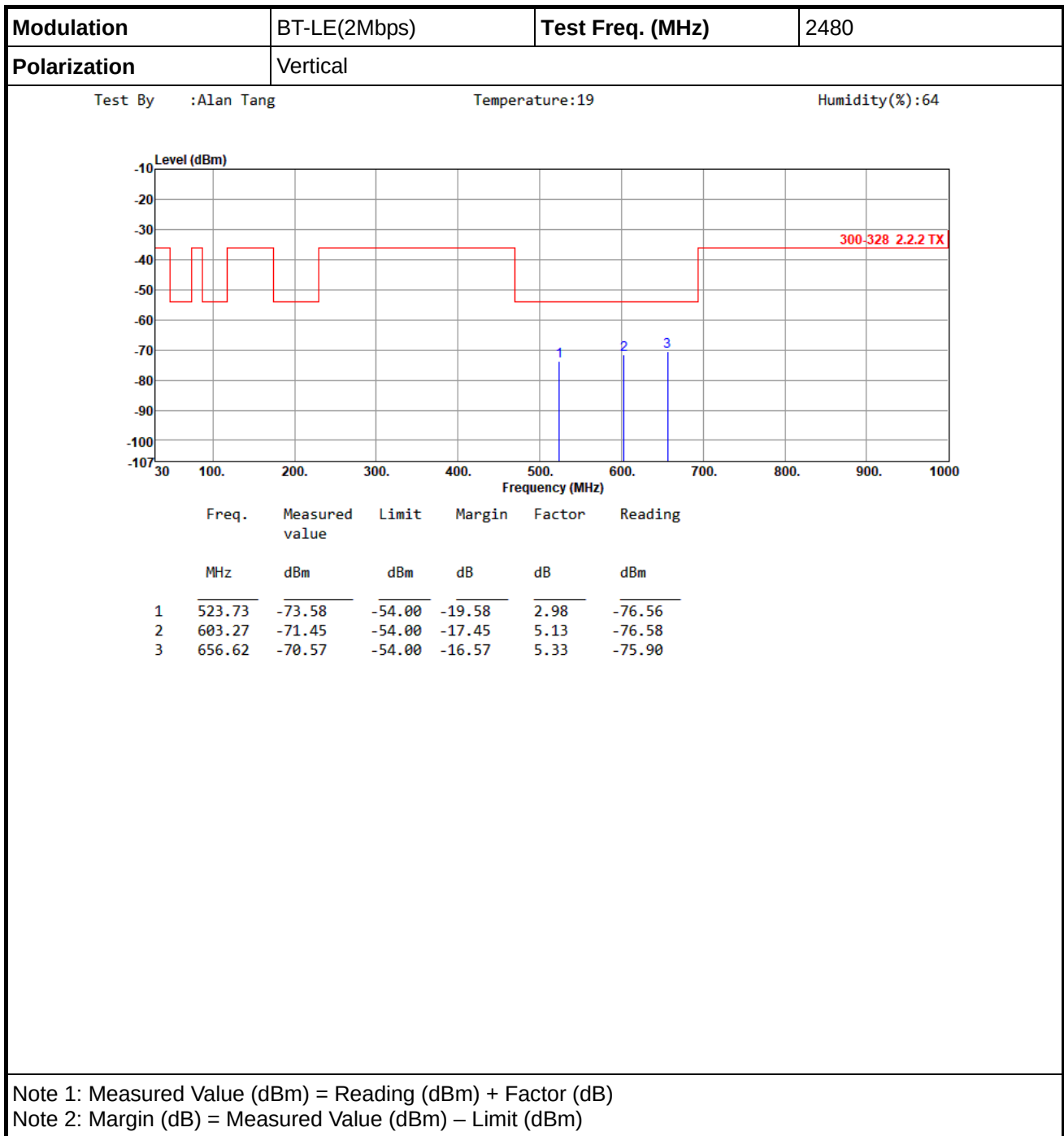
Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.07	-73.33	-54.00	-19.33	2.97	-76.30
2	603.65	-71.57	-54.00	-17.57	5.16	-76.73
3	656.56	-70.91	-54.00	-16.91	5.33	-76.24

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)







Emissions (Above 1GHz)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By : Alan Tang		Temperature: 19	Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	4959.56	-56.03	-30.00	-26.03	9.30	-65.33
2	7440.40	-49.13	-30.00	-19.13	15.39	-64.52

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
 Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Internal Antenna

Emissions (Below 1GHz)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.46	-73.04	-54.00	-19.04	2.98	-76.02
2	603.07	-71.61	-54.00	-17.61	5.11	-76.72
3	656.31	-70.09	-54.00	-16.09	5.33	-75.42

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.15	-73.48	-54.00	-19.48	2.97	-76.45
2	603.46	-71.91	-54.00	-17.91	5.15	-77.06
3	656.80	-70.76	-54.00	-16.76	5.33	-76.09

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	521.18	-73.49	-54.00	-19.49	2.99	-76.48
2	604.61	-71.30	-54.00	-17.30	5.16	-76.46
3	677.07	-68.68	-54.00	-14.68	5.77	-74.45

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.02	-73.23	-54.00	-19.23	2.97	-76.20
2	603.76	-71.21	-54.00	-17.21	5.17	-76.38
3	656.46	-70.11	-54.00	-16.11	5.33	-75.44

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

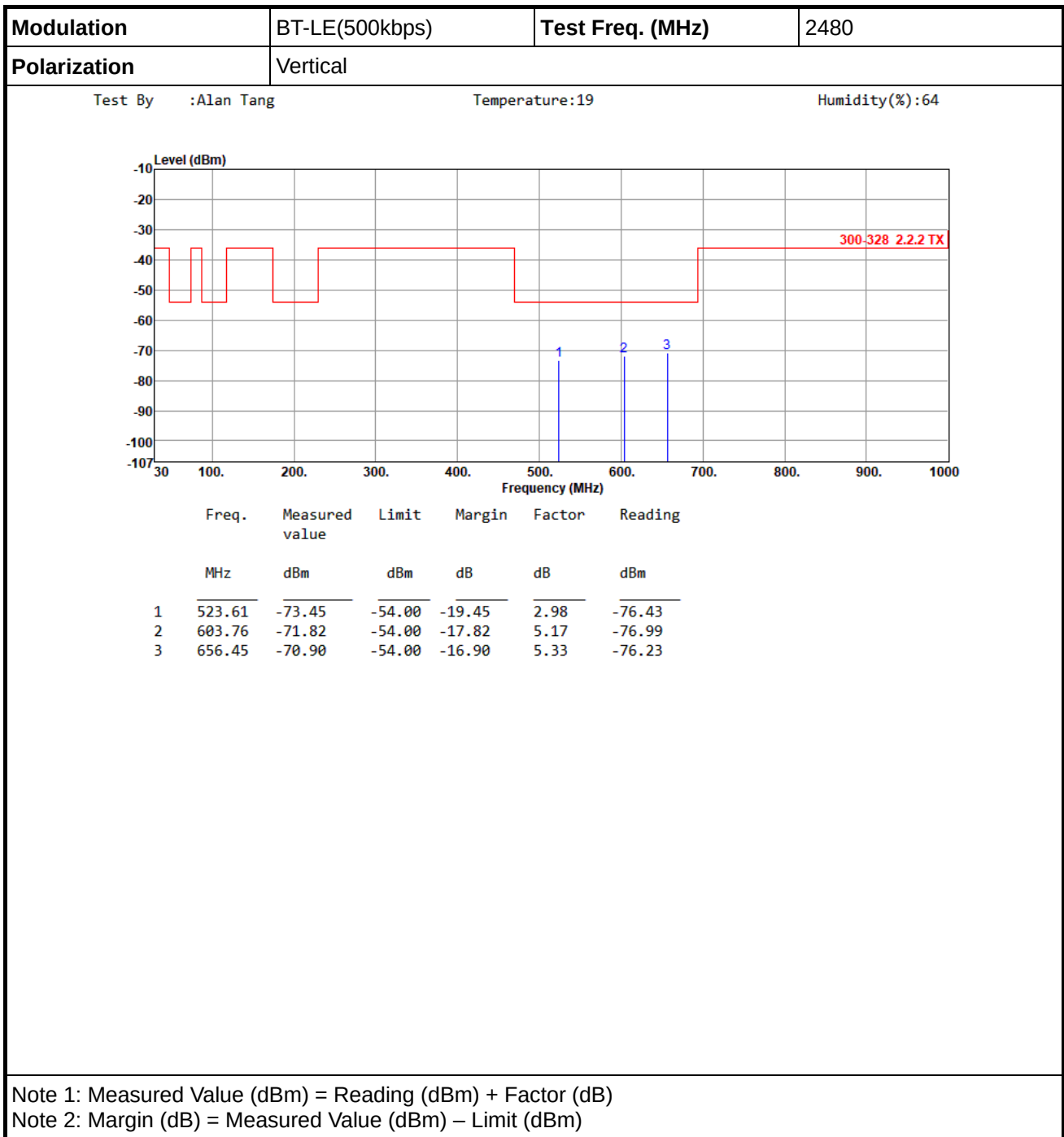
Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	521.48	-73.53	-54.00	-19.53	2.99	-76.52
2	604.65	-71.58	-54.00	-17.58	5.16	-76.74
3	677.51	-68.44	-54.00	-14.44	5.77	-74.21

