FCC RADIO TEST REPORT

FCC ID	:	**UZ7MC3300U**
Equipment	:	**Mobile Computer**
Brand Name	:	**Zebra**
Model Name	:	**MC3300U**
Applicant	:	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Manufacturer	:	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Standard	:	**FCC Part 15 Subpart C §15.247**

The product was received on Aug. 12, 2019 and testing was started from Aug. 26, 2019 and completed on Oct. 11, 2019. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Louis Wu

Reviewed by: Louis Wu

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History of this test report

Report No.	Version	Description	Issued Date
FR981238E	01	Initial issue of report	Dec. 09, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(1)	Number of Channels	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	Pass	-
3.4	2.1049	99% Occupied Bandwidth	Reporting Only	-
3.5	15.247(b)(1)	Output Power	Pass	-
3.6	15.247(d)	Conducted Band Edges	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 3.02 dB at 922.400 MHz
-	15.207	AC Conducted Emission	Not Required	-
3.9	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Remark: Not required means after assessing, test items are not necessary to carry out.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Jessie Ho

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Computer
Brand Name	Zebra
Model Name	MC3300U
FCC ID	UZ7MC3300U
EUT supports Radios application	NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	DV
SW Version	RFID Manager Application Version: 2.0.10.1 123 RFID Mobile Application Version: 1.0.0.11 Terminal Version: 02-11-14.00-PG-U07-PRD
FW Version	Module Version: PAAEES00-001-N20 Radio Version: 2.0.32.0 Terminal Version: FUSION_QA_2_1.2.0.006_P
MFD	27JUL19
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
AC Adapter	**Brand Name**	Zebra	**Part Number**	PWR-WUA5V12W0US
USB Cable	**Brand Name**	Zebra	**Part Number**	CBL-MC33-USBCHG-01
MC32 2X battery (Inventus)	**Brand Name**	Symbol	**Part Number**	82-000012-02
MC33 2X battery (Inventus)	**Brand Name**	ZEBRA	**Part Number**	BT-000337-01
MC33 7000mA 2X (Inventus)	**Brand Name**	ZEBRA	**Part Number**	BT-000375 -10
GUN Holster	**Brand Name**	ZEBRA	**Part Number**	SG-MC3021212-01R

<Sample Information>

	SKU1	SKU2	SKU3
Part Number	MC333U-GJ2EG4US	MC339U-GE2EG4US	MC339U-GF2EG4US
RFID Antenna	Middle range	Long range	Long range
Scanner	SE4770	SE4850	SE4750MR
Keypad	29	29	29
Region	US	US	US

	SKU7	SKU8	SKU9
Part Number	MC333U-GJ3EG4US	MC339U-GE3EG4US	MC339U-GF3EG4US
RFID Antenna	Middle range	Long range	Long range
Scanner	SE4770	SE4850	SE4750MR
Keypad	38	38	38
Region	US	US	US

	SKU13	SKU14	SKU15
Part Number	MC333U-GJ4EG4US	MC339U-GE4EG4US	MC339U-GF4EG4US
RFID Antenna	Middle range	Long range	Long range
Scanner	SE4770	SE4850	SE4750MR
Keypad	47	47	47
Region	US	US	US

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	902.75 MHz ~ 927.25 MHz
Number of Channels	50
Maximum Output Power to Antenna	**Conducted power from antenna side:** 29.83dBm (0.9616 W)
20dB Bandwidth	**Long Range:** 0.326 MHz **Middle Range:** 0.326 MHz
99% Occupied Bandwidth	**Long Range:** 0.315 MHz **Middle Range:** 0.315 MHz
Antenna Type / Gain	**Long Range:** Yagi Antenna with gain 5.95 dBi **Middle Range:** Dipole Antenna with gain 0.12 dBi
Type of Modulation	ASK

Remark: The above EUT's information was declared by manufacturer.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW0007

1.5 Applicable Standards

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

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r01
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
902.75-927.25 MHz	0	902.75	27	916.25
	1	903.25	28	916.75
	2	903.75	29	917.25
	3	904.25	30	917.75
	4	904.75	31	918.25
	5	905.25	32	918.75
	6	905.75	33	919.25
	7	906.25	34	919.75
	8	906.75	35	920.25
	9	907.25	36	920.75
	10	907.75	37	921.25
	11	908.25	38	921.75
	12	908.75	39	922.25
	13	909.25	40	922.75
	14	909.75	41	923.25
	15	910.25	42	923.75
	16	910.75	43	924.25
	17	911.25	44	924.75
	18	911.75	45	925.25
	19	912.25	46	925.75
	20	912.75	47	926.25
	21	913.25	48	926.75
	22	913.75	49	927.25
	23	914.25		
	24	914.75		
	25	915.25		
	26	915.75		

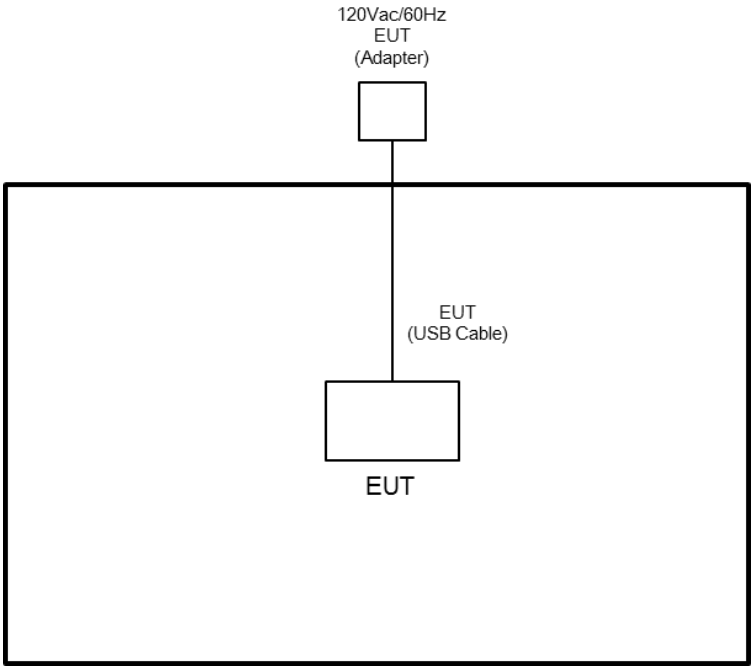
2.2 Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	**UHF RFID**
Conducted Test Cases	Mode 1: UHF RFID Tx CH00_902.75 MHz Mode 2: UHF RFID Tx CH24_914.75 MHz Mode 3: UHF RFID Tx CH49_927.25 MHz
Radiated Test Cases	Mode 1: UHF RFID Tx CH00_902.75 MHz for SKU 1 Mode 2: UHF RFID Tx CH24_914.75 MHz for SKU 1 Mode 3: UHF RFID Tx CH49_927.25 MHz for SKU 1 Mode 4: UHF RFID Tx CH00_902.75 MHz for SKU 2 Mode 5: UHF RFID Tx CH24_914.75 MHz for SKU 2 Mode 6: UHF RFID Tx CH49_927.25 MHz for SKU 2 Mode 7: UHF RFID Tx CH24_914.75 MHz for SKU 3
Remark: For Radiated Test Cases, the tests were performed with MC32 2X battery.	

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

The RF test items, utility “Regulatory Test application” was installed in EUT which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 902.75-927.25 MHz band shall use at least 25 channels.

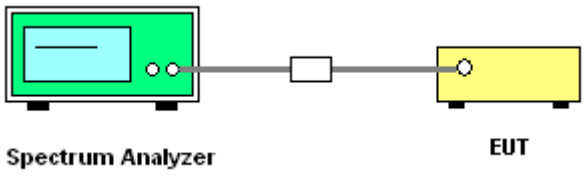
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW = 300kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

3.1.4 Test Setup



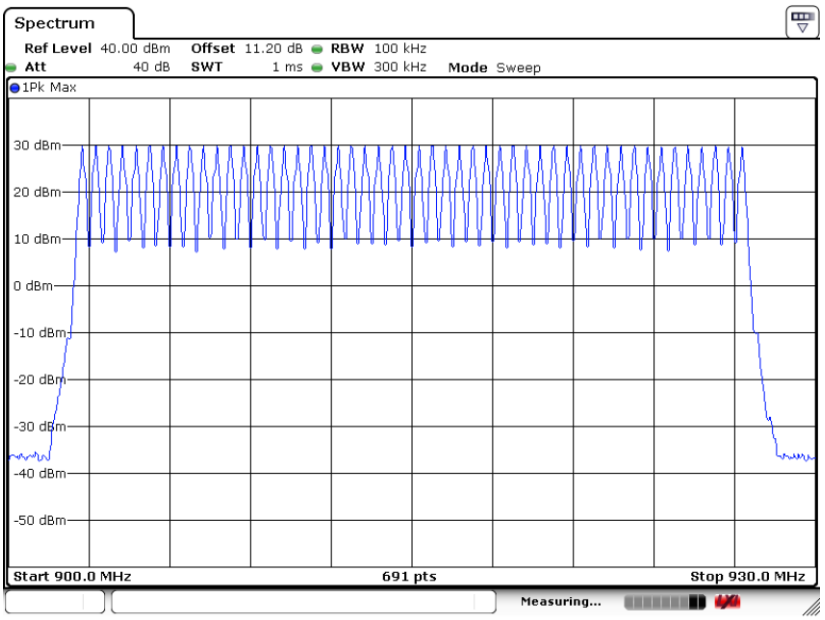
3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	UHF	**Temperature :**	21~25℃
Test Engineer :	Tommy Lee	**Relative Humidity :**	51~54%

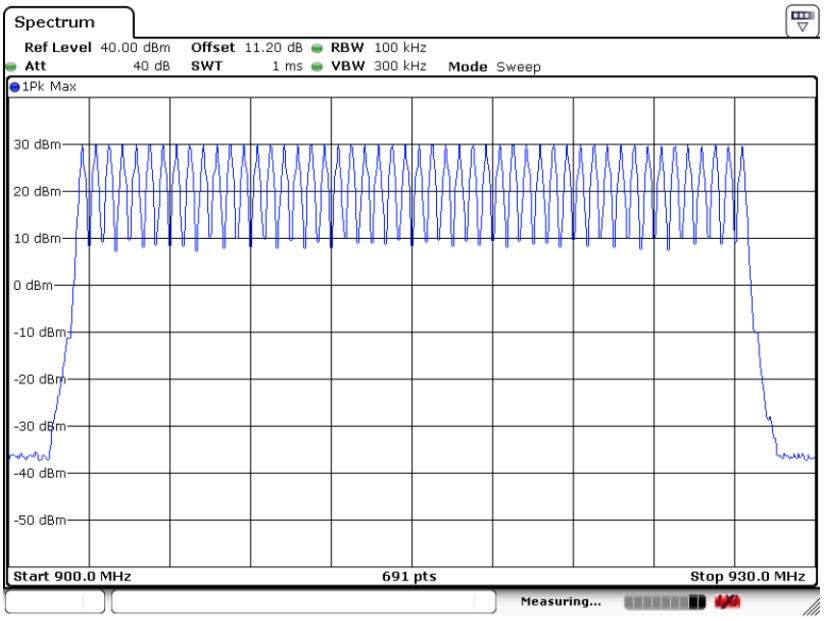
Number of Hopping (Channel)	Limits (Channel)	Pass/Fail
50	> 25	Pass

Number of Hopping Channel Plot on Channel 00 - 49

<Longe Range>



<Middle Range>



3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 902.75-927.25 MHz band may have hopping channel carrier frequencies that are 20 dB bandwidth of the hopping channel, whichever is greater.

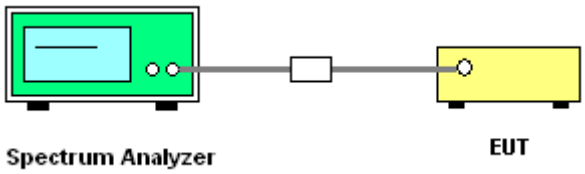
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.2.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels;
   RBW = 300kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Hopping Channel Separation

Test Mode :	UHF	Temperature :	21~25℃
Test Engineer :	Tommy Lee	Relative Humidity :	51~54%

<Long Range>

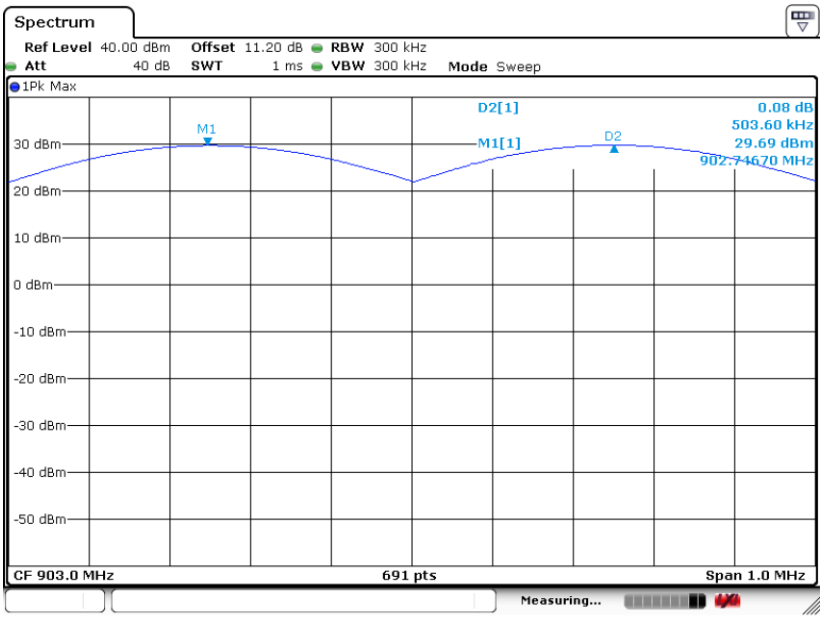
Mod.	NTX	CH.	Freq. (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
UHF RFID	1	0	902.75	0.504	0.3256	Pass
UHF RFID	1	24	914.75	0.501	0.3256	Pass
UHF RFID	1	49	927.25	0.504	0.3256	Pass

