LTA
Laboratory for Test & Approval Co.,Ltd.

243 Jubug-Ri,Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 17159
Tel: +82-31-323-6008 Fax: +82-31-323-6010
http://www.ltalab.com

Dates of Tests: Dec 20, 2019 ~ April 29, 2020
Test Report S/N: LR500112005A
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID **SS4FR900**

APPLICANT **BLUEBIRD INC.**

Equipment Class	**:**	**Part 15 Spread Spectrum Transmitter**
Manufacturing Description	**:**	**RFID Reader**
Manufacturer	**:**	**BLUEBIRD INC.**
Model name	**:**	**FR900**
Test Device Serial No.:	**:**	**Identical prototype**
Rule Part(s)	**:**	**FCC Part 15.247**
		Subpart C ; ANSI C-63.4-2014 / ANSI C-63.10-2013
Frequency Range	**:**	**902.75 ~ 927.25 MHz**
RF power	**:**	**Max 29.30 dBm – Conducted**
Data of issue	**:**	**May 6, 2020**

This test report is issued under the authority of:

JaBeom.Koo

Ja-Beom Koo, Manager

The test was supervised by:

Jae-Hum Yun, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NVLAP LAB Code.: 200723-0

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1. General information

1-1 Test Performed

Company name : LTA Co., Ltd.

Address : 243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822

Web site : http://www.ltalab.com

E-mail : chahn@ltalab.com

Telephone : +82-31-323-6008

Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2020-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	649054	2021-04-11	FCC CAB
VCCI	JAPAN	C-4948,	2020-09-10	VCCI registration
VCCI	JAPAN	T-2416,	2020-09-10	VCCI registration
VCCI	JAPAN	R-4483(10 m),	2020-10-15	VCCI registration
VCCI	JAPAN	G-847	2021-12-13	VCCI registration
IC	CANADA	5799A-1	updating	IC filing
KOLAS	KOREA	NO.551	2021-08-20	KOLAS accredited Lab.

2. Information about test item

2-1 Client & Manufacturer

Client Company name	:	BLUEBIRD INC.
Address	:	3F, 115, Irwon-ro, Gangnam-gu, Seoul, South Korea (SSang-young IT Twin tower-B 7~8F), 531, Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, South Korea
Tel / Fax	:	+82-02-2258-9209 / -

2-2 Equipment Under Test (EUT)

Model name	:	FR900
Serial number	:	Identical prototype
Date of receipt	:	Dec 20, 2019
EUT condition	:	Pre-production, not damaged
Antenna type	:	Dipole Antenna (Max Gain : 6 dBi)
Frequency Range	:	902.75 ~ 927.25 MHz
RF output power	:	Max 29.30 dBm – Conducted
Type of Modulation	:	FSK
Power Source	:	24 Vdc

2-3 Tested frequency

Bluetooth	LOW	MID	HIGH
Frequency (MHz) – 900 MHz RFID	902.75	915.25	927.25

2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Notebook	-	MS-1736	MSI

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	Carrier Frequency Separation	≥ 2/3 of 20dB BW	Conducted	C
15.247(a)	Number of Hopping Frequencies	≥ 15 channels		C
15.247(a)	20 dB Bandwidth 99% Bandwidth	–		C
15.247(a)	Dwell Time	≤ 0.4 seconds		C
15.247(b)	Transmitter Output Power	≤ 1W for 1Mbps ≤ 125mW for 2,3Mbps		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.249 / 15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.109	Field Strength	–		C
15.207 /15.107	AC Conducted Emissions	EN 55022	Line Conducted	C
15.203	Antenna requirement	–	–	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 1: Antenna Requirement

→ The **BLUEBIRD INC. FCC ID: SS4FR900** unit complies with the requirement of §15.203.

The antenna type is PCB Pattern antenna.

The sample was tested according to the following specification:

*FCC Parts 15.247; ANSI C-63.4-2014;ANSI C-63.10-2013
*FCC KDB Publication No. 558074 D01 v03r05
*FCC TCB Workshop 2012, April

3.2 Frequency Hopping System Requirements

3.2.1 Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

3.3 TECHNICAL CHARACTERISTIC TEST

3.3.1 Carrier Frequency Separation

Procedure:

The test follows ANSI C63.10-2013 7.8.2. The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 2~ 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 100 kHz (1% of the span or more) Sweep = auto

VBW = 100 kHz Detector function = peak

Trace = max hold

Measurement Data:

Test Results	
Carrier Frequency Separation (MHz)	**Result**
0.999	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of 20 dB bandwidth of the hopping channel, whichever is greater.

Measurement Setup

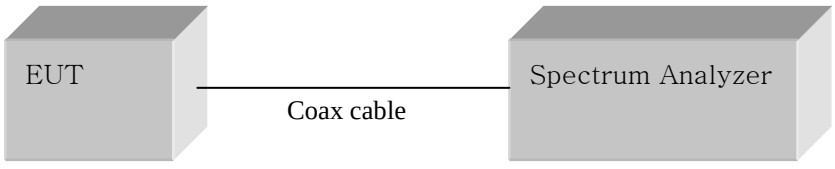
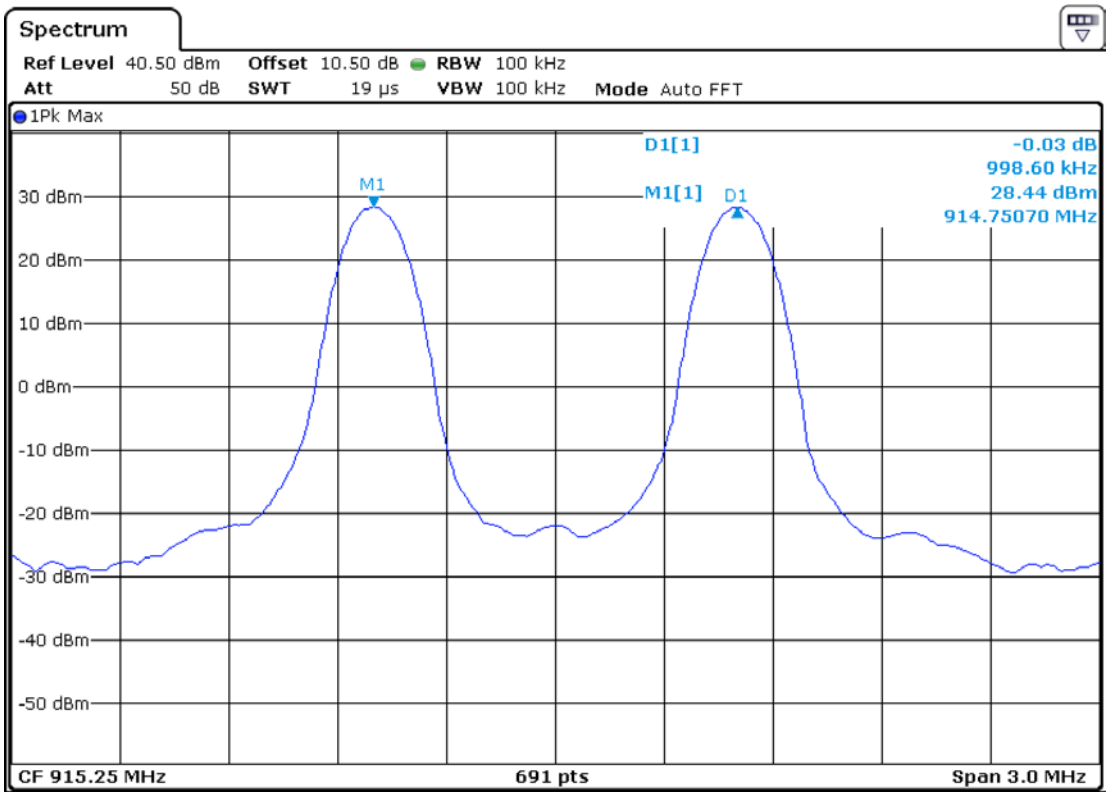


Figure 1: Measurement setup for the carrier frequency separation

Carrier Frequency Separation



3.3.2 Number of Hopping Frequencies

Procedure:

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

The spectrum analyzer is set to (Bluetooth):

Frequency range Start = 902 MHz, Stop = 928 MHz

RBW = 100 kHz (1% of the span or more) Sweep = auto

VBW = 100 kHz (VBW ≥ RBW) Detector function = peak

Trace = max hold Span > 40 MHz

Measurement Data : Complies

Total number of Hopping Channels	50 (RFID)

- See next pages for actual measured spectrum plots.

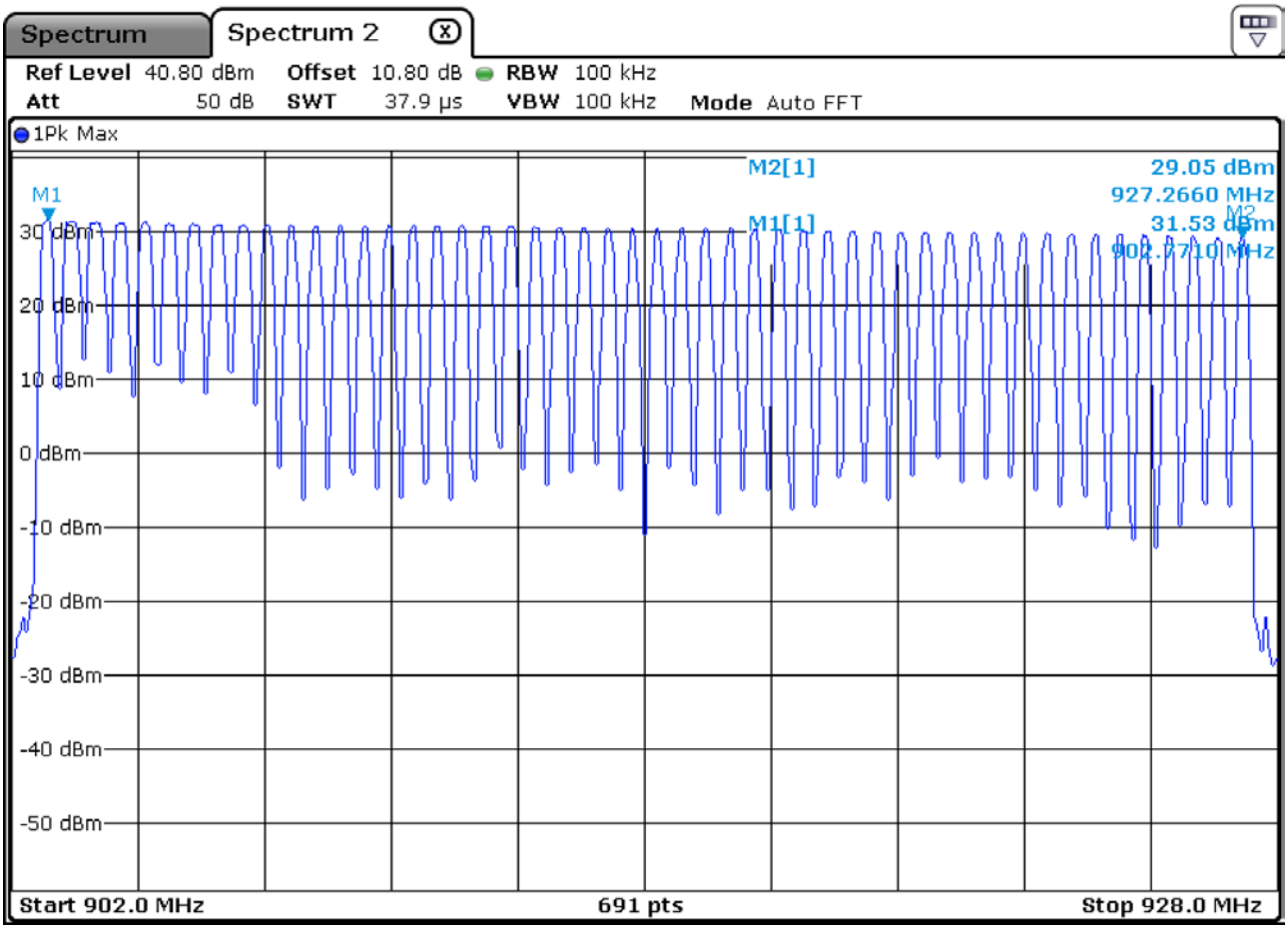
Minimum Standard:

Have at least 50 channels below 250 kHz bandwidth

Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)

Number of Hopping Frequencies (RFID)



3.3.3 20 dB Bandwidth

Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to RFID :

Center frequency = the highest, middle and the lowest channels

Span = 3 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz (VBW ≥ RBW)

Detector function = peak

Trace = max hold

Measurement Data: 900 MHz RFID Mode

Frequency (MHz)	Channel No.	Test Results(MHz)	
		20dB Bandwidth	99% Bandwidth
902.0	1	0.334	0.295
915.0	26	0.126	0.113
928.0	50	0.161	0.135

- See next pages for actual measured spectrum plots.