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

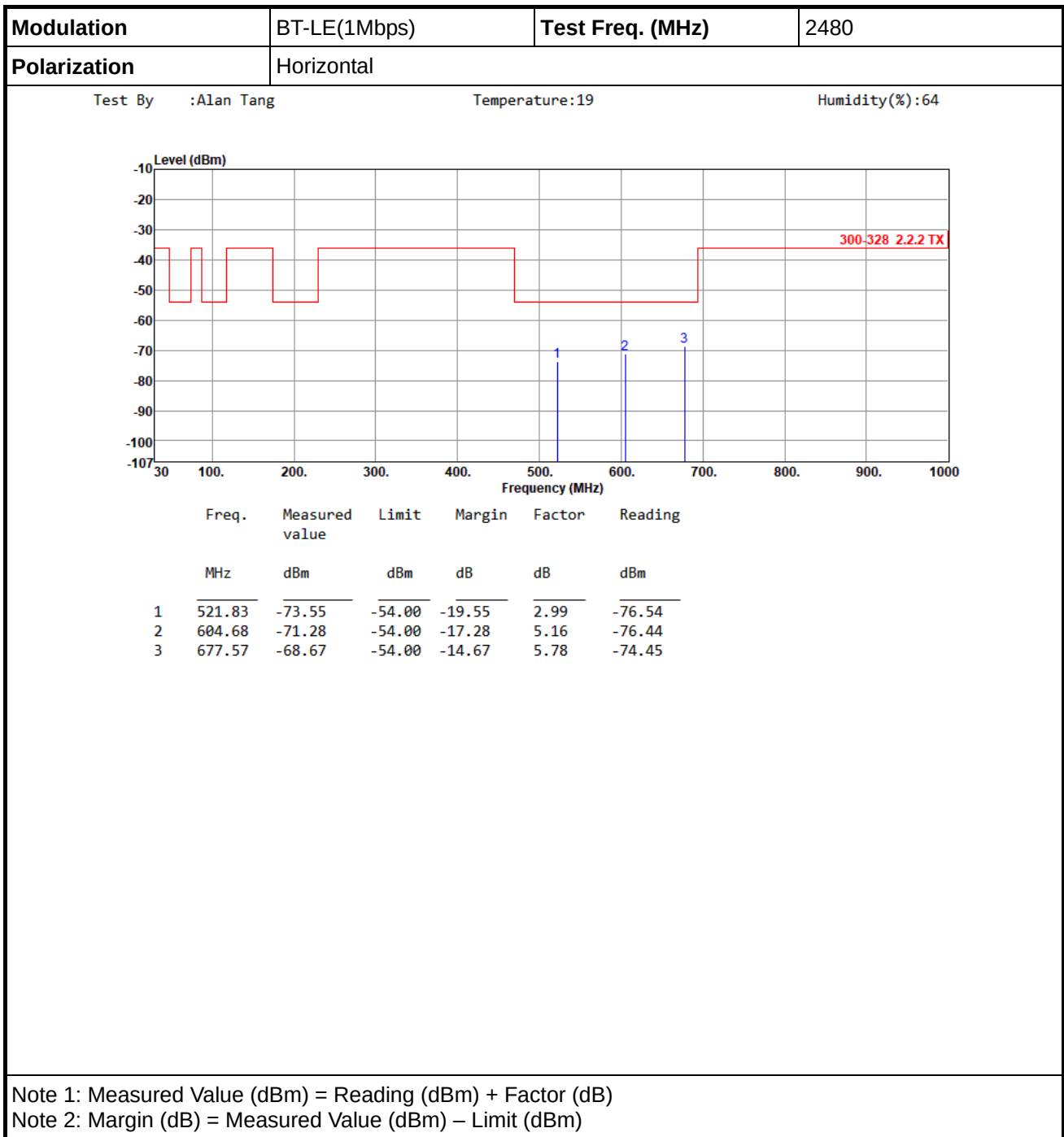
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)



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Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

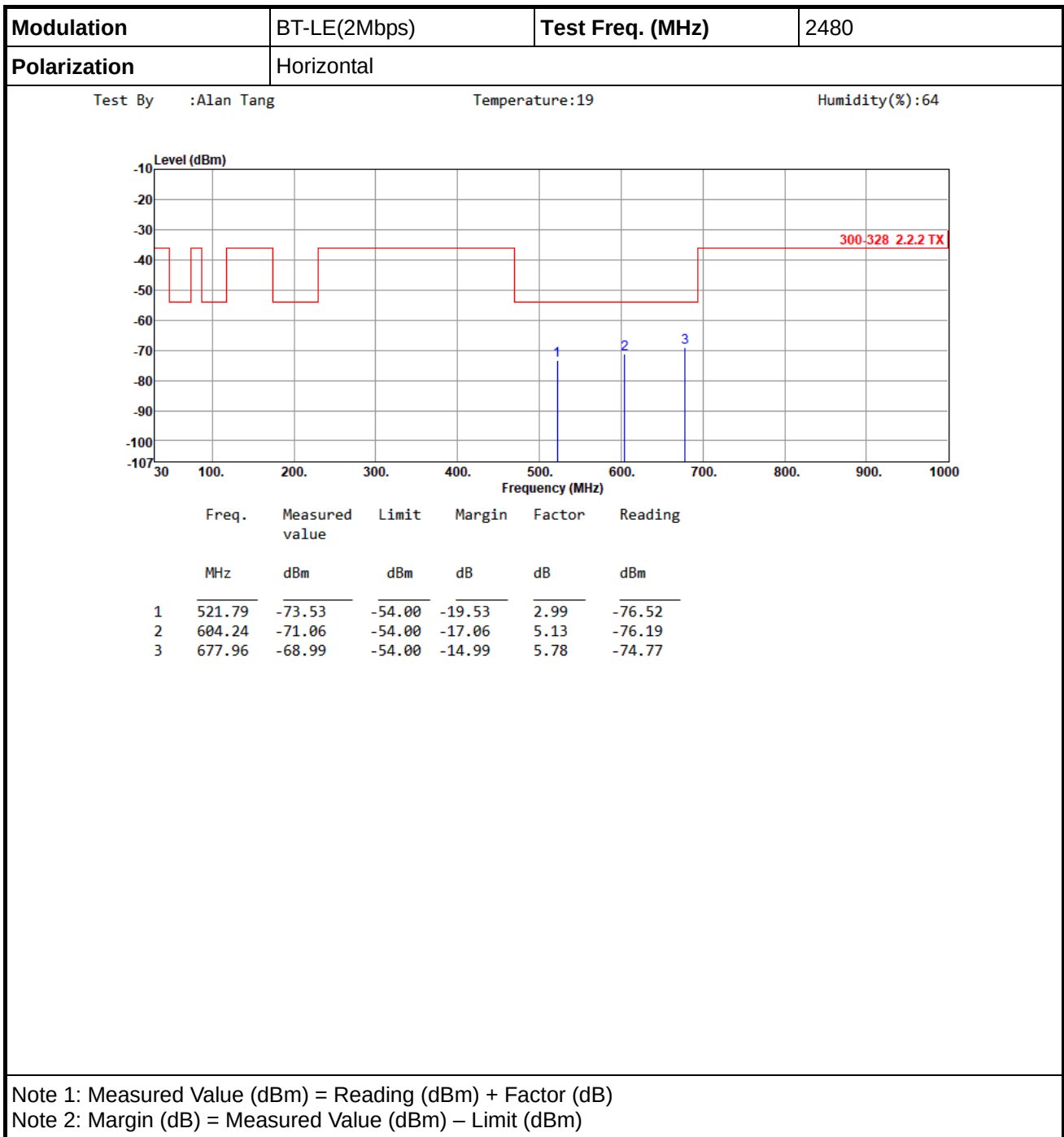
	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	523.77	-73.16	-54.00	-19.16	2.98	-76.14
2	603.47	-71.31	-54.00	-17.31	5.15	-76.46
3	656.77	-70.61	-54.00	-16.61	5.33	-75.94

