
RF Test Report

Report No.: AGC04094190602EE04

PRODUCT DESIGNATION : TWS earbuds in wireless chargingcase
BRAND NAME : N/A
MODEL NAME : P329.12
APPLACANT : Xindao B.V.
DATE OF ISSUE : Jun, 26, 2019
STANDARD(S) : EN 300 328 V2.1.1 (2016-11)
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun. 26, 2019	Valid	Initial release



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1. TEST RESULT CERTIFICATION

Applicant	Xindao B.V.
Address	P.O. Box 3082, 2280 GB, Rijswijk, The Netherlands
Manufacturer	Xindao B.V.
Address	P.O. Box 3082, 2280 GB, Rijswijk, The Netherlands
Factory	Xindao B.V.
Address	P.O. Box 3082, 2280 GB, Rijswijk, The Netherlands
Product Designation	TWS earbuds in wireless chargingcase
Brand Name	N/A
Test Model	P329.12
Date of test	Jun, 12, 2019 to Jun, 26, 2019

We (AGC), Attestation of Global Compliance (Shenzhen) Co., Ltd has tested the product mentioned above in compliance with the requirements set forth in the European Standard ETSI EN 300 328 V2.1.1. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. The test results of this report relate only to the tested sample identified in this report.

Tested By



Sky Dong(Dong Huihui) Jun. 26, 2019

Reviewed By



Max Zhang(Zhang Yi) Jun. 26, 2019

Approved By



Forrest Lei(Lei Yonggang)
Authorized Officer Jun. 26, 2019



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2. TECHNICAL INFORMATION

2.1 EUT DESCRIPTION

Modulation type	FHSS
Bluetooth Version	V4.2
Modulation	GFSK, $\pi/4$ -DQPSK for BR/EDR
Receiver Category	Category 3
Hardware Version	V1.1
Software Version	V1.0
Adaptive / non-adaptive equipment	Adaptive Equipment
The number of Hopping Frequencies	79 for BR/EDR
The maximum RF Output Power (e.i.r.p.)	-9.31dBm
The different transmit operating modes	Operating mode 1: Single Antenna Equipment Equipment with only 1 antenna
Operating Frequency Range(s)	2402MHz~2480MHz
Occupied Channel Bandwidth(s)	1.203MHz
Accumulated Transmit Time	311.56ms(max)
Type of Equipment	Stand-alone
Antenna designation	PCB Antenna
Antenna gain	-5.8dBi
Nominal voltages	DC 3.7V by battery
The extreme operating conditions	Extreme test temperature: -10°C~40°C

Note:

1. The above information was declared by the applicant.
2. The equipment submitted are representative production models.
3. The EUT provides Bluetooth wireless interface operating at 2.4G ISM band (2402MHz-2480MHz). The EUT use Frequency Hopping Spread Spectrum (FHSS) modulation.



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4. Only the Bluetooth was tested according the standard requirement.
5. The EUT is an adaptive equipment and hand-portable station according to ETSI EN 300 328 V2.1.1.
6. Please refer to Appendix I for the photographs of the EUT. For more details, please refer to the User's manual of the EUT.
7. The EUT doesn't support BLE.
8. Note: The EUT comprises left and right channel headsets, both are the same and have been tested. Only the test data of right headset recorded in this report.



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2.2 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
--	--	--	--	--

2.3 DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Low channel (RX Mode)
5	Middle channel (RX Mode)
6	High channel (RX Mode)
7	Normal hopping

Note: 1. All the transmit mode would tested with each modulation (GFSK, π /4-DQPSK).
2. All modes have been tested and the worst mode test data recording in the test report, if no any other data.



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A) OBJECTIVE

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the RED Directive

B) TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 300 328 V2.1.1 (2016-11).

ETSI EN 300 328 V2.1.1 (2016-11)	Wideband transmission systems ;Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
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TEST ITEMS AND THE RESULTS ARE AS BELOW:

No	Basic Standard	Test Type	The worst case operational mode	Result
1	ETSI EN 300 328 4.3.1.2	RF Output Power	Mode 7	Pass
2	ETSI EN 300 328 4.3.1.3	Duty Cycle,Tx-sequence,Tx-gap	N/A	N/A
3	ETSI EN 300 328 4.3.1.4	Accumulated Transmit time, Frequency Occupation and hopping sequence	Mode 1/2/3/7	Pass
4	ETSI EN 300 328 4.3.1.5	Hopping Frequency Separation	Mode 7	Pass
5	ETSI EN 300 328 4.3.1.6	Medium Utilisation	N/A	N/A
6	ETSI EN 300 328 4.3.1.7	Adaptivity (Adaptive Frequency Hopping)	N/A	N/A
7	ETSI EN 300 328 4.3.1.8	Occupied Channel Bandwidth	Mode 1/3	Pass
8	ETSI EN 300 328 4.3.1.9	Transmitter unwanted emission in the out of band domain	Mode 1/3	Pass
9	ETSI EN 300 328 4.3.1.10	Transmitter unwanted emission in the Spurious domain	Mode 1/3	Pass
10	ETSI EN 300 328 4.3.1.11	Receiver Spurious emissions	Mode 4/6	Pass
11	ETSI EN 300 328 4.3.1.12	Receiver Blocking	Mode 7	Pass
12	ETSI EN 300328 4.3.1.13	Geo-location capability	N/A	N/A

Note:

1. N/A means it's not applicable to this item.
2. Owing to the maximum declared RF Output power (e.i.r.p.) less than 10 dBm, so the item 2, 5, 6 are not applicable.



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2. DETAILS OF TEST

3.1 IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Company Name:	Attestation of Global Compliance (Shenzhen) Co., Ltd.
Address:	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



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3.2 LIST OF TEST EQUIPMENTS

Description	Manufacturer	Model No.	S/N	Calibration Date	Calibration Due.
Signal Analyzer	AGILENT	N9020A	MY49100060	Nov. 09, 2018	Nov. 08, 2019
Signal Generator	AGILENT	N5182A	MY50140530	Sep. 20, 2018	Sep. 19, 2019
Signal Generator	AGILENT	E8257D	MY45141029	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54110007	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54110009	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54110014	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	AGILENT	U2021XA	MY54110012	Sep. 20, 2018	Sep. 19, 2019
USB Simultaneous Sampling Multifunction DAQ	AGILENT	U2531A	MY5211038	Sep. 20, 2018	Sep. 19, 2019
2.4 GHz Filter	MICRO-TRONICS	BRM50702	017	Sep. 20, 2018	Sep. 19, 2019
Spectrum Analyzer	AGILENT	E4440A	US41421290	July 13, 2018	July. 12, 2019
Wideband Frequency Antenna	SCHWARZBECK	VULB9168	VULB9168-494	Mar. 13, 2018	Mar. 12, 2020
Horn Antenna	EM	EM-AH-10180	67	Mar. 01, 2018	Feb. 28, 2020
Amplifier	EM	EM30180	060552	Feb. 27, 2019	Feb. 26, 2020
Bluetooth Tester	R&S	CMW270	1201.0002K75-100528-Tu WIRELESSCO NN.TESTER	Oct.10, 2018	Oct. 09, 2019
Signal generator	R&S	SMBV100A	ST113247Z	Oct.10, 2018	Oct. 09, 2019
Attenuator	Warriors	W13	11324	N/A	N/A
Power splitter	Mini-Circuits	ZFRSC-183-S	3122	N/A	N/A
Small environmental tester	ESPEC	SH-242	--	Mar.02, 2018	Mar. 01, 2020



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3.3 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

- Normal Temperature: 15-35°C
- Extreme Temperature: -10-40°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3.4 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Radio Frequency, $U_c = \pm 1 \times 10^{-5}$
- Uncertainty of total RF power, conducted, $U_c = \pm 1.5\text{dB}$
- Uncertainty of RF power density, conducted, $U_c = \pm 3\text{dB}$
- Uncertainty of spurious emissions, conducted, $U_c = \pm 3\text{dB}$
- Uncertainty of all emissions, radiated, $U_c = \pm 6\text{dB}$
- Uncertainty of Temperature: $\pm 1^\circ \text{C}$
- Uncertainty of Humidity: $\pm 5\%$
- Uncertainty of DC and low frequency voltages: $\pm 3\%$



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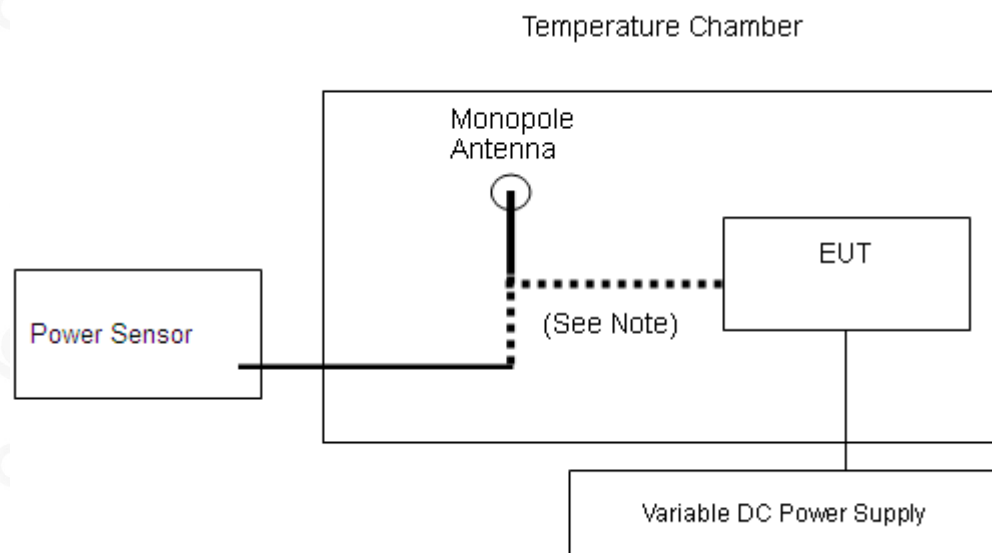
4. ETSI EN 300 328 REQUIREMENTS

4.1 RF OUTPUT POWER

EN 300 328 Clause 4.3.1.2

The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20 dBm. The maximum RF output power for non-adaptive Frequency Hopping equipment shall be declared by the supplier. See clause 5.3.1 m). The maximum RF output power for this equipment shall be equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.

Test Configuration



Remarks:

EUT was direct connected to test equipment through coupling device.

TEST PROCEDURE

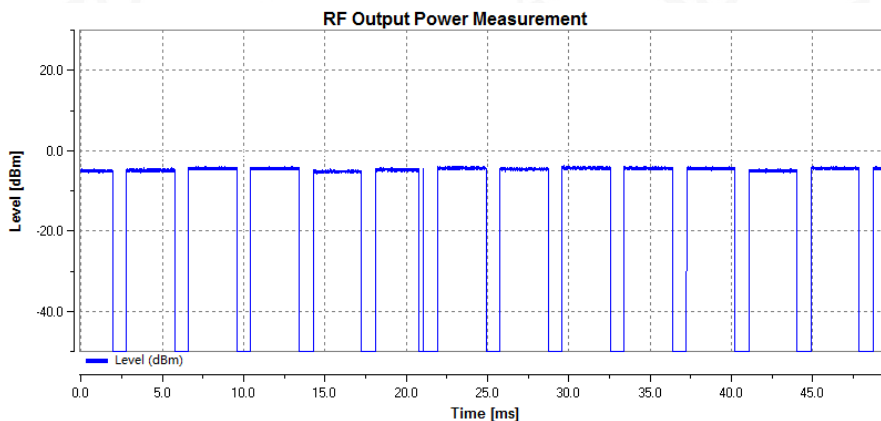
1. Please refer to ETSI EN 300 328 (V2.1.1) clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) clause 5.4.2 for the measurement method.