Minimum Standard:

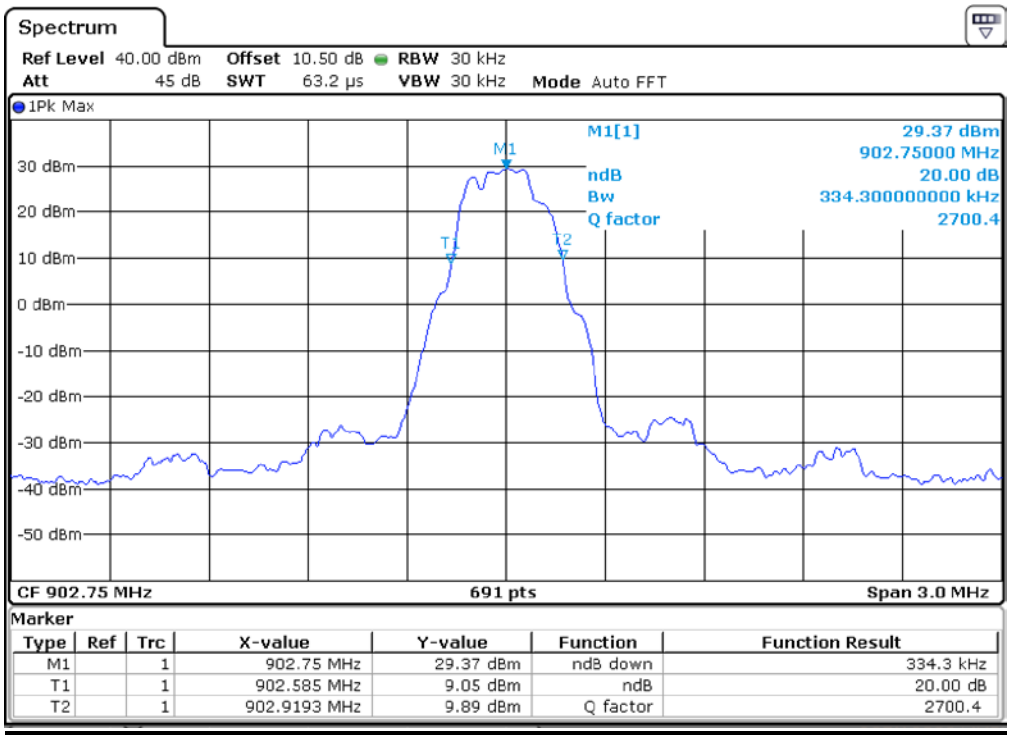
N/A

Measurement Setup

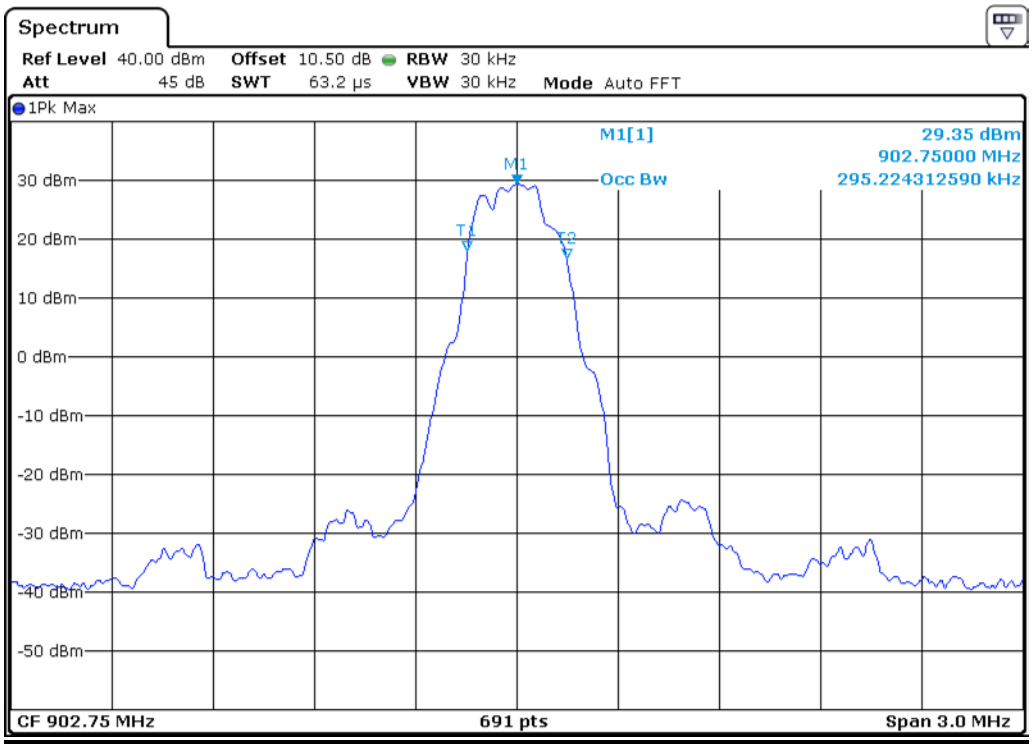
Same as the Chapter 3.3.1 (Figure 1)

Channel 1 of RFID mode

20 dB Bandwidth

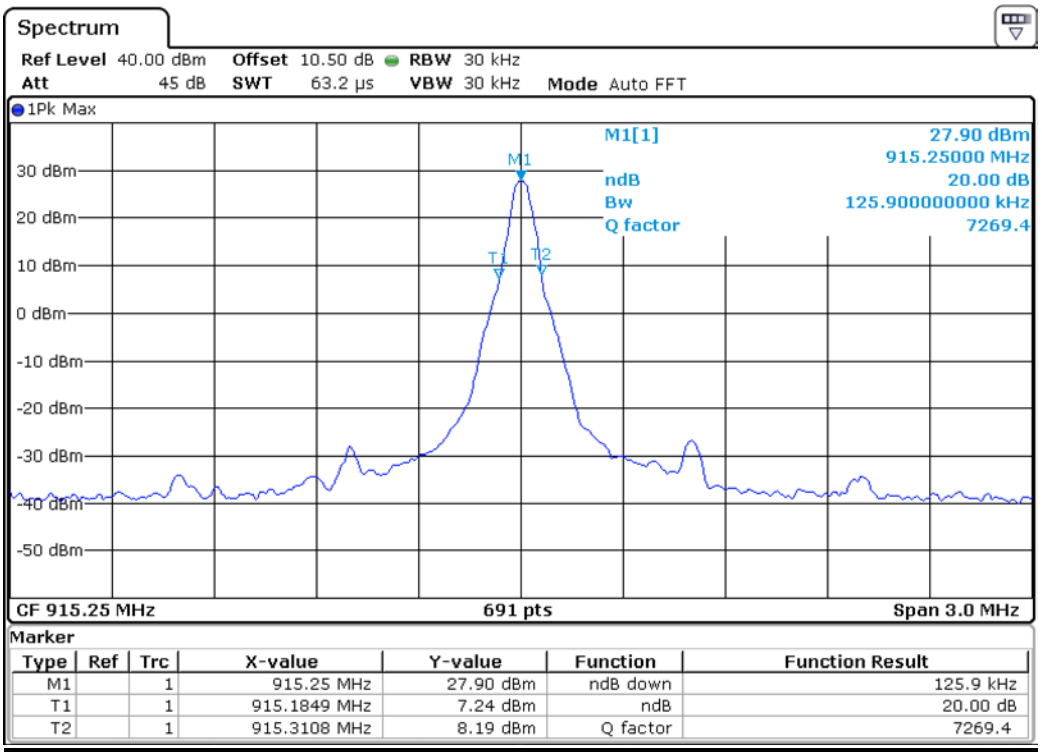


99% Bandwidth



Channel 25 of RFID mode

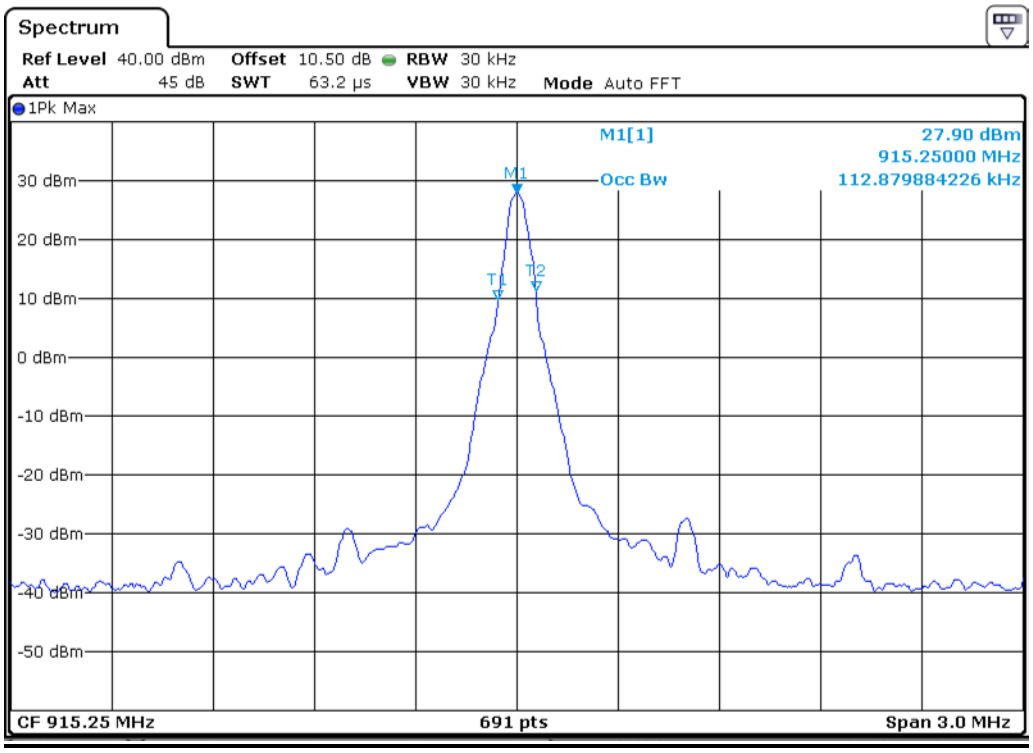
20 dB Bandwidth



Marker

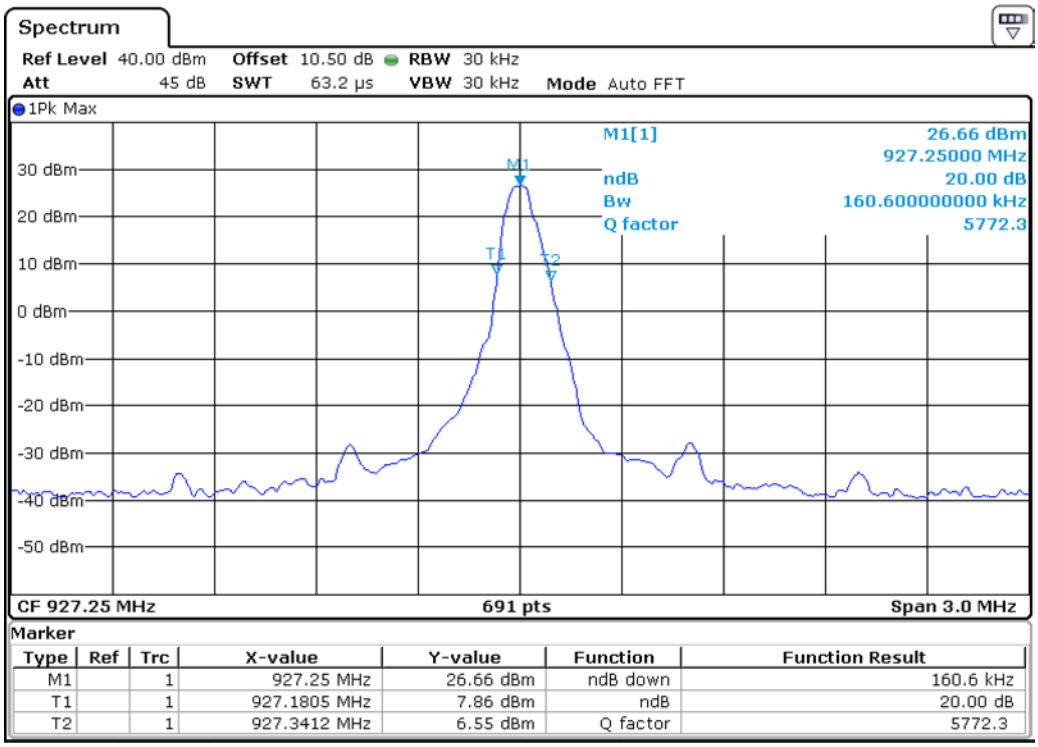
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	915.25 MHz	27.90 dBm	ndB down	125.9 kHz
T1		1	915.1849 MHz	7.24 dBm	ndB	20.00 dB
T2		1	915.3108 MHz	8.19 dBm	Q factor	7269.4

99% Bandwidth

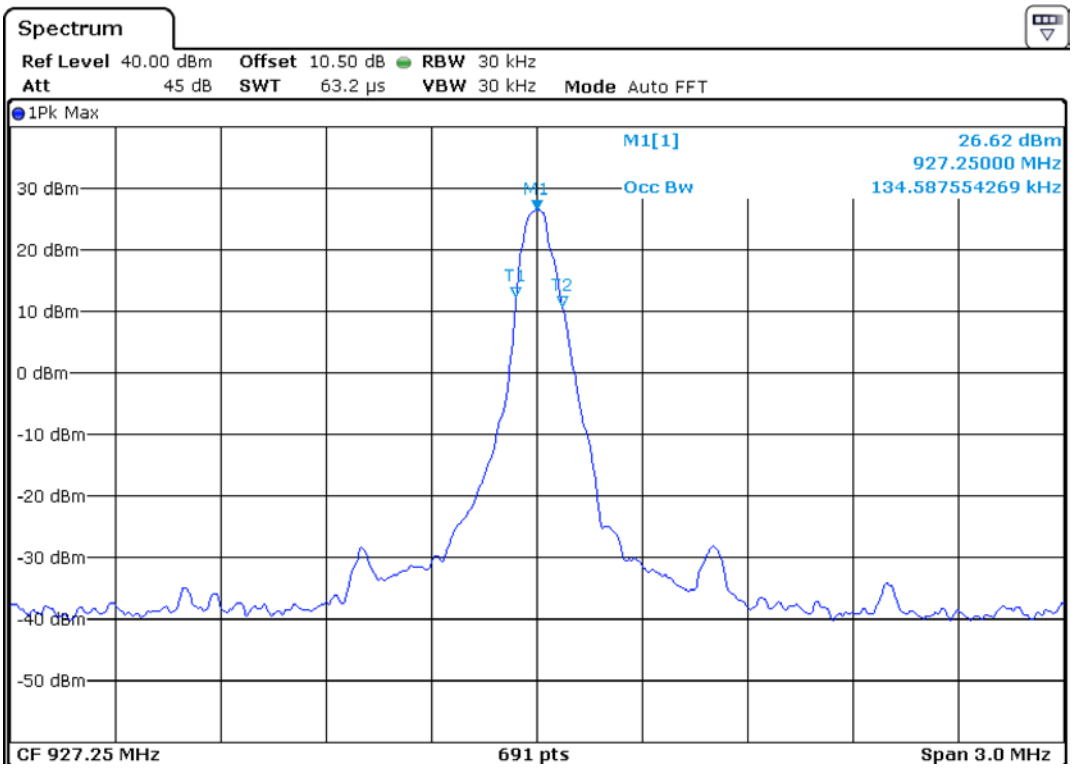


Channel 50 of RFID mode

20 dB Bandwidth



99% Bandwidth



3.3.4 Time of Occupancy (Dwell Time)

Procedure:

The test follows ANSI C63.10-2013 7.8.4. The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to :

Center frequency = 915.25 MHz Span = zero

RBW = 1 MHz VBW = 1 MHz (VBW ≥ RBW)

Trace = max hold Detector function = peak

Measurement Data (RFID):

Mode	Length (ms)	Number	Dwell Time (ms)	Limit (msec)
RFID	**392.76**	**1**	**392.76**	**400**

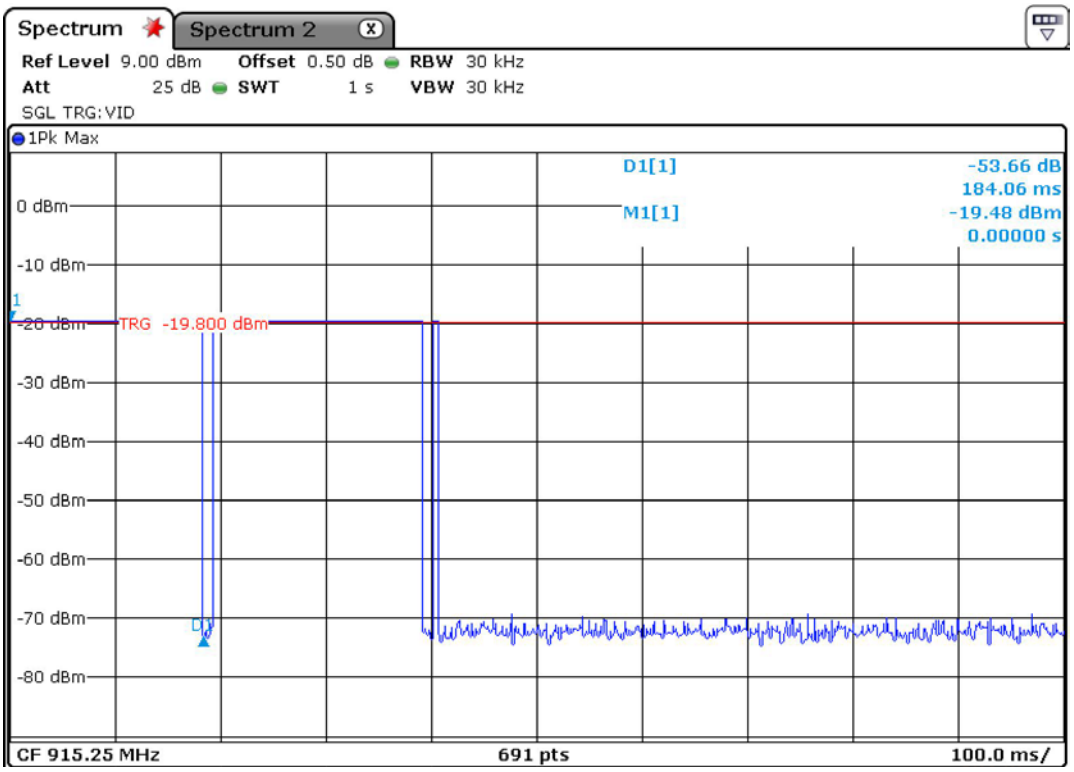
- See next pages for actual measured spectrum plots.

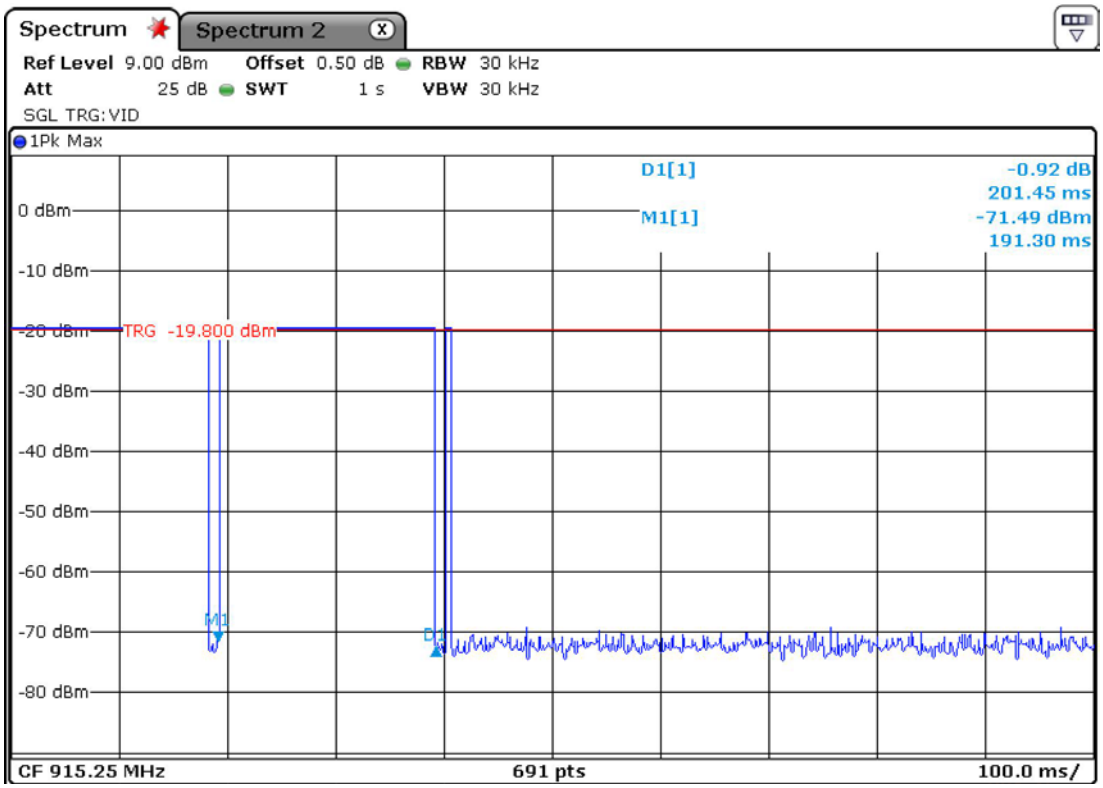
Minimum Standard:

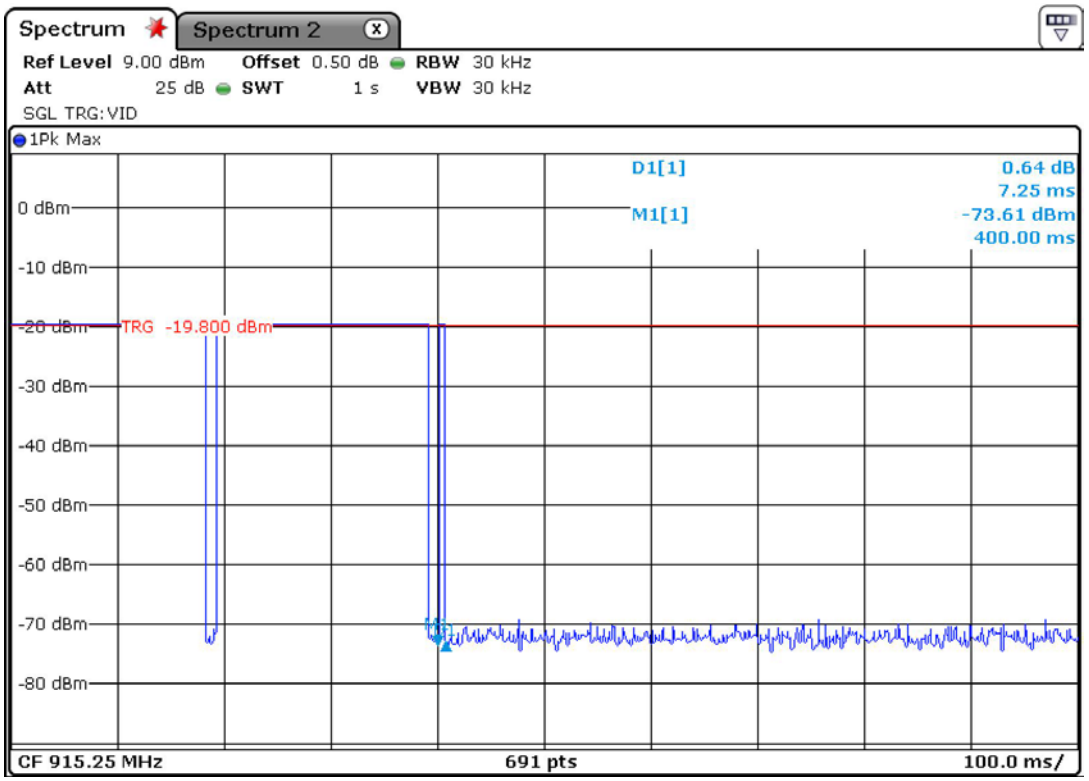
the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period

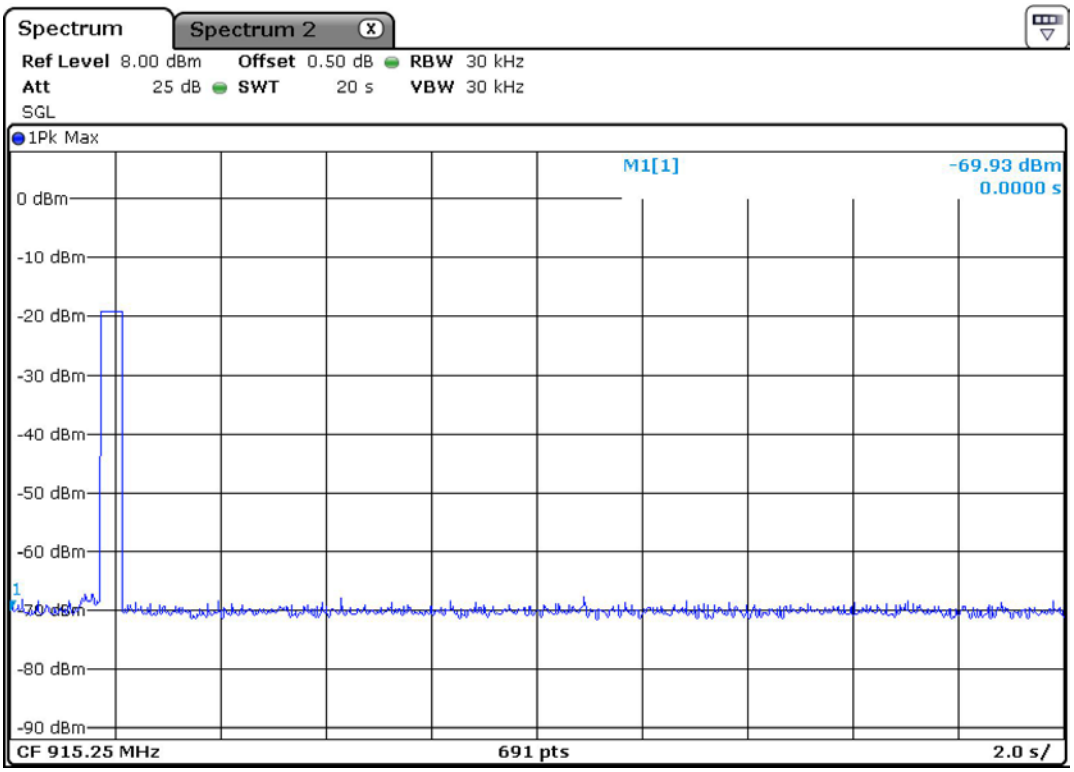
Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)









3.3.5 Transmitter Output Power

Procedure:

The test follows ANSI C63.10-2013 7.8.5. The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to :

Center frequency = the highest, middle and the lowest channels

Span = 10 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 3 MHz (greater than the 20 dB bandwidth of the emission being measured)

VBW = 3 MHz (VBW ≥ RBW) Detector function = peak

Trace = max hold Sweep = auto

Measurement Data : RFID Mode

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
902.75	1	**29.30**	**851.14**	Complies
915.25	26	**27.93**	**620.87**	Complies
927.25	50	**26.59**	**456.04**	Complies

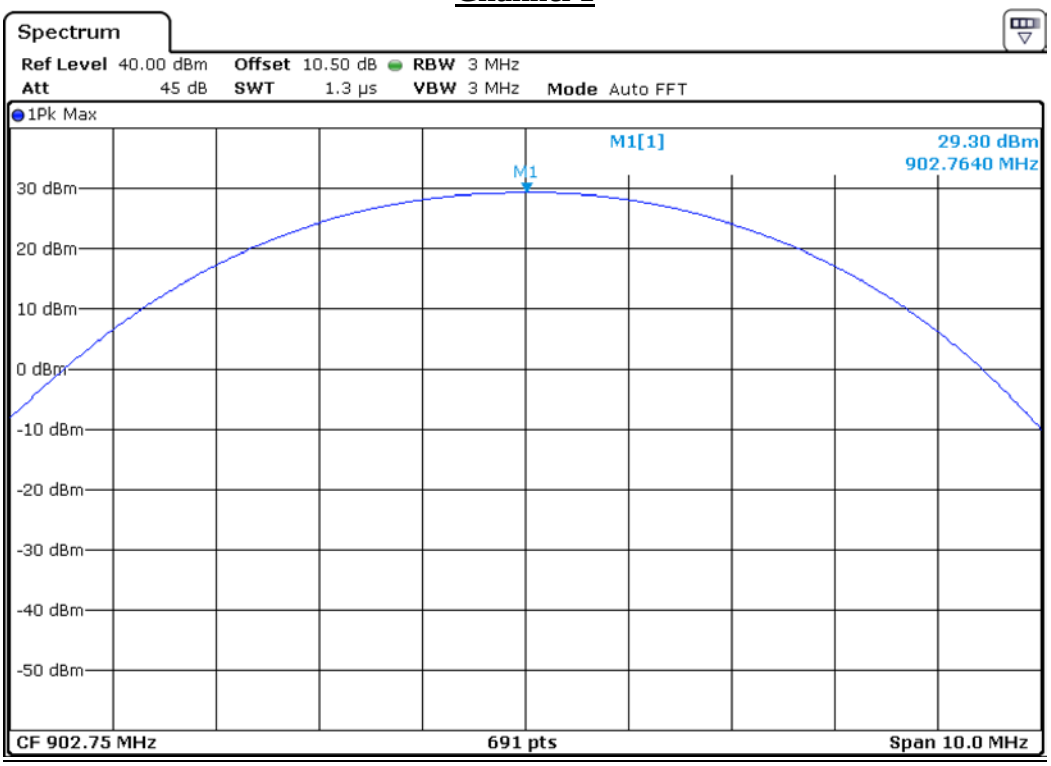
- See next pages for actual measured spectrum plots.