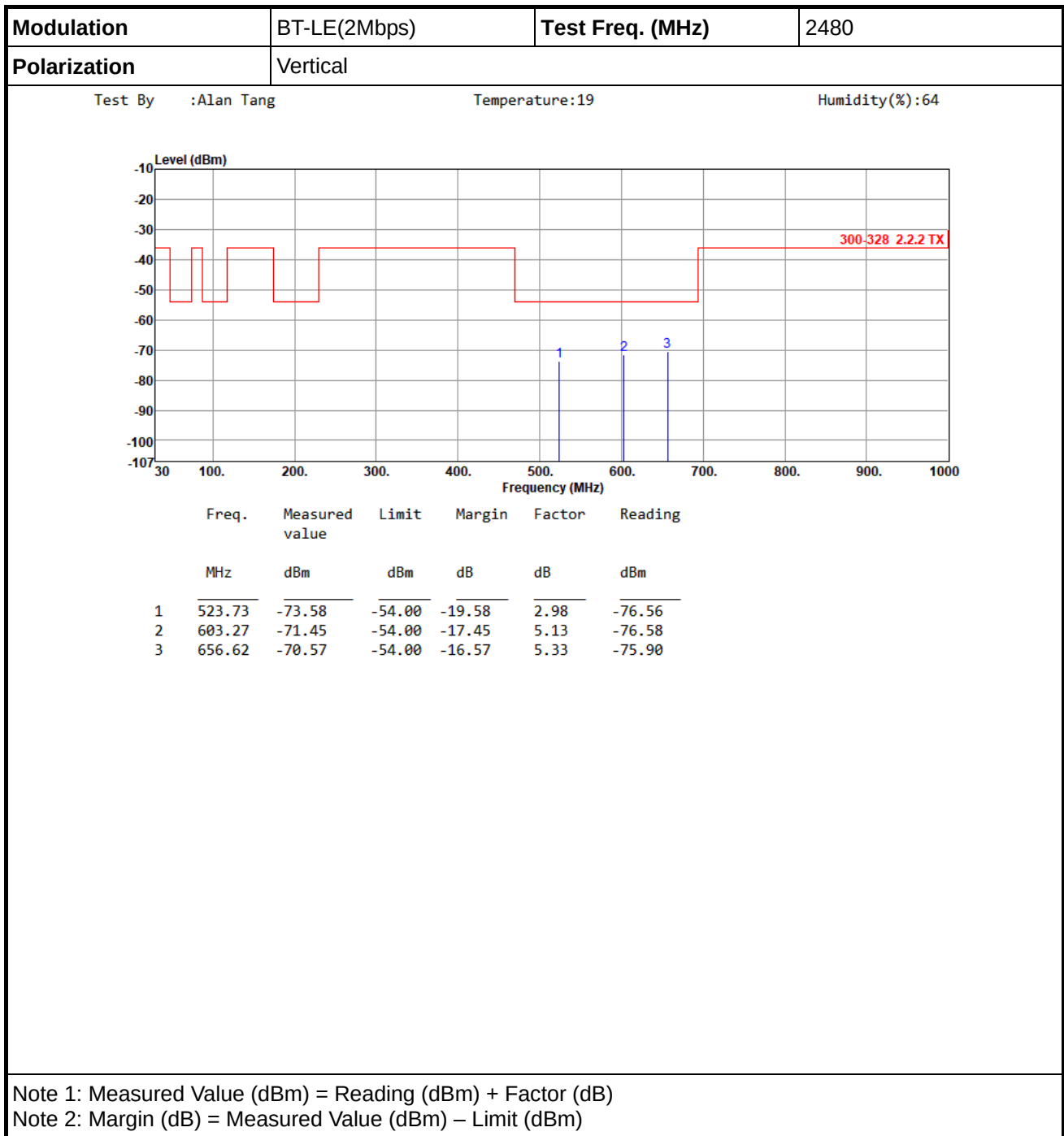
Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

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Emissions (Above 1GHz)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	4959.90	-55.78	-30.00	-25.78	9.50	-65.28
2	7440.45	-47.99	-30.00	-17.99	15.83	-63.82

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) </			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) </			



Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

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Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	4959.65	-55.87	-30.00	-25.87	9.50	-65.37
2	7440.30	-48.59	-30.00	-18.59	15.83	-64.42

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

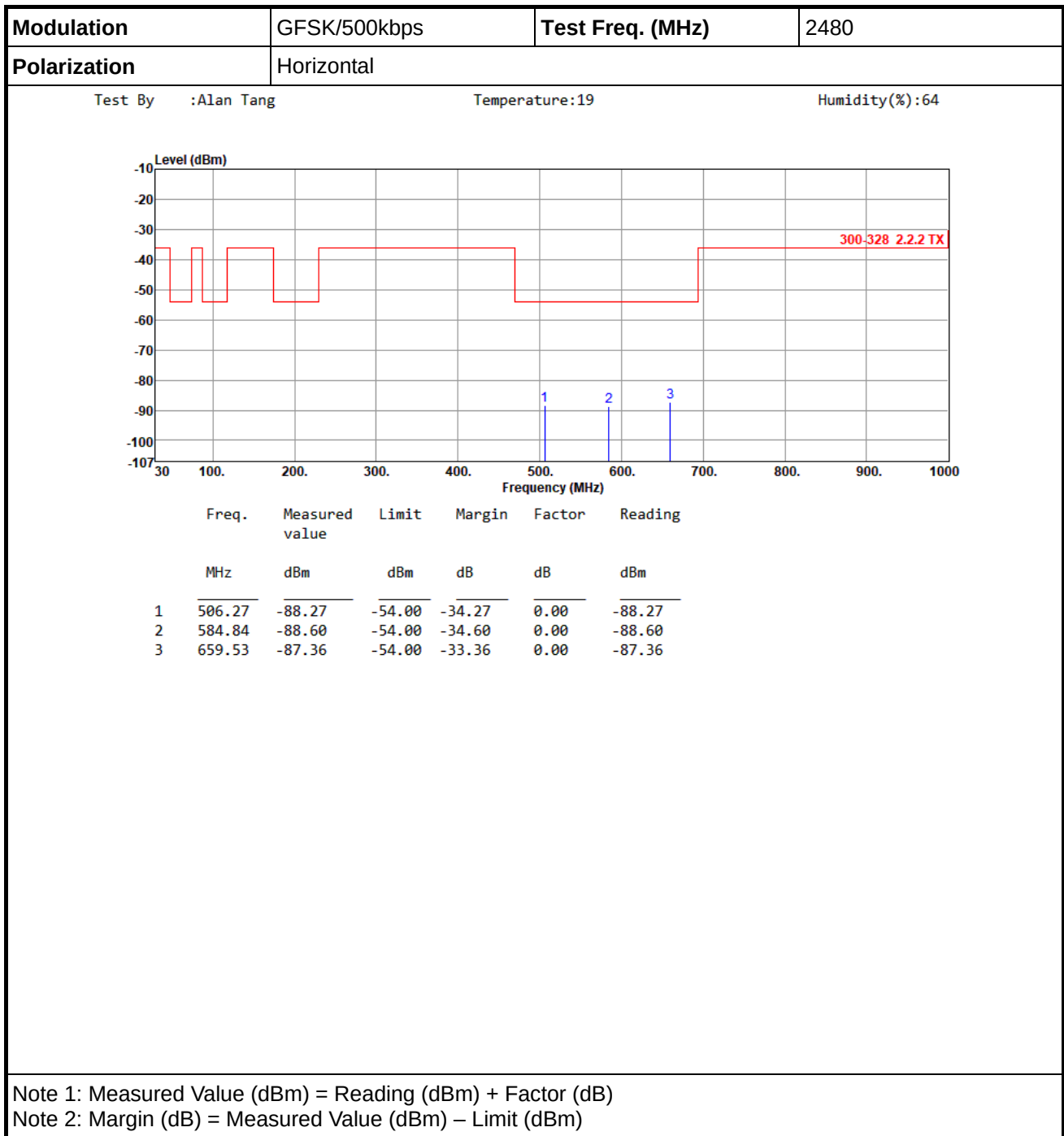
External Antenna

Transmitter Conducted Unwanted Emissions (Below 1GHz)

