ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT CLASS II PC Report

OF

Product Name of Host:	**Juno T41/5**
Brand Name:	**Trimble**
Marketing Name of Host:	**RH42G**
Model No of Host:	**JUNO/T41/5-BWCRF, JUNO/T41/5-BWCRFG, JUNO/T41/5-BWRF**
Model Difference:	**JUNO/T41/5-BWCRF is 2-4M GPS, JUNO/T41/5-BWCRFG is 1M GPS, JUNO/T41/5-BWRF without WWAN function**
FCC ID:	**QV5MERCURY6E-M**
Report No.:	**EH/2013/B0007-03**
Issue Date:	**Nov. 25, 2015**
FCC Rule Part:	**§15.247, Cat: DSS**
Prepared for:	**Trimble Navigation Limited 345 SW Avery Avenue, Corvallis, OR 97333**
Prepared by:	**SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803**

CERTIFICATION OF COMPLIANCE

Applicant:	Trimble Navigation Limited 345 SW Avery Avenue, Corvallis, OR 97333
Product Name of Host:	Juno T41/5
Brand Name:	Trimble
Marketing Name of Host:	RH42G
Model No. of Host:	JUNO/T41/5-BWCRF, JUNO/T41/5-BWCRFG, JUNO/T41/5-BWRF
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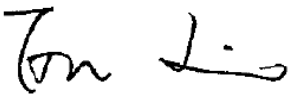
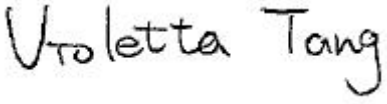
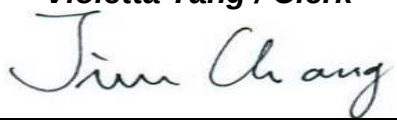
FCC ID:	QV5MERCURY6E-M
File Number:	EH/2013/B0007-03
Date of test:	Oct. 27, 2015 ~ Nov. 19, 2015
Date of EUT Received:	Oct. 27, 2015

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013, the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.
The test results of this report relate only to the tested sample identified in this report.

Test By:		***Date:***	Nov. 25, 2015
	Tin Lin / Engineer		
Prepared By:		***Date:***	Nov. 25, 2015
	Violetta Tang / Clerk		
Approved By:		***Date:***	Nov. 25, 2015
	Jim Chang / Asst. Manager		

Revision History

Report Number	Revision	Description	Issue Date
EH/2013/B0007-03	Rev.00	Initial creation of document	Nov. 25, 2015

Contents

1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name of Host:	Juno T41/5	
Brand Name:	Trimble	
Marketing Name of Host:	RH42G	
Model No. of Host:	JUNO/T41/5-BWCRF, JUNO/T41/5-BWCRFG, JUNO/T41/5-BWRF	
Model difference:	JUNO/T41/5-BWCRF is 2-4M GPS, JUNO/T41/5-BWCRFG is 1M GPS, JUNO/T41/5-BWRF without WWAN function	
Hardware Version:	2.0	
Software Version:	2.1	
Data Cable:	Model: A9136939, Supplier: Sinbon	
Power Supply:	3.7Vdc Rechargeable Li-polymer battery or 5Vdc from adapter	
	Battery:	Model No.: S11GD103A, Supplier: LICO
	Adapter:	Model No.: PSA10F-050Q-R, Supplier: PHIHONG TECHNOLOGY CO., LTD
Class II Permissive Change	1. The subject approved RFID module is being used in a host system (Product Name: Juno T41/5, Brand name: Trimble, Model No.: JUNO/T41/5-BWCRF, JUNO/T41/5-BWCRFG, JUNO/T41/5-BWRF) RFID Module FCC ID: QV5MERCURY6E-M 2. The channel plan was changed to space the same number of channels (50), with a narrower spacing of 100kHz instead of the original 500kHz. Per client, this is only a software change of the frequency and end user cannot switch between channel plans.	

RFID:

Frequency Range:	917.5-922.5MHz
Channel number:	50 channels
Modulation type:	PR-ASK
Transmit Power:	28.12dBm (Peak)
Dwell Time:	<= 0.4s
Operating Mode:	Point-to-Point
Antenna Designation:	Part number:MPAC29SE921P-TA, Ceramic Patch Antenna , Gain: 0.17dBi

This test report applies for RFID function.

1.2. Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC Public Notice DA 00-705 Measurement Guidelines

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under a DoC procedure.

1.3. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan.

FCC Registration Number is: 990257, Canada Registration Number: 4620A-4.

1.4. Special Accessories

Not available for this EUT intended for grant.