TEST RESULTS

Temperature:	25°C	Tested by:	Sky
Humidity:	55 % RH	Detector:	RMS
Number of Burst	>= 10		
Measurement Time	= 45.48ms		

TEST CONDITIONS	GFSK MODULATION RF OUTPUT POWER (dBm)		
	Temp (25)°C	Temp (-10)°C	Temp (40)°C
Result	DC 3.7V	DC 3.7V	DC 3.7V
Normal Hopping	-9.47	-9.50	-9.53
Limit	20dBm		

NORMAL TEMPERATURE NORMAL VOLTAGE



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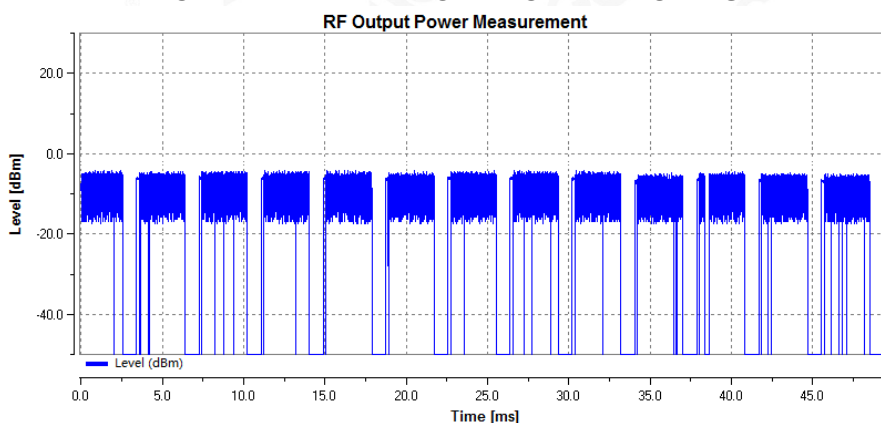
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TEST CONDITIONS	II/4-DQPSK MODULATION RF OUTPUT POWER (dBm)		
	Temp (25)°C	Temp (-10)°C	Temp (40)°C
Result	DC 3.7V	DC 3.7V	DC 3.7V
Normal Hopping	-9.31	-9.35	-9.38
Limit	20dBm		

NORMAL TEMPERATURE NORMAL VOLTAGE



Note: Result=Reading+ Ant. Gain

Conclusion: PASS



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4.2 ACCUMULATED TRANSMIT TIME, FREQUENCY OCCUPATION AND HOPPING SEQUENCE

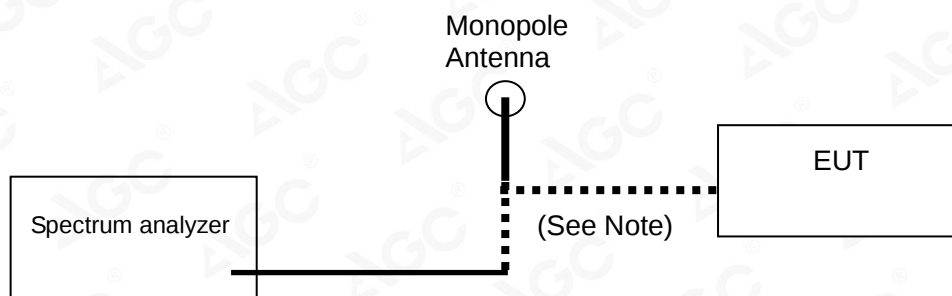
ETSI EN 300 328 SUBCLAUSE 4.3.1.4 HOPPING SEQUENCE

ACCUMULATED TRANSMIT TIME	
CONDITION	LIMIT
☐ Non-adaptive frequency hopping systems	≤ 15 ms
☒ Adaptive frequency hopping systems	≤ 400 ms

FREQUENCY OCCUPATION	
CONDITION	LIMIT
☐ Non-adaptive frequency hopping systems	Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use.
☒ Adaptive frequency hopping systems	

HOPPING SEQUENCE(S)	
CONDITION	LIMIT
☐ Non-adaptive frequency hopping systems	≥ 15 hopping frequencies or 15/minimum Hopping Frequency Separation in MHz , whichever is the greater.
☒ Adaptive frequency hopping systems	Operating frequency band ≥ 58.45 MHz (Operating over a minimum of 70 % of the operating in the band 2,4 GHz to 2,4835 GHz)
	≥ 15 hopping frequencies or 15/minimum Hopping Frequency Separation in MHz , whichever is the greater.

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN300328 V2.1.1 Section 5.4.4



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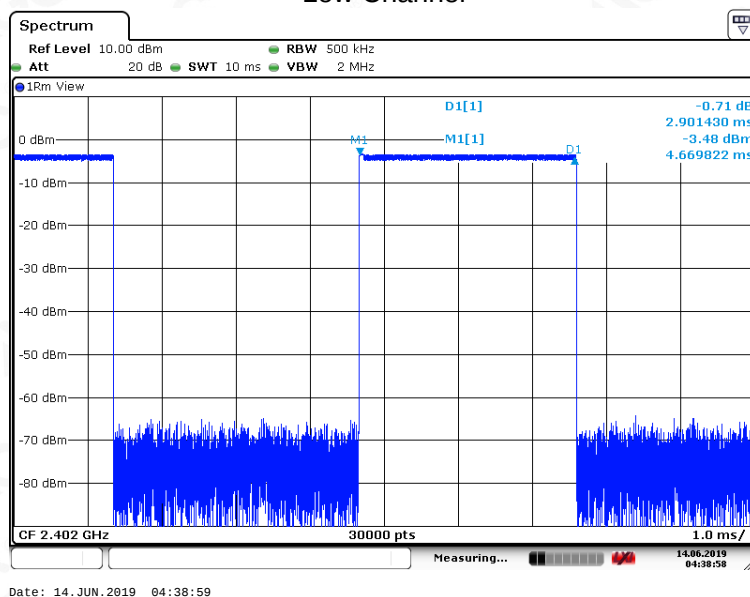
Service Hotline: 400 089 2118

TEST RESULT (Accumulated Transmit Time)

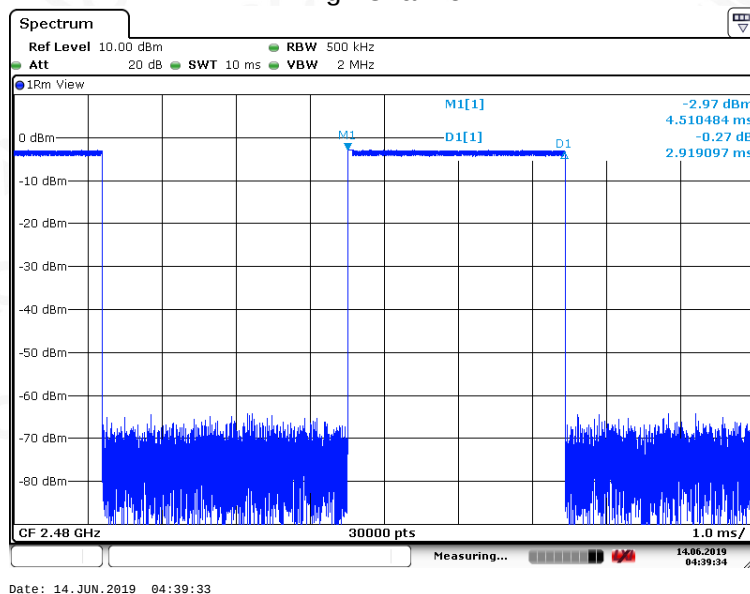
Bluetooth 1Mbps (DH5) Test Result

Channel	Pulse time(ms)	Accumulated Transmit Time (ms)	Limit (ms)
Low	2.901	309.54	400
High	2.919	311.46	400

Low Channel



High Channel



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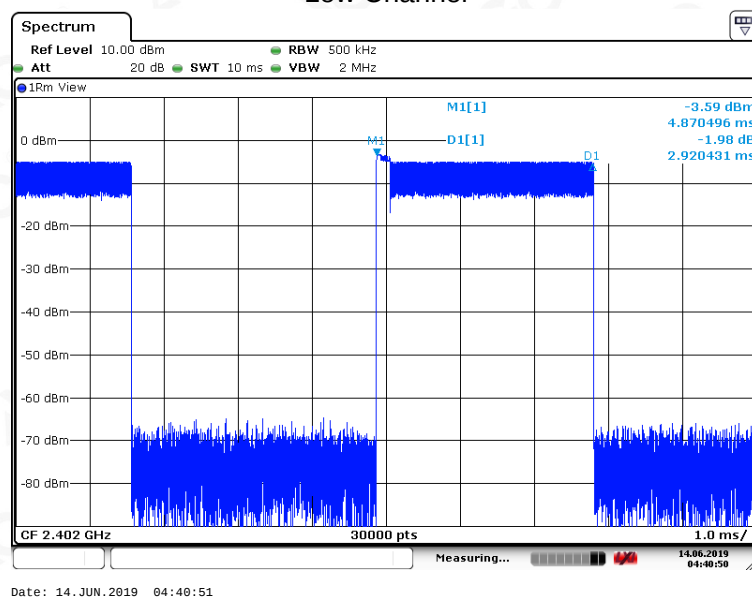
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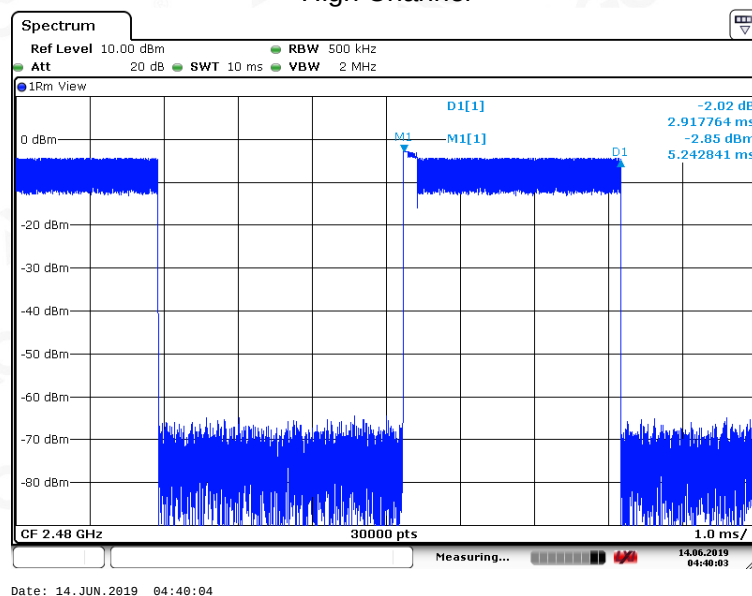
Bluetooth 2Mbps(DH5) Test Result

Channel	Pulse time(ms)	Accumulated Transmit Time (ms)	Limit (ms)
Low	2.920	311.56	400
High	2.917	311.24	400

Low Channel



High Channel



Note: Accumulated Transmit Time=pulse time*hopping numbers,
Hopping numbers={1000/[(0.625*time slot+0.625)*79]}*31.6
Time slot(DH1,DH3,DH5)



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TEST RESULT FOR HOPPING SEQUENCE

Channel	Frequency (GHz)	Channel	Frequency (GHz)
00	2.40202	41	2.44302
01	2.40302	42	2.44402
02	2.40402	43	2.44502
03	2.40502	44	2.44602
04	2.40602	45	2.44702
05	2.40702	46	2.44802
06	2.40802	47	2.44902
07	2.40902	48	2.45002
08	2.41002	49	2.45102
09	2.41102	50	2.45202
10	2.41202	51	2.45302
11	2.41302	52	2.45402
12	2.41402	53	2.45502
13	2.41502	54	2.45602
14	2.41602	55	2.45702
15	2.41702	56	2.45802
16	2.41802	57	2.45902
17	2.41902	58	2.46002
18	2.42002	59	2.46102
19	2.42102	60	2.46202
20	2.42202	61	2.46302
21	2.42302	62	2.46402
22	2.42402	63	2.46502
23	2.42502	64	2.46602
24	2.42602	65	2.46702
25	2.42702	66	2.46802
26	2.42802	67	2.46902
27	2.42902	68	2.47002
28	2.43002	69	2.47102
29	2.43102	70	2.47202
30	2.43202	71	2.47302
31	2.43302	72	2.47402
32	2.43402	73	2.47502
33	2.43502	74	2.47602
34	2.43602	75	2.47702
35	2.43702	76	2.47802
36	2.43802	77	2.47902
37	2.43902	78	2.48002
38	2.44002		
39	2.44102		
40	2.44202		



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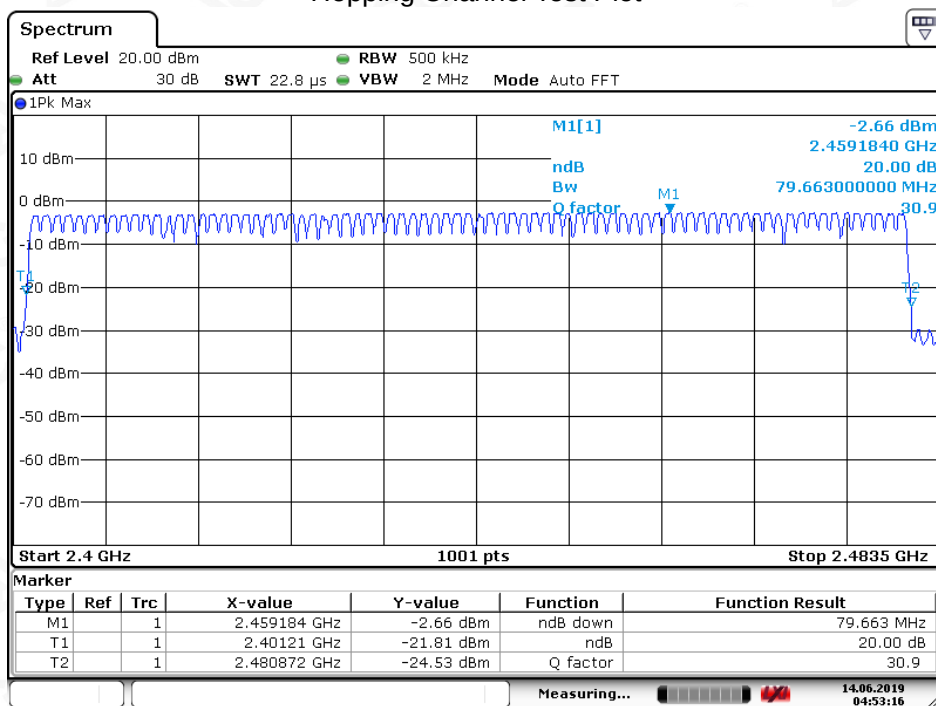
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Hopping Channel Test Plot



Date: 14.JUN.2019 04:53:15

Note: The test data has 79 channels.