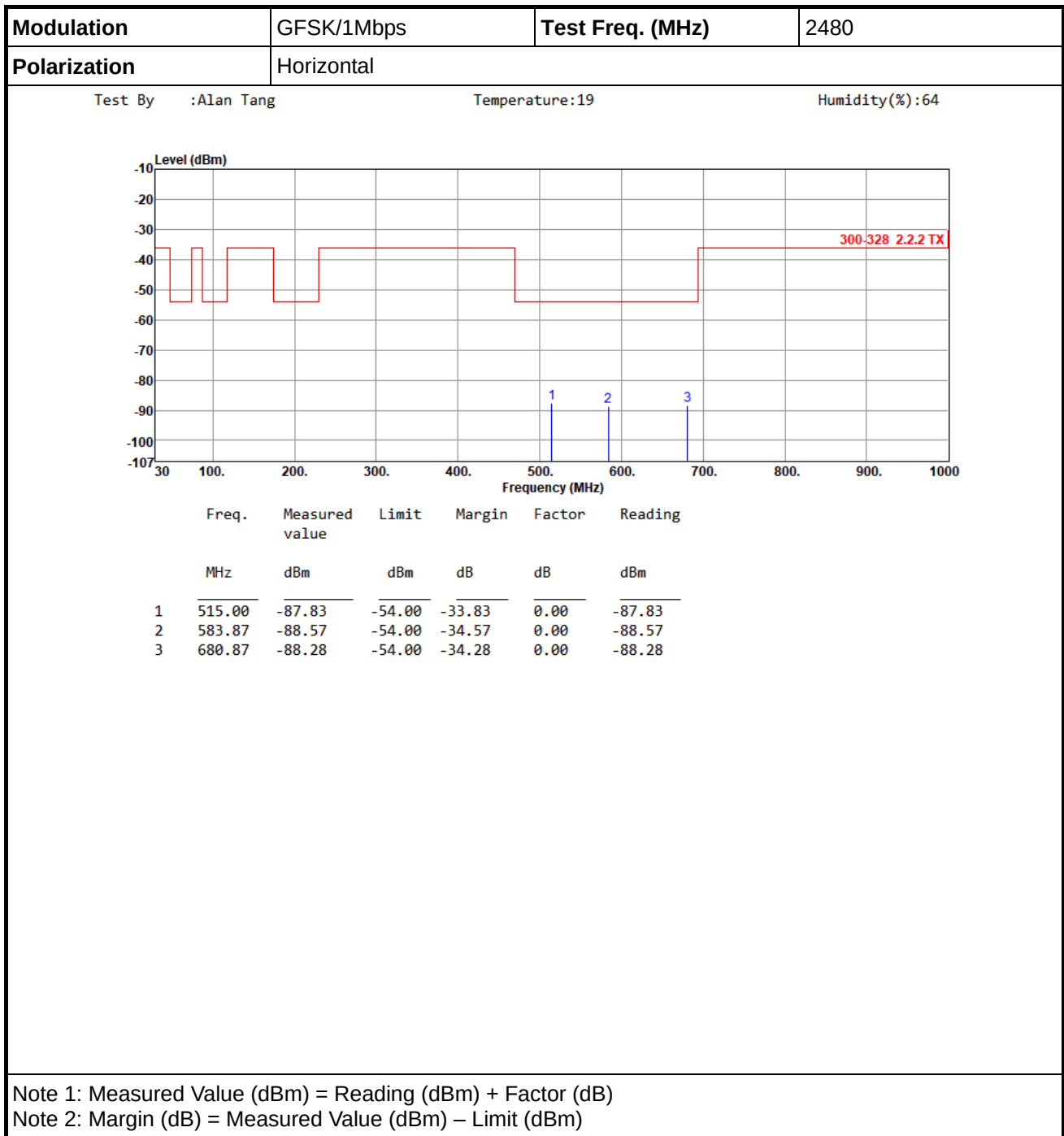
Modulation		GFSK/125kbps		Test Freq. (MHz)		2402	
Polarization		Horizontal					
Test By		:Alan Tang		Temperature:19		Humidity(%):64	
Level (dBm) <							

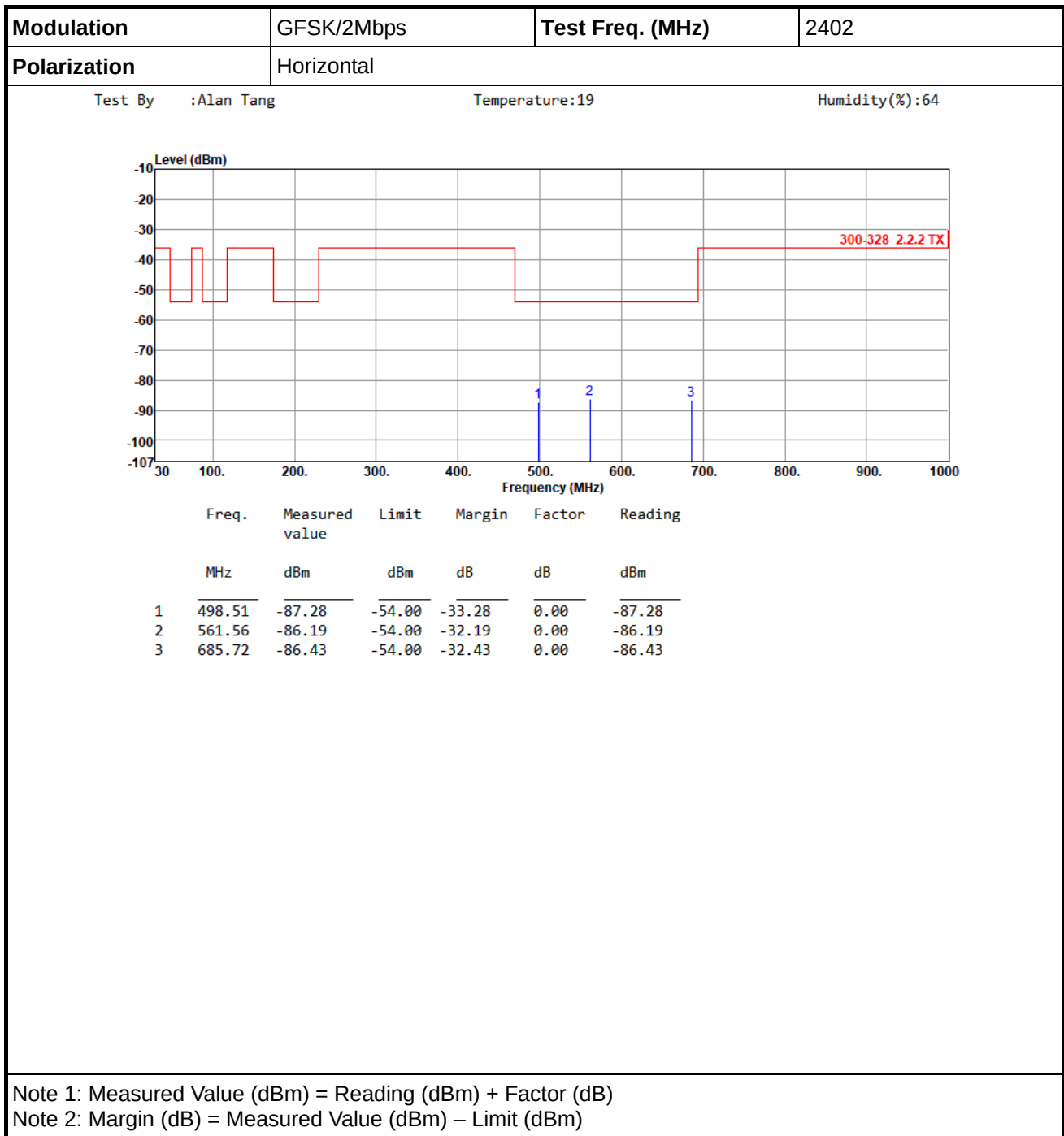
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Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			







Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Transmitter Conducted Unwanted Emissions (Above 1GHz)

Modulation	GFSK/125kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) </			



Modulation	GFSK/125kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/2Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