<Middle Range>

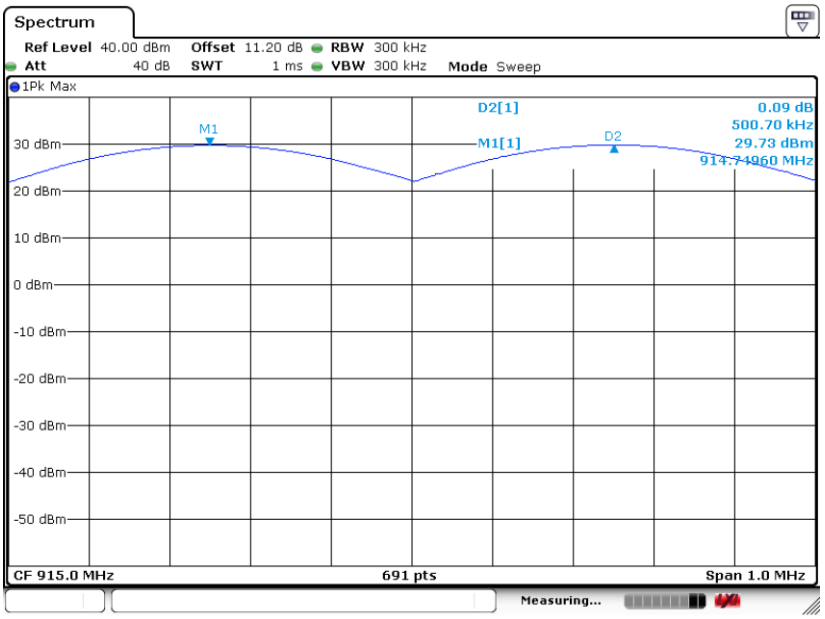
Mod.	NTX	CH.	Freq. (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
UHF RFID	1	0	902.75	0.504	0.3256	Pass
UHF RFID	1	24	914.75	0.501	0.3256	Pass
UHF RFID	1	49	927.25	0.504	0.3256	Pass

<Long Range>

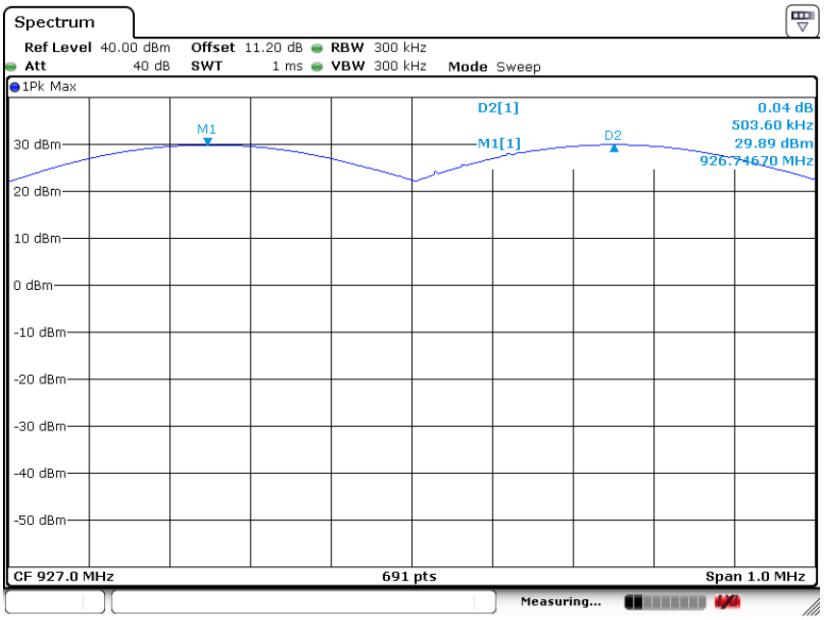
Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 24 - 25

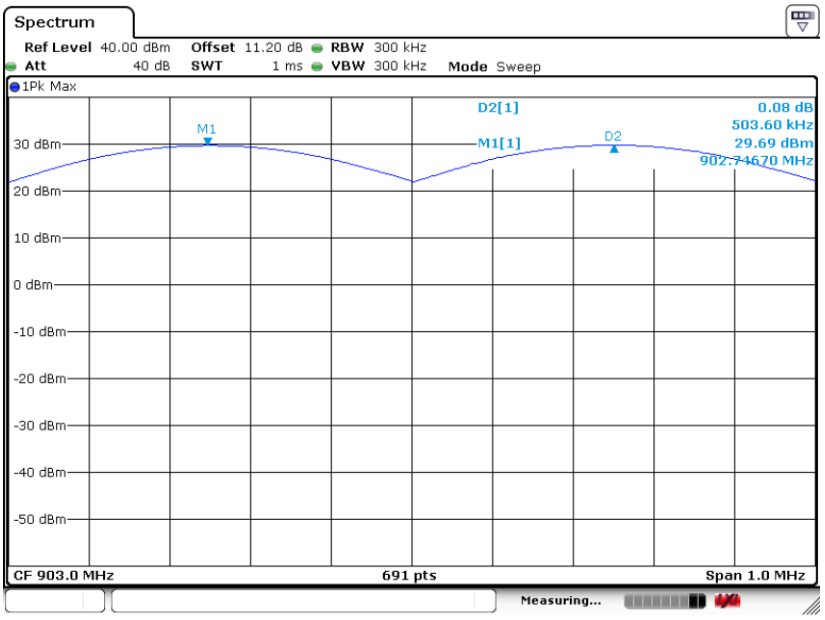


Channel Separation Plot on Channel 48 - 49

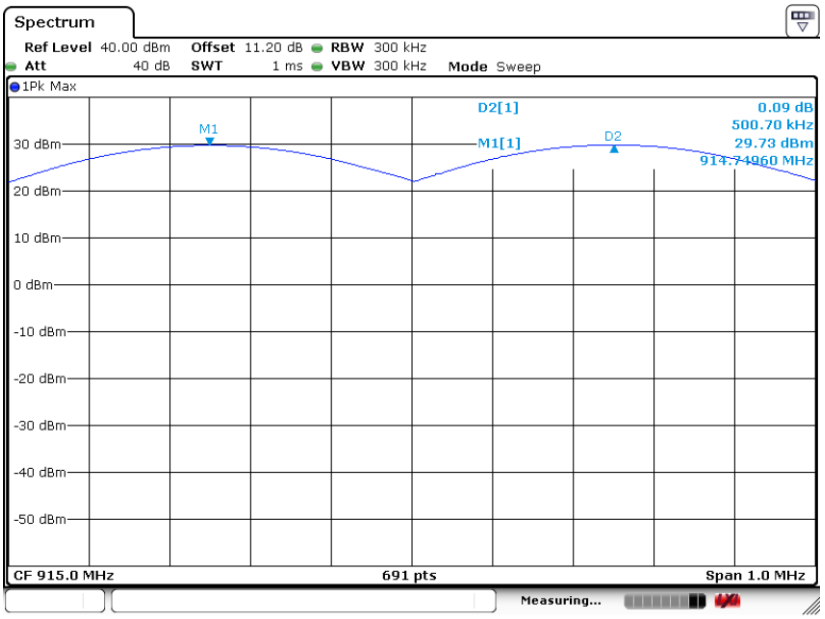


<Middle Range>

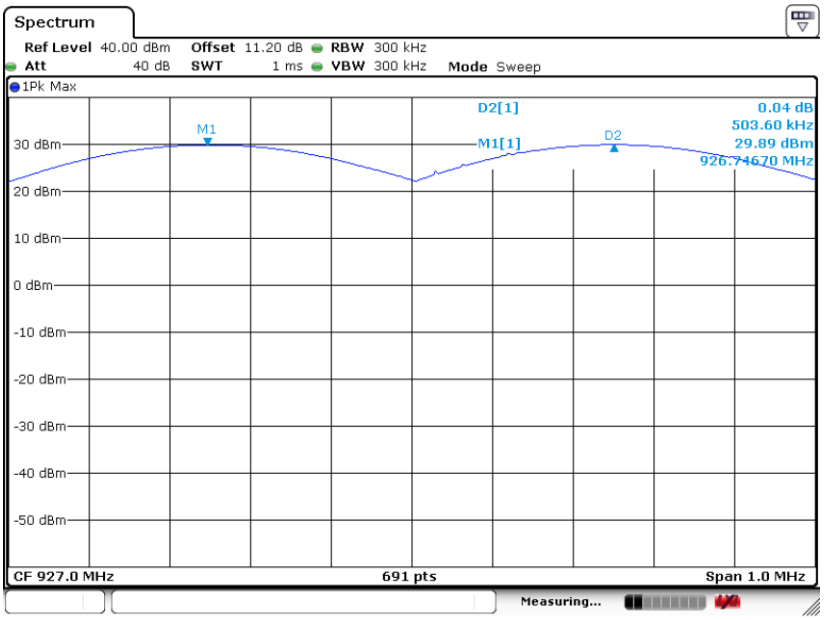
Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 24 - 25



Channel Separation Plot on Channel 48 - 49



3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 20 seconds multiplied by the number of hopping channels employed.

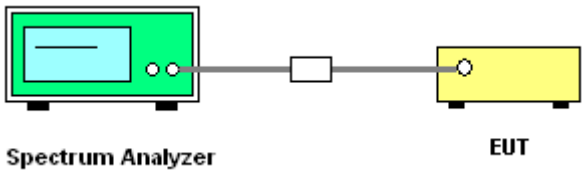
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.4.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Test Mode :	UHF	Temperature :	21~25℃
Test Engineer :	Tommy Lee	Relative Humidity :	51~54%

<Long Range>

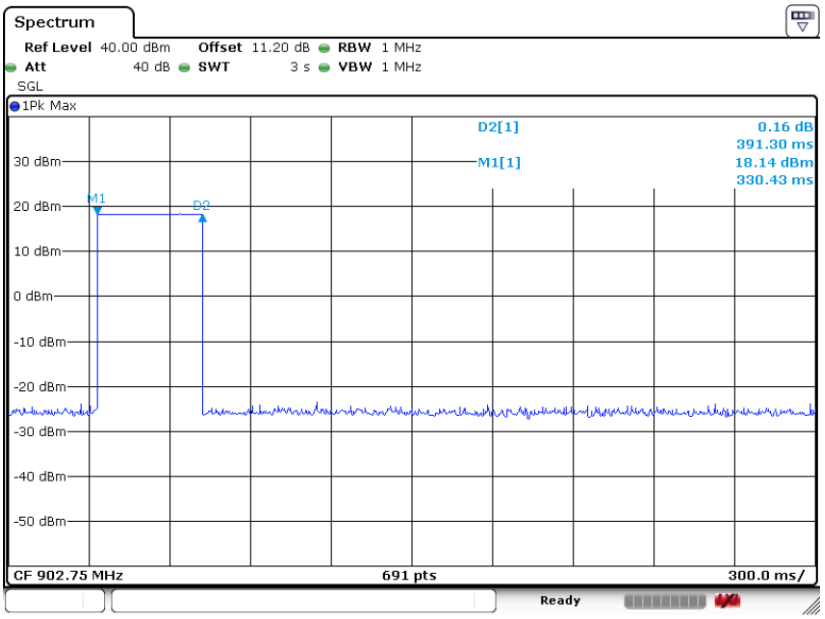
Mod.	Channel Number Rate	Package Transfer Time (msec)	Hops Over Occupancy Time (hops)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Nomal	50	391.30	1.00	0.391	0.4	Pass

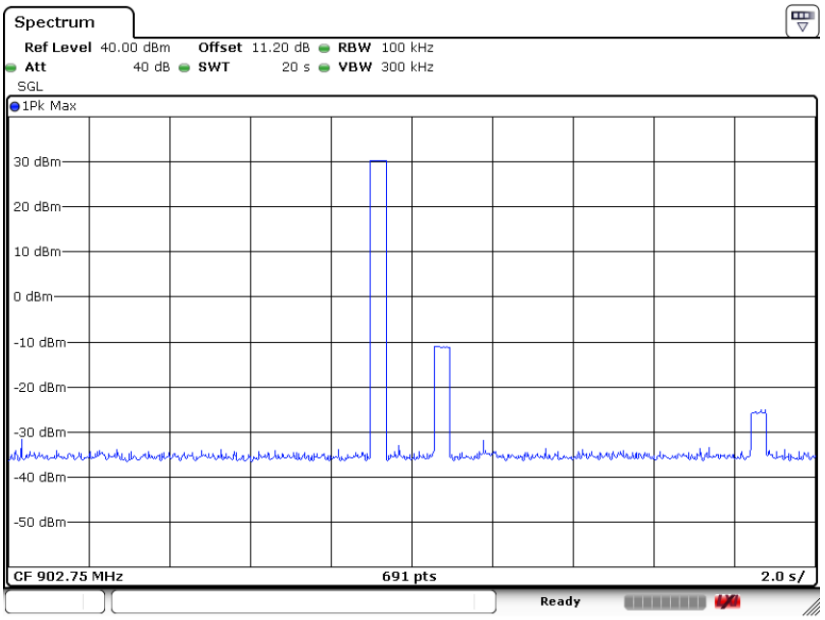
<Middle Range>

Mod.	Channel Number Rate	Package Transfer Time (msec)	Hops Over Occupancy Time (hops)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Nomal	50	391.30	1.00	0.391	0.4	Pass

<Long Range>

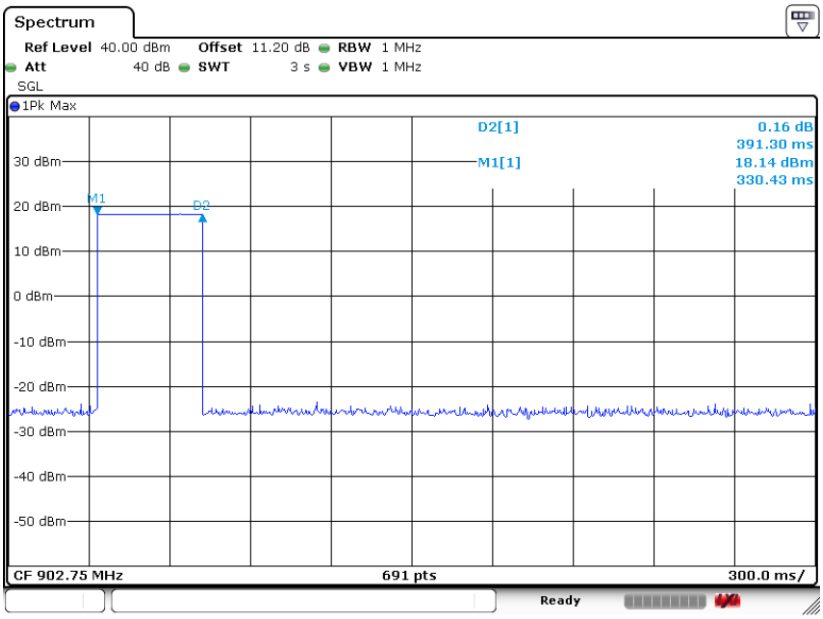
Package Transfer Time Plot

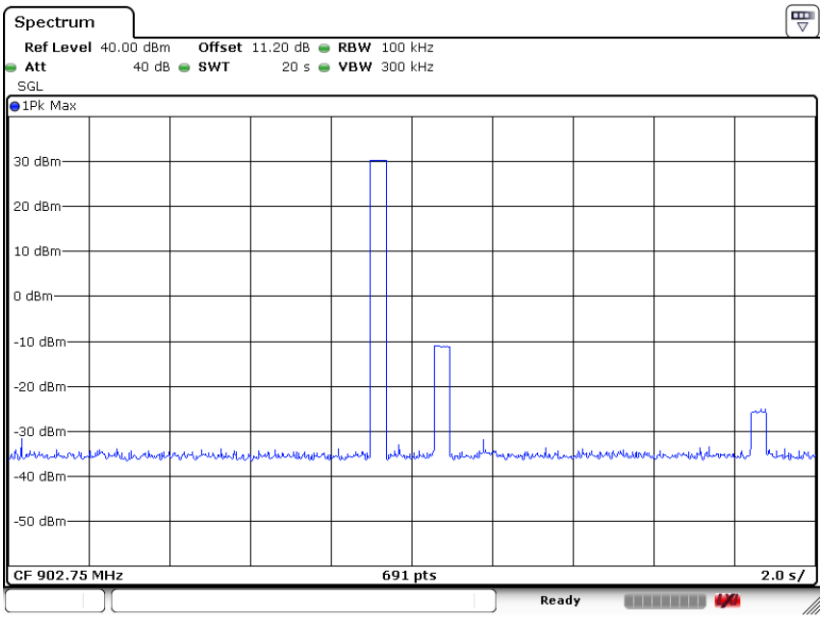




<Middle Range>

Package Transfer Time Plot





Remark: Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
   Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
   Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
   RBW ≥ 1-5% of the 99% bandwidth; VBW ≥ 3 * RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
6. Measure and record the results in the test report.