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TEST RESULT FOR FREQUENCY OCCUPATION

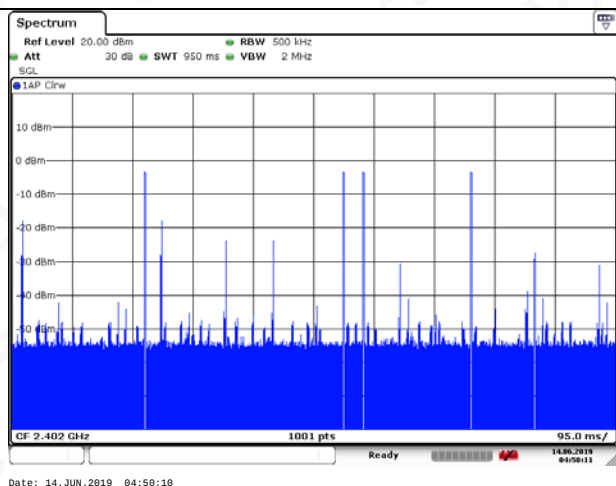
Test Result

Channel	Modulation	Frequency occupation (pcs)	Limit (pcs)	Result
LCH	GFSK	4	≥1	Pass
	$\pi/4$ -DQPSK	4		Pass
HCH	GFSK	4		Pass
	$\pi/4$ -DQPSK	4		Pass

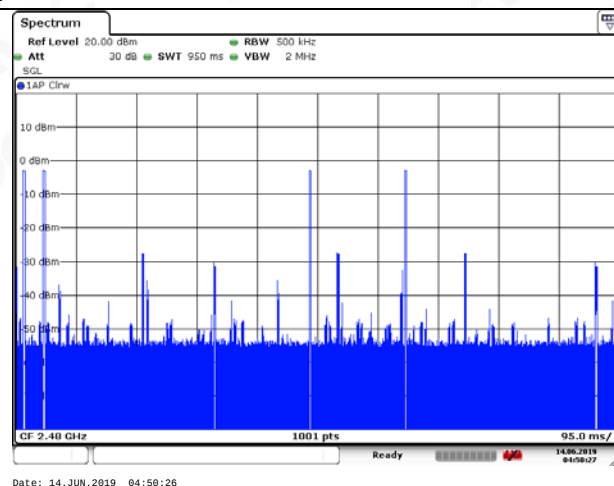
Test Graphs

☐ Minimum Frequency Occupation

GFSK

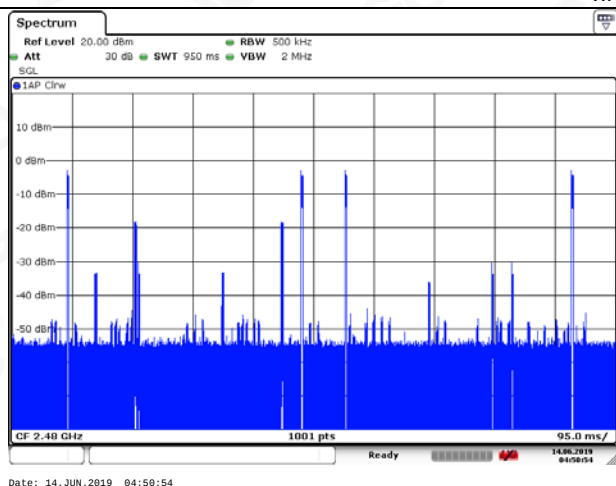


CH00

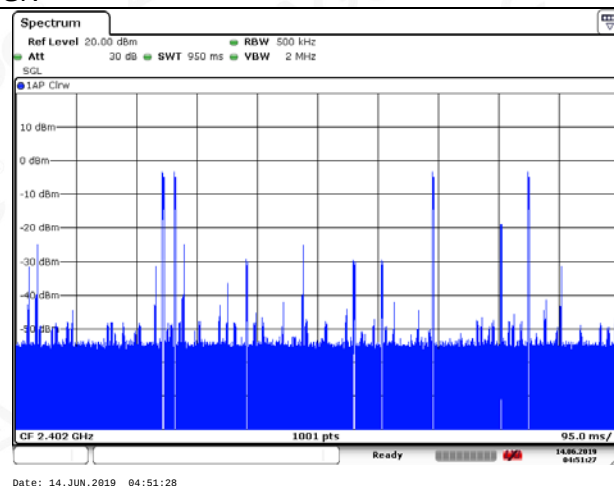


CH78

$\pi/4$ -DQPSK



CH00



CH78

Note: pcs means the number of hopping sequence.



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4.3 HOPPING FREQUENCY SEPARATION

ETSI EN 300 328 SUBCLAUSE 4.3.1.5

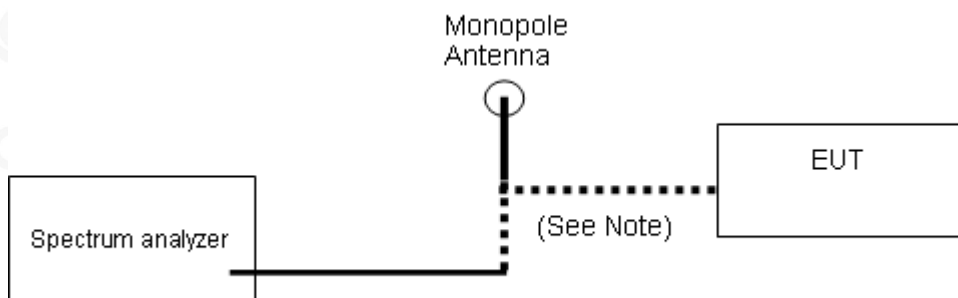
For Non-adaptive frequency hopping systems:

For non-adaptive Frequency Hopping equipment, the Hopping Frequency Separation shall be equal or greater than the Occupied Channel Bandwidth (see clause 4.3.1.8), with a minimum separation of 100 kHz.

For Adaptive frequency hopping systems:

The minimum Hopping Frequency Separation shall be 100 kHz.

CONFIGURATION

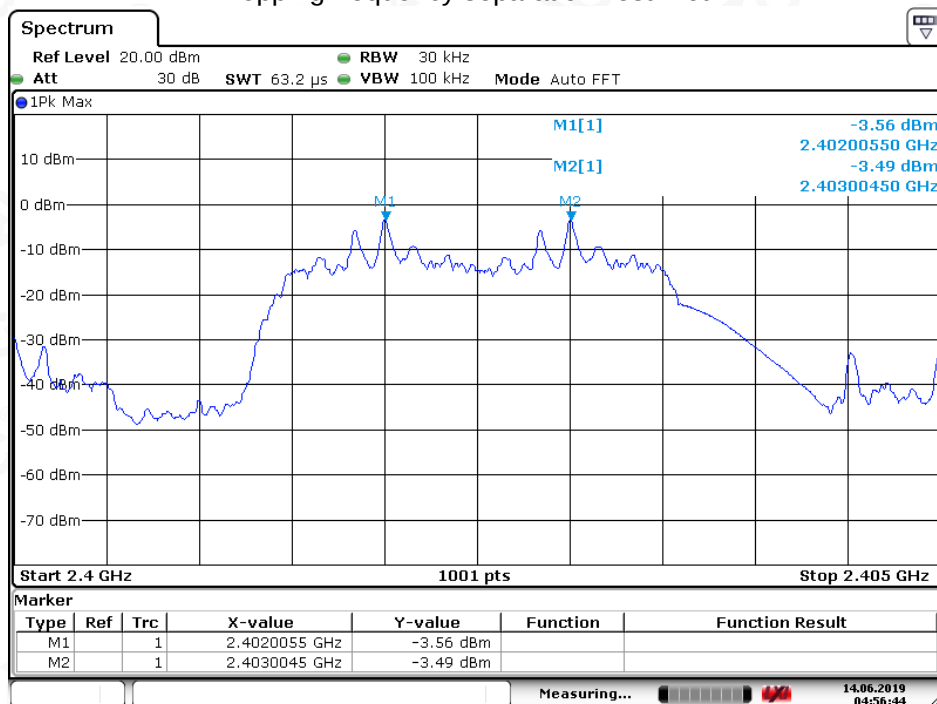


TEST PROCEDURE

Test Procedure please refer to clause 5.4.5

TEST RESULT

Hopping frequency separation Test Plot-1



Date: 14. JUN. 2019 04:56:43

Hopping Frequency Separation (F_{HS}) = $F_{2C} - F_{1C} = 0.999\text{MHz}$

Note: The modulation used during test is $\pi/4$ -DQPSK and this is the worst case.

Conclusion: PASS



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Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

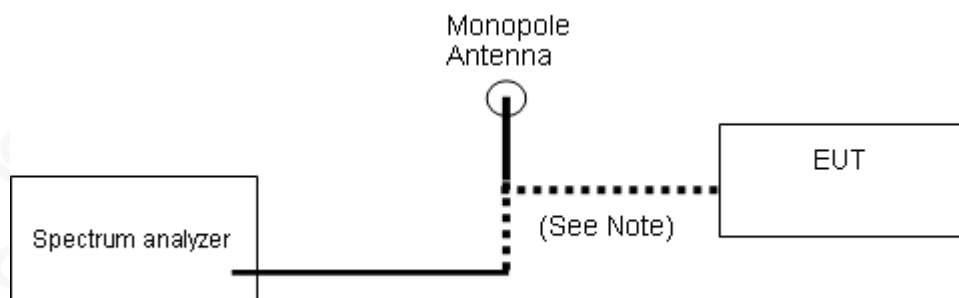
Service Hotline: 400 089 2118

4.4 OCCUPIED CHANNEL BANDWIDTH

EN300328 4.3.1.8 OCCUPIED CHANNEL BANDWIDTH

The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal.

CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.1.1) clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) clause 5.4.7 the measurement method.
3. The Test equipment information as following
Centre frequency: 2402MHz,2480MHz
Resolution bandwidth: 20kHz
Video bandwidth: 62kHz
Detector mode :RMS
Trace mode :Max Hold

TEST RESULT

TEST ITEM	OCCUPIED CHANNEL BANDWIDTH
TEST MODE	GFSK MOUDULATION

MEASUREMENT RESULT		
Test Data (MHz)		Criteria
Low Channel	0.887	PASS
High Channel	0.871	PASS



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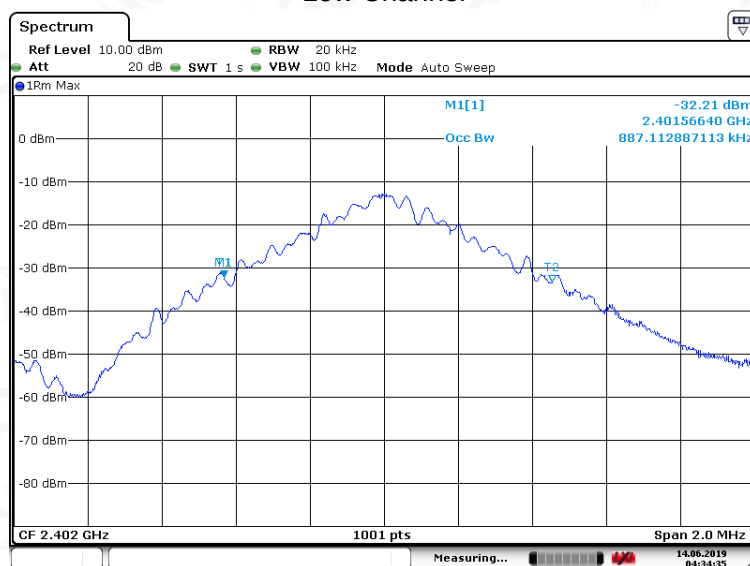
Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu,
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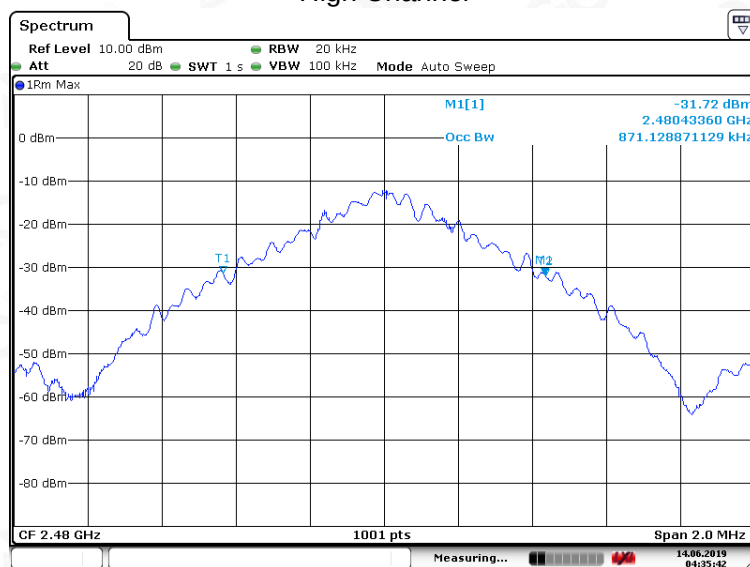
Service Hotline:400 089 2118

Low Channel



Date: 14. JUN. 2019 04:34:35

High Channel



Date: 14. JUN. 2019 04:35:42



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Tel: +86-755 2523 4088

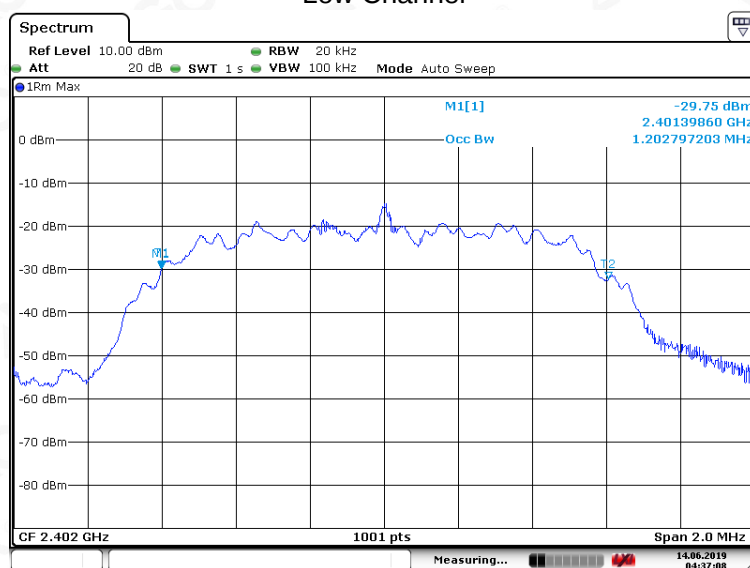
E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