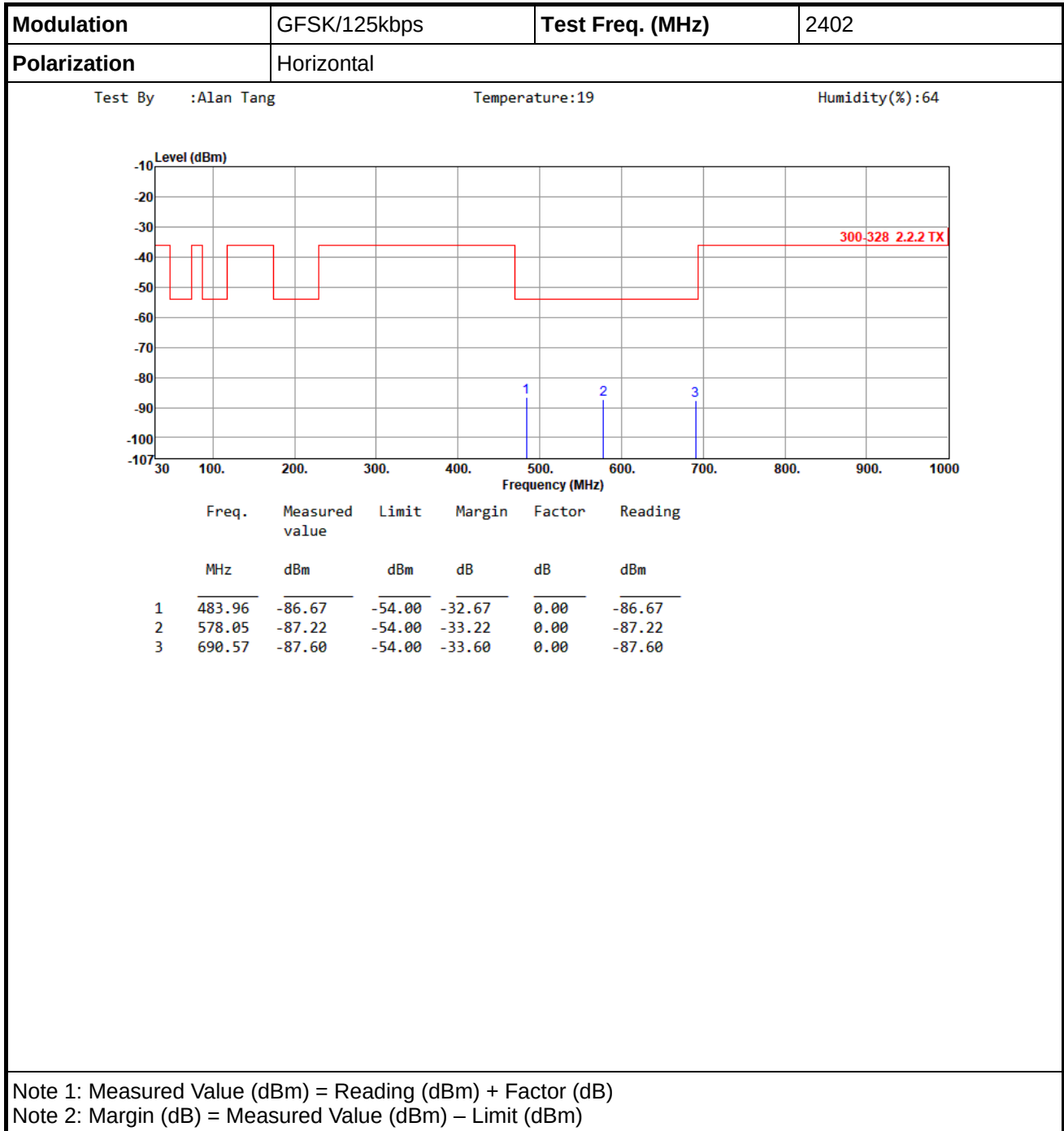


Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Internal Antenna

Transmitter Conducted Unwanted Emissions (Below 1GHz)



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Modulation	GFSK/500kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

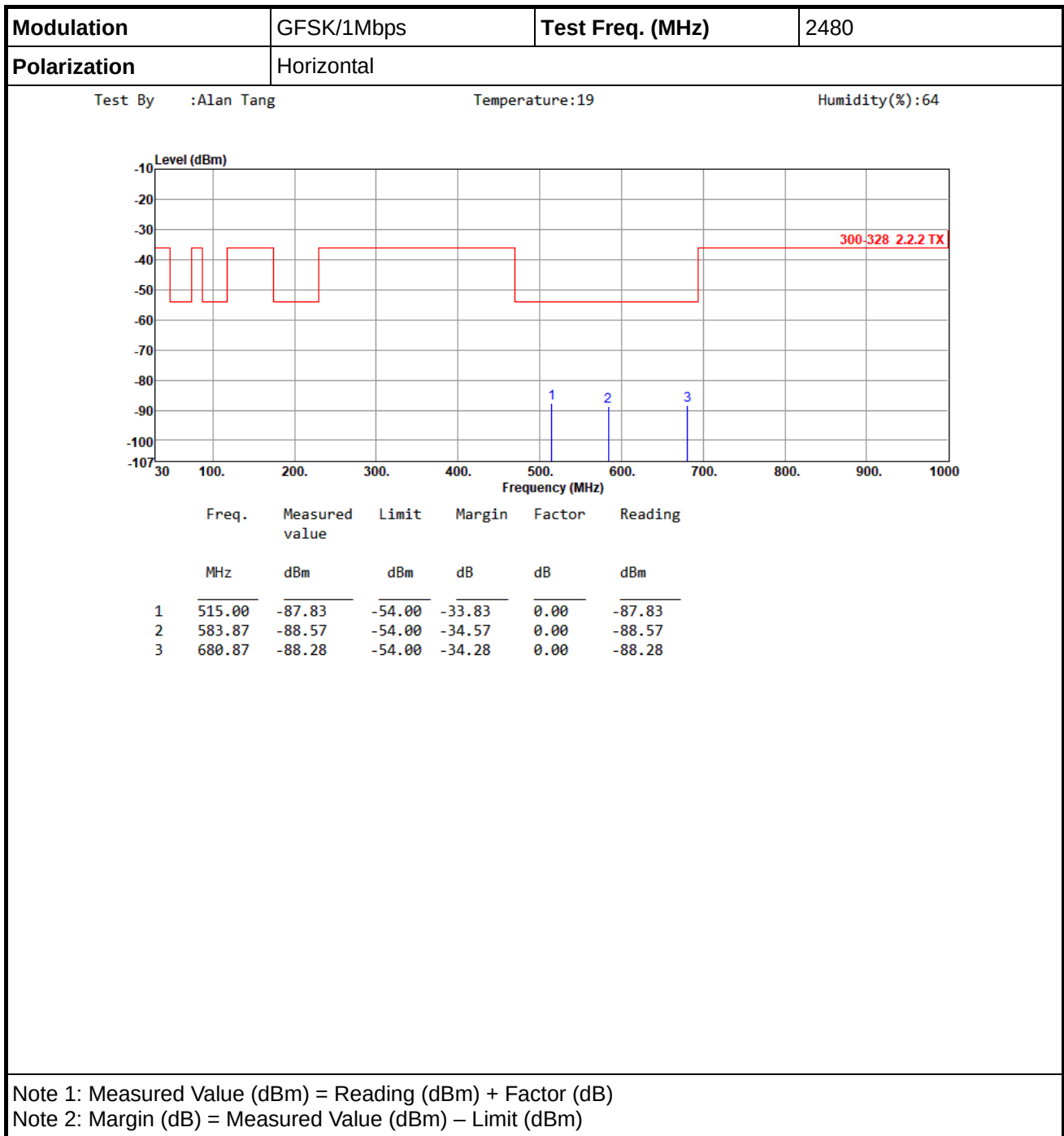
	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	470.38	-87.76	-54.00	-33.76	0.00	-87.76
2	610.06	-86.97	-54.00	-32.97	0.00	-86.97
3	683.78	-87.41	-54.00	-33.41	0.00	-87.41