Minimum Standard:	Less than 1 W.

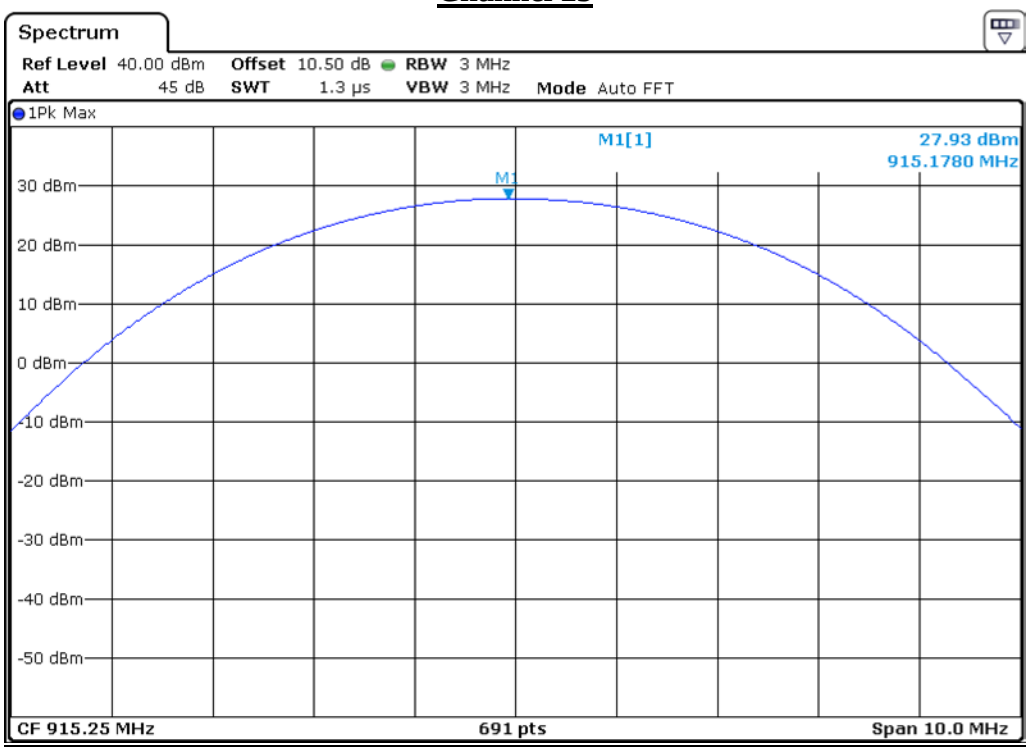
Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)

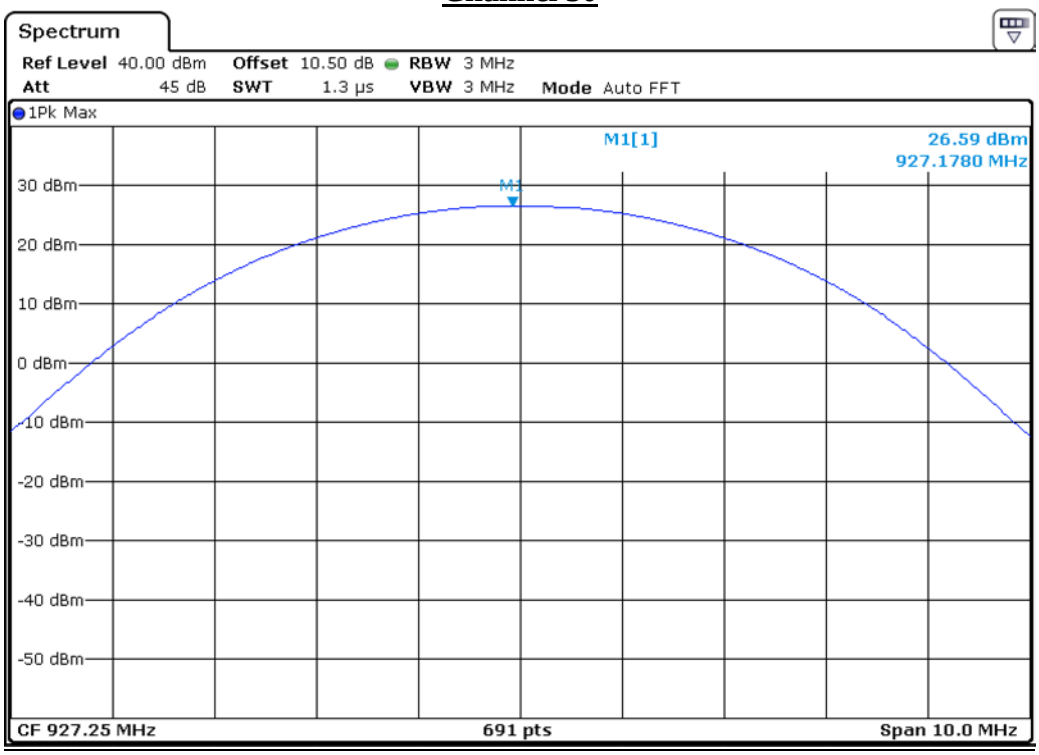
Channel 1



Channel 25



Channel 50



3.3.6 Band Edge

Procedure:

The bandwidth at 20 dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz	VBW = 300 kHz
Span = 10~30 MHz	Detector function = peak
Trace = max hold	Sweep = auto

Measurement Data: **Complies**

- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

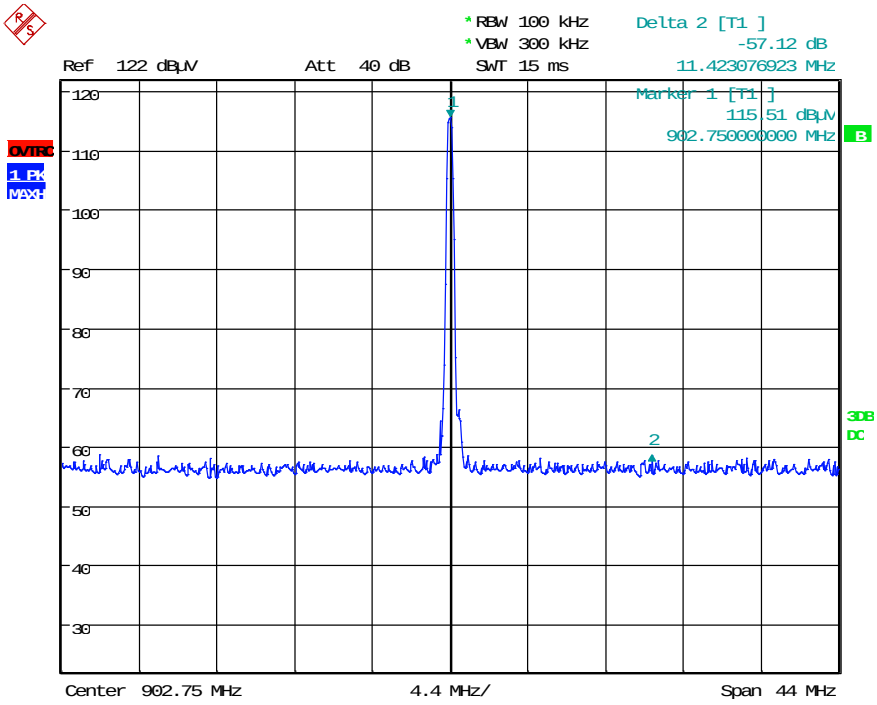
Minimum Standard:	≤ 20 dBc

Measurement Setup

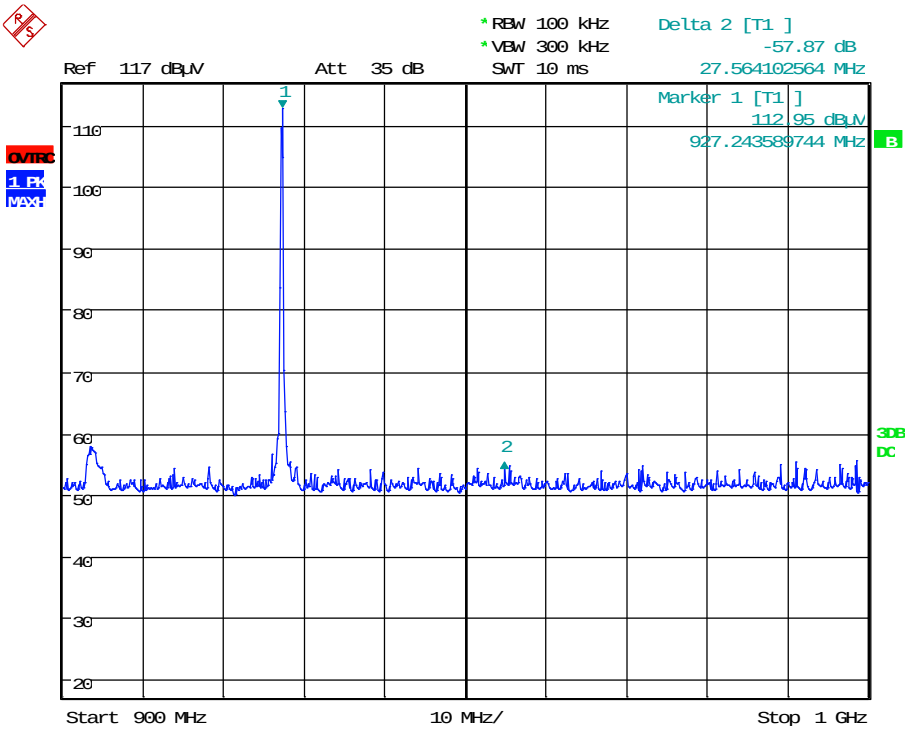
Same as the Chapter 3.3.1 (Figure 1)

Band Edge (Basic)

Lower edge



Upper edge



3.3.7 Conducted Spurious Emissions

Procedure:

The test follows ANSI C63.10-2013 7.8.8. The conducted spurious emissions were measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, set the marker on the peak of any spurious emission recorded.

The spectrum analyzer is set to:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions

RBW = 100 kHz Sweep = auto

VBW = 100 kHz Detector function = peak

Trace = max hold

Measurement Data: **Complies**

- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

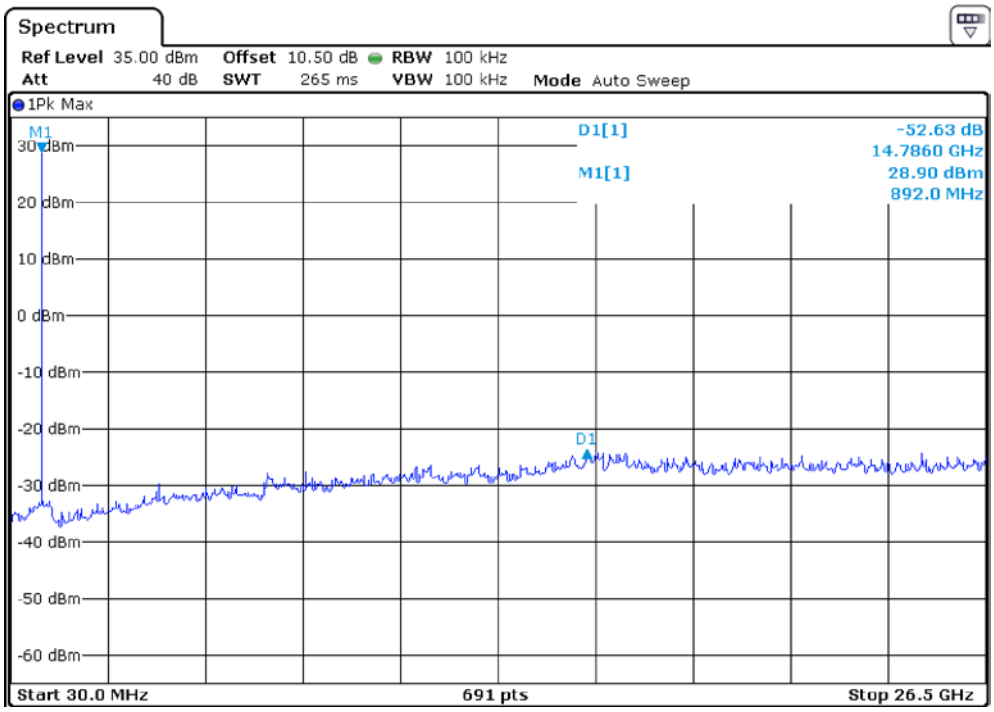
Minimum Standard:	≤ 20 dBc

Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)