TEST ITEM	OCCUPIED CHANNEL BANDWIDTH
TEST MODE	Π/4-DQPSK MODULATION

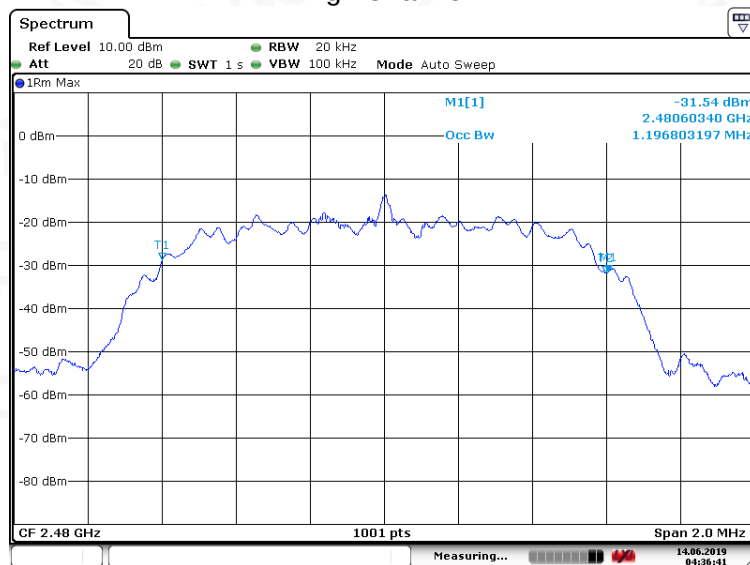
MEASUREMENT RESULT		
Test Data (MHz)		Criteria
Low Channel	1.203	PASS
High Channel	1.197	PASS

Low Channel



Date: 14. JUN. 2019 04:37:08

High Channel



Date: 14. JUN. 2019 04:36:40



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4.5 TRANSMITTER UNWANTED EMISSIONS IN THE OUT OF BAND DOMAIN

EN300328 4.3.1.9 TRANSMITTER UNWANTED EMISSIONS IN THE OUT OF BAND DOMAIN

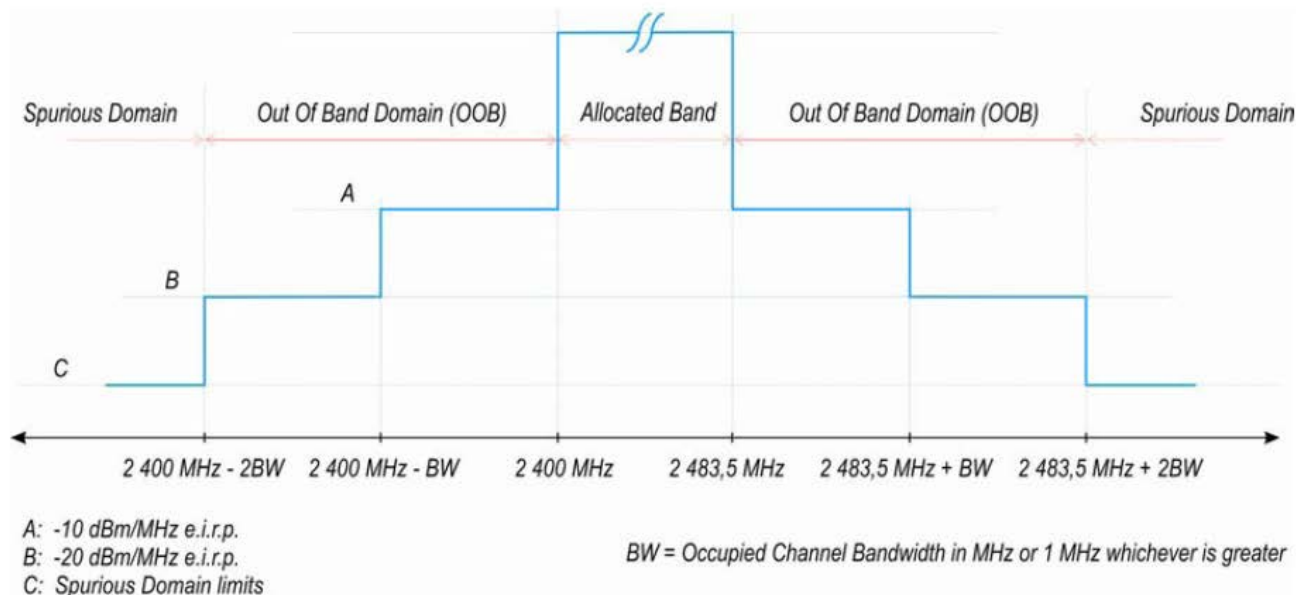
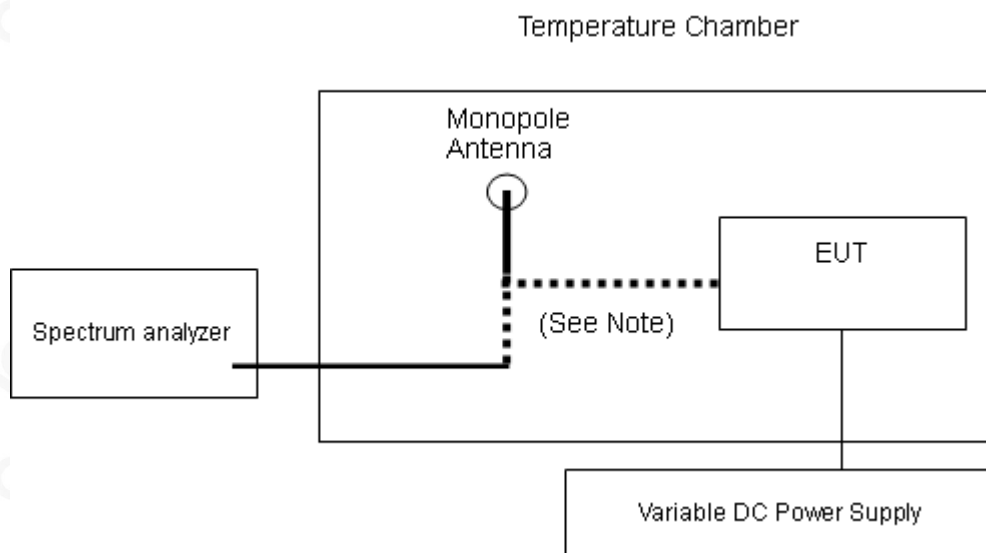
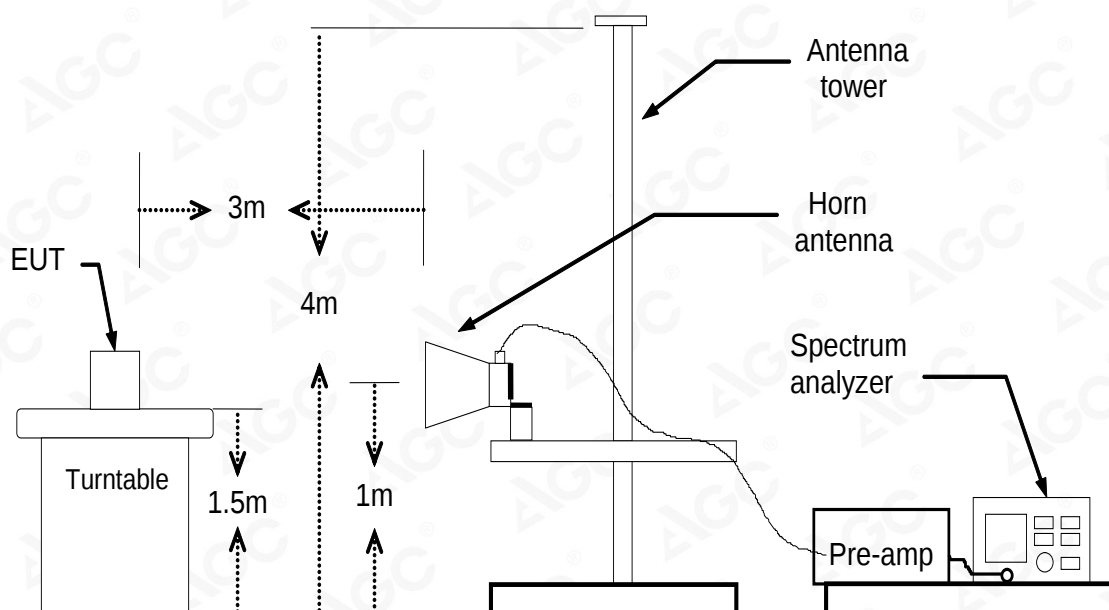


Figure 1: Transmit mask

TEST CONFIGURATION



For have temporary antenna connector product



For have no temporary antenna product

TEST PROCEDURE

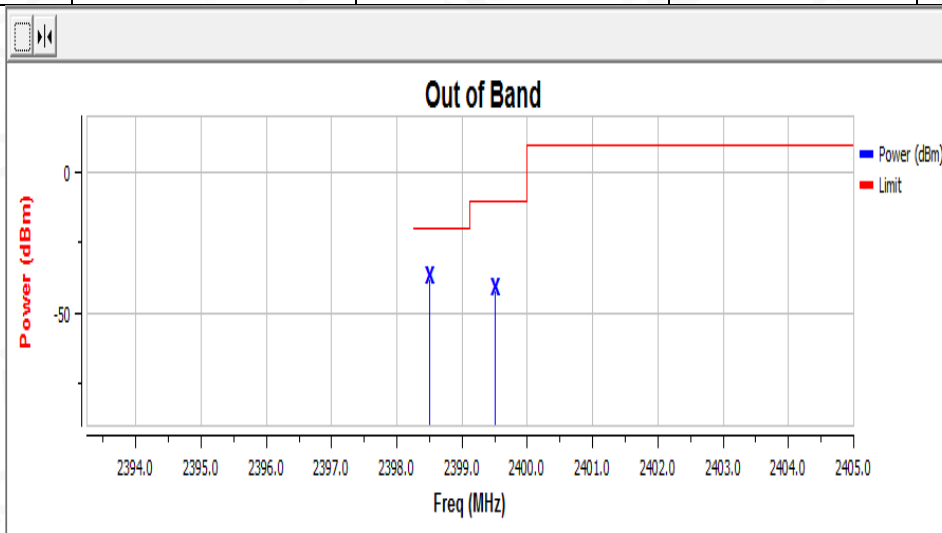
Test Procedure Please refer to Clause 5.4.8

TEST RESULT

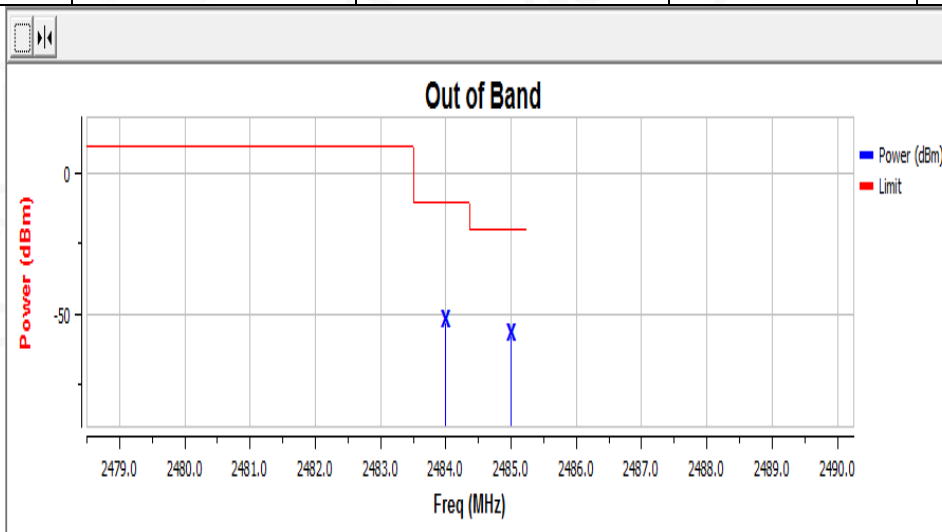
see the next page

NORMAL TEMPERATURE NORMAL VOLTAGE

Channel	Antenna	Freq(MHz)	Level	Limit
CH Low-2402	Antenna 1	2399.5	-42.44	-10
CH Low-2402	Antenna 1	2398.5	-38.69	-20



Channel	Antenna	Freq(MHz)	Level	Limit
CH High-2480	Antenna 1	2484	-53.37	-10
CH High-2480	Antenna 1	2485	-58.61	-20



Note: The worst modulation used during test is $\pi/4$ -DQPSK

Conclusion: PASS



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4.6 TRANSMITTER SPURIOUS EMISSIONS

Spurious emissions are emissions outside the frequency range(s) of the equipment as defined in Clause 4.3.1.10.3.

Transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the out-of-band domain as indicated in figure 1 when the equipment is in Transmit mode.