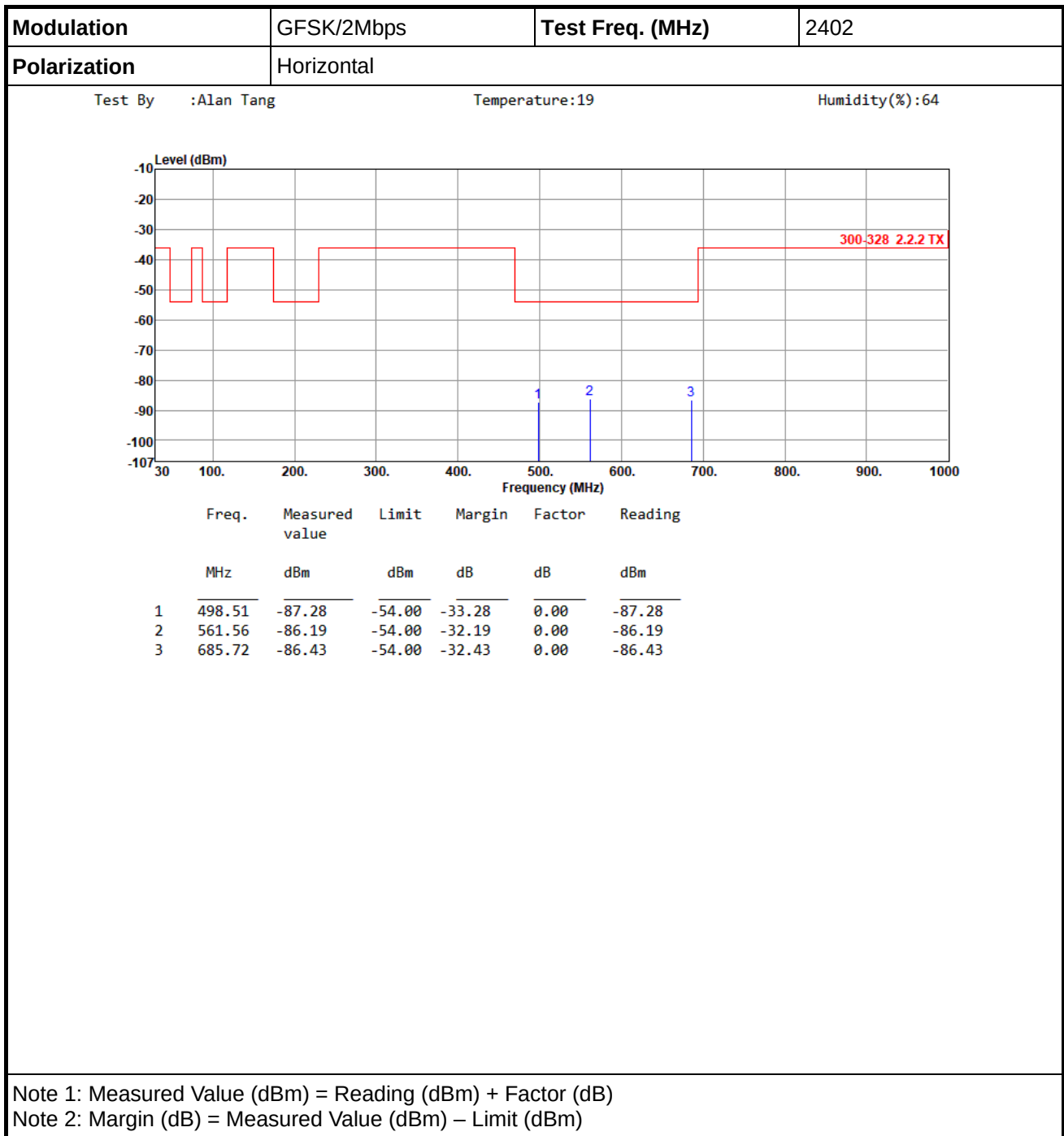
Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

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Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			







Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Transmitter Conducted Unwanted Emissions (Above 1GHz)

Modulation	GFSK/125kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/125kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	GFSK/2Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	4959.36	-72.33	-30.00	-42.33	0.00	-72.33
2	7440.02	-75.98	-30.00	-45.98	0.00	-75.98

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)



External Antenna

Emissions (Below 1GHz)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Page No. : 4 of 32

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

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Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

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Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

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Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			

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Emissions (Above 1GHz)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) </			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		

Test By :Alan Tang

Temperature:19

Humidity(%):64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	4804.04	-56.45	-47.00	-9.45	8.57	-65.02

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			



Internal Antenna

Emissions (Below 1GHz)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

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Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) </			



Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang			

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Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			



Emissions (Above 1GHz)

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(125kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			



Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	BT-LE(500kbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

Modulation	BT-LE(1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) </			

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		

Test By : Alan Tang
Temperature: 19
Humidity(%): 64

	Freq.	Measured value	Limit	Margin	Factor	Reading
	MHz	dBm	dBm	dB	dB	dBm
1	4804.04	-56.45	-47.00	-9.45	8.57	-65.02

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)

Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	BT-LE(2Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		
Test By :Alan Tang			



External Antenna

Receiver Conducted Unwanted Emissions (Below 1GHz)

Modulation		GFSK/125kbps		Test Freq. (MHz)		2402	
Polarization		Horizontal					
Test By		:Alan Tang		Temperature:19		Humidity(%):64	
Level (dBm) </							



Modulation	GFSK/125kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/2Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Receiver Conducted Unwanted Emissions (Above 1GHz)

Modulation	GFSK/125kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/125kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	GFSK/500kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



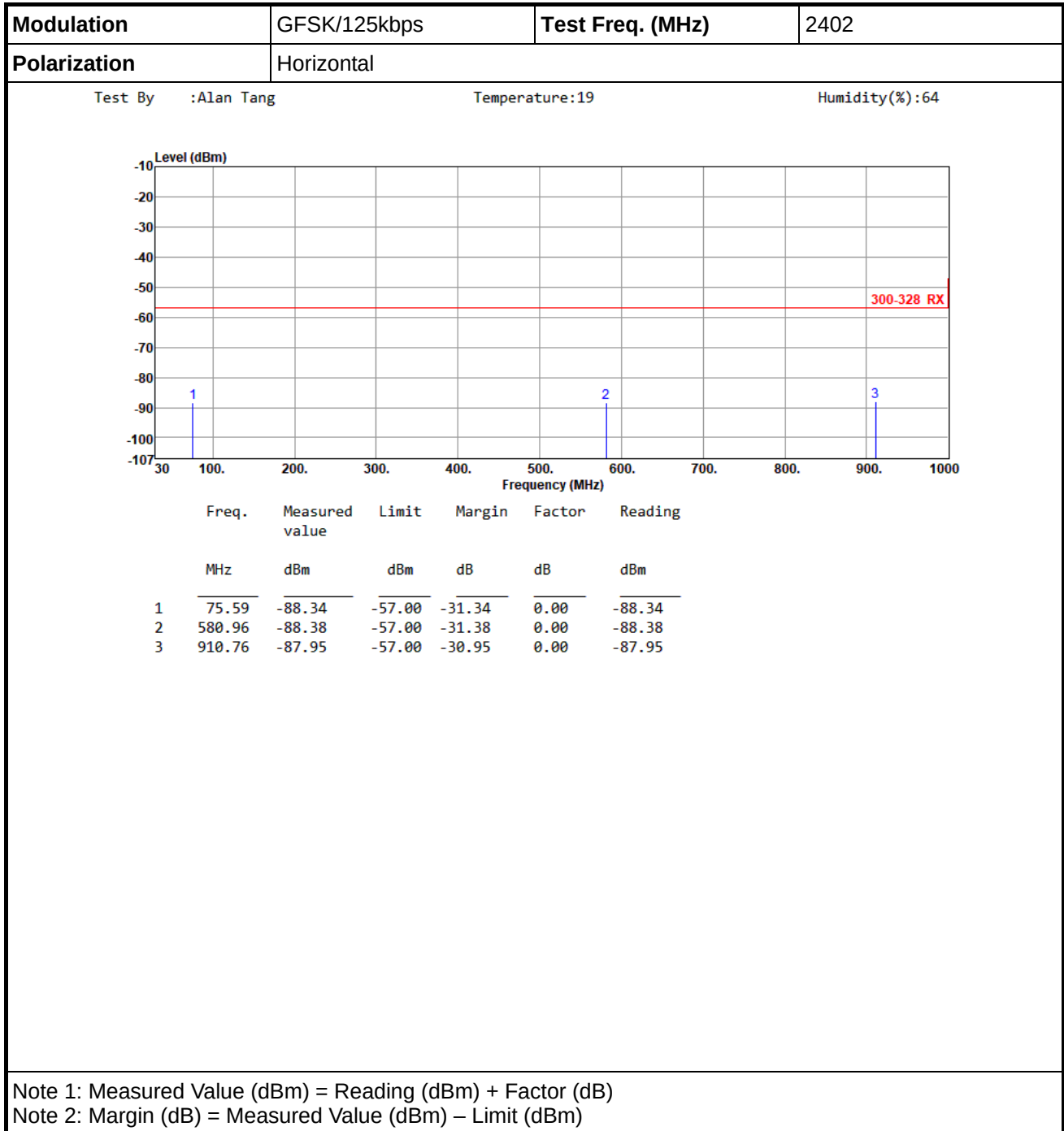
Modulation	GFSK/2Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Internal Antenna

Receiver Conducted Unwanted Emissions (Below 1GHz)





Modulation	GFSK/125kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/500kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/2Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Receiver Conducted Unwanted Emissions (Above 1GHz)

Modulation	GFSK/125kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/125kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			

Modulation	GFSK/500kbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			

Modulation	GFSK/500kbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm)			