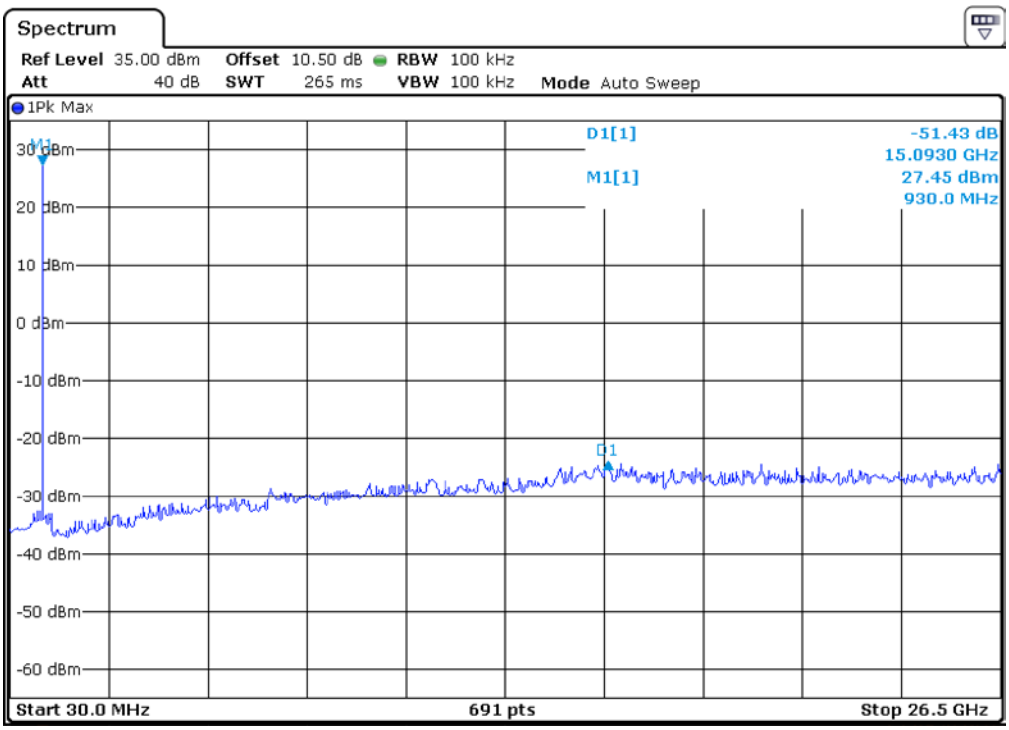
Unwanted Emission – Low channel (Basic)

Frequency Range = 30 MHz ~ 26.5 GHz



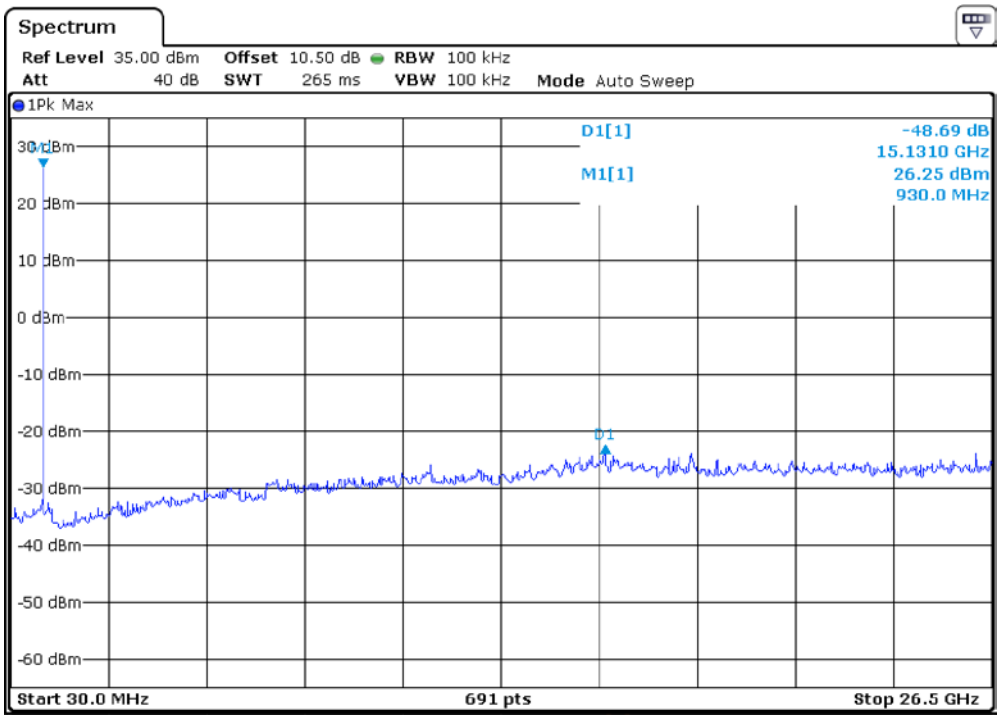
Unwanted Emission – Middle channel

Frequency Range = 30 MHz ~ 26.5 GHz



Unwanted Emission – High channel

Frequency Range = 30 MHz ~ 26.5 GHz



3.3.8 Radiated Spurious Emissions

Procedure:

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10-2013 6.3. The EUT was placed on a 0.8 m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

(a) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 3 m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

(b) In the frequency range above 30 MHz, Bi-Log Test Antenna (30 MHz to 1 GHz) and Horn Test Antenna (above 1 GHz) are used. Test Antenna is 3 m away from the EUT. Test Antenna height is carried from 1 m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 9 kHz ~ 10^{th} harmonic.

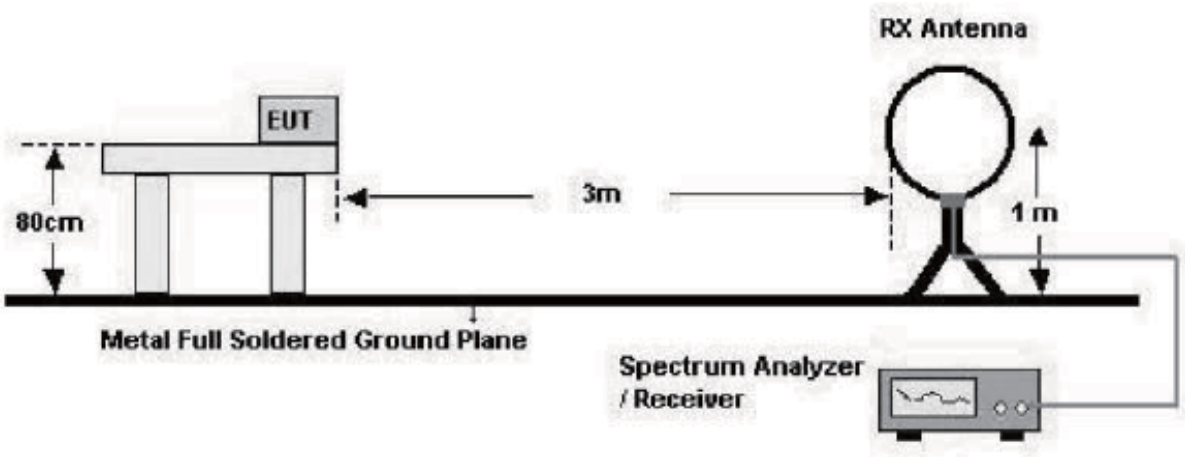
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW

= 1 MHz (1 GHz ~ 10^{th} harmonic)

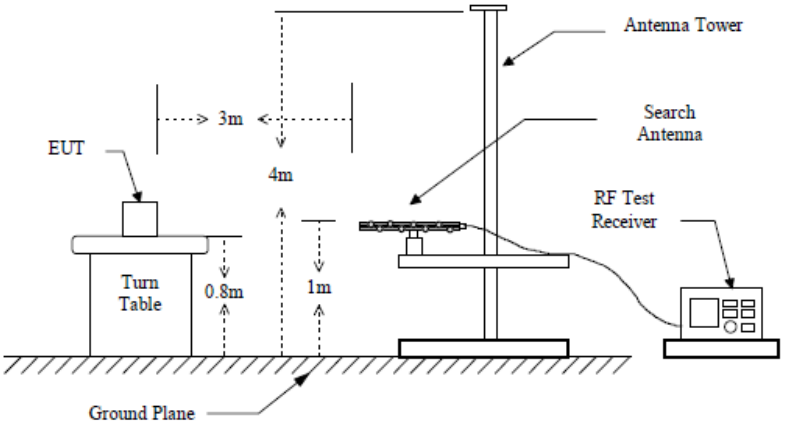
Span = 100 MHz Detector function = peak

Trace = max hold Sweep = auto

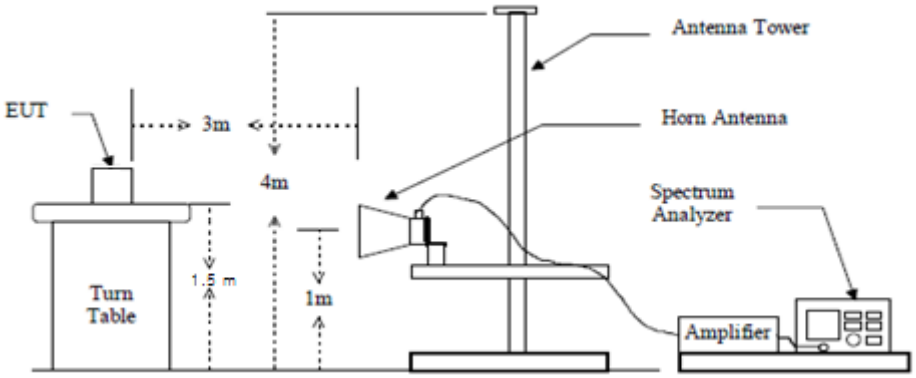
below 30 MHz



below 1 GHz (30 MHz to 1 GHz)



above 1 GHz



Measurement Data: **Complies**

- See next pages for actual measured data.
- No other emissions were detected at a level greater than 20 dB below limit include from 9 kHz to 30 MHz.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
0.009 ~ 0.490	2400/F(kHz) **(@ 300m)**
0.490 ~ 1.705	24000/F(kHz) **(@ 30m)**
1.705 ~ 30	30**(@ 30m)**
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

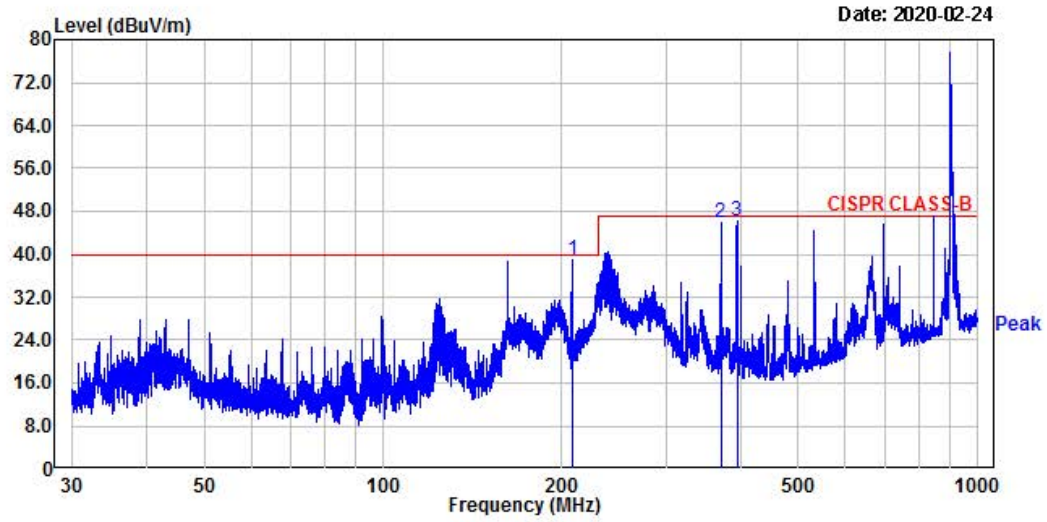
Radiated Emissions

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
Tel : +82-31-3236008,9
Fax : +82-31-3236010
www.ltalab.com

EUT/Model No.: FR900 Temp/Humi: 22 'C / 41 % R.H.

Test Mode : 900MHz RFID MODE Tested by: YUN J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	208.03	53.70	-14.80	38.90	40.00	1.10	100	56	horizontal
2.	370.22	55.00	-9.17	45.83	47.00	1.17	100	90	horizontal
3.	394.16	55.00	-8.76	46.24	47.00	0.76	100	124	horizontal

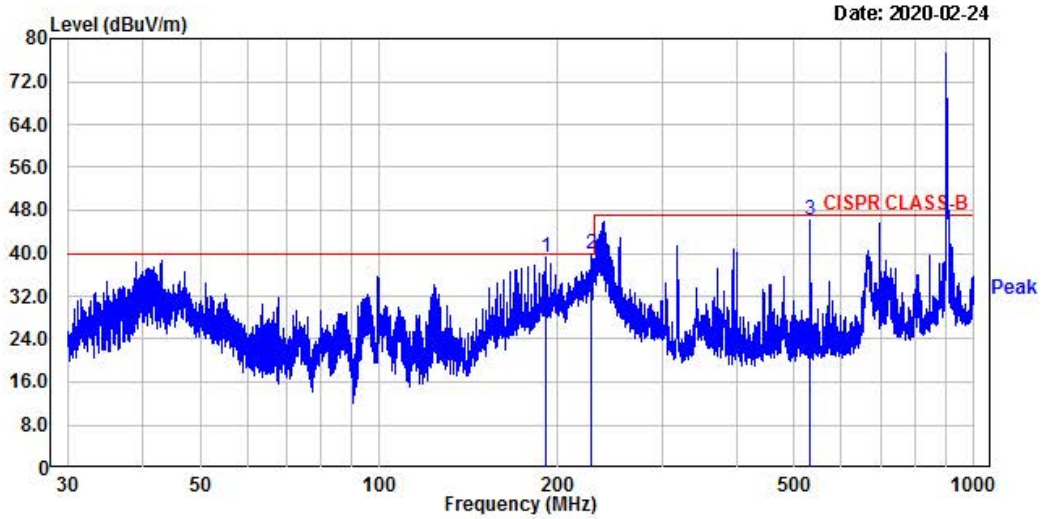
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
Tel : +82-31-3236008,9
Fax : +82-31-3236010
www.ltalab.com

EUT/Model No.: FR900 Temp/Humi: 22 'C / 41 % R.H.