The spurious emissions of the transmitter shall not exceed the values in tables in the indicated bands:

Frequency Range	Maximum Power e.r.p(<=1GHz)/e.i.r.p(>1GHz)	Bandwidth
30MHz to 47MHz	-36dBm	100kHz
47MHz to 74MHz	-54dBm	100kHz
74MHz to 87.5MHz	-36dBm	100kHz
87.5MHz to 118MHz	-54dBm	100kHz
118MHz to 174MHz	-36dBm	100kHz
174 MHz to 230MHz	-54dBm	100kHz
230 MHz to 470MHz	-36dBm	100kHz
470 MHz to 862MHz	-54dBm	100kHz
862 MHz to 1GHz	-36dBm	100kHz
1 GHz to 12.75GHz	-30dBm	1MHz



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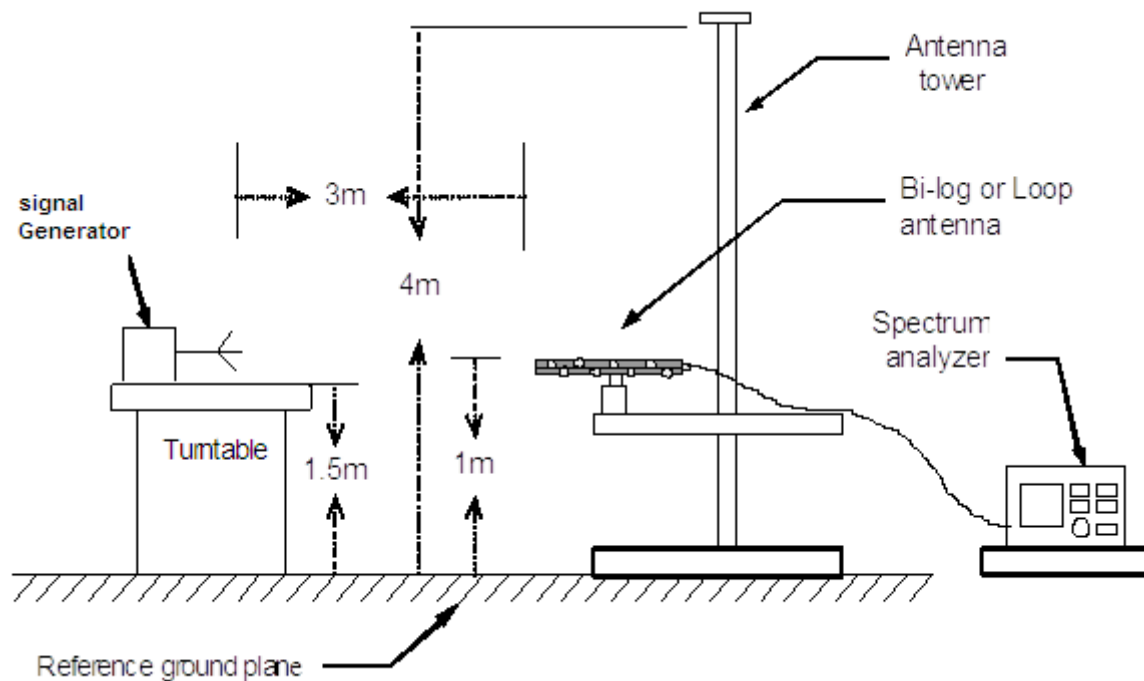
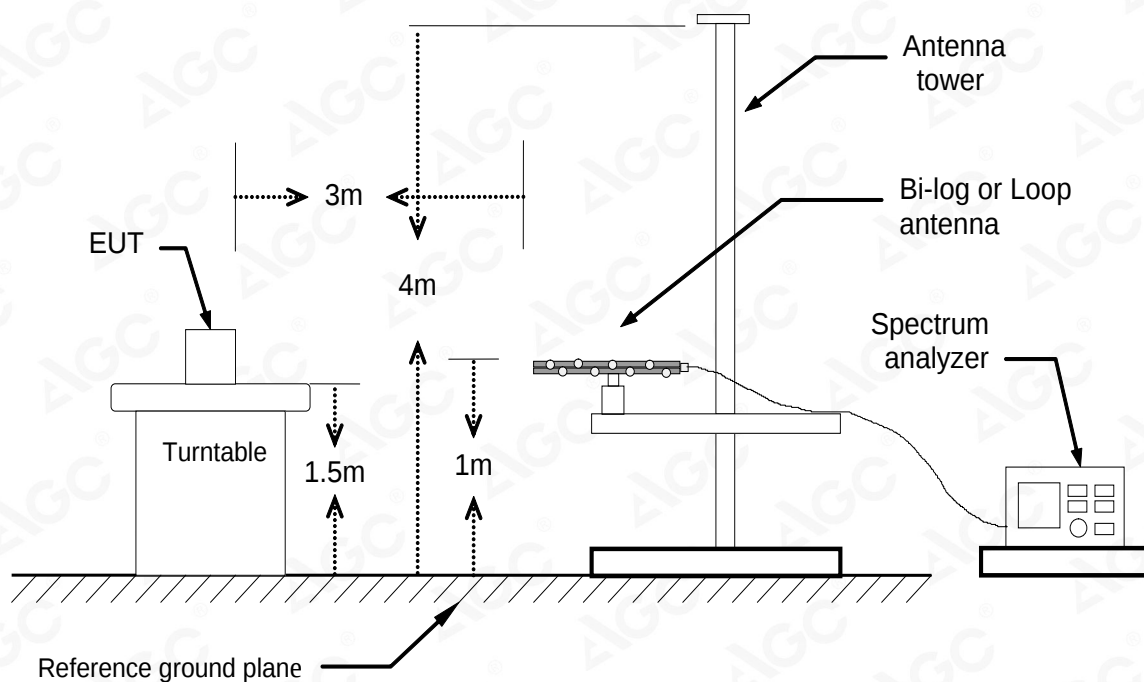
Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

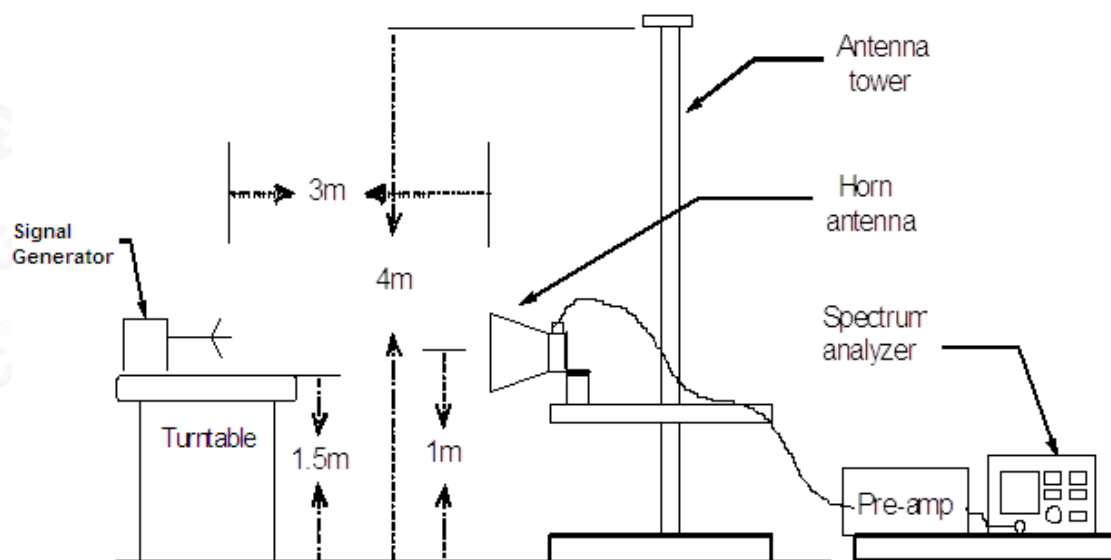
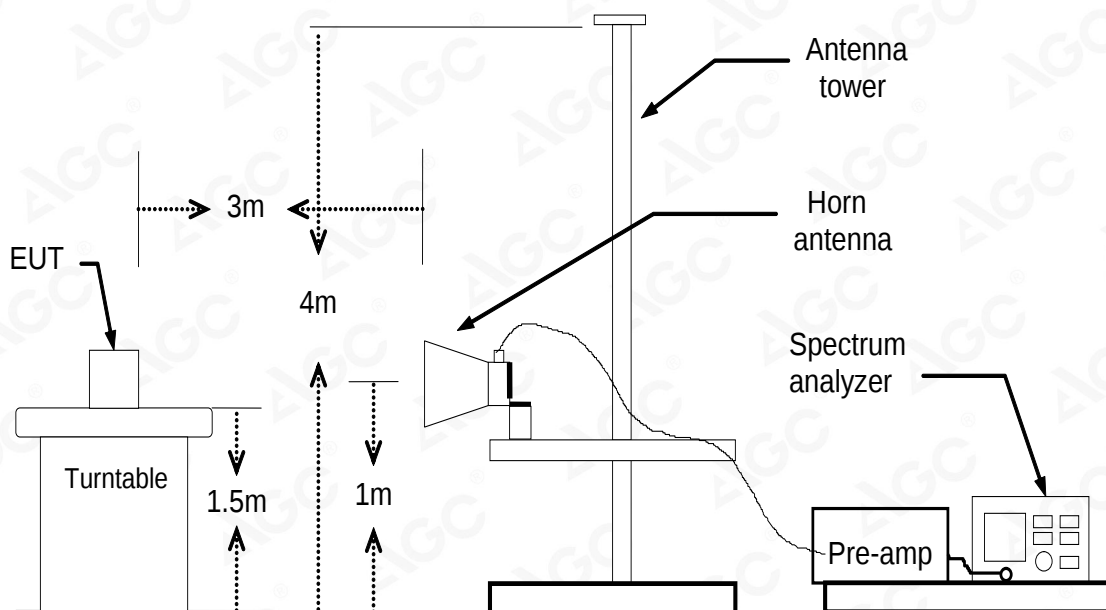
Service Hotline:400 089 2118

Test Configuration

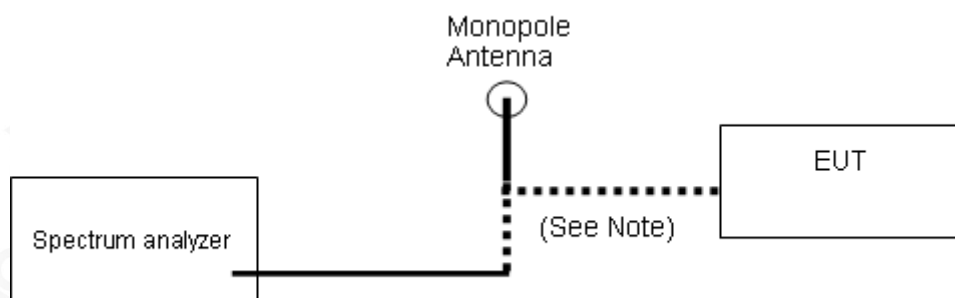
Below 1GHz



Above 1GHz



Radiated Method



Conducted Method

TEST PROCEDURE

1. Replace the UUT with the substitution antenna as shown as above radiated method setup diagram. The substitution and the measurement antenna shall be vertically polarized.
2. Connect a signal generator to the substitution antenna and set it to the frequency being investigated.
3. The measurement antenna shall be raised or lowered, to ensure that the maximum signal is received.
4. Subsequently, the power of the signal generator is adjusted until the same level is obtained as recorded from the UUT.
5. The radiated power is equal to the power supplied by the signal generator, plus the gain of substitution antenna, minus the cable loss.
6. This measurement shall be replaced in horizontal polarization.

TEST SETTING

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyzer settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: ≥ 19400

The emissions over the range 1 GHz to 12.75 GHz shall be identified.