Modulation	GFSK/1Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			



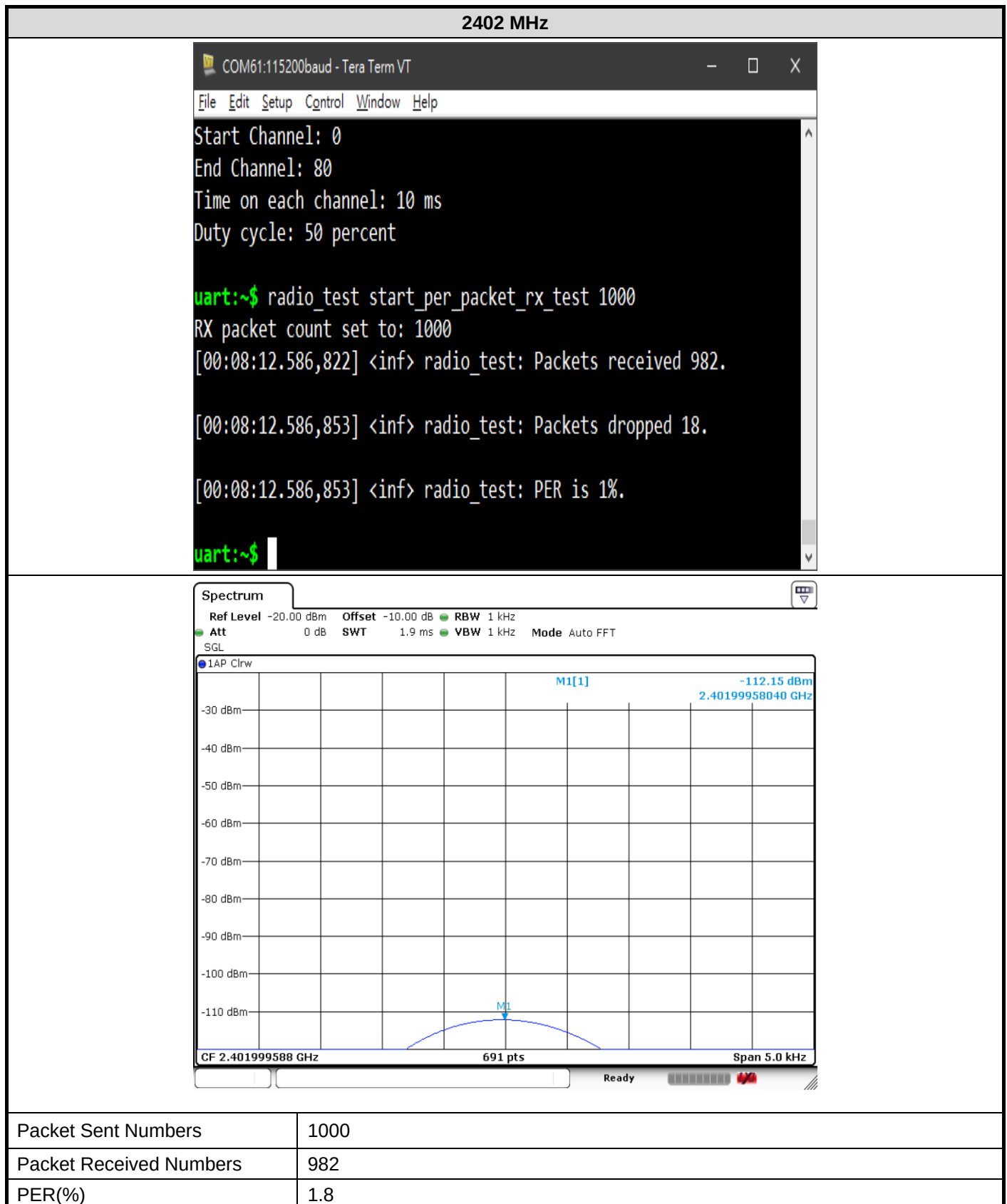
Modulation	GFSK/1Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang			



Modulation	GFSK/2Mbps	Test Freq. (MHz)	2402
Polarization	Horizontal		
Test By :Alan Tang			

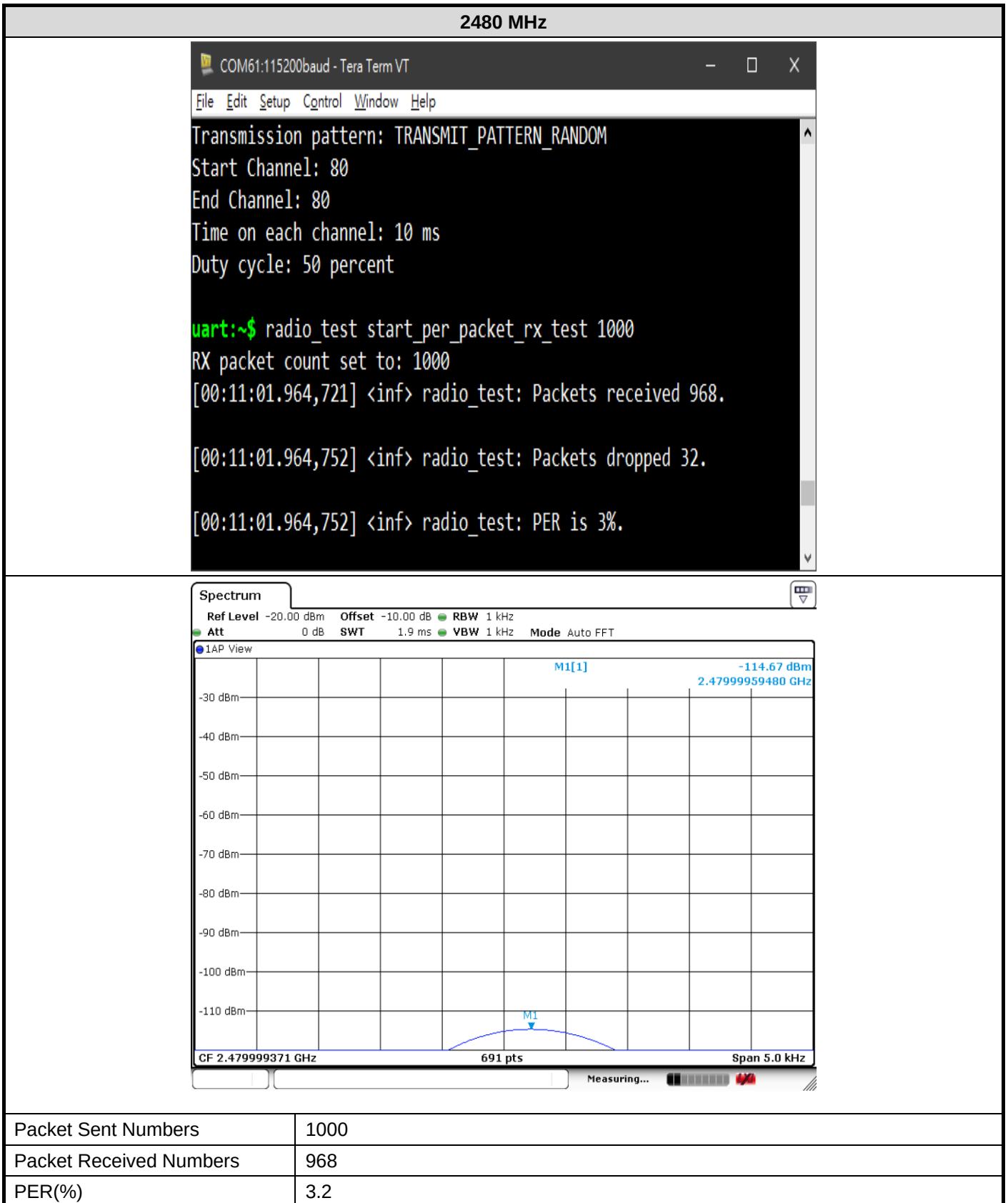
Modulation	GFSK/2Mbps	Test Freq. (MHz)	2480
Polarization	Horizontal		
Test By :Alan Tang		Temperature:19	Humidity(%):64
Level (dBm) <			