Test Mode : 900MHz RFID MODE Tested by: YUN J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	190.49	53.78	-14.54	39.24	40.00	0.76	100	151	vertical
2.	227.59	53.50	-13.75	39.75	40.00	0.25	100	12	vertical
3.	532.43	52.28	-5.99	46.29	47.00	0.71	100	0	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

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Tel : +82-31-3236008,9
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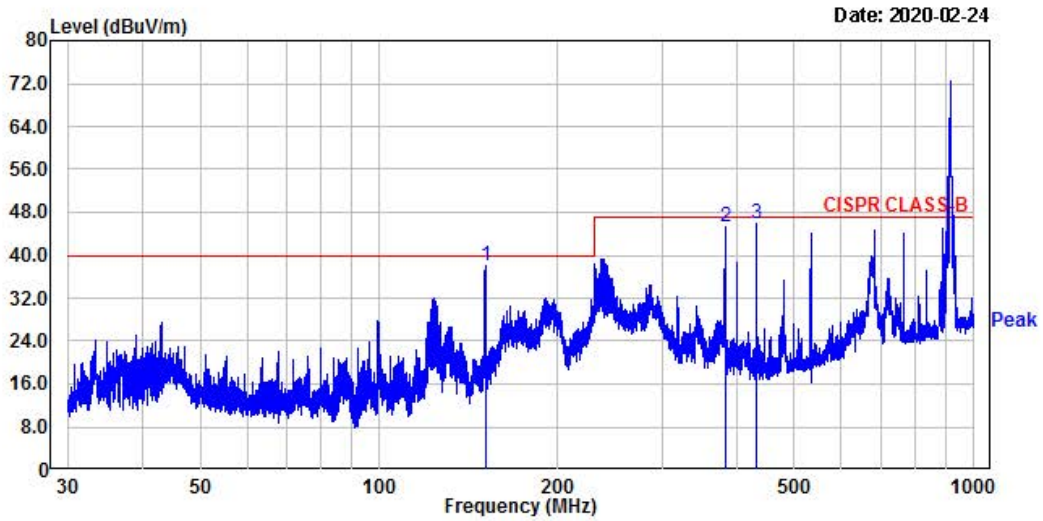
EUT/Model No.: FR900 Temp/Humi: 22 'C / 41 % R.H.

Test Mode : 900MHz RFID MODE Tested by: YUN J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	150.93	50.39	-12.46	37.93	40.00	2.07	265	0	horizontal
2.	382.09	54.19	-8.97	45.22	47.00	1.78	100	278	horizontal
3.	431.60	54.15	-8.12	46.03	47.00	0.97	100	104	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

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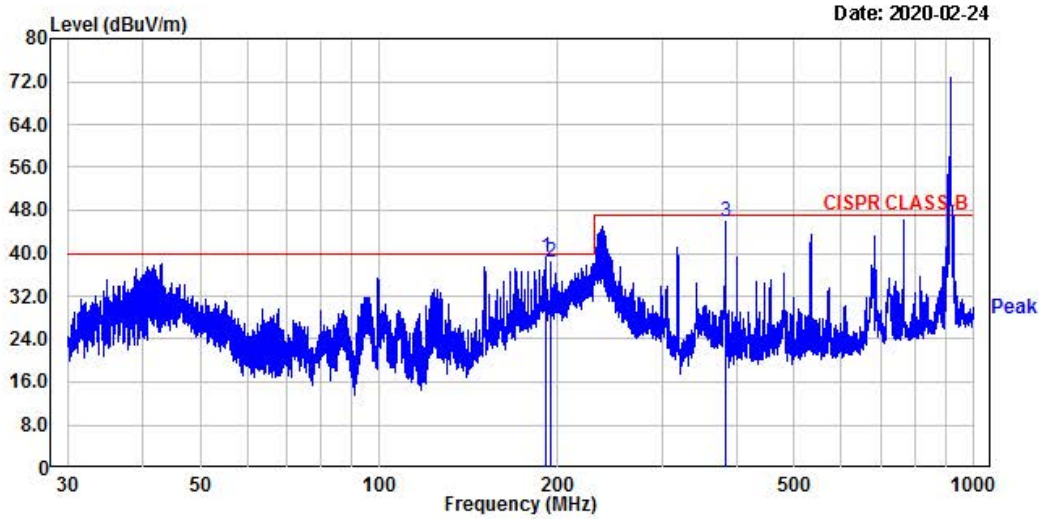
EUT/Model No.: FR900 Temp/Humi: 22 'C / 41 % R.H.

Test Mode : 900MHz RFID MODE Tested by: YUN J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	190.49	53.68	-14.54	39.14	40.00	0.86	102	0	vertical
2.	194.54	53.14	-14.84	38.30	40.00	1.70	100	0	vertical
3.	382.42	54.85	-8.96	45.89	47.00	1.11	100	231	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
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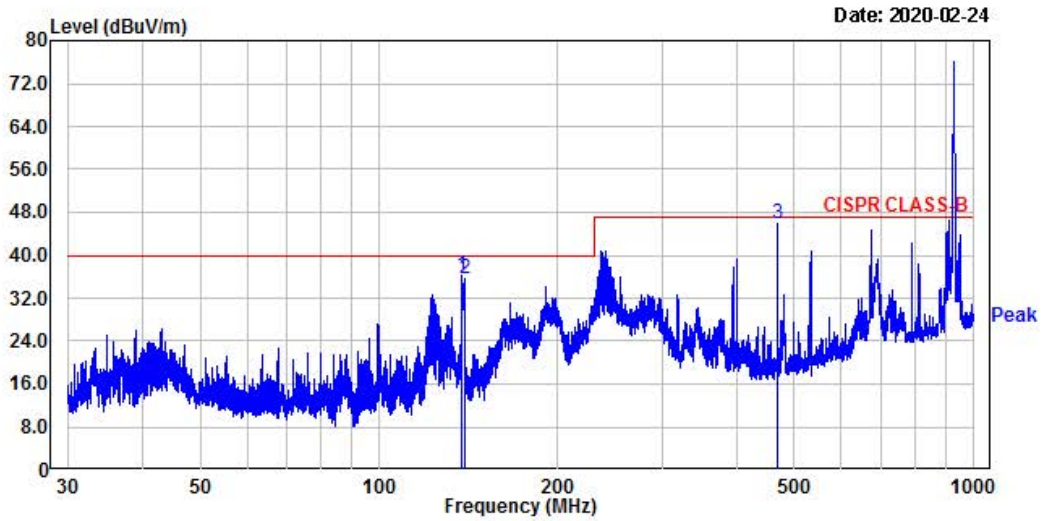
EUT/Model No.: FR900 Temp/Humi: 22 'C / 41 % R.H.

Test Mode : 900MHz RFID MODE Tested by: YUN J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	138.02	49.22	-13.04	36.18	40.00	3.82	400	0	horizontal
2.	139.24	48.60	-12.94	35.66	40.00	4.34	264	0	horizontal
3.	467.64	53.44	-7.46	45.98	47.00	1.02	100	164	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

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Tel : +82-31-3236008,9
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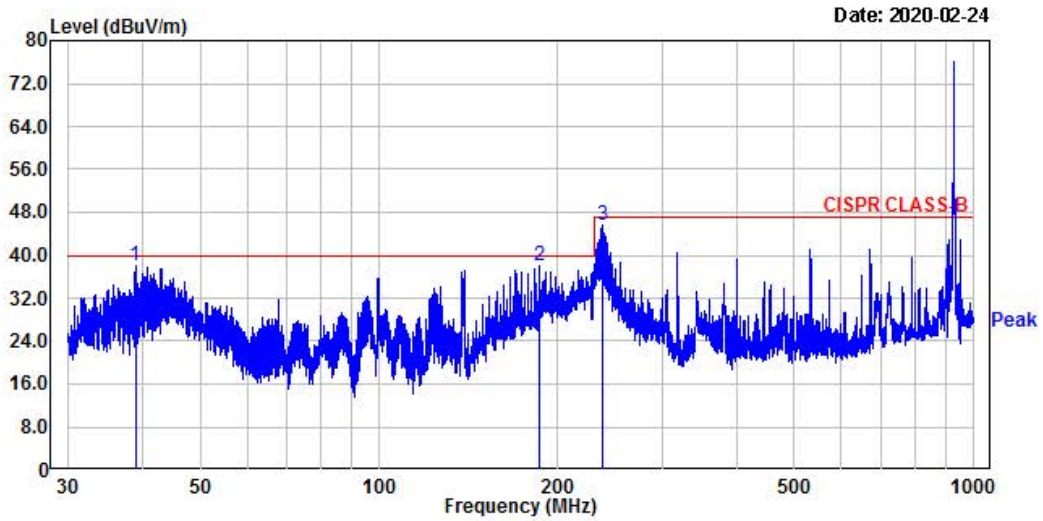
EUT/Model No.: FR900 Temp/Humi: 22 'C / 41 % R.H.

Test Mode : 900MHz RFID MODE Tested by: YUN J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	38.89	51.98	-13.88	38.10	40.00	1.90	100	104	vertical
2.	186.36	52.20	-14.25	37.95	40.00	2.05	100	23	vertical
3.	237.79	58.87	-13.20	45.67	47.00	1.33	100	104	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
Tel : +82-31-3236008,9
Fax : +82-31-3236010
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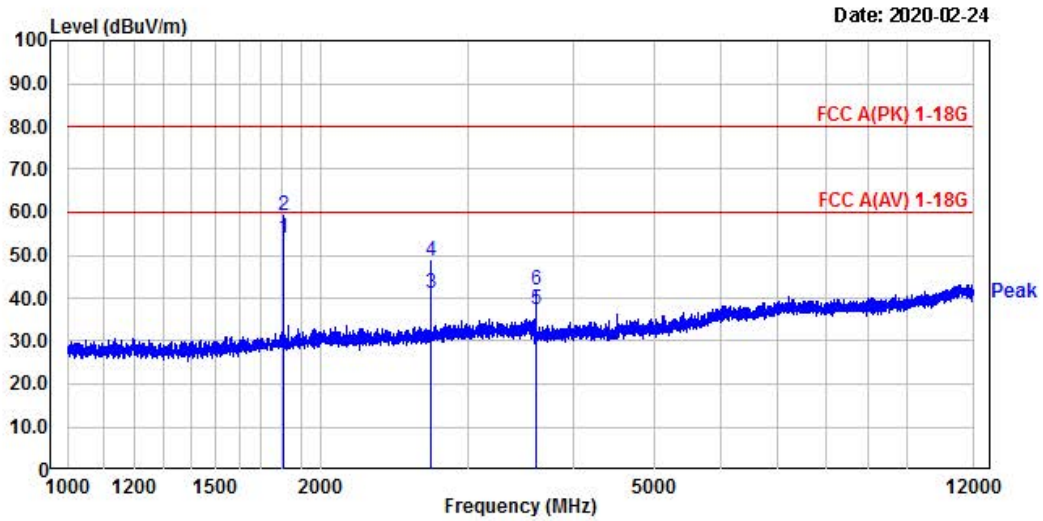
EUT/Model No.: FR900 Temp/Humi: 22 'C / 34 % R.H.

Test Mode : Wireless mode Tested by: YEON J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1805.97	61.48	-7.67	53.81	60.00	6.19	100	164	horizontal
2.	1805.97	66.96	-7.67	59.29	80.00	20.71	100	164	horizontal
3.	2708.64	45.33	-4.38	40.95	60.00	19.05	100	71	horizontal
4.	2708.64	52.91	-4.38	48.53	80.00	31.47	100	71	horizontal
5.	3611.33	39.16	-1.98	37.18	60.00	22.82	100	71	horizontal
6.	3611.33	43.98	-1.98	42.00	80.00	38.00	100	71	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

4, Songjuro 236Beon-gil, yanggi-myeon,
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Tel : +82-31-3236008,9
Fax : +82-31-3236010
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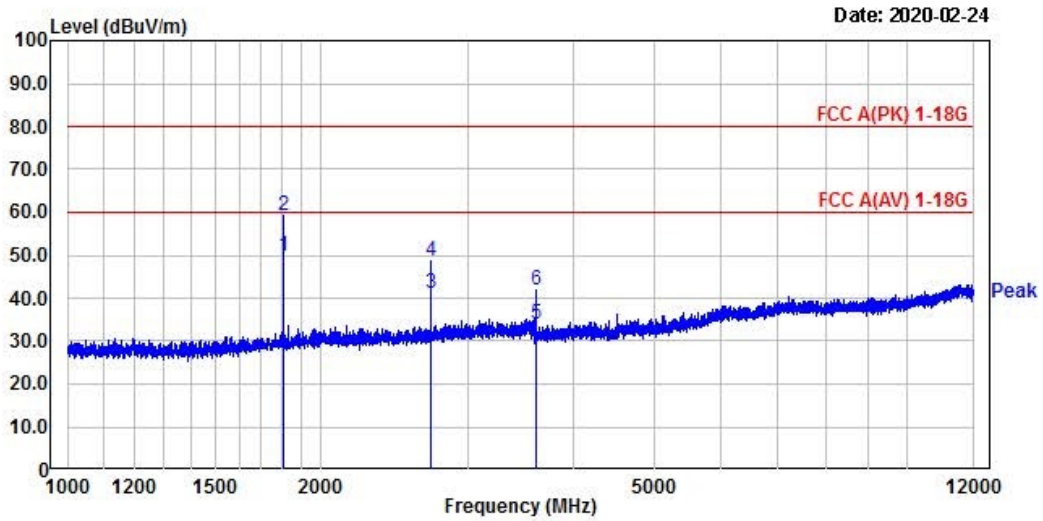
EUT/Model No.: FR900 Temp/Humi: 22 'C / 34 % R.H.