3.4.4 Test Setup

3.4.5 Test Result of 20dB Bandwidth

Test Mode :	UHF	Temperature :	21~25℃
Test Engineer :	Tommy Lee	Relative Humidity :	51~54%

<Long Range>

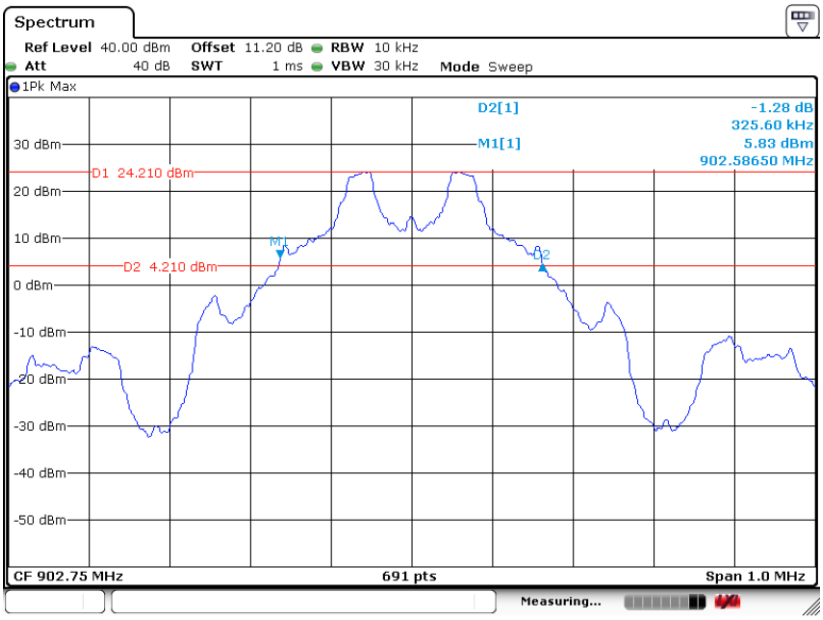
Mod.	NTx	CH.	Freq.(MHz)	20db BW (MHz)	Pass/Fail
UHF RFID	1	0	902.75	0.326	Pass
UHF RFID	1	24	914.75	0.326	Pass
UHF RFID	1	49	927.25	0.326	Pass

<Middle Range>

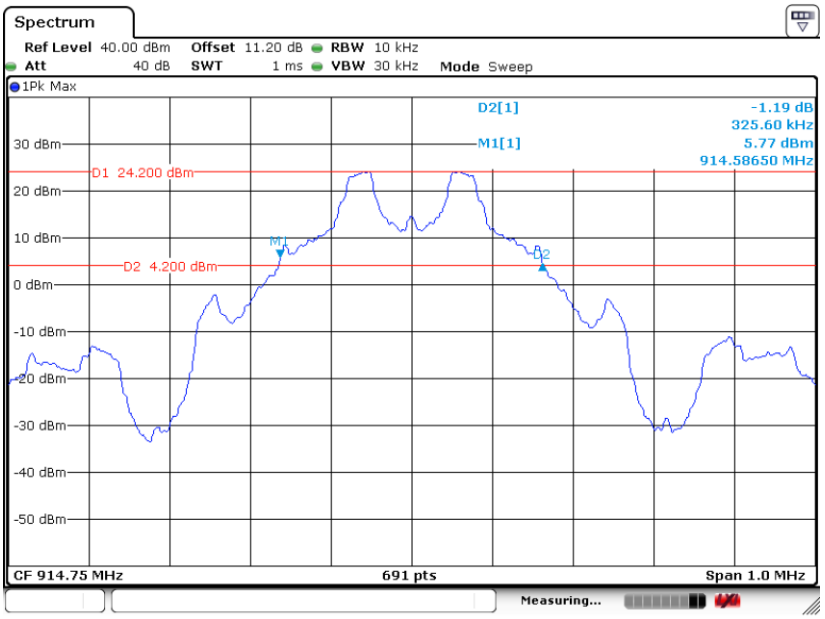
Mod.	NTx	CH.	Freq.(MHz)	20db BW (MHz)	Pass/Fail
UHF RFID	1	0	902.75	0.326	Pass
UHF RFID	1	24	914.75	0.326	Pass
UHF RFID	1	49	927.25	0.326	Pass

<Long Range>

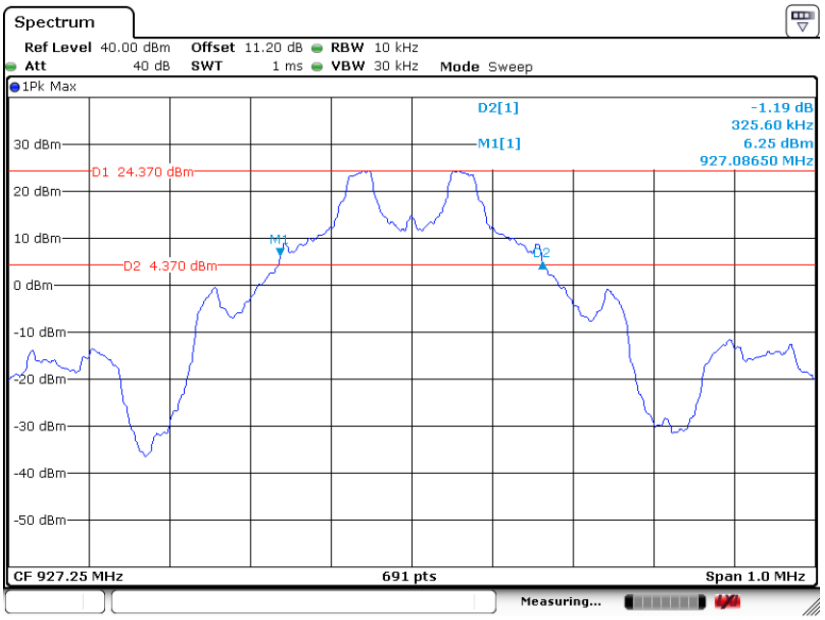
20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 24

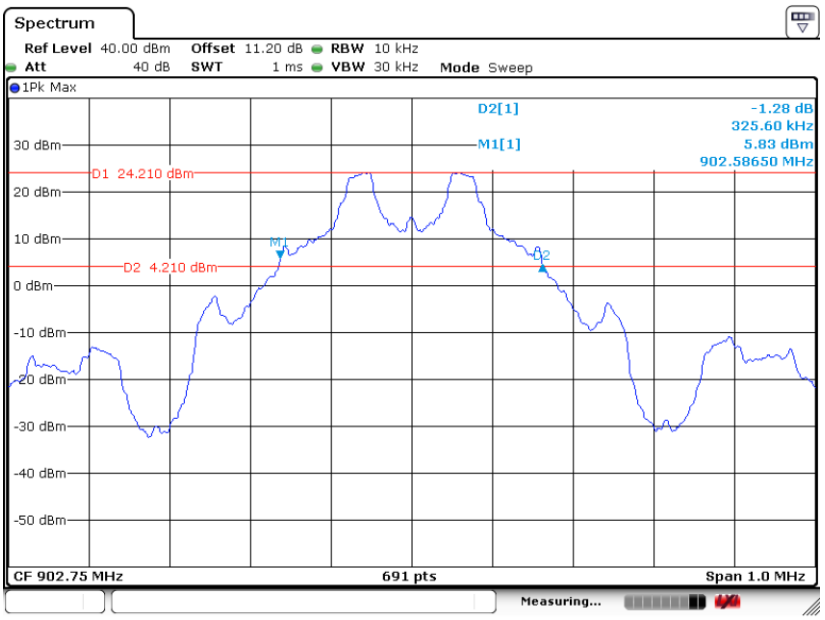


20 dB Bandwidth Plot on Channel 49

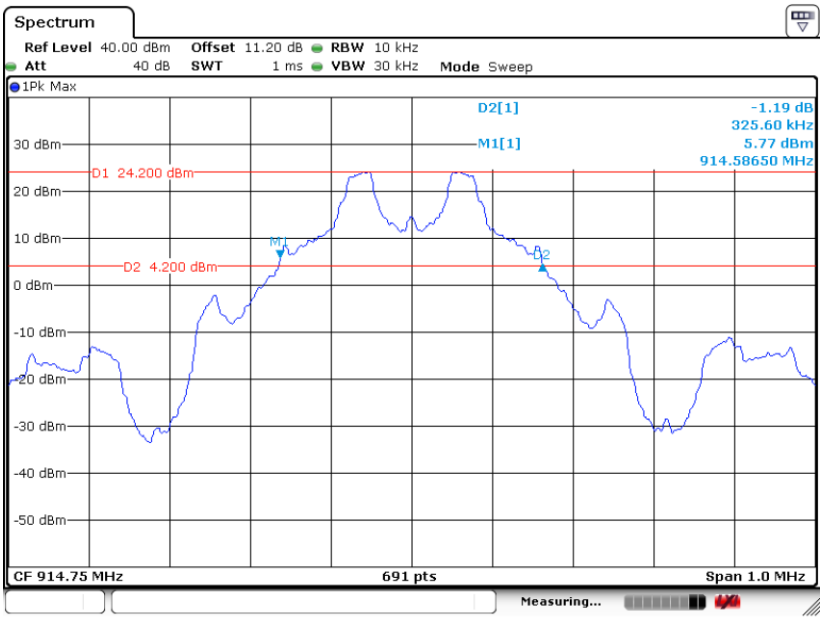


<Middle Range >

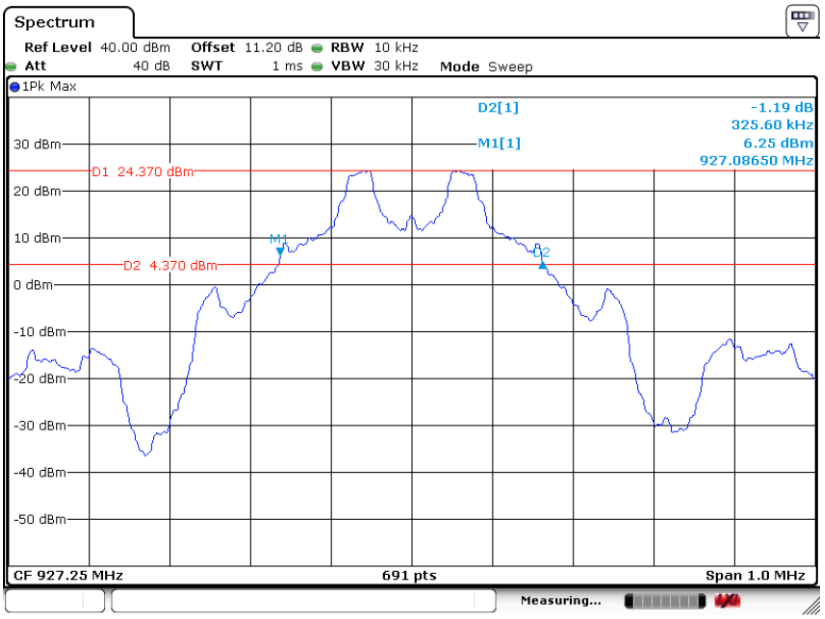
20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 24



20 dB Bandwidth Plot on Channel 49



3.4.6 Test Result of 99% Occupied Bandwidth

Test Mode :	UHF	Temperature :	21~25℃
Test Engineer :	Tommy Lee	Relative Humidity :	51~54%

<Long Range>

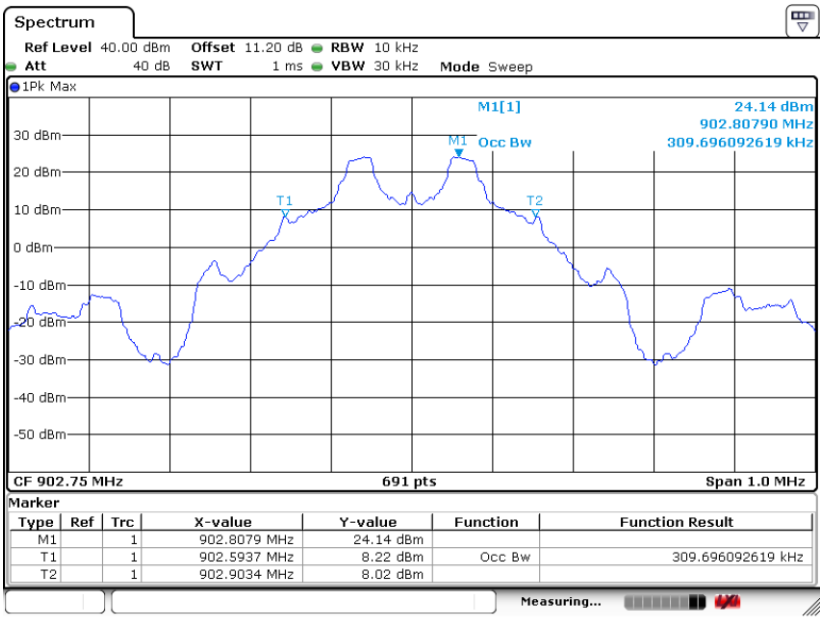
Mod.	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	Pass/Fail
UHF RFID	1	0	902.75	0.310	Pass
UHF RFID	1	24	914.75	0.313	Pass
UHF RFID	1	49	927.25	0.315	Pass