External Antenna





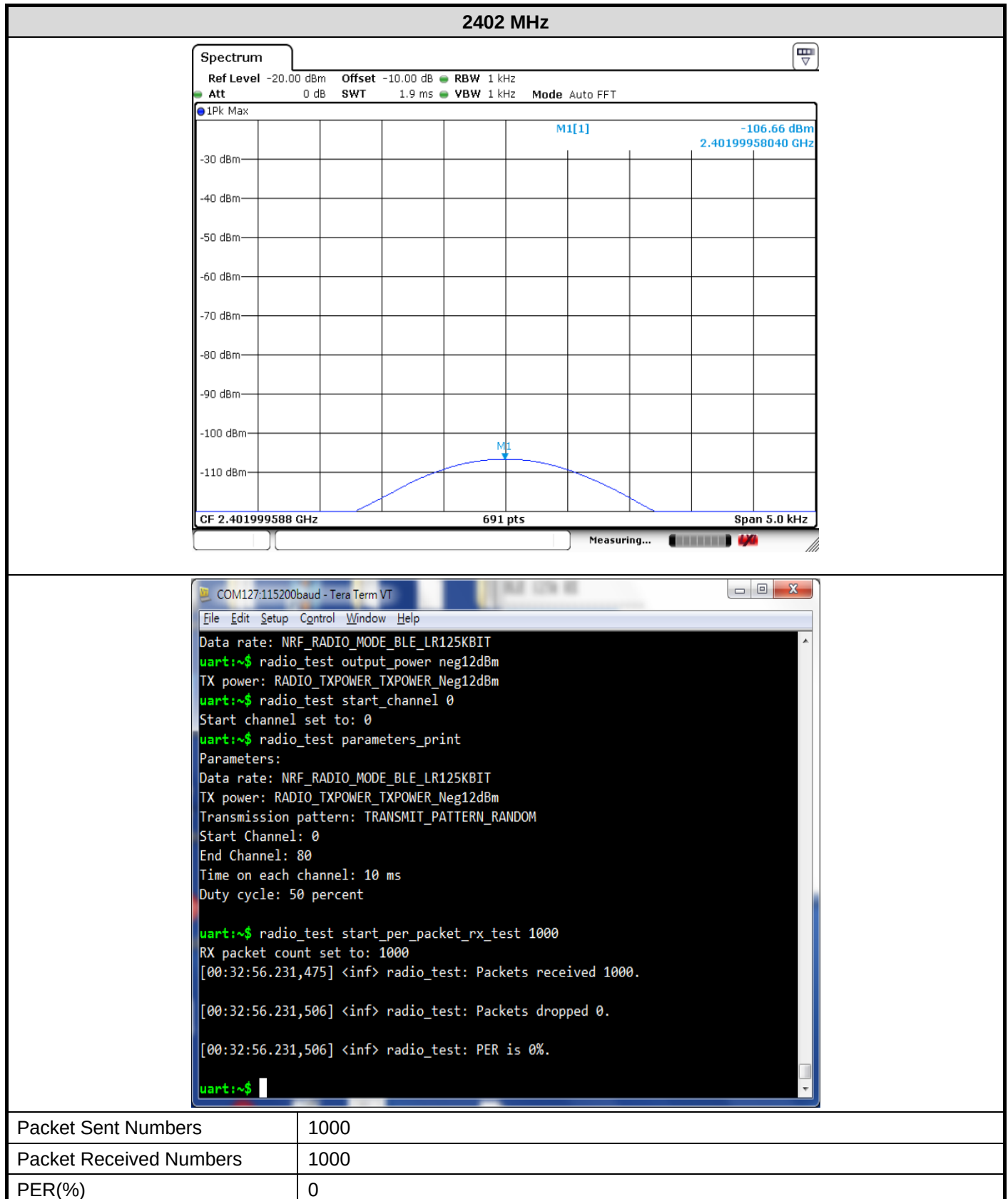
Receiver Category	2		
Performance Criteria Limit	PER ≤ 10 %		
Wanted Signal Mean Power from Companion Device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Test Result
-65.69	2380	-30.9	Pass
-65.69	2300	-30.9	Pass





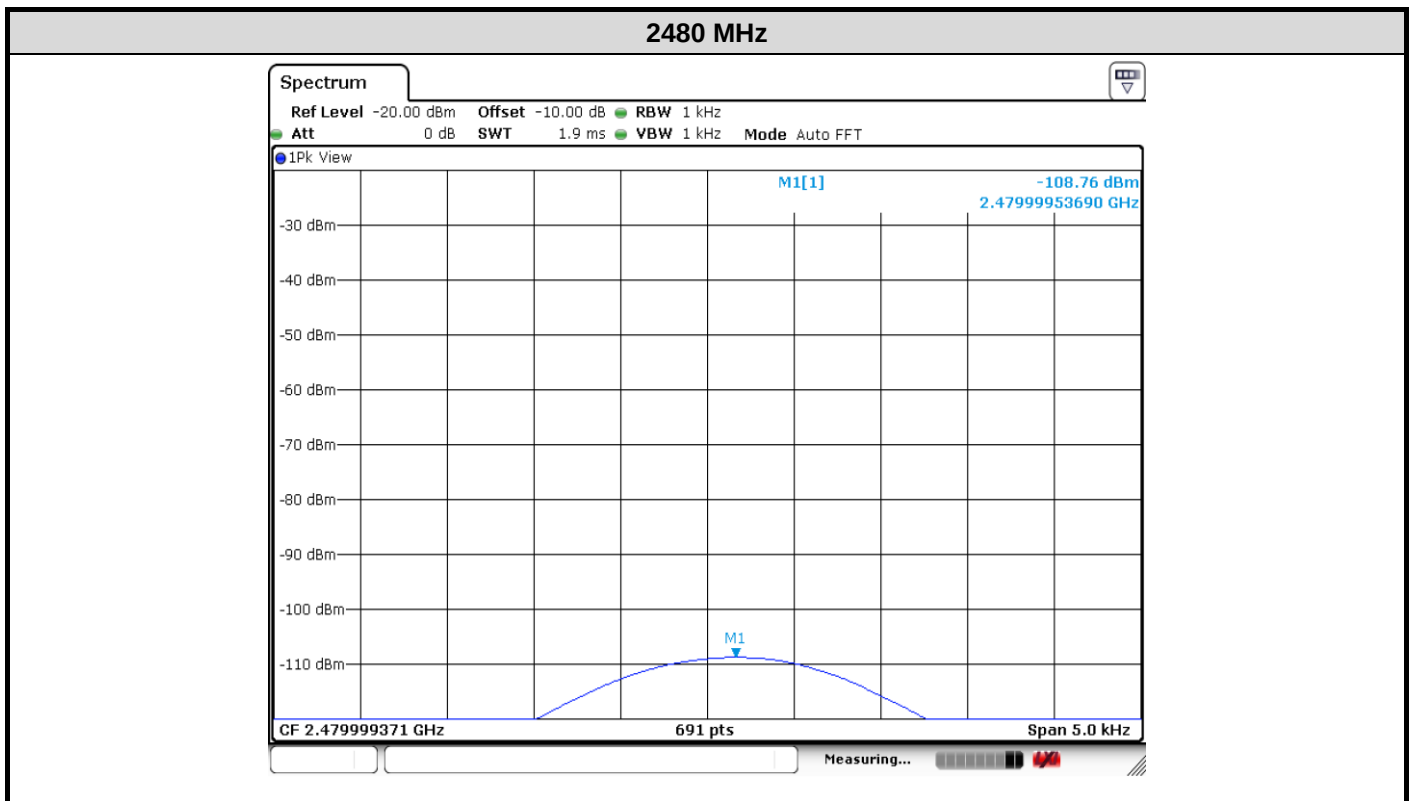
Receiver Category	2		
Performance Criteria Limit	PER ≤ 10 %		
Wanted Signal Mean Power from Companion Device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Test Result
-65.68	2504	-30.9	Pass
-65.68	2584	-30.9	Pass

Internal Antenna





Receiver Category	2		
Performance Criteria Limit	PER ≤ 10 %		
Wanted Signal Mean Power from Companion Device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Test Result
-67.29	2380	-32.51	Pass
-67.29	2300	-32.51	Pass



```
COM127:115200baud - Tera Term VT
File Edit Setup Control Window Help
uart:~$ radio_test parameters_print
Parameters:
Data rate: NRF_RADIO_MODE_BLE_LR125KBIT
TX power: RADIO_TXPOWER_TXPOWER_Neg12dBm
Transmission pattern: TRANSMIT_PATTERN_RANDOM
Start Channel: 80
End Channel: 80
Time on each channel: 10 ms
Duty cycle: 50 percent

uart:~$ radio_test start_per_packet_rx_test 1000
RX packet count set to: 1000
[00:35:17.882,446] <inf> radio_test: Packets received 971.

[00:35:17.882,476] <inf> radio_test: Packets dropped 29.

[00:35:17.882,476] <inf> radio_test: PER is 2%.

uart:~$ radio_test cancel
uart:~$ vreqctrl config Off
VREQCTRL Configured OK.

uart:~$ fem select_antenna 0
Antenna Configured OK.
```

Packet Sent Numbers	1000
Packet Received Numbers	1000
PER(%)	0



Receiver Category	2		
Performance Criteria Limit	PER ≤ 10 %		
Wanted Signal Mean Power from Companion Device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Test Result
-67.28	2504	-32.51	Pass
-67.28	2584	-32.51	Pass