Test Mode : Wireless mode Tested by: YEON J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1805.97	57.64	-7.67	49.97	60.00	10.03	100	164	vertical
2.	1805.97	66.96	-7.67	59.29	80.00	20.71	100	164	vertical
3.	2708.64	45.53	-4.38	41.15	60.00	18.85	100	71	vertical
4.	2708.64	52.91	-4.38	48.53	80.00	31.47	100	71	vertical
5.	3611.33	36.12	-1.98	34.14	60.00	25.86	100	71	vertical
6.	3611.33	43.98	-1.98	42.00	80.00	38.00	100	71	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

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Tel : +82-31-3236008,9
Fax : +82-31-3236010
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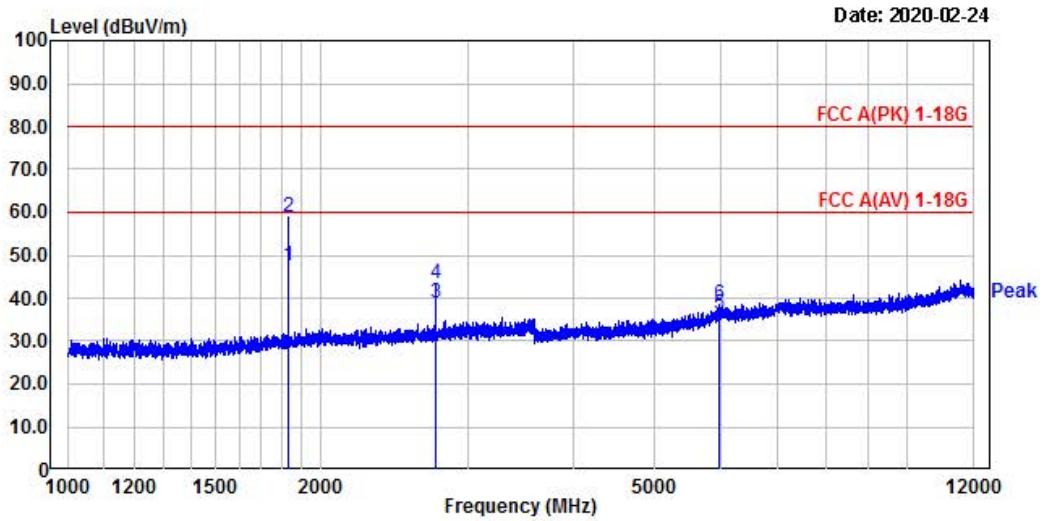
EUT/Model No.: FR900 Temp/Humi: 22 'C / 34 % R.H.

Test Mode : Wireless mode Tested by: YEON J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1830.25	55.19	-7.49	47.70	60.00	12.30	100	19	horizontal
2.	1830.25	66.19	-7.49	58.70	80.00	21.30	100	19	horizontal
3.	2745.92	43.12	-4.20	38.92	60.00	21.08	100	9	horizontal
4.	2745.92	47.62	-4.20	43.42	80.00	36.58	100	9	horizontal
5.	5962.00	31.16	5.25	36.41	60.00	23.59	100	29	horizontal
6.	5962.00	33.43	5.25	38.68	80.00	41.32	100	29	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
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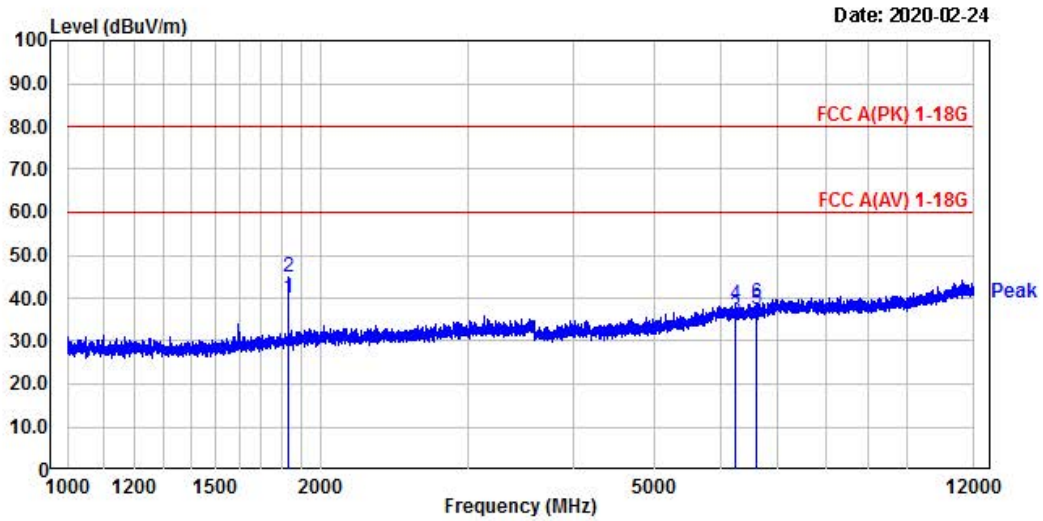
EUT/Model No.: FR900 Temp/Humi: 22 'C / 34 % R.H.

Test Mode : Wireless mode Tested by: YEON J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1830.25	47.43	-7.49	39.94	60.00	20.06	100	254	vertical
2.	1830.25	52.27	-7.49	44.78	80.00	35.22	100	254	vertical
3.	6238.60	30.16	5.66	35.82	60.00	24.18	100	233	vertical
4.	6238.60	32.95	5.66	38.61	80.00	41.39	100	233	vertical
5.	6605.53	31.06	6.18	37.24	60.00	22.76	100	311	vertical
6.	6605.53	32.74	6.18	38.92	80.00	41.08	100	311	vertical

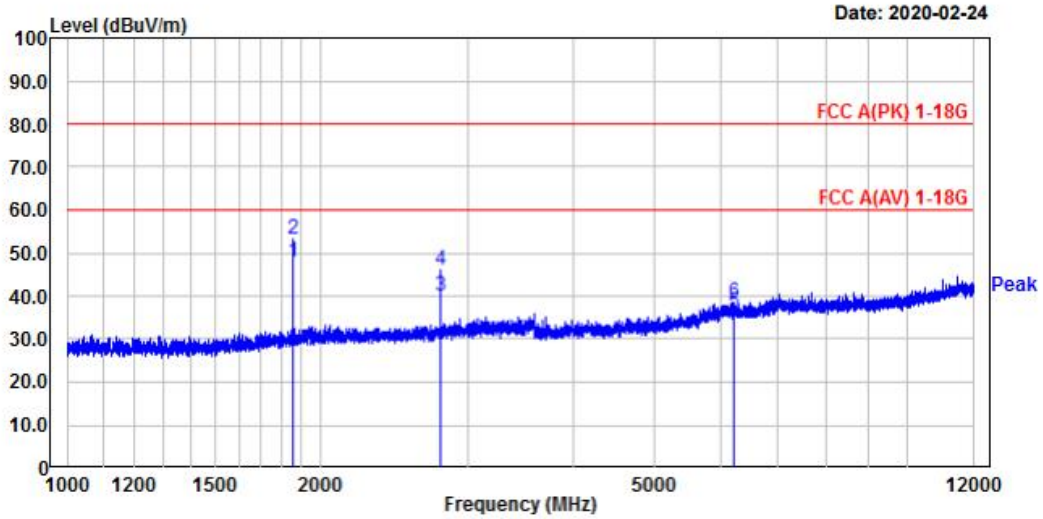
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
Tel : +82-31-3236008,9
Fax : +82-31-3236010
www.ltalab.com

EUT/Model No.: FR900 Temp/Humi: 22 'C / 34 % R.H.

Test Mode : Wireless mode Tested by: YEON J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1854.29	55.17	-7.30	47.87	60.00	12.13	100	8	horizontal
2.	1854.29	60.40	-7.30	53.10	80.00	26.90	100	8	horizontal
3.	2781.97	44.17	-4.04	40.13	60.00	19.87	100	18	horizontal
4.	2781.97	49.92	-4.04	45.88	80.00	34.12	100	18	horizontal
5.	6223.11	30.55	5.65	36.20	60.00	23.80	100	163	horizontal
6.	6223.11	32.92	5.65	38.57	80.00	41.43	100	163	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

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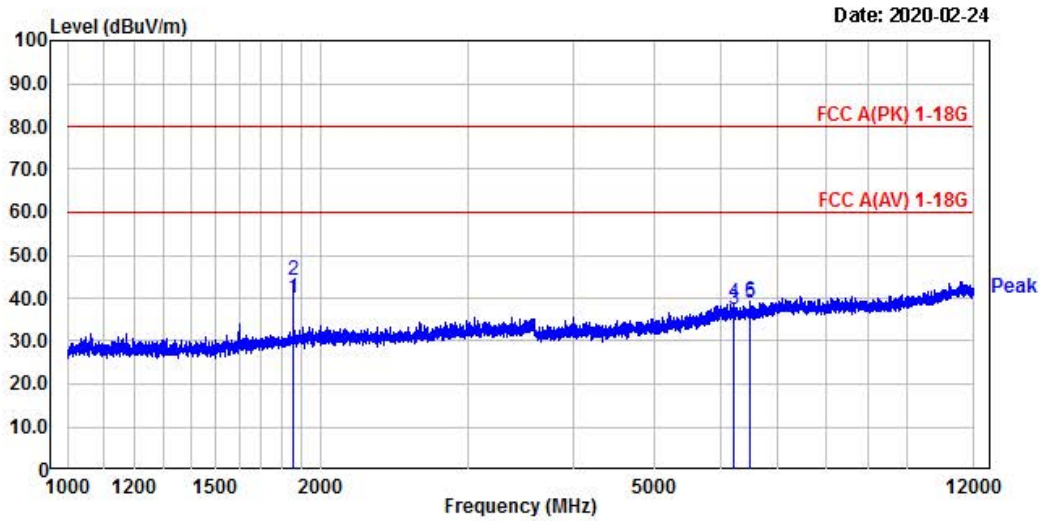
EUT/Model No.: FR900 Temp/Humi: 22 'C / 34 % R.H.

Test Mode : Wireless mode Tested by: YEON J H

Power :



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1854.29	47.25	-7.30	39.95	60.00	20.05	100	249	vertical
2.	1854.29	51.54	-7.30	44.24	80.00	35.76	100	249	vertical
3.	6230.85	31.66	5.65	37.31	60.00	22.69	100	14	vertical
4.	6230.85	33.13	5.65	38.78	80.00	41.22	100	14	vertical
5.	6513.85	32.93	5.97	38.90	60.00	21.10	100	260	vertical
6.	6513.85	33.18	5.97	39.15	80.00	40.85	100	260	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

3.3.9 AC Conducted Emissions

Procedure:

AC power line conducted emissions from the EUT were measured according to the dictates of ANSI C63.4:2003. The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: Complies

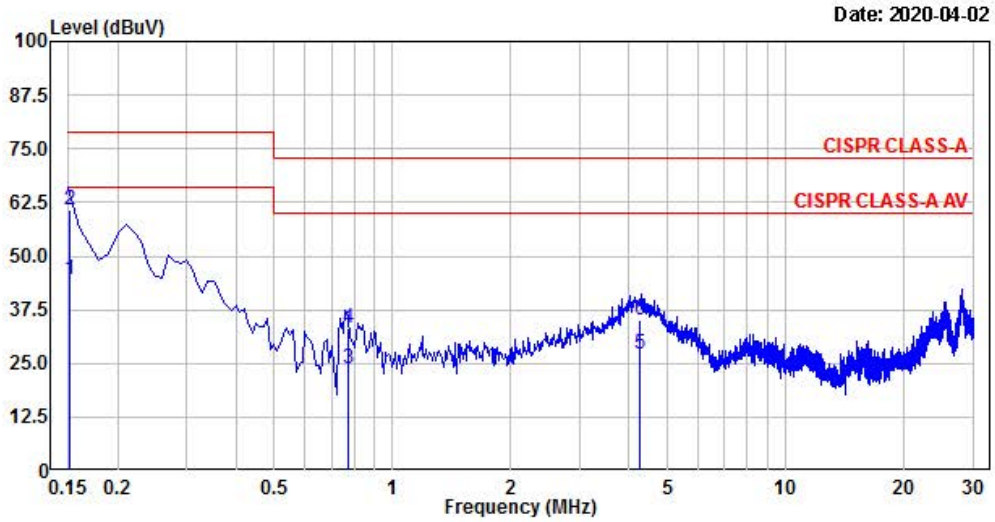
Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Note: This product operates only with battery and does not operate during charging.