Spectrum analyzer settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: ≥ 23500



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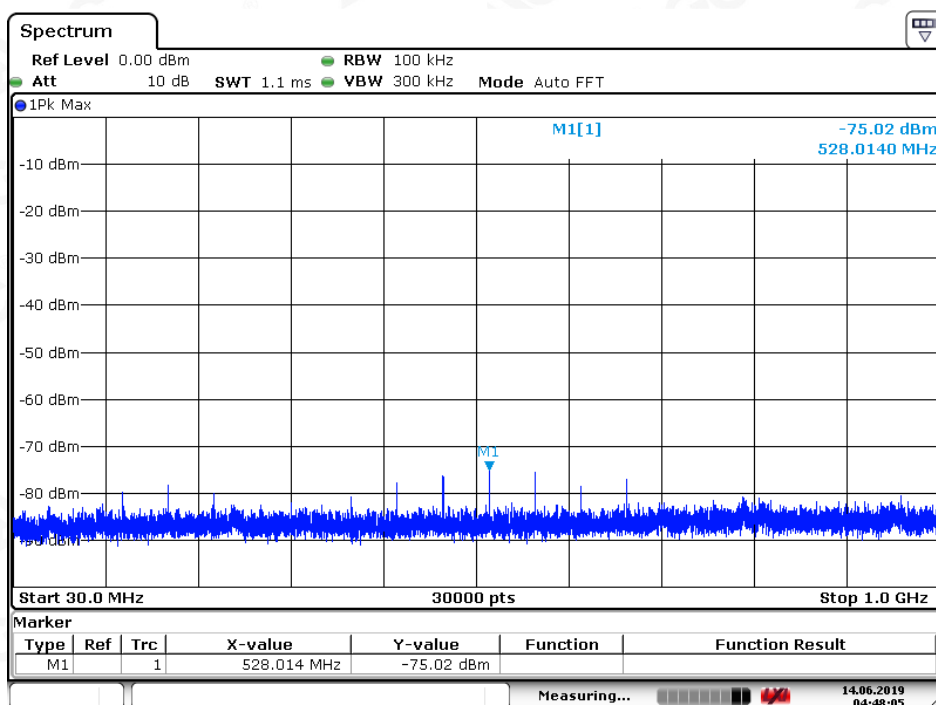
Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu,
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Tel: +86-755 2523 4088

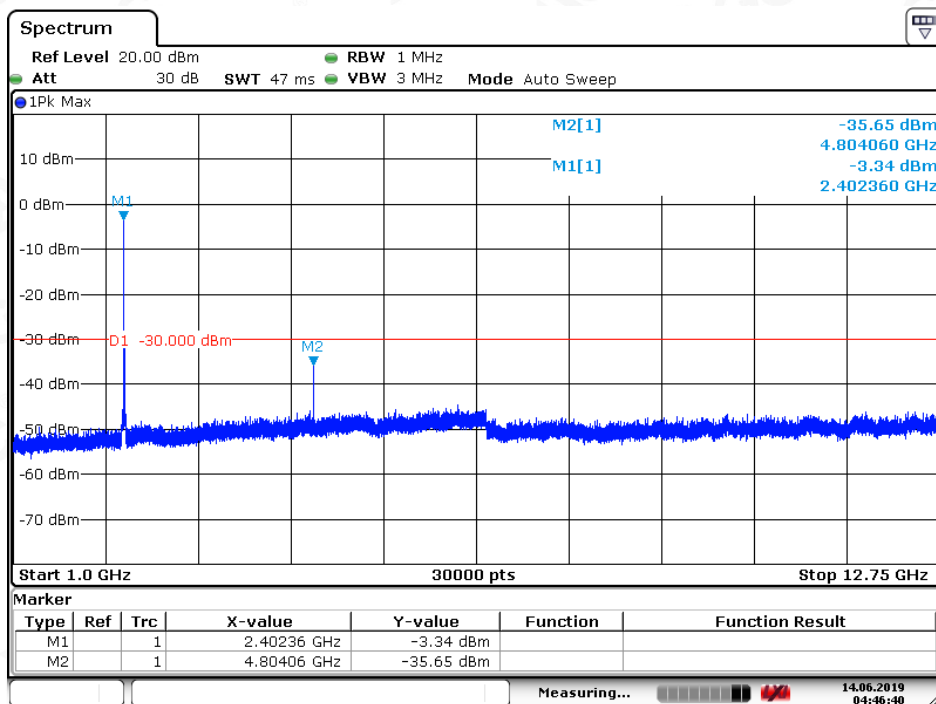
E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

CONDUCTED RESULTS: (Worst Case: Low channel, 2Mbps)



Date: 14. JUN. 2019 04:48:04



Date: 14. JUN. 2019 04:46:39



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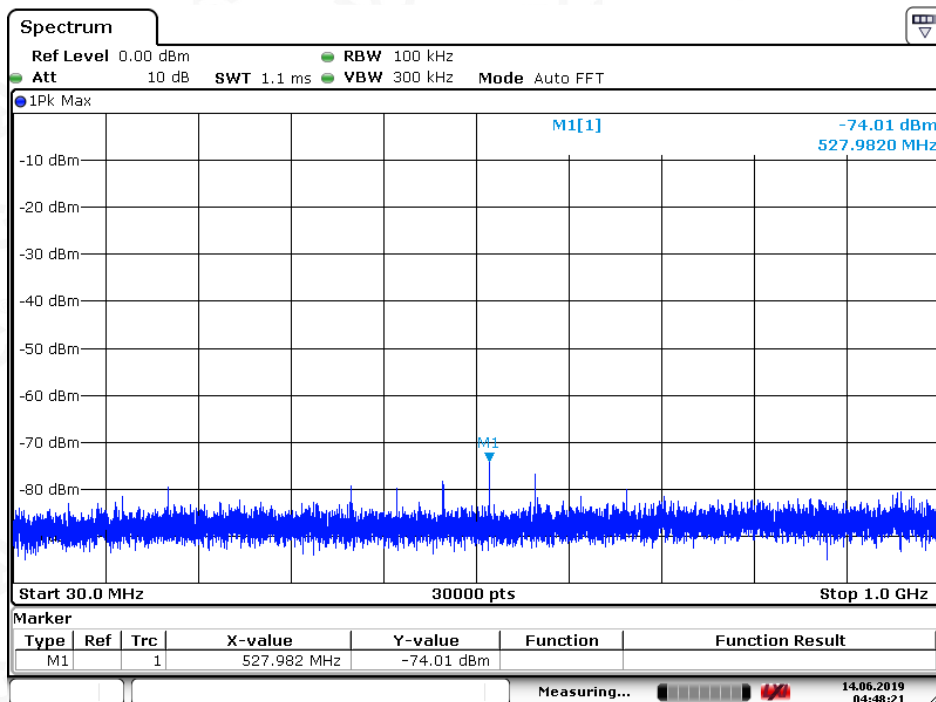
Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu,
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Tel: +86-755 2523 4088

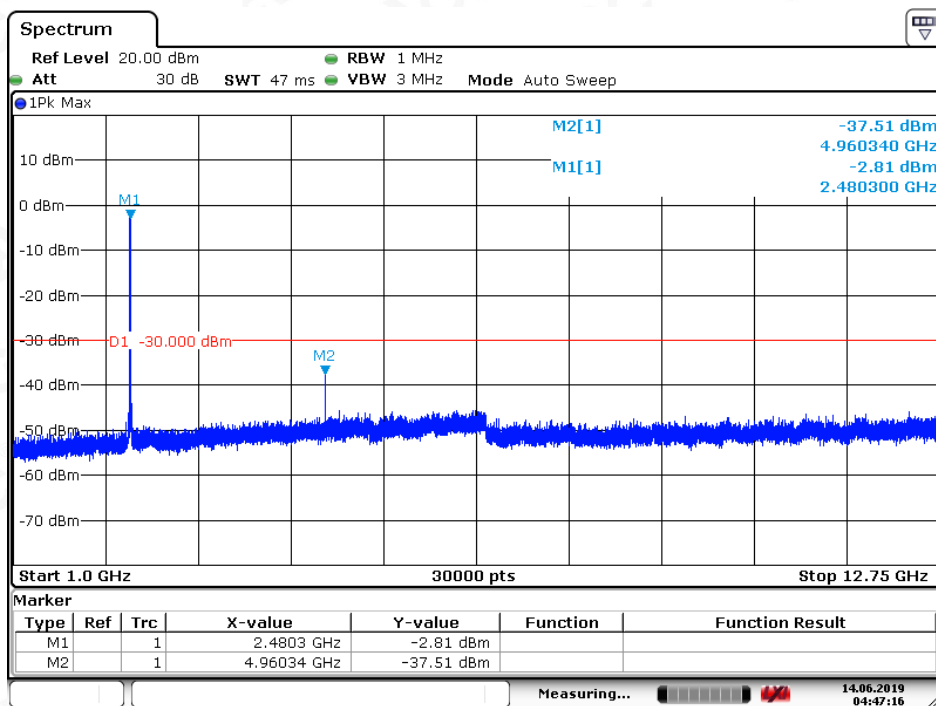
E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

(Worst Case: High channel, 2Mbps)



Date: 14.JUN.2019 04:48:21



Date: 14.JUN.2019 04:47:15

Note: All the modes have been tested but only the worst data recorded in the report.

Conclusion: PASS



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TEST RESULTS FOR RADIATED METHOD (Worst case :2Mbps)

Low Channel: Transmitter Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
78.47	28.92	V	-64.13	0.04	-0.50	-64.67	-36.00	28.67
237.19	29.18	V	-70.62	0.11	6.60	-64.13	-36.00	28.13
381.68	27.75	V	-71.35	0.28	6.49	-65.14	-36.00	29.14
386.66	29.49	V	-70.11	0.29	6.44	-63.96	-36.00	27.96
426.06	26.91	V	-72.39	0.33	6.98	-65.74	-36.00	29.74
830.57	30.37	V	-69.05	0.66	6.30	-63.40	-54.00	9.40
Other(30-1000)	--	V	--	--	--	--	-36.00/-54.00	--
137.48	32.18	H	-60.38	0.05	0.00	-60.43	-36.00	24.43
341.09	32.55	H	-66.58	0.23	5.68	-61.13	-36.00	25.13
397.09	29.72	H	-70.64	0.30	6.54	-64.40	-36.00	28.40
455.74	27.53	H	-72.68	0.37	6.55	-66.50	-36.00	30.50
617.54	31.81	H	-67.41	0.51	6.78	-61.13	-54.00	7.13
768.98	31.09	H	-68.12	0.62	6.84	-61.89	-54.00	7.89
Other(30-1000)	--	H	--	--	--	--	-36.00/-54.00	--



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High Channel: Transmitter Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
75.73	29.12	V	-63.20	0.03	-1.10	-64.33	-36.00	28.33
234.22	29.13	V	-69.58	0.11	6.60	-63.09	-36.00	27.09
382.70	27.42	V	-71.18	0.28	6.48	-64.98	-36.00	28.98
386.53	30.41	V	-69.12	0.29	6.44	-62.97	-36.00	26.97
426.10	27.80	V	-71.71	0.33	6.98	-65.07	-36.00	29.07
827.62	30.78	V	-67.32	0.66	6.45	-61.53	-54.00	7.53
Other(30-1000)	--	V	--	--	--	--	-36.00/-54.00	--
142.06	30.33	H	-63.18	0.05	0.12	-63.11	-36.00	27.11
340.75	33.14	H	-66.41	0.23	5.70	-60.94	-36.00	24.94
397.60	28.80	H	-70.54	0.30	6.54	-64.30	-36.00	28.30
458.87	28.33	H	-71.88	0.37	6.64	-65.61	-36.00	29.61
614.15	30.82	H	-69.54	0.50	6.66	-63.38	-54.00	9.38
769.51	30.83	H	-68.88	0.62	6.87	-62.63	-54.00	8.63
Other(30-1000)	--	H	--	--	--	--	-36.00/-54.00	--



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Low Channel: Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
4804.00	60.08	V	-39.62	2.64	9.30	-32.96	-30.00	2.96
7206.00	41.97	V	-58.64	3.14	11.28	-50.50	-30.00	20.50
3827.81	41.18	V	-57.54	2.01	7.89	-51.66	-30.00	21.66
Other(1000-12750)	--	V	--	--	--	--	-30.00	--
4804.00	55.8	H	-43.22	2.64	9.30	-36.56	-30.00	6.56
7206.00	40.84	H	-60.73	3.14	11.28	-52.59	-30.00	22.59
3827.81	40.48	H	-58.09	2.01	7.89	-52.21	-30.00	22.21
Other(1000-12750)	--	H	--	--	--	--	-30.00	--



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High Channel: Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
4960.00	58.85	V	-40.63	2.75	9.62	-33.76	-30.00	3.76
7440.00	42.35	V	-58.72	3.09	11.62	-50.19	-30.00	20.19
3542.47	39.83	V	-60.77	1.93	8.34	-54.36	-30.00	24.36
Other(1000-12750)	--	V	--	--	--	--	-30.00	--
4960.00	55.07	H	-44.38	2.75	9.62	-37.51	-30.00	7.51
7440.00	40.09	H	-61.80	3.09	11.62	-53.27	-30.00	23.27
3542.47	39.55	H	-60.04	1.93	8.34	-53.63	-30.00	23.63
Other(1000-12750)	--	H	--	--	--	--	-30.00	--

Note: All the above "--" means that the other spectrum have 20dB margin. No recording in the test report.