<Middle Range>

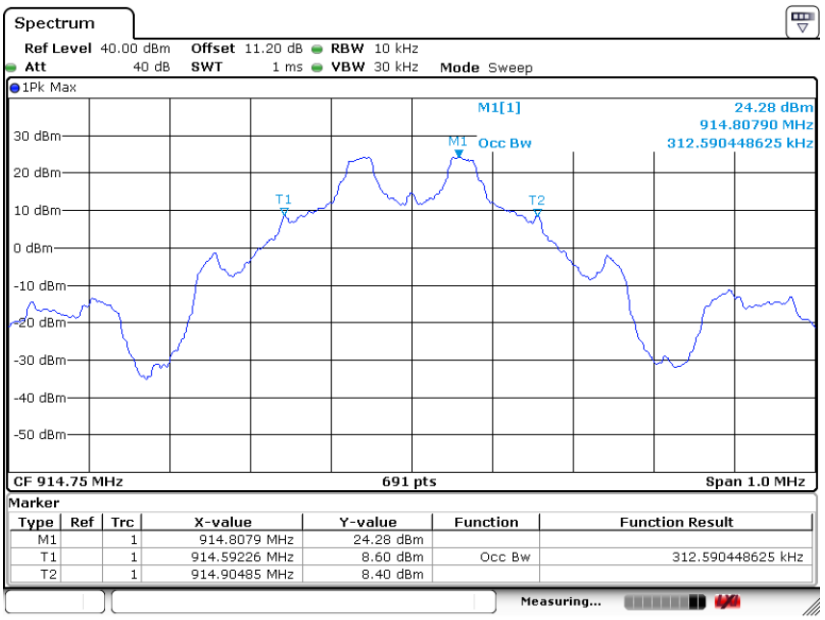
Mod.	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	Pass/Fail
UHF RFID	1	0	902.75	0.310	Pass
UHF RFID	1	24	914.75	0.313	Pass
UHF RFID	1	49	927.25	0.315	Pass

<Long Range>

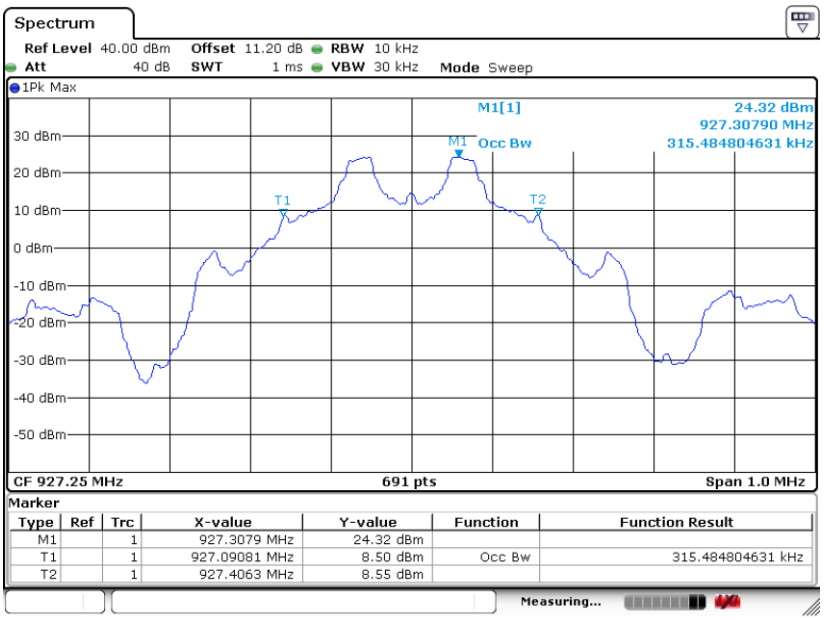
99% Occupied Bandwidth Plot on Channel 00



99% Occupied Bandwidth Plot on Channel 24

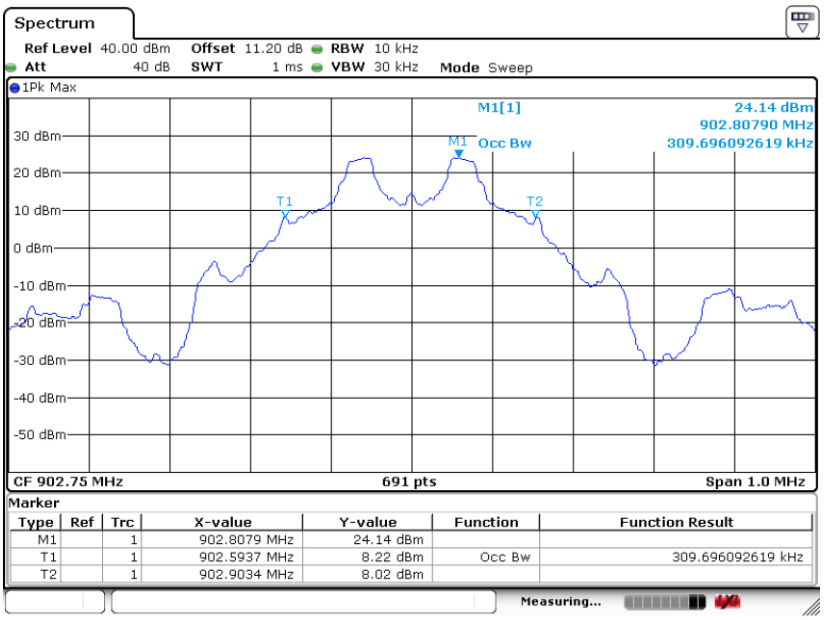


99% Occupied Bandwidth Plot on Channel 49

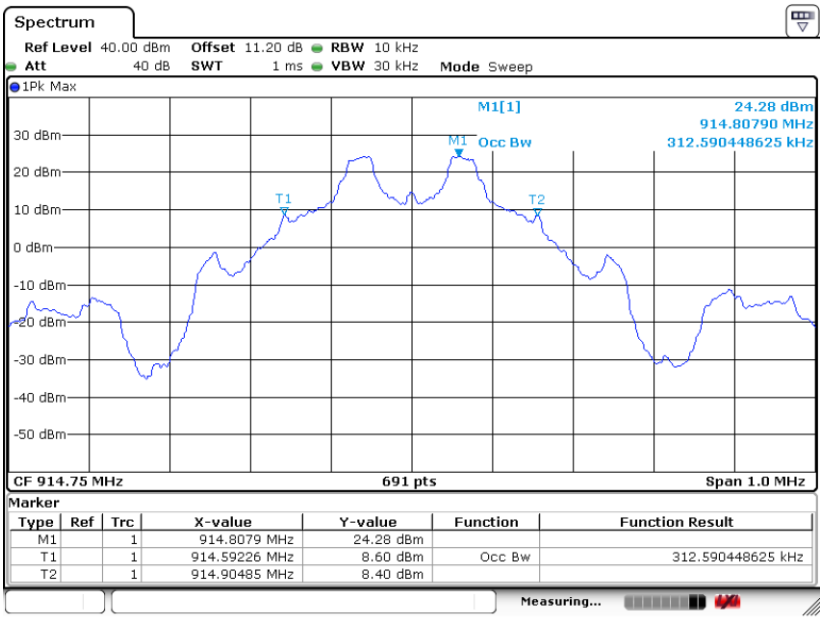


<Middle Range>

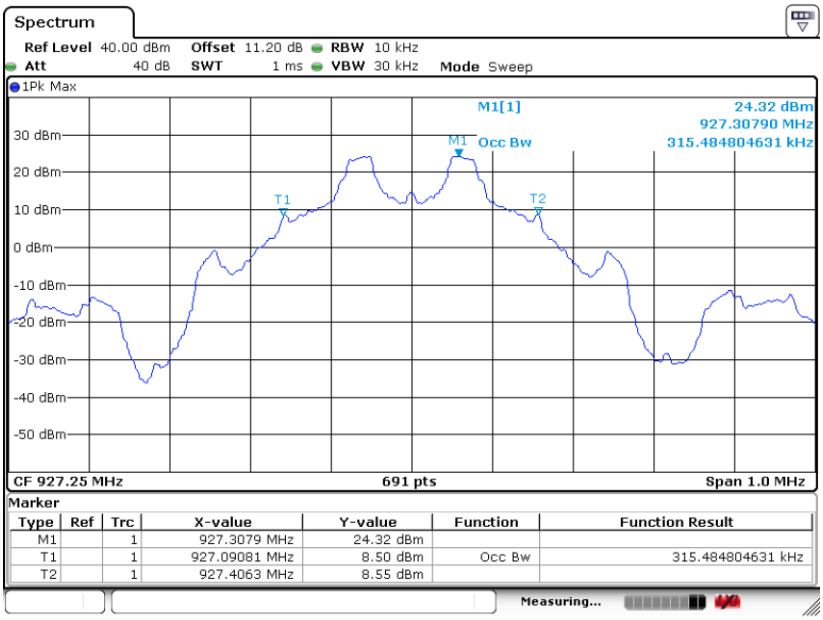
99% Occupied Bandwidth Plot on Channel 00



99% Occupied Bandwidth Plot on Channel 24



99% Occupied Bandwidth Plot on Channel 49



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.5 Output Power Measurement

3.5.1 Limit of Output Power

Section 15.247 (a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions: (1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

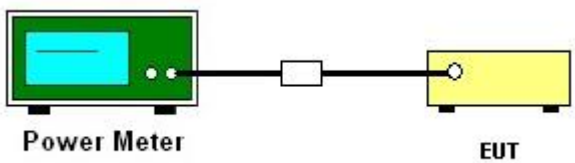
3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup



3.5.5 Test Result of Output Power

Test Mode :	UHF	Temperature :	21~25℃
Test Engineer :	Tommy Lee	Relative Humidity :	51~54%

<Long Range>

Channel	Frequency (MHz)	RF Power (dBm)		
		UHF	Max. Limits (dBm)	Pass/Fail
0	902.75	29.82	30.00	Pass
24	914.75	29.83	30.00	Pass
49	927.25	29.81	30.00	Pass

<Middle Range>

Channel	Frequency (MHz)	RF Power (dBm)		
		UHF	Max. Limits (dBm)	Pass/Fail
0	902.75	27.86	30.00	Pass
24	914.75	27.88	30.00	Pass
49	927.25	27.90	30.00	Pass

3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

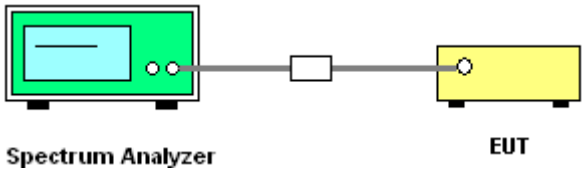
3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.6.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz, VBW = 300kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

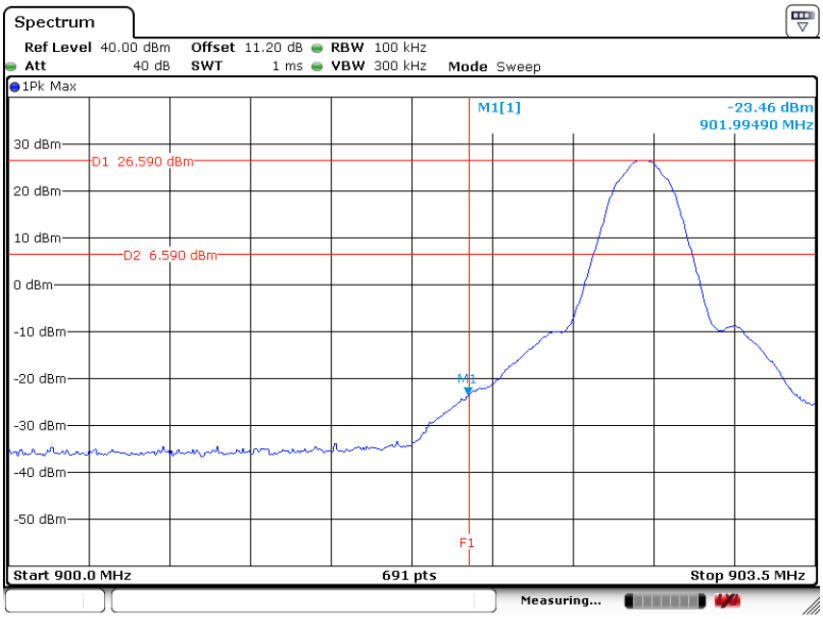
3.6.4 Test Setup



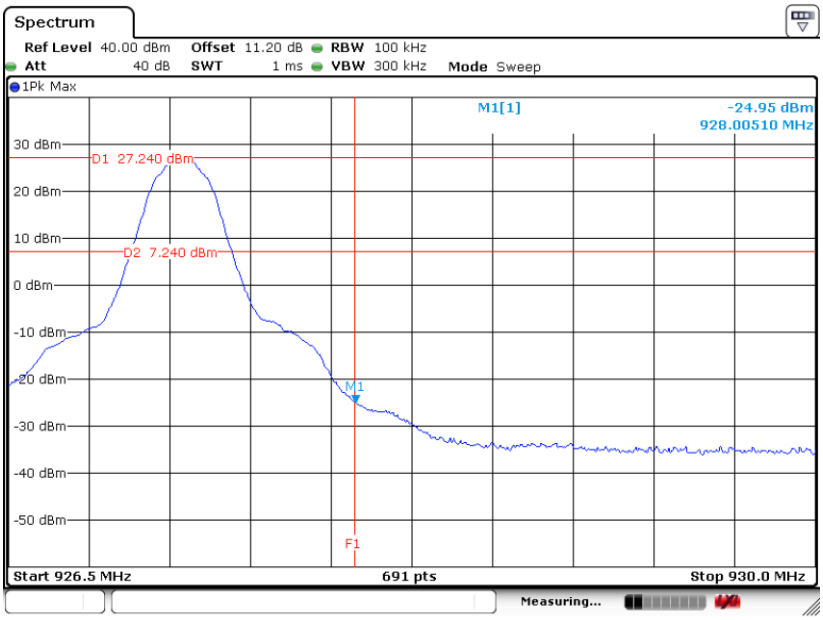
3.6.5 Test Result of Conducted Band Edges