4, Songjuro 236 Beon-gil, Yangji-myeon
Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT /Model No.	:	Phase	: LINE
Test Mode	:	Test Power	: 120 V / 60 Hz
Temp./ Humi.	: 20 'C / 32 % R.H.	Test Engineer	:

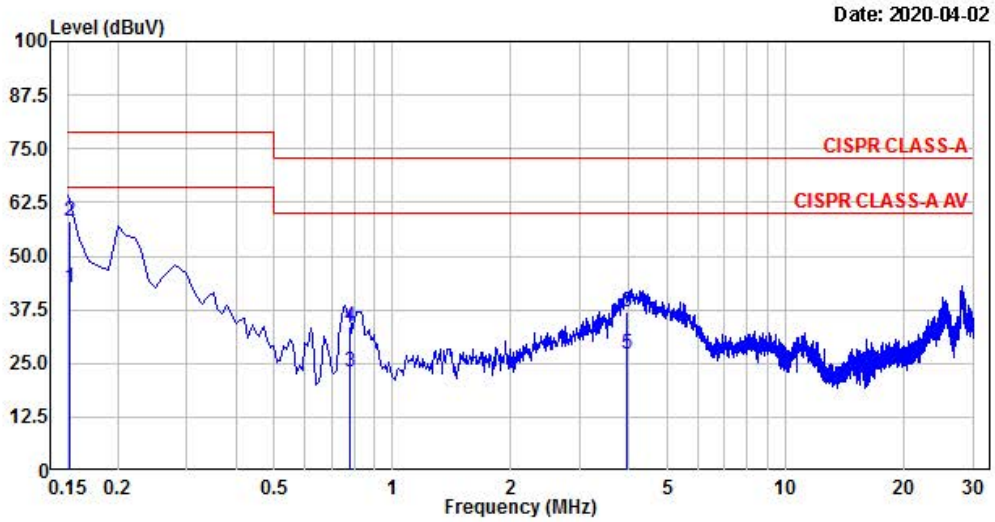


No.	Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Phase
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	
2.	0.151	41.12	24.93	19.47	60.59	44.40	79.00	66.00	18.41	21.60	Line
4.	0.773	13.70	4.35	19.52	33.22	23.87	73.00	60.00	39.78	36.13	Line
6.	4.265	15.33	7.64	19.70	35.03	27.34	73.00	60.00	37.97	32.66	Line

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

4, Songjuro 236 Beon-gil, Yangji-myeon
Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT /Model No.	:	Phase	: Neutral
Test Mode	:	Test Power	: 120 V / 60 Hz
Temp./ Humi.	: 20 'C / 32 % R.H.	Test Engineer	:

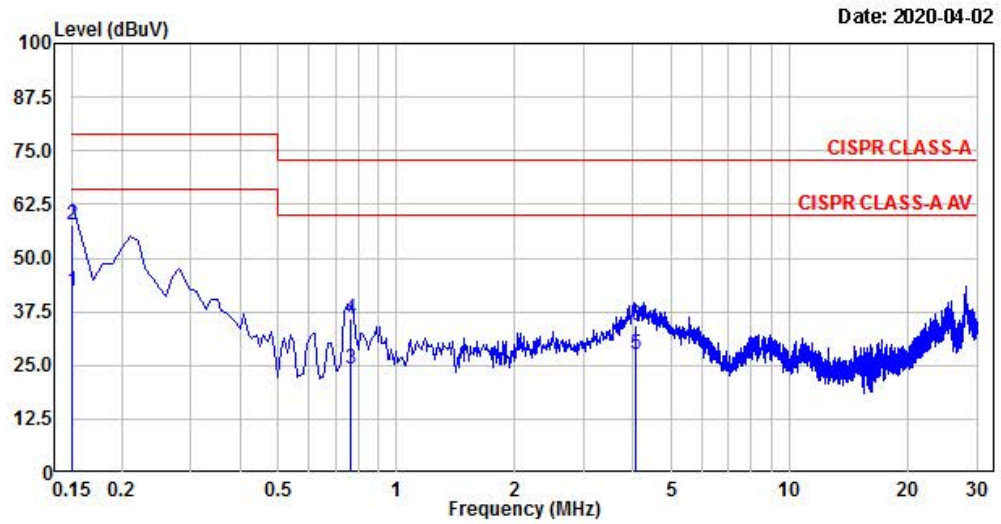


No.	Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Phase
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	
2.	0.151	38.75	23.09	19.53	58.28	42.62	79.00	66.00	20.72	23.38	neutral
4.	0.777	13.97	3.28	19.56	33.53	22.84	73.00	60.00	39.47	37.16	neutral
6.	3.957	17.12	7.36	19.72	36.84	27.08	73.00	60.00	36.16	32.92	neutral

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

4, Songjuro 236 Beon-gil, Yangji-myeon
Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT /Model No.	:	Phase	: Line
Test Mode	:	Test Power	: 120 V / 60 Hz
Temp./ Humi.	: 20 'C / 32 % R.H.	Test Engineer	:

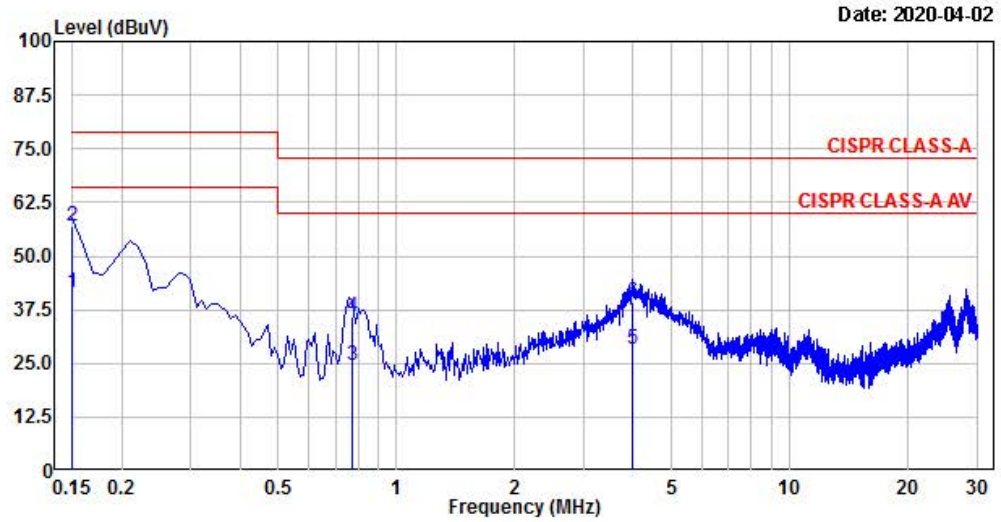


No.	Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Phase
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	
2.	0.150	38.24	22.67	19.47	57.71	42.14	79.00	66.00	21.29	23.86	Line
4.	0.766	16.20	4.65	19.52	35.72	24.17	73.00	60.00	37.28	35.83	Line
6.	4.057	14.66	7.81	19.69	34.35	27.50	73.00	60.00	38.65	32.50	Line

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

4, Songjuro 236 Beon-gil, Yangji-myeon
Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT /Model No.	:	Phase	: Neutral
Test Mode	:	Test Power	: 120 V / 60 Hz
Temp./ Humi.	: 20 'C / 32 % R.H.	Test Engineer	:



No.	Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Phase
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	
2.	0.150	37.34	22.00	19.53	56.87	41.53	79.00	66.00	22.13	24.47	neutral
4.	0.772	16.13	5.12	19.56	35.69	24.68	73.00	60.00	37.31	35.32	neutral
6.	3.969	19.37	8.50	19.72	39.09	28.22	73.00	60.00	33.91	31.78	neutral

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

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Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
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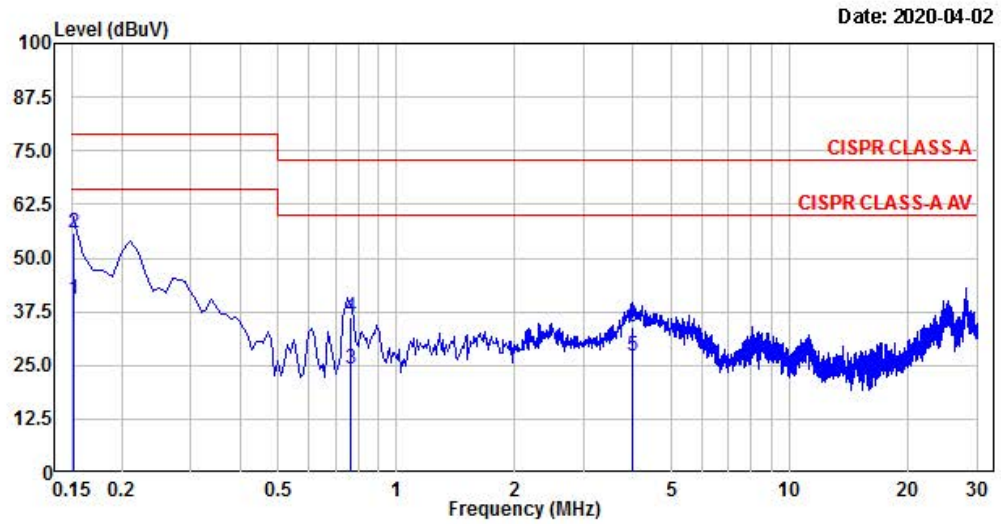
Fax:+82-31-3236010

EUT /Model No. :		Phase	: Line
Test Mode	:	Test Power	: 120 V / 60 Hz
Temp./ Humi.	: 20 'C / 32 % R.H.	Test Engineer	:

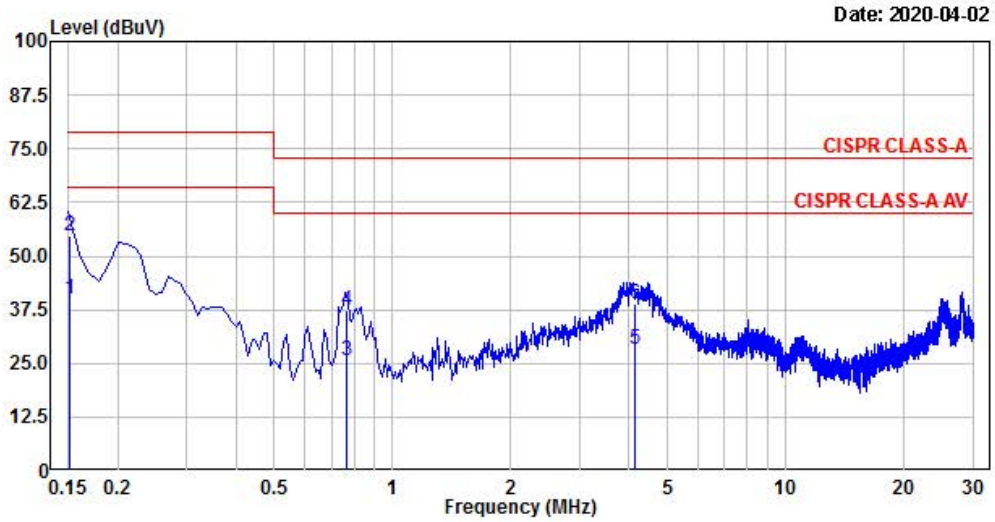


No.	Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Phase
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	
2.	0.151	36.23	21.04	19.47	55.70	40.51	79.00	66.00	23.30	25.49	Line
4.	0.767	16.78	4.59	19.52	36.30	24.11	73.00	60.00	36.70	35.89	Line
6.	4.004	14.40	7.46	19.69	34.09	27.15	73.00	60.00	38.91	32.85	Line

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

4, Songjuro 236 Beon-gil, Yangji-myeon
Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT /Model No. :		Phase	: Neutral
Test Mode	:	Test Power	: 120 V / 60 Hz
Temp./ Humi.	: 20 'C / 32 % R.H.	Test Engineer	:



No.	Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Phase
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	
2.	0.151	35.16	20.40	19.53	54.69	39.93	79.00	66.00	24.31	26.07	neutral
4.	0.766	17.66	6.23	19.56	37.22	25.79	73.00	60.00	35.78	34.21	neutral
6.	4.142	19.07	8.43	19.72	38.79	28.15	73.00	60.00	34.21	31.85	neutral

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Use	Description	Model No.	Serial No.	Manufacturer	Interval	Next Cal. Date
1	■	Signal Analyzer (9 kHz ~ 30 GHz)	FSV30	100757	R&S	1 year	2020-09-06
2	■	Signal Generator (~3.2 GHz)	8648C	3623A02597	HP	1 year	2021-03-20
3		SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2021-03-20
4		Attenuator (3 dB)	8491A	37822	HP	1 year	2020-09-06
5		Attenuator (10 dB)	8491A	63196	HP	1 year	2020-09-06
6	■	EMI Test Receiver (~7 GHz)	ESCI7	100722	R&S	1 year	2020-09-06
7		RF Amplifier (~1.3 GHz)	8447D OPT 010	2944A07684	HP	1 year	2020-09-06
8		RF Amplifier (1~26.5 GHz)	8449B	3008A02126	HP	1 year	2021-03-20
9	■	Horn Antenna (1~18 GHz)	3115	00114105	ETS	2 year	2020-08-04
10		DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2022-03-18
11		DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2022-03-18
12	■	TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2022-03-20
13		Temp.Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2021-03-16
14		Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
15	■	DC Power Supply	6674A	3637A01657	Agilent	-	-
17	■	Power Meter	EPM-441A	GB32481702	HP	1 year	2021-03-16
18	■	Power Sensor	8481A	3318A94972	HP	1 year	2020-09-06
19		Audio Analyzer	8903B	3729A18901	HP	1 year	2020-09-06
20		Modulation Analyzer	8901B	3749A05878	HP	1 year	2020-09-06
21		TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2020-09-06
22		Stop Watch	HS-3	812Q08R	CASIO	2 year	2022-03-16
23		LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2020-09-06
24		Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2021-03-18
25		UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2021-03-16
26		Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	1 year	2021-03-16
27		Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	1 year	2021-03-16
28		OSP120 BASE UNIT	OSP120	101230	R&S	1 year	2021-03-16
29		Signal Generator(100 kHz ~ 40 GHz)	SMB100A03	177621	R&S	1 year	2021-03-16
30		Signal Analyzer (10 Hz ~ 40 GHz)	FSV40	101367	R&S	1 year	2021-03-16
31	■	Active Loop Antenna	FMZB 1519	1519-031	SCHWARZBECK	2 year	2021-02-26