Conclusion: PASS



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4.7 RECEIVER SPURIOUS EMISSIONS
TEST LIMIT
SPURIOUS EMISSION LIMITS FOR RECEIVERS

Frequency range	Maximum power	Measurement bandwidth
30MHz to 1GHz	-57dBm	100kHz
1GHz to 12.75GHz	-47dBm	1MHz



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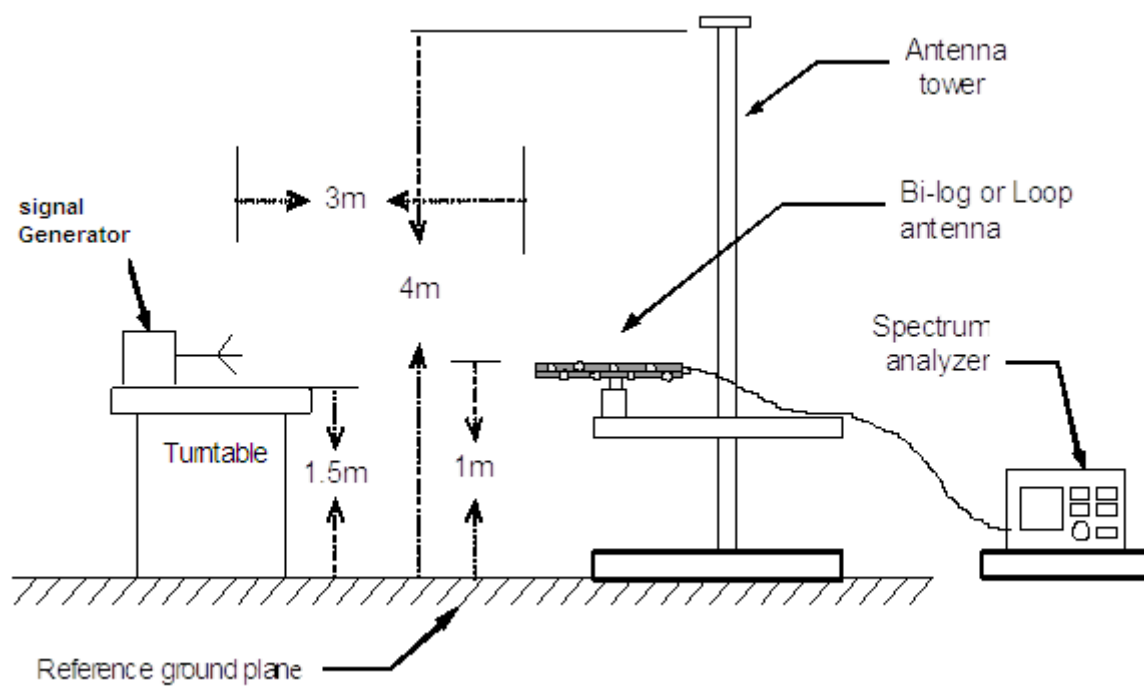
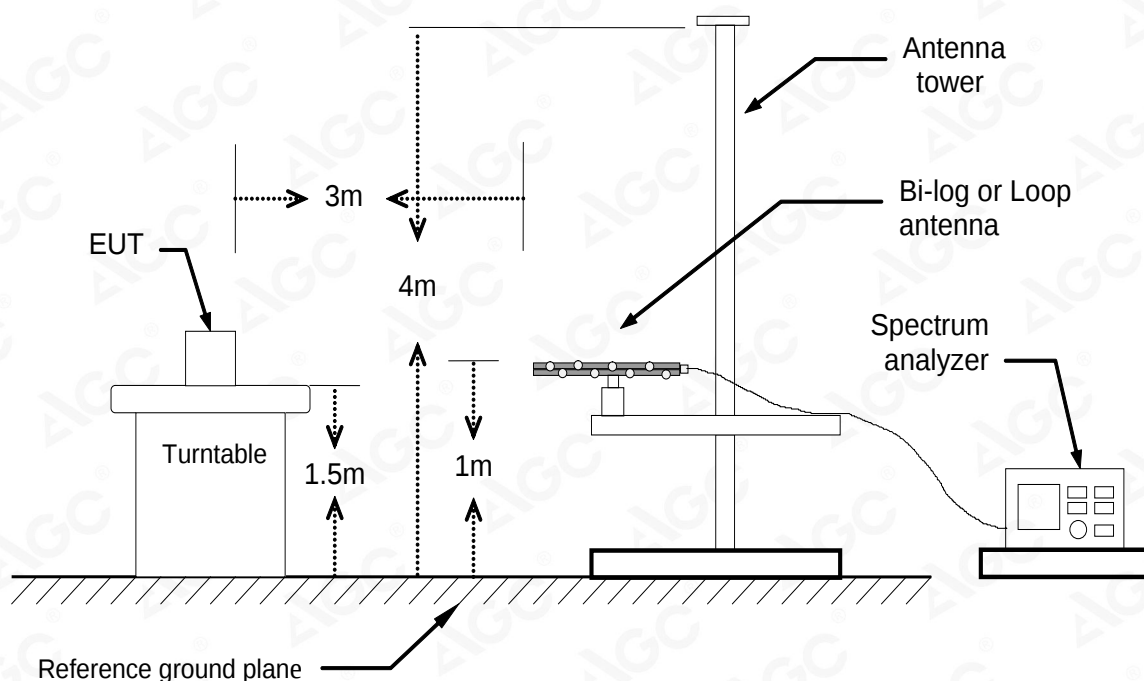
Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

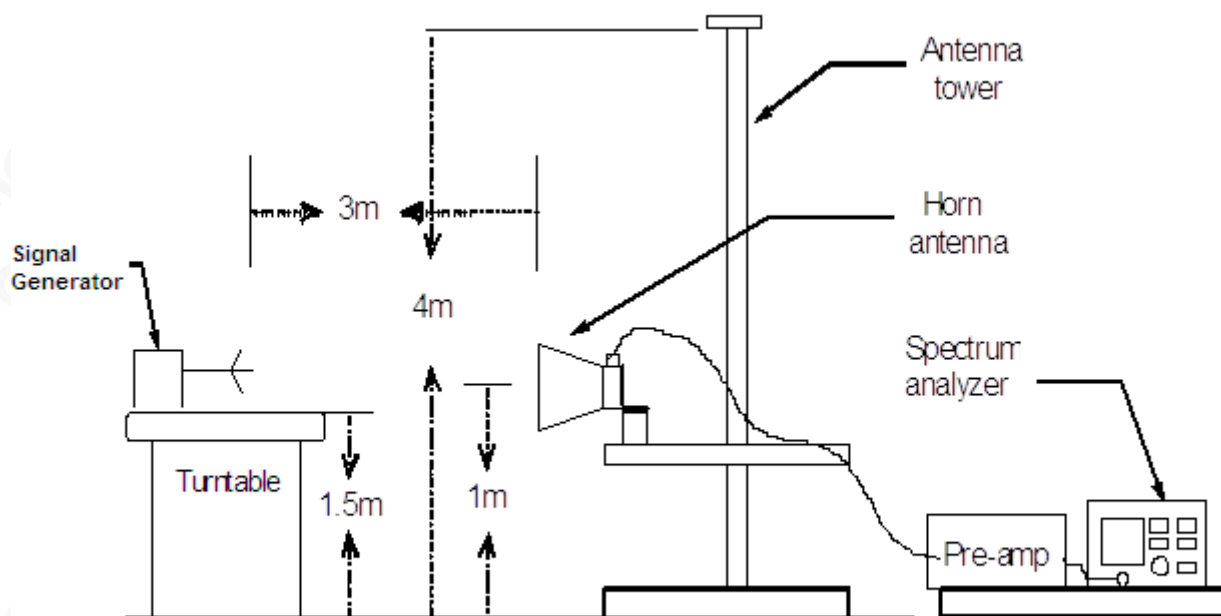
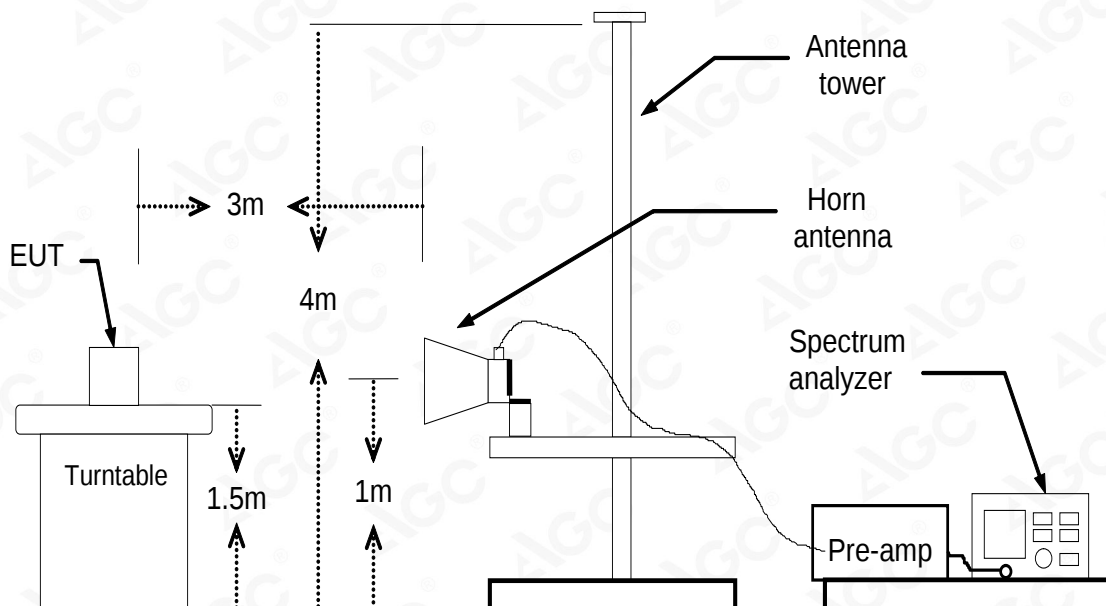
Service Hotline:400 089 2118

Test Configuration

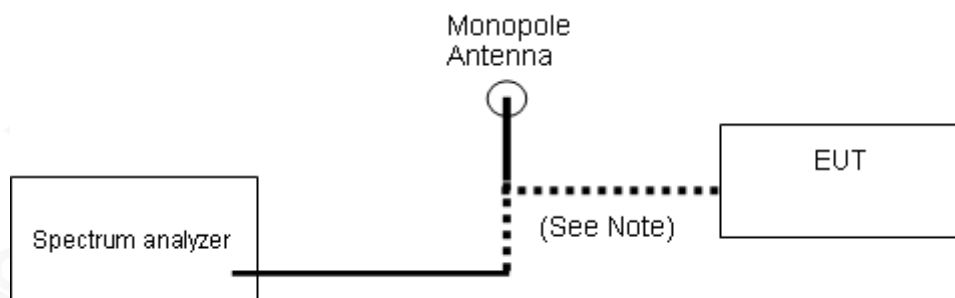
Below 1GHz



Above 1GHz



Radiated Method



Conducted Method

TEST PROCEDURE

1. Replace the UUT with the substitution antenna as shown as above radiated method setup diagram. The substitution and the measurement antenna shall be vertically polarized.
2. Connect a signal generator to the substitution antenna and set it to the frequency being investigated.
3. The measurement antenna shall be raised or lowered, to ensure that the maximum signal is received.
4. Subsequently, the power of the signal generator is adjusted until the same level is obtained as recorded from the UUT.
5. The radiated power is equal to the power supplied by the signal generator, plus the gain of substitution antenna, minus the cable loss.
6. This measurement shall be replaced in horizontal polarization.



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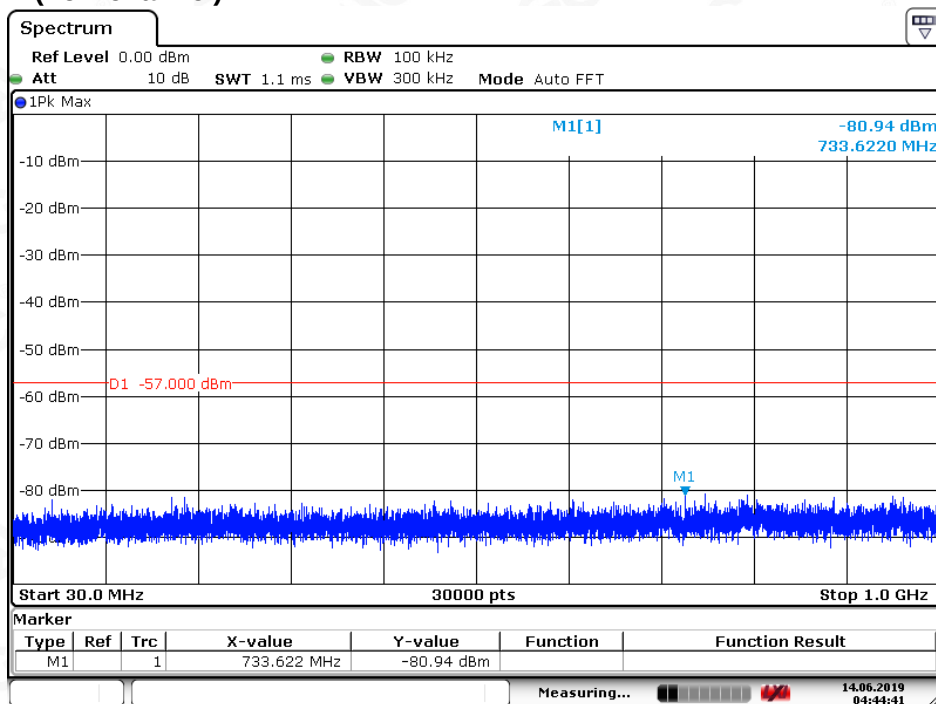
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Tel: +86-755 2523 4088

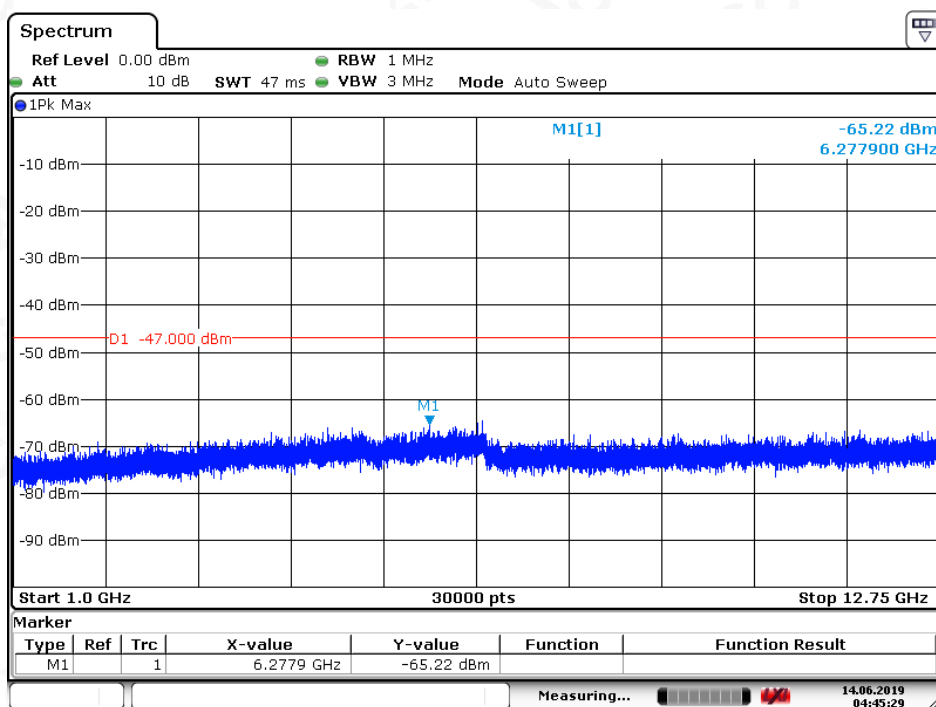
E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