<Long Range>

Low Band Edge Plot on Channel 00

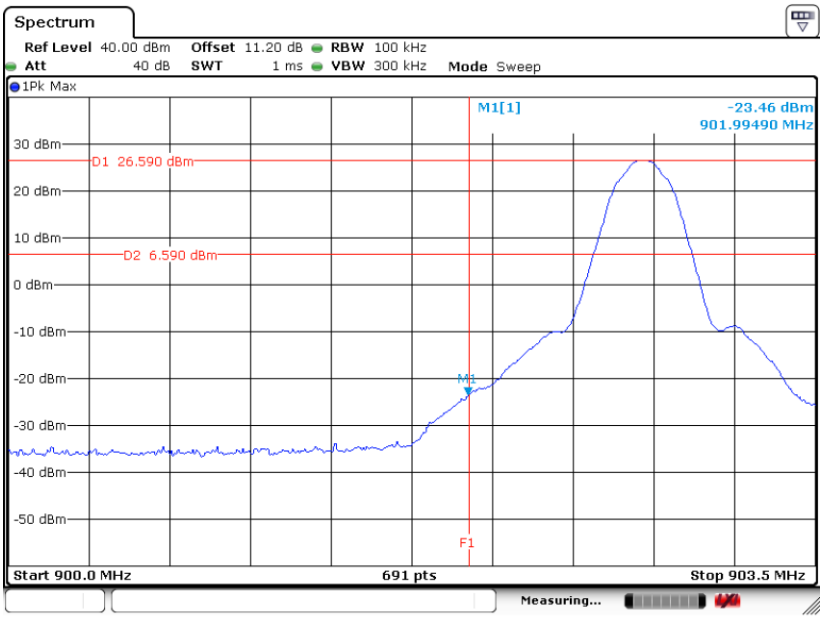


High Band Edge Plot on Channel 49

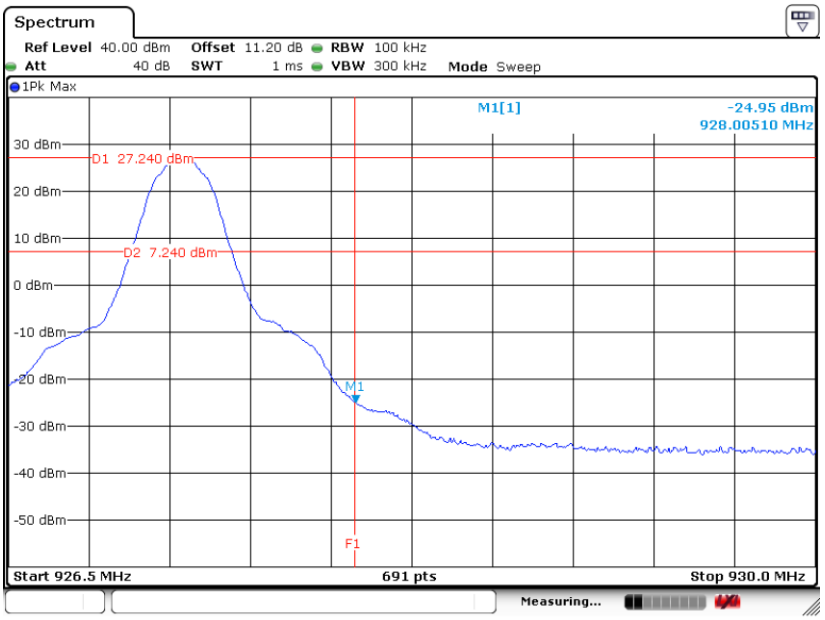


<Middle Range>

Low Band Edge Plot on Channel 00



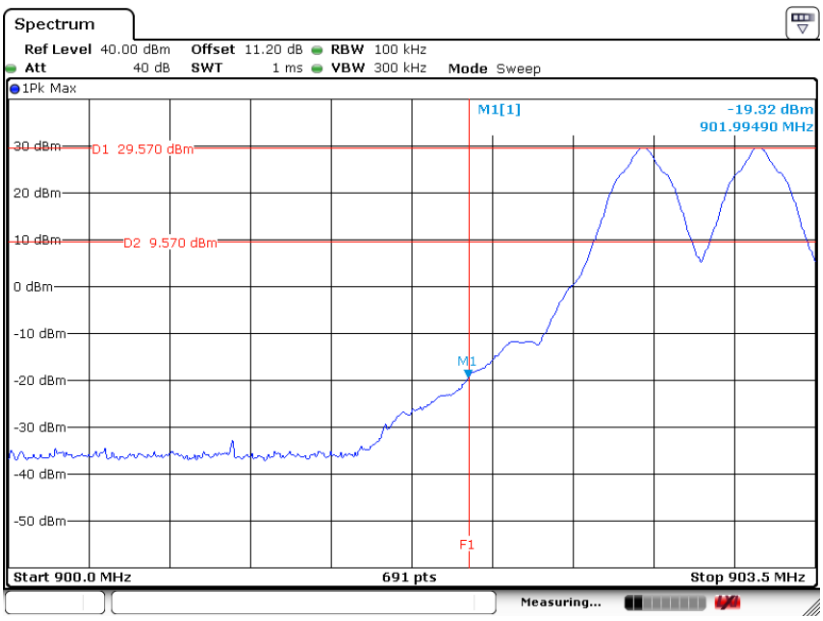
High Band Edge Plot on Channel 49



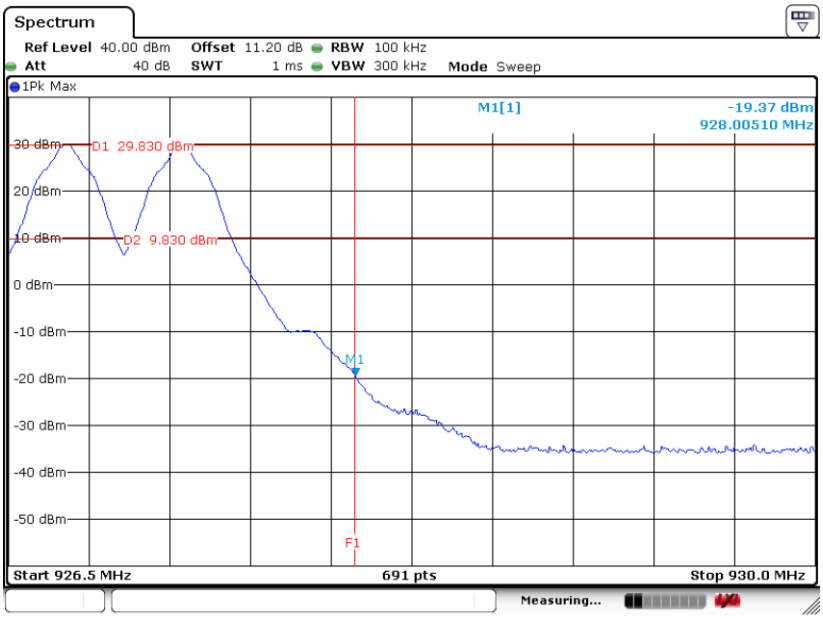
3.6.6 Test Result of Conducted Hopping Mode Band Edges

<Long Range>

Hopping Mode Low Band Edge Plot

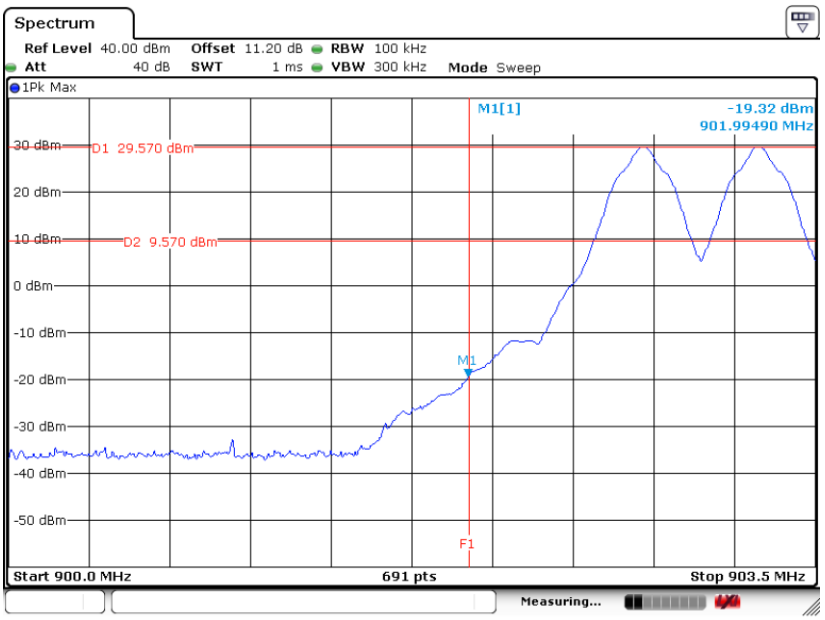


Hopping Mode High Band Edge Plot

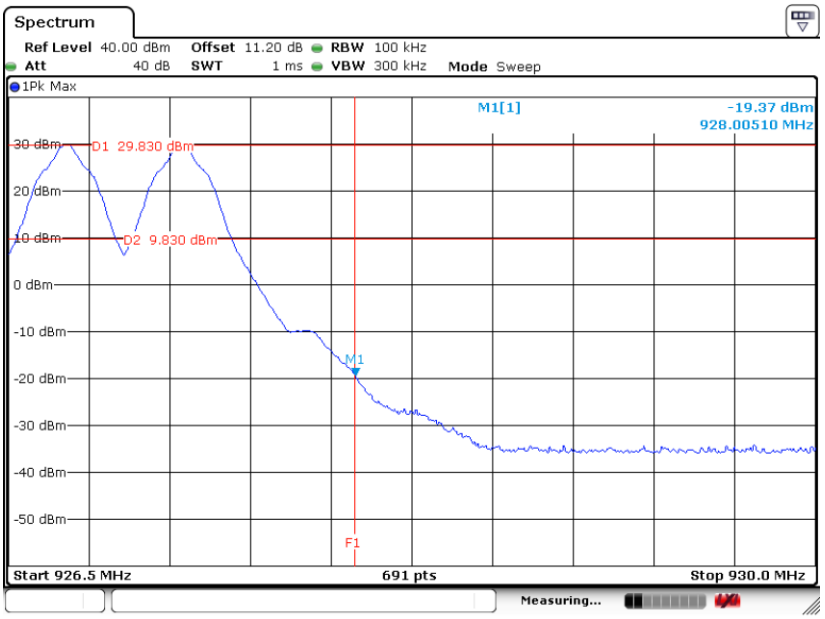


<Middle Range>

Hopping Mode Low Band Edge Plot



Hopping Mode High Band Edge Plot



3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

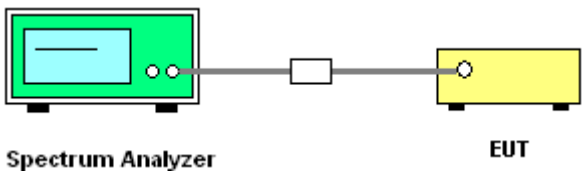
3.7.2 Measuring Instruments

See list of measuring equipment of this test report.

3.7.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

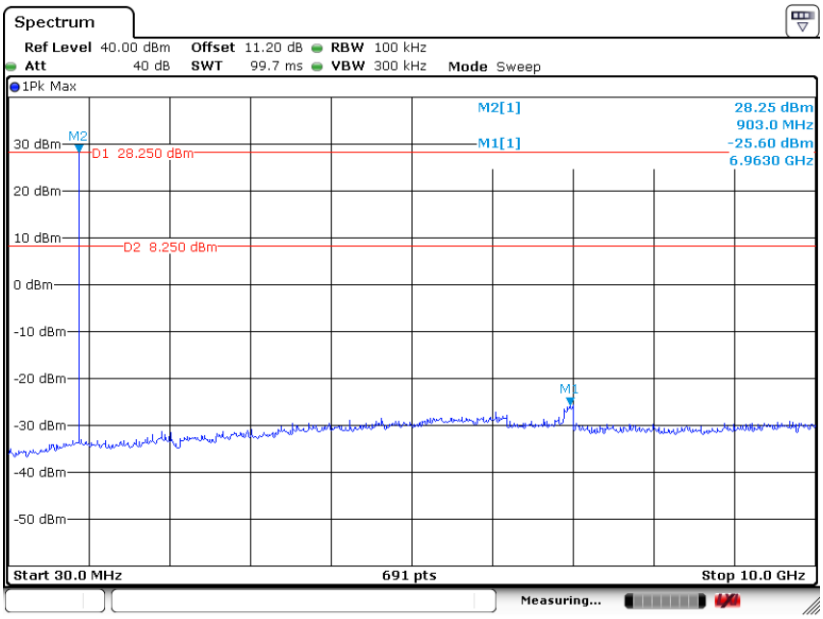
3.7.4 Test Setup



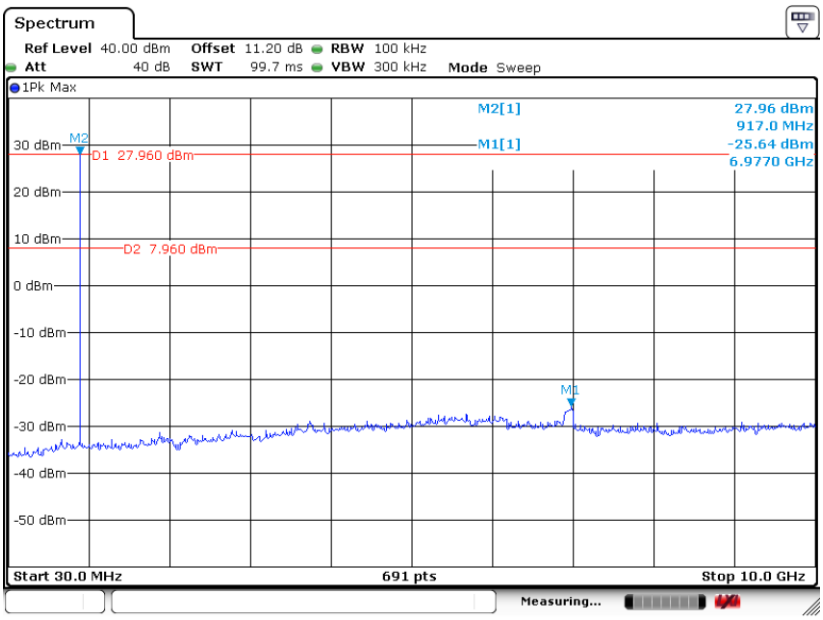
3.7.5 Test Result of Conducted Spurious Emission

<Long Range>

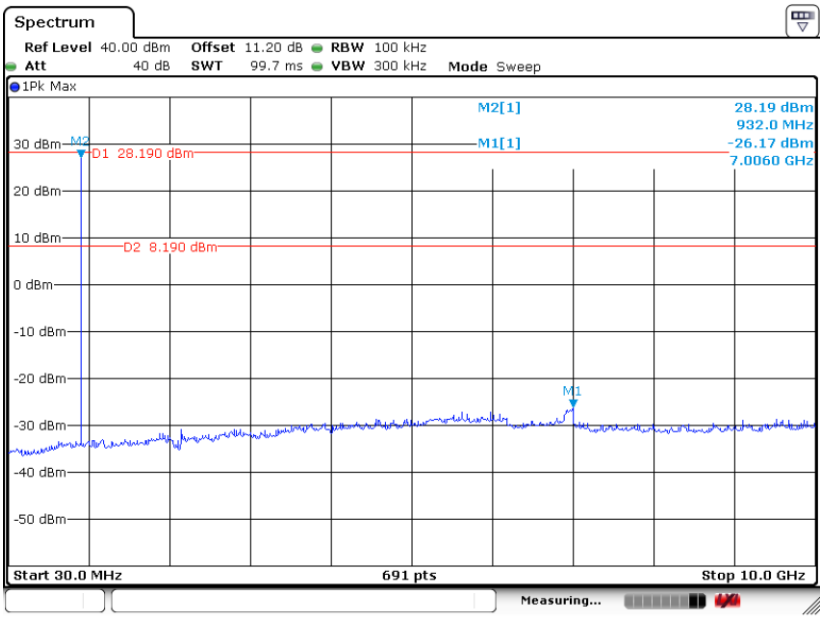
CSE Plot on Ch 00 between 30MHz ~ 10 GHz



CSE Plot on Ch 24 between 30MHz ~ 10 GHz

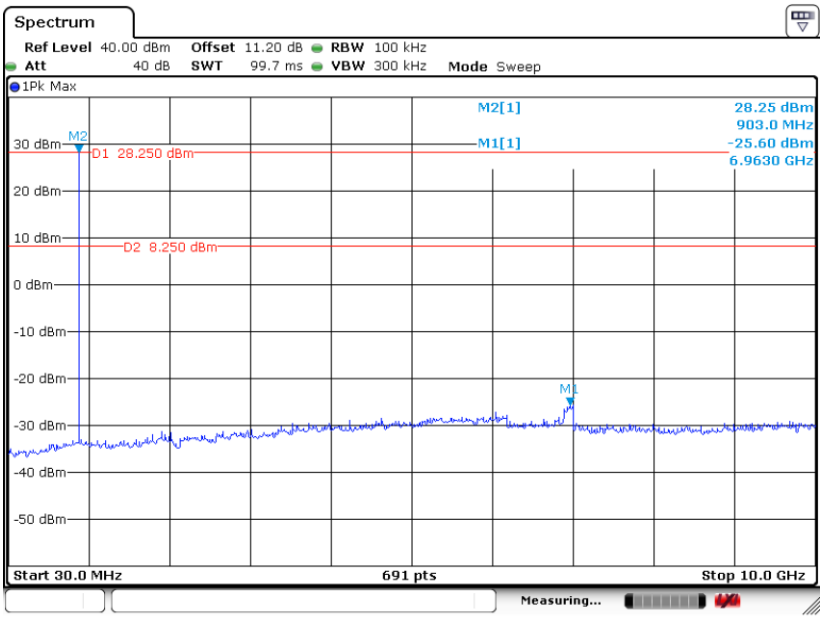


CSE Plot on Ch 49 between 30MHz ~ 10 GHz

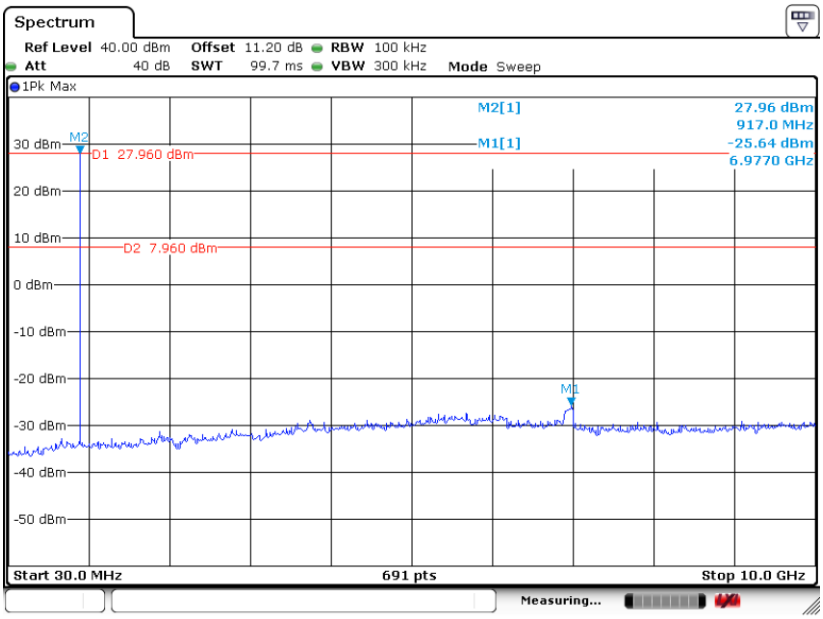


<Middle Range>

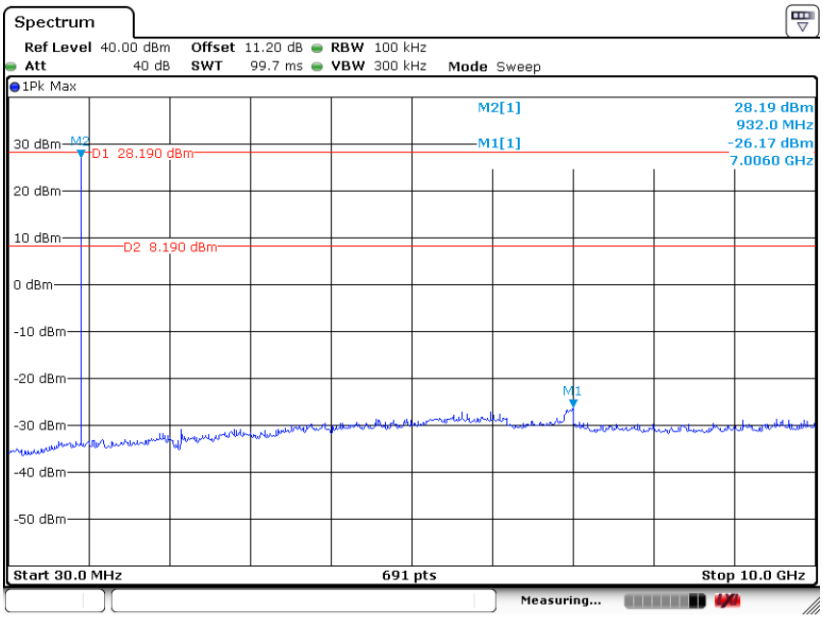
CSE Plot on Ch 00 between 30MHz ~ 10 GHz



CSE Plot on Ch 24 between 30MHz ~ 10 GHz



CSE Plot on Ch 49 between 30MHz ~ 10 GHz



3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.8.2 Measuring Instruments

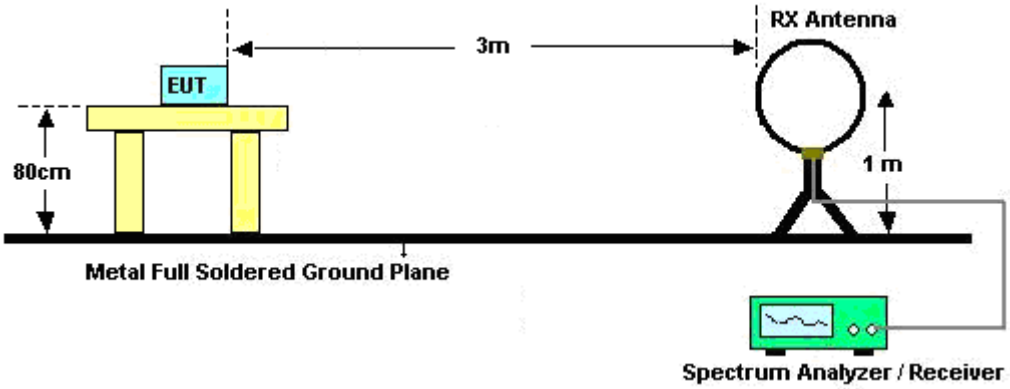
See list of measuring equipment of this test report.

3.8.3 Test Procedures

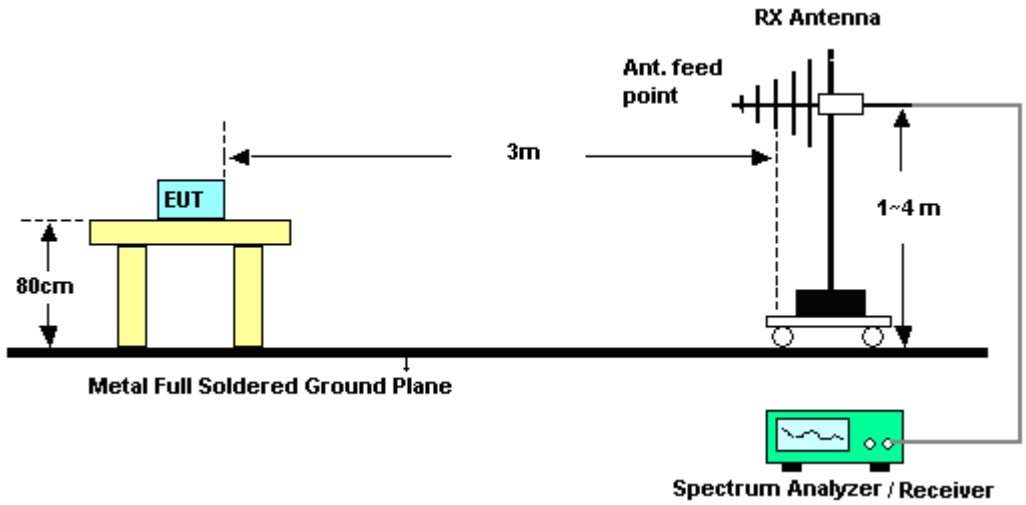
1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = N1*L1+N2*L2+...+Nn-1*LNn-1+Nn*Ln
   Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.8.4 Test Setup

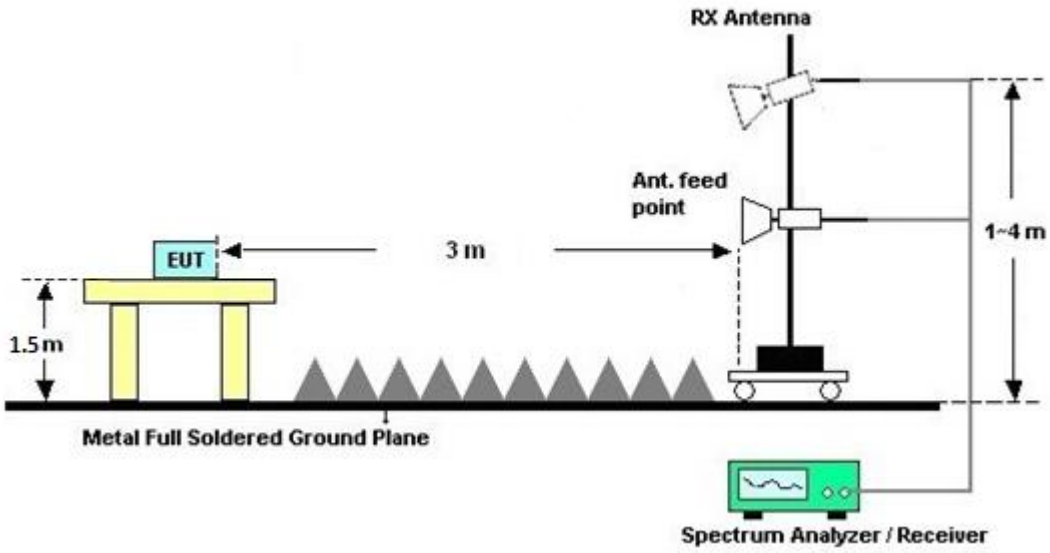
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

3.8.7 Duty Cycle

Please refer to Appendix C.

3.8.8 Test Result of Radiated Spurious Emission

Please refer to Appendix A and B.

3.9 Antenna Requirements

3.9.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.9.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.9.3 Antenna Gain

The antenna peak gain of EUT is 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1036004	N/A	Aug. 08, 2019	Aug. 26, 2019~ Oct. 11, 2019	Aug. 07, 2020	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 08, 2019	Aug. 26, 2019~ Oct. 11, 2019	Aug. 07, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz~30GHz	Jan. 21, 2019	Aug. 26, 2019~ Oct. 11, 2019	Jan. 20, 2020	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	GEO821767	N/A	Oct. 16, 2018	Aug. 26, 2019~ Oct. 11, 2019	Oct. 15, 2019	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1208382	N/A	Mar. 27, 2019	Aug. 26, 2019~ Oct. 11, 2019	Mar. 26, 2020	Conducted (TH05-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Oct. 01, 2019~ Oct. 02, 2019	Dec. 05, 2019	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 04, 2018	Oct. 01, 2019~ Oct. 02, 2019	Dec. 03, 2019	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-06	35414&AT-N0602	30MHz~1GHz	Oct. 13, 2018	Oct. 01, 2019~ Oct. 02, 2019	Oct. 12, 2019	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 30, 2018	Oct. 01, 2019~ Oct. 02, 2019	Oct. 29, 2019	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 22, 2018	Oct. 01, 2019~ Oct. 02, 2019	Nov. 21, 2019	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 14, 2018	Oct. 01, 2019~ Oct. 02, 2019	Nov. 13, 2020	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHz	Oct. 19, 2018	Oct. 01, 2019~ Oct. 02, 2019	Oct. 18, 2019	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Oct. 01, 2019~ Oct. 02, 2019	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Oct. 01, 2019~ Oct. 02, 2019	N/A	Radiation (03CH11-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590074	1GHz~18GHz	May 20, 2019	Oct. 01, 2019~ Oct. 02, 2019	May 19, 2020	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Dec. 05, 2018	Oct. 01, 2019~ Oct. 02, 2019	Dec. 04, 2019	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	N/A	Nov. 01, 2018	Oct. 01, 2019~ Oct. 02, 2019	Oct. 31, 2019	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Oct. 01, 2019~ Oct. 02, 2019	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 13, 2019	Oct. 01, 2019~ Oct. 02, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 13, 2019	Oct. 01, 2019~ Oct. 02, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30M-18G	Mar. 13, 2019	Oct. 01, 2019~ Oct. 02, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 13, 2019	Oct. 01, 2019~ Oct. 02, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WLJ4-1000-1530-6000-40ST	SN3	1.53GHz Low Pass Filter	Mar. 23, 2019	Oct. 01, 2019~ Oct. 02, 2019	Mar. 22, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-1080-1200-15000-60ST	SN1	1.2GHz High Pass Filter	Mar. 19, 2019	Oct. 01, 2019~ Oct. 02, 2019	Mar. 18, 2020	Radiation (03CH11-HY)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.5**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Appendix A. Radiated Spurious Emission

Test Engineer :	Fu Chen and Troye Hsieh	Temperature :	21.4~24.8°C
		Relative Humidity :	51~65.8%

<SKU 1>

902~928MHz

UHF (1GHz ~ 10GHz @ 3m)