TEST RESULTS FOR CONDUCTED METHOD **RECEIVER MODE (Low channel)**



Date: 14.JUN.2019 04:44:42



Date: 14.JUN.2019 04:45:29



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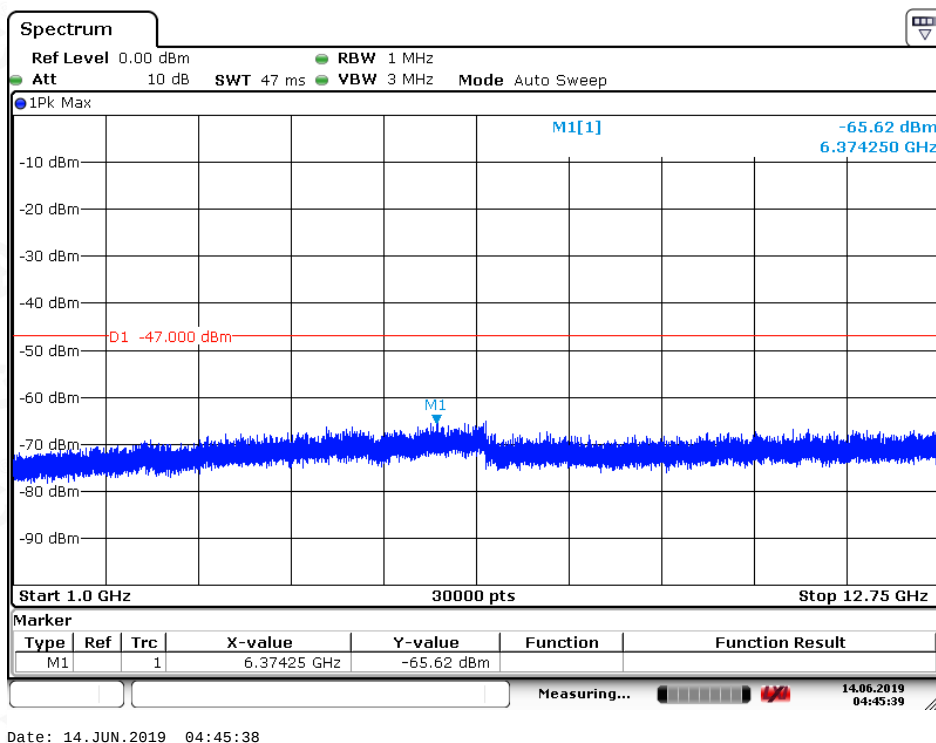
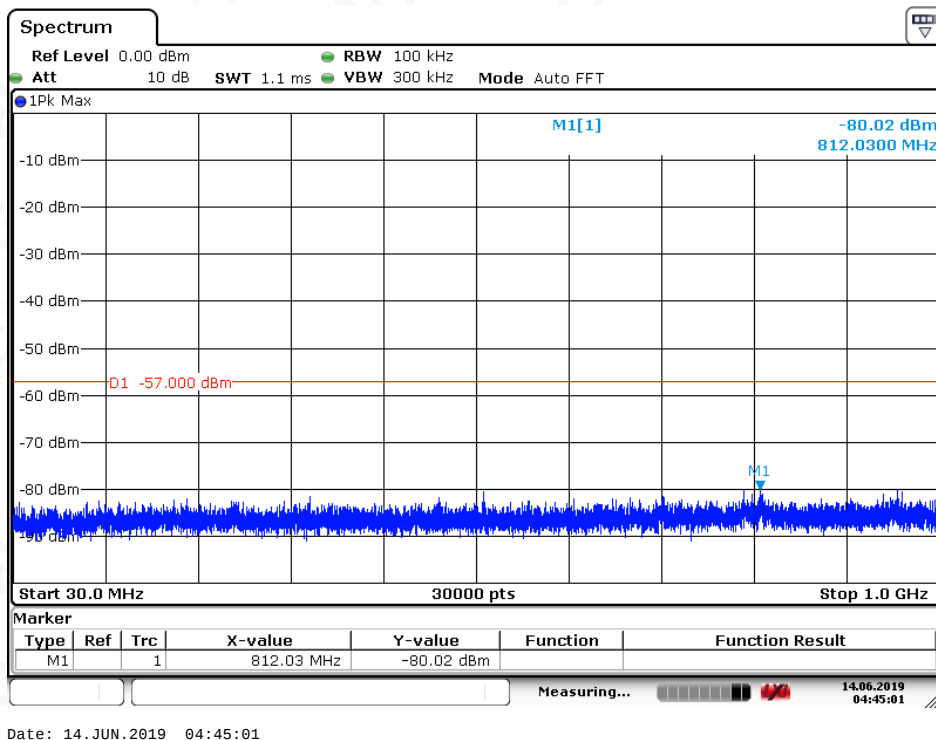
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(High channel)



Note: All the modes have been tested but only the worst data recorded in the report.

Conclusion: PASS



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TEST RESULTS FOR RADIATED METHOD

Low Channel: Receiver Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
86.89	29.66	V	-65.09	0.04	0.84	-64.29	-57.00	7.29
240.40	29.48	V	-69.63	0.12	6.60	-63.15	-57.00	6.15
316.66	29.24	V	-69.95	0.21	6.22	-63.93	-57.00	6.93
387.13	29.66	V	-70.12	0.29	6.43	-63.98	-57.00	6.98
477.73	28.82	V	-71.46	0.39	6.87	-64.99	-57.00	7.99
827.72	31.62	V	-67.49	0.66	6.45	-61.70	-57.00	4.70
Other(30-1000)	--	V	--	--	--	--	-57.00	--
138.50	29.47	H	-63.72	0.05	0.00	-63.77	-57.00	6.77
335.55	30.20	H	-68.31	0.23	5.90	-62.64	-57.00	5.64
397.98	30.99	H	-68.51	0.30	6.54	-62.27	-57.00	5.27
565.85	29.60	H	-70.40	0.47	6.85	-64.02	-57.00	7.02
613.54	28.60	H	-71.26	0.50	6.62	-65.15	-57.00	8.15
818.95	29.53	H	-69.91	0.65	6.86	-63.70	-57.00	6.70
Other(30-1000)	--	H	--	--	--	--	-57.00	--



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High Channel: Receiver Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
87.98	29.17	V	-64.43	0.04	0.98	-63.49	-57.00	6.49
238.52	29.40	V	-70.03	0.11	6.60	-63.54	-57.00	6.54
312.85	28.29	V	-71.15	0.20	6.34	-65.01	-57.00	8.01
385.58	29.54	V	-69.56	0.29	6.45	-63.39	-57.00	6.39
476.13	29.28	V	-69.78	0.39	6.86	-63.31	-57.00	6.31
831.19	30.78	V	-68.45	0.66	6.37	-62.74	-57.00	5.74
Other(30-1000)	--	V	--	--	--	--	-57.00	--
136.86	30.17	H	-62.09	0.05	0.00	-62.14	-57.00	5.14
335.16	29.90	H	-68.31	0.23	5.90	-62.64	-57.00	5.64
397.54	30.31	H	-69.48	0.30	6.54	-63.24	-57.00	6.24
565.57	29.46	H	-69.32	0.47	6.85	-62.94	-57.00	5.94
616.34	27.68	H	-71.00	0.51	6.74	-64.76	-57.00	7.76
818.49	29.94	H	-69.97	0.65	6.86	-63.76	-57.00	6.76
Other(30-1000)	--	H	--	--	--	--	-57.00	--



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Low Channel: Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
1837.29	32.66	V	-66.26	1.26	7.15	-60.37	-47.00	13.37
3122.94	31.55	V	-66.51	1.81	7.64	-60.69	-47.00	13.69
--	--	V	--	--	--	--	-47.00	--
--	--	V	--	--	--	--	-47.00	--
--	--	V	--	--	--	--	-47.00	--
Other(1000-12750)	--	V	--	--	--	--	-47.00	--
1781.21	31.06	H	-67.72	1.23	6.93	-62.02	-47.00	15.02
3429.12	31.47	H	-68.71	1.90	8.24	-62.37	-47.00	15.37
--	--	H	--	--	--	--	-47.00	--
--	--	H	--	--	--	--	-47.00	--
--	--	H	--	--	--	--	-47.00	--
Other(1000-12750)	--	H	--	--	--	--	-47.00	--



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High Channel: Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
1835.29	32.65	V	-66.10	1.26	7.15	-60.21	-47.00	13.21
3127.80	32.83	V	-65.96	1.81	7.64	-60.13	-47.00	13.13
--	--	V	--	--	--	--	-47.00	--
--	--	V	--	--	--	--	-47.00	--
--	--	V	--	--	--	--	-47.00	--
Other(1000-12750)	--	V	--	--	--	--	-47.00	--
1787.45	31.60	H	-66.40	1.23	6.93	-60.70	-47.00	13.70
3429.27	30.73	H	-68.04	1.90	8.24	-61.70	-47.00	14.70
--	--	H	--	--	--	--	-47.00	--
--	--	H	--	--	--	--	-47.00	--
--	--	H	--	--	--	--	-47.00	--
Other(1000-12750)	--	H	--	--	--	--	-47.00	--

Note: All the above "--" means that the other spectrum have 20dB margin. No recording in the test report.

Conclusion: PASS



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4.8. RECEIVER BLOCKING

ETSI EN300328 SUBCLAUSE 4.3.1.12

This requirement applies to all receiver categories as defined in clause 4.2.3.

Performance Criteria

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1.t)).

Receiver Category 1

Table 6 contains the Receiver Blocking parameters for Receiver Category 1 equipment.

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{min} + 6 \text{ dB}$	2 380 2 503,5	-53	CW
$P_{min} + 6 \text{ dB}$	2 300 2 330 2 360	-47	CW
$P_{min} + 6 \text{ dB}$	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Receiver Category 2

Table 7 contains the Receiver Blocking parameters for Receiver Category 2 equipment.

Table 7: Receiver Blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{min} + 6 \text{ dB}$	2 380 2 503,5	-57	CW
$P_{min} + 6 \text{ dB}$	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			



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Receiver Category 3

Table 8 contains the Receiver Blocking parameters for Receiver Category 3 equipment.

Table 8: Receiver Blocking parameters receiver category 3 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{\min} + 12 \text{ dB}$	2 380 2 503,5	-57	CW
$P_{\min} + 12 \text{ dB}$	2 300 2 583,5	-47	CW
NOTE 1: $P_{\min}$ is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 clause 5.4.11.1 for the test conditions.
2. Please refer to ETSI EN 300 328 clause 5.4.11.2 for the measurement methods.

TEST RESULTS:

For GFSK

(Low channel RX, DUT Mode, Category 3)

Wanted signal mean power from companion device(dBm)	Blocking Signal Frequency(MHz)	Blocking Signal Power(dBm)	Type of blocking signal	Limit PER	Performance PER	Result
$P_{\min} (-84)+12$	2380	-57	CW	10%	0.17%	Pass
$P_{\min} (-84)+12$	2503.5	-57	CW	10%	0.12%	
$P_{\min} (-84)+12$	2300	-47	CW	10%	0.11%	Pass
$P_{\min} (-84)+12$	2583.5	-47	CW	10%	0.15%	

(High channel RX, DUT Mode, Category 3)

Wanted signal mean power from companion device(dBm)	Blocking Signal Frequency(MHz)	Blocking Signal Power(dBm)	Type of blocking signal	Limit PER	Performance PER	Result
$P_{\min} (-84)+12$	2380	-57	CW	10%	0.16%	Pass
$P_{\min} (-84)+12$	2503.5	-57	CW	10%	0.11%	
$P_{\min} (-84)+12$	2300	-47	CW	10%	0.1%	Pass
$P_{\min} (-84)+12$	2583.5	-47	CW	10%	0.14%	



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For $\pi/4$ -DQPSK

(Low channel RX, DUT Mode, Category 3)

Wanted signal mean power from companion device(dBm)	Blocking Signal Frequency(MHz)	Blocking Signal Power(dBm)	Type of blocking signal	Limit PER	Performance PER	Result
Pmin (-84)+12	2380	-57	CW	10%	0.19%	Pass
Pmin (-84)+12	2503.5	-57	CW	10%	0.15%	
Pmin (-84)+12	2300	-47	CW	10%	0.13%	Pass
Pmin (-84)+12	2583.5	-47	CW	10%	0.12%	

(High channel RX, DUT Mode, Category 3)

Wanted signal mean power from companion device(dBm)	Blocking Signal Frequency(MHz)	Blocking Signal Power(dBm)	Type of blocking signal	Limit PER	Performance PER	Result
Pmin (-84)+12	2380	-57	CW	10%	0.21%	Pass
Pmin (-84)+12	2503.5	-57	CW	10%	0.17%	
Pmin (-84)+12	2300	-47	CW	10%	0.15%	Pass
Pmin (-84)+12	2583.5	-47	CW	10%	0.13%	



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APPENDIX A: PHOTOGRAPHS OF THE TEST SETUP

Refer to Attached file(appendix I)

APPENDIX B: PHOTOGRAPHS OF THE EUT

Refer to Attached file(appendix I)

----END OF REPORT----



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