UHF	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.75MHz		1805.5	37.88	-36.12	74	66.9	25.11	6.9	61.03	100	0	P	H
		2708.25	35.69	-38.31	74	60.71	27.62	8.2	60.84	100	0	P	H
		3611	41.12	-32.88	74	63.86	29.12	9.3	61.16	100	0	P	H
		1805.5	34.68	-39.32	74	63.7	25.11	6.9	61.03	100	0	P	V
		2708.25	36.21	-37.79	74	61.23	27.62	8.2	60.84	100	0	P	V
		3611	41.92	-32.08	74	64.66	29.12	9.3	61.16	100	0	P	V
914.75MHz		1829.5	42.74	-31.26	74	71.64	25.16	6.98	61.04	100	0	P	H
		3659	40.82	-33.18	74	63.4	29.2	9.35	61.13	100	0	P	H
													H
													H
													H
		1829.5	41.47	-32.53	74	70.37	25.16	6.98	61.04	100	0	P	V
		3659	43.72	-30.28	74	66.3	29.2	9.35	61.13	100	0	P	V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UHF	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
927.25MHz		1854.5	43.5	-30.5	74	72.29	25.22	7.05	61.06	100	0	P	H
		2781.75	36.25	-37.75	74	60.95	27.89	8.28	60.87	100	0	P	H
		3709	40.77	-33.23	74	63.22	29.22	9.42	61.09	100	0	P	H
													H
													H
		1854.5	40.61	-33.39	74	69.4	25.22	7.05	61.06	100	0	P	V
		2781.75	36.61	-37.39	74	61.31	27.89	8.28	60.87	100	0	P	V
		3709	43.63	-30.37	74	66.08	29.22	9.42	61.09	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

902~928MHz

(30MHz ~ 1GH @3m)

UHF	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.75MHz		30.97	31.29	-8.71	40	29.42	23.58	10.66	32.37	-	-	P	H
		97.9	27.98	-15.52	43.5	33.64	15.45	11.21	32.32	-	-	P	H
		155.13	28.15	-15.35	43.5	32.25	16.58	11.6	32.28	-	-	P	H
		741.01	39.93	-6.07	46	30.55	27.69	13.72	32.03	-	-	P	H
		867.11	36.9	-9.1	46	25.08	29.27	14.07	31.52	100	270	QP	H
	*	902.75	124.21	-	-	112.39	29	14.14	31.32	-	-	P	H
		951.5	38.57	-7.43	46	24.56	30.64	14.25	30.88	126	267	QP	H
													H
													H
		41.64	33.93	-6.07	40	37.32	18.23	10.75	32.37	100	19	QP	V
		75.59	25.68	-14.32	40	34.33	12.61	11.08	32.34	-	-	P	V
		186.17	29.42	-14.08	43.5	35.25	14.61	11.81	32.25	-	-	P	V
		868.08	37.11	-8.89	46	25.29	29.27	14.07	31.52	100	275	QP	V
	*	902.75	126.81	-	-	114.99	29	14.14	31.32	-	-	P	V
		943.74	38.31	-7.69	46	24.83	30.19	14.24	30.95	111	231	QP	V
		959.26	39.22	-6.78	46	24.78	30.97	14.27	30.8	100	274	QP	V
													V
													V

Remark	1. No other spurious found. 2. All results are PASS against limit line.

UHF	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
914.75MHz		33.88	30.15	-9.85	40	29.53	22.3	10.69	32.37	-	-	P	H
		65.89	25.18	-14.82	40	34.88	11.67	10.98	32.35	-	-	P	H
		154.16	29.13	-14.37	43.5	33.19	16.64	11.58	32.28	-	-	P	H
		840.92	36.03	-9.97	46	24.88	28.81	14	31.66	100	298	QP	H
		891.36	37.2	-8.8	46	25.45	29.03	14.12	31.4	146	289	QP	H
	*	914.75	124.54	-	-	112.51	29.07	14.17	31.21	-	-	P	H
		952.47	42.7	-3.3	46	28.63	30.68	14.26	30.87	190	314	QP	H
													H
													H
		41.64	33.89	-6.11	40	37.28	18.23	10.75	32.37	100	19	QP	V
		75.59	25.86	-14.14	40	34.51	12.61	11.08	32.34	-	-	P	V
		155.13	28.05	-15.45	43.5	32.15	16.58	11.6	32.28	-	-	P	V
		676.99	38.88	-7.12	46	31.04	26.51	13.48	32.15	-	-	P	V
		895.24	37.61	-8.39	46	25.85	29.01	14.13	31.38	109	280	QP	V
	*	914.75	126.76	-	-	114.73	29.07	14.17	31.21	-	-	P	V
		956.35	39.03	-6.97	46	24.76	30.85	14.25	30.83	110	247	QP	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.

UHF	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
927.25MHz		30.97	31.25	-8.75	40	29.38	23.58	10.66	32.37	-	-	P	H
		63.95	26.07	-13.93	40	35.86	11.61	10.96	32.36	-	-	P	H
		119.24	30.43	-13.07	43.5	34.13	17.29	11.31	32.3	-	-	P	H
		803.09	35.09	-10.91	46	24.89	28.19	13.87	31.86	145	319	QP	H
		899.12	37.51	-8.49	46	25.73	28.99	14.14	31.35	139	254	QP	H
	*	927.25	124.14	-	-	111.67	29.37	14.2	31.1	-	-	P	H
		942.77	37.74	-8.26	46	24.34	30.12	14.24	30.96	100	0	QP	H
													H
													H
		31.94	32.82	-7.18	40	31.36	23.16	10.67	32.37	-	-	P	V
		41.64	36.31	-3.69	40	39.7	18.23	10.75	32.37	100	21	QP	V
		118.27	28.94	-14.56	43.5	32.76	17.19	11.3	32.31	-	-	P	V
		866.14	37.17	-8.83	46	25.35	29.28	14.07	31.53	100	272	QP	V
		913.67	37.9	-8.1	46	25.89	29.06	14.17	31.22	100	232	QP	V
	*	927.25	125.43	-	-	112.96	29.37	14.2	31.1	-	-	P	V
		955.38	39.09	-6.91	46	24.86	30.81	14.26	30.84	100	276	QP	V
													V
													V

Remark	1. No other spurious found. 2. All results are PASS against limit line.

<SKU 2>

902~928MHz

(1GHz ~ 10GHz @ 3m)

UHF	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.75MHz		1805.5	37.49	-36.51	74	66.51	25.11	6.9	61.03	100	0	P	H
		2708.25	35.43	-38.57	74	60.45	27.62	8.2	60.84	100	0	P	H
		3611	40.9	-33.1	74	63.64	29.12	9.3	61.16	100	0	P	H
													H
													H
		1805.5	34.94	-39.06	74	63.96	25.11	6.9	61.03	100	0	P	V
		2708.25	36.71	-37.29	74	61.73	27.62	8.2	60.84	100	0	P	V
		3611	43.03	-30.97	74	65.77	29.12	9.3	61.16	100	0	P	V
													V
													V
914.75MHz		1829.5	43.4	-30.6	74	72.3	25.16	6.98	61.04	100	0	P	H
		3659	40.97	-33.03	74	63.55	29.2	9.35	61.13	100	0	P	H
													H
													H
													H
		1829.5	41.03	-32.97	74	69.93	25.16	6.98	61.04	100	0	P	V
		3659	44.14	-29.86	74	66.72	29.2	9.35	61.13	100	0	P	V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UHF	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
927.25MHz		1854.5	44.02	-29.98	74	72.81	25.22	7.05	61.06	100	0	P	H
		2781.75	36.23	-37.77	74	60.93	27.89	8.28	60.87	100	0	P	H
		3709	40.73	-33.27	74	63.18	29.22	9.42	61.09	100	0	P	H
													H
													H
		1854.5	41.07	-32.93	74	69.86	25.22	7.05	61.06	100	0	P	V
		2781.75	36.48	-37.52	74	61.18	27.89	8.28	60.87	100	0	P	V
		3709	42.66	-31.34	74	65.11	29.22	9.42	61.09	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

902~928MHz

(30MHz ~ 1GH @3m)

UHF	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.75MHz		33.88	30.43	-9.57	40	29.81	22.3	10.69	32.37	-	-	P	H
		114.39	27.98	-15.52	43.5	32.14	16.87	11.28	32.31	-	-	P	H
		141.55	27.83	-15.67	43.5	31.51	17.12	11.49	32.29	-	-	P	H
		826.37	35.93	-10.07	46	25.42	28.29	13.96	31.74	103	272	QP	H
		877.78	37.49	-8.51	46	25.7	29.17	14.09	31.47	104	284	QP	H
	*	902.75	127.21	81.21	46	115.39	29	14.14	31.32			P	H
		954.41	38.98	-7.02	46	24.8	30.77	14.26	30.85	118	234	QP	H
													H
													H
		34.85	31.18	-8.82	40	30.97	21.88	10.7	32.37	-	-	P	V
		42.61	34.68	-5.32	40	38.54	17.75	10.76	32.37	100	18	QP	V
		112.45	29.18	-14.32	43.5	33.39	16.83	11.27	32.31	-	-	P	V
		838.98	36.17	-9.83	46	25.11	28.74	13.99	31.67	123	315	QP	V
	*	902.75	123.71	77.71	46	111.89	29	14.14	31.32	-	-	P	V
		936.95	38.01	-7.99	46	25	29.8	14.22	31.01	113	315	QP	V
		956.35	38.89	-7.11	46	24.62	30.85	14.25	30.83	100	319	QP	V
													V
													V

Remark	1. No other spurious found. 2. All results are PASS against limit line.

UHF	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
914.75MHz		30.97	30.86	-9.14	40	28.99	23.58	10.66	32.37	-	-	P	H
		115.36	28.08	-15.42	43.5	32.2	16.91	11.28	32.31	-	-	P	H
		145.43	27.77	-15.73	43.5	31.43	17.08	11.54	32.28	-	-	P	H
		838.01	36.56	-9.44	46	25.55	28.7	13.99	31.68	146	280	QP	H
	*	914.75	127.5	81.5	46	115.47	29.07	14.17	31.21	-	-	P	H
		922.4	42.96	-3.04	46	30.72	29.2	14.18	31.14	130	270	QP	H
		953.44	38.69	-7.31	46	24.57	30.72	14.26	30.86	139	280	QP	H
													H
													H
		37.76	32.07	-7.93	40	33.44	20.28	10.72	32.37	-	-	P	V
		42.61	34.51	-5.49	40	38.37	17.75	10.76	32.37	100	17	QP	V
		112.45	28.83	-14.67	43.5	33.04	16.83	11.27	32.31	-	-	P	V
		809.88	35.29	-10.71	46	25.06	28.16	13.9	31.83	128	315	QP	V
		904.94	38.66	-7.34	46	26.82	29	14.14	31.3	116	311	QP	V
	*	914.75	123.61	77.61	46	111.58	29.07	14.17	31.21	-	-	P	V
		922.4	41.31	-4.69	46	29.07	29.2	14.18	31.14	117	315	QP	V
													V
													V

Remark	1. No other spurious found. 2. All results are PASS against limit line.

UHF	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
927.25MHz		34.85	30.02	-9.98	40	29.81	21.88	10.7	32.37	-	-	P	H
		118.27	28.98	-14.52	43.5	32.8	17.19	11.3	32.31	-	-	P	H
		152.22	29.37	-14.13	43.5	33.33	16.75	11.57	32.28	-	-	P	H
		749.74	39.76	-6.24	46	30.19	27.82	13.76	32.01	-	-	P	H
		843.83	37.05	-8.95	46	25.78	28.91	14.01	31.65	156	297	QP	H
	*	927.25	127.81	81.81	46	115.34	29.37	14.2	31.1	-	-	P	H
		935.01	38.86	-7.14	46	25.96	29.71	14.22	31.03	127	270	QP	H
													H
													H
		41.64	33.18	-6.82	40	36.57	18.23	10.75	32.37	103	19	QP	V
		72.68	26.44	-13.56	40	35.45	12.3	11.04	32.35	-	-	P	V
		115.36	30.18	-13.32	43.5	34.3	16.91	11.28	32.31	-	-	P	V
		864.2	37.03	-8.97	46	25.21	29.29	14.07	31.54	114	310	QP	V
		919.49	40.65	-5.35	46	28.53	29.11	14.18	31.17	114	310	QP	V
	*	927.25	123.65	77.65	46	111.18	29.37	14.2	31.1	-	-	P	V
		935.01	41.22	-4.78	46	28.32	29.71	14.22	31.03	116	313	QP	V
													V
													V

Remark	1. No other spurious found. 2. All results are PASS against limit line.

<SKU 3>

902~928MHz

(1GHz ~ 10GHz @ 3m)

UHF	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
914.75MHz		1829.5	42.92	-31.08	74	71.82	25.16	6.98	61.04	100	0	P	H
		3659	40.88	-33.12	74	63.46	29.2	9.35	61.13	100	0	P	H
													H
													H
													H
		1829.5	41.7	-32.3	74	70.6	25.16	6.98	61.04	100	0	P	V
		3659	44.92	-29.08	74	67.5	29.2	9.35	61.13	100	0	P	V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

902~928MHz

(30MHz ~ 1GH @3m)

UHF	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
914.75MHz		30	31.47	-8.53	40	29.19	24.01	10.65	32.38	-	-	P	H
		101.78	28.74	-14.76	43.5	33.88	15.95	11.23	32.32	-	-	P	H
		148.34	27.23	-16.27	43.5	31.03	16.95	11.53	32.28	-	-	P	H
		792.42	39.99	-6.01	46	29.92	28.12	13.85	31.9	-	-	P	H
		838.01	39.45	-6.55	46	28.44	28.7	13.99	31.68	100	298	QP	H
	*	914.75	127.59	81.59	46	115.56	29.07	14.17	31.21	-	-	P	H
		922.4	42.98	-3.02	46	30.74	29.2	14.18	31.14	130	277	QP	H
													H
													H
		40.67	34.72	-5.28	40	37.65	18.7	10.74	32.37	100	15	QP	V
		103.72	30.95	-12.55	43.5	35.78	16.25	11.24	32.32	-	-	P	V
		118.27	29.4	-14.1	43.5	33.22	17.19	11.3	32.31	-	-	P	V
		803.09	35.15	-10.85	46	24.95	28.19	13.87	31.86	114	307	QP	V
		878.75	37.33	-8.67	46	25.55	29.15	14.09	31.46	121	328	QP	V
	*	914.75	123.69	77.69	46	111.66	29.07	14.17	31.21	-	-	P	V
		954.41	38.85	-7.15	46	24.67	30.77	14.26	30.85	110	319	QP	V
													V
													V

Remark	1. No other spurious found. 2. All results are PASS against limit line.

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
QP/P/A	Quasi Peak or Peak or Average
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.

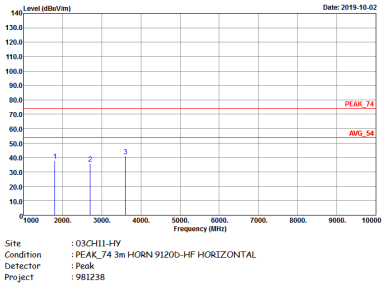
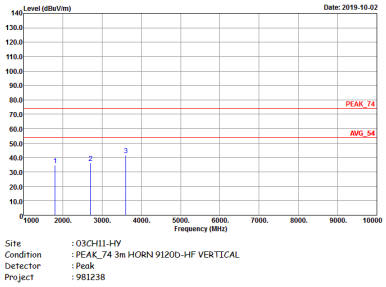
Appendix B. Radiated Spurious Emission Plots

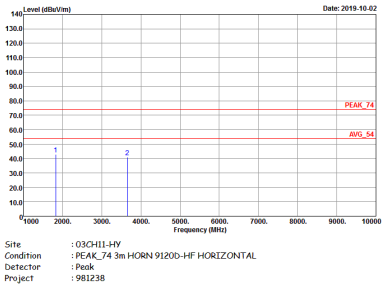
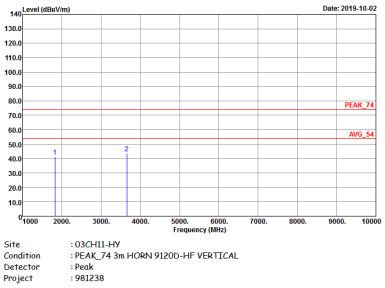
Test Engineer :	Fu Chen and Troye Hsieh	Temperature :	21.4~24.8°C
		Relative Humidity :	51~65.8%

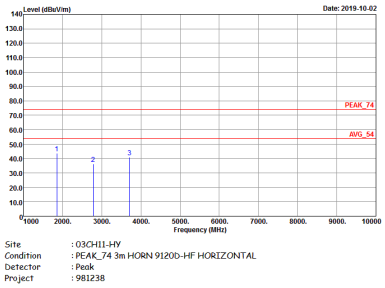
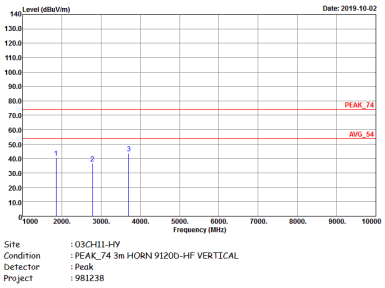
<SKU 1>

902~928MHz

(1GHz ~ 10GHz @ 3m)

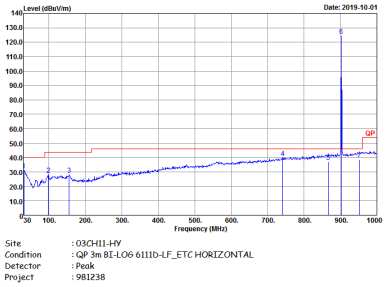
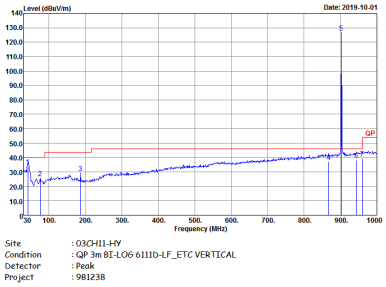
UHF	902.75MHz	
	Horizontal	Vertical
Peak Avg.		

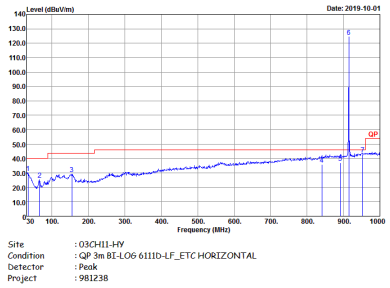
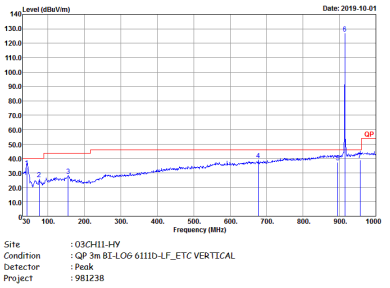
UHF	914.75MHz	
	Horizontal	Vertical
Peak Avg.		

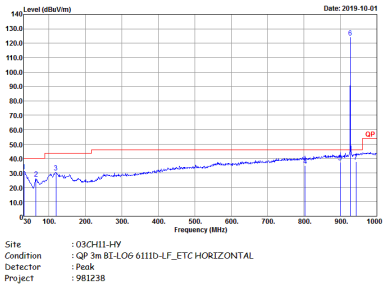
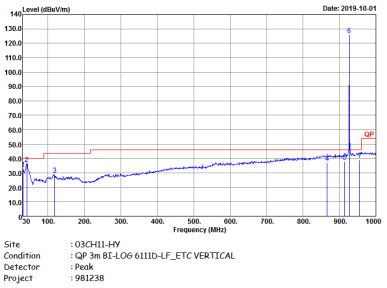
UHF	927.25MHz	
	Horizontal	Vertical
Peak Avg.		

902~928MHz

(30MHz ~ 1GHz @ 3m)

UHF	902.75MHz	
	Horizontal	Vertical
QP / Peak		

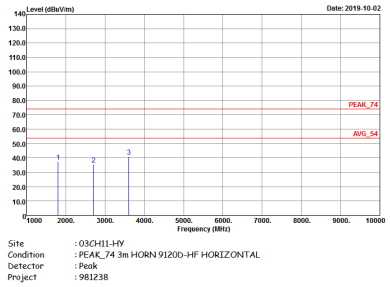
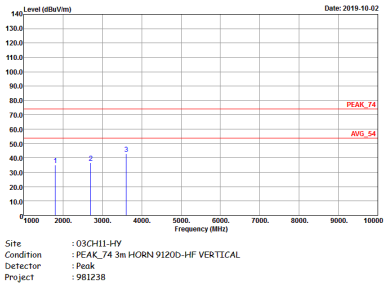
UHF	914.75MHz	
	Horizontal	Vertical
QP / Peak		

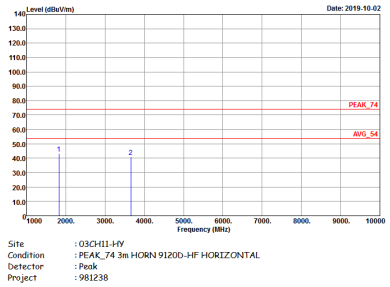
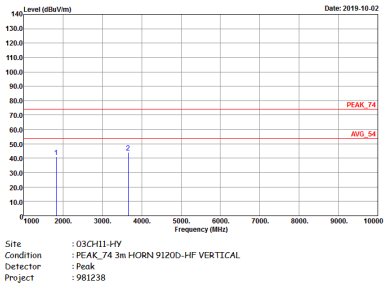
UHF	927.25MHz	
	Horizontal	Vertical
QP / Peak		

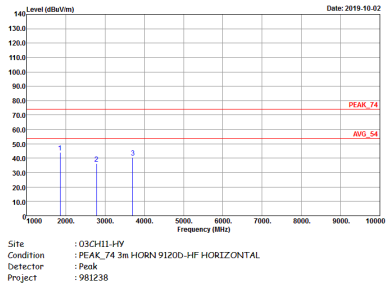
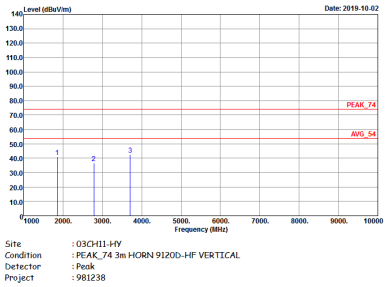
<SKU 2>

902~928MHz

(1GHz ~ 10GHz @ 3m)

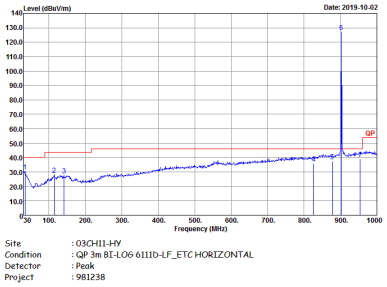
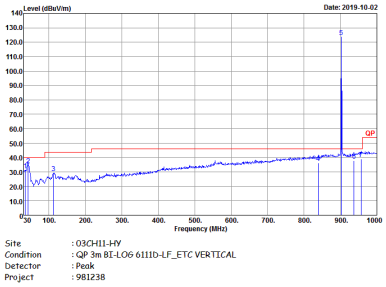
UHF	902.75MHz	
	Horizontal	Vertical
Peak Avg.		

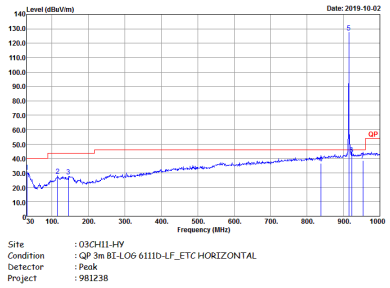
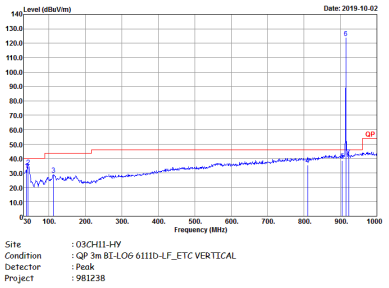
UHF	914.75MHz	
	Horizontal	Vertical
Peak Avg.		

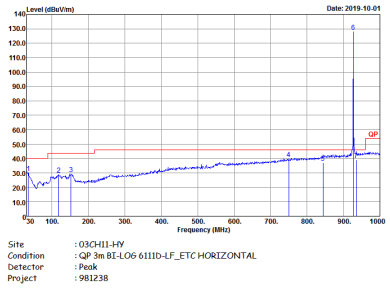
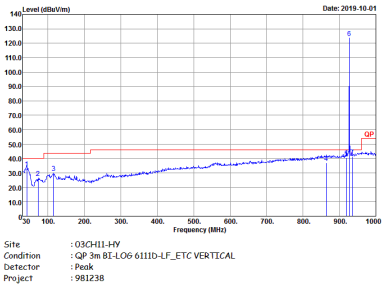
UHF	927.25MHz	
	Horizontal	Vertical
Peak Avg.		

902~928MHz

(30MHz ~ 1GHz @ 3m)

UHF	902.75MHz	
	Horizontal	Vertical
QP / Peak	 Site : 03CH11-HY Condition : QP 3m BI-LOG 6111D-LF_ETC HORIZONTAL Detector : Peak Project : 981238	 Site : 03CH11-HY Condition : QP 3m BI-LOG 6111D-LF_ETC VERTICAL Detector : Peak Project : 981238

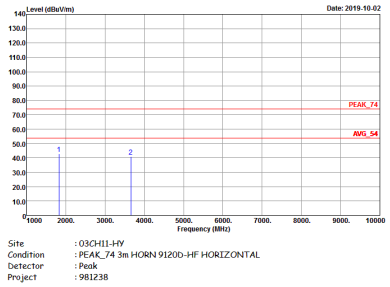
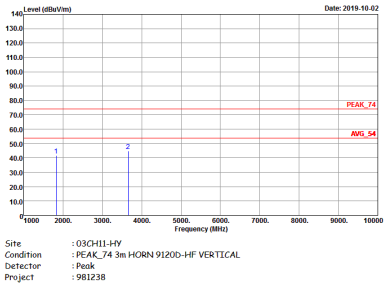
UHF	914.75MHz	
	Horizontal	Vertical
QP / Peak		

UHF	927.25MHz	
	Horizontal	Vertical
QP / Peak		

<SKU 3>

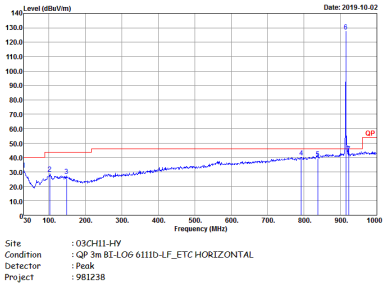
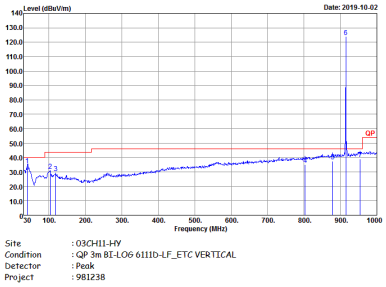
902~928MHz

(1GHz ~ 10GHz @ 3m)

UHF	914.75MHz	
	Horizontal	Vertical
Peak Avg.		

902~928MHz

(30MHz ~ 1GHz @ 3m)

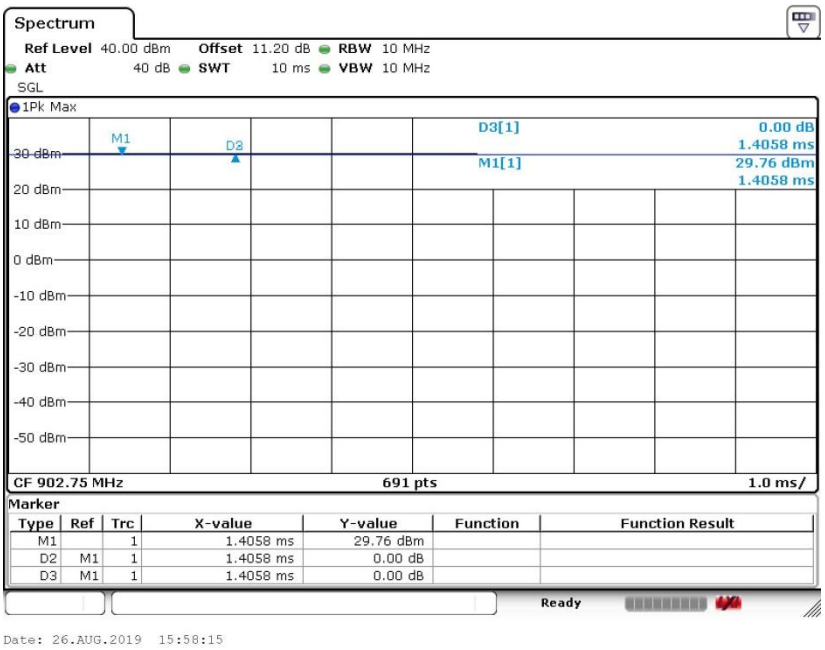
UHF	914.75MHz	
	Horizontal	Vertical
QP / Peak		

Appendix C. Duty Cycle Plots

Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting
UHF for Long Range	100.00	-	-	10Hz
UHF for Middle Range	100.00	-	-	10Hz

<Long Range>

UHF



<Middle Range>

UHF