1.5. Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plan. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4. 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 attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 10dB and splitter 0.5dB splitter. Offset = RF cable loss (dB)+ splitter(dB) =10 + 0.5 = 10.5(dB)

2.5. Configuration of Tested System

Fig. 2-1 Radiated Emission and Conducted (Antenna Port) Configuration

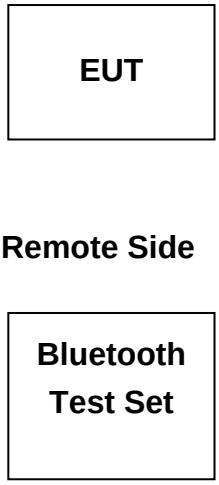


Fig. 2-2 AC Power line Conducted Emission

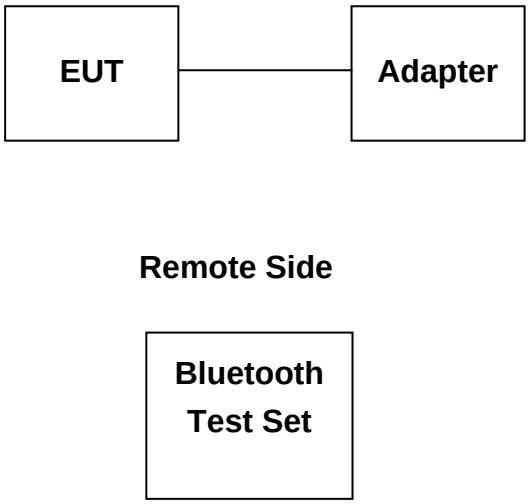


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Set	Anritsu	MT8852B	6k00006107	N/A	N/A

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b)(2)	Peak Output Power	Compliant
$15.247(d) §15.209(a) (f)	Spurious Emission	Compliant
§15.203	Antenna Requirement	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.
Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel Low (917.5MHz), Mid (920MHz) and High (922.5MHz) with were chosen as worst case for full testing.

The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth Transmitter for channel Low, Mid and High the worst case E1 position was reported.

5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55 dB
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : **Vertical**)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : **Horizontal**)	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6. CONDUCTED EMISSION TEST

6.1. Standard Applicable:

According to §15.207, frequency range within 150 KHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

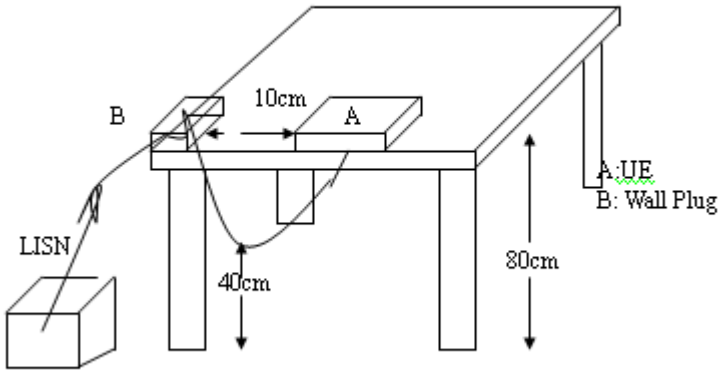
6.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100760	05/04/2015	05/03/2016
LISN	SCHWARZBECK	NSLK 8127	8127-649	05/15/2015	05/14/2016
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/13/2015	03/12/2016
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2014	11/25/2015

6.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10: 2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

6.4. Test SET-UP (Block Diagram of Configuration)



6.5. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

6.6. Measurement Result:

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit.

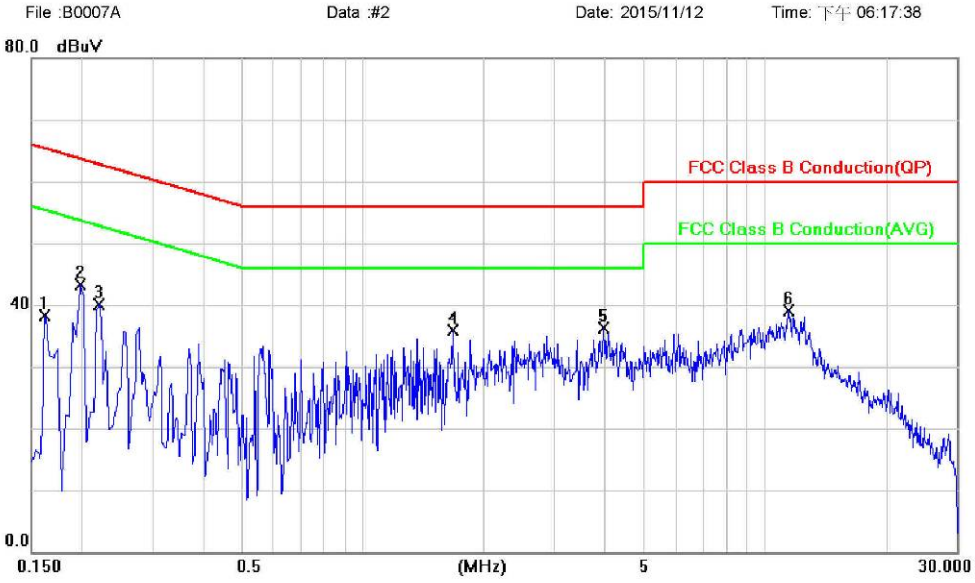
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	Nov. 12, 2015
Temperature:	24 ℃	Humidity:	60 %	Test By:	Tin

Site Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation
Note: Adapter: PSA10F-050Q

Phase: *L1*
Power: AC 120V/60Hz

Temperature: 24 ℃
Humidity: 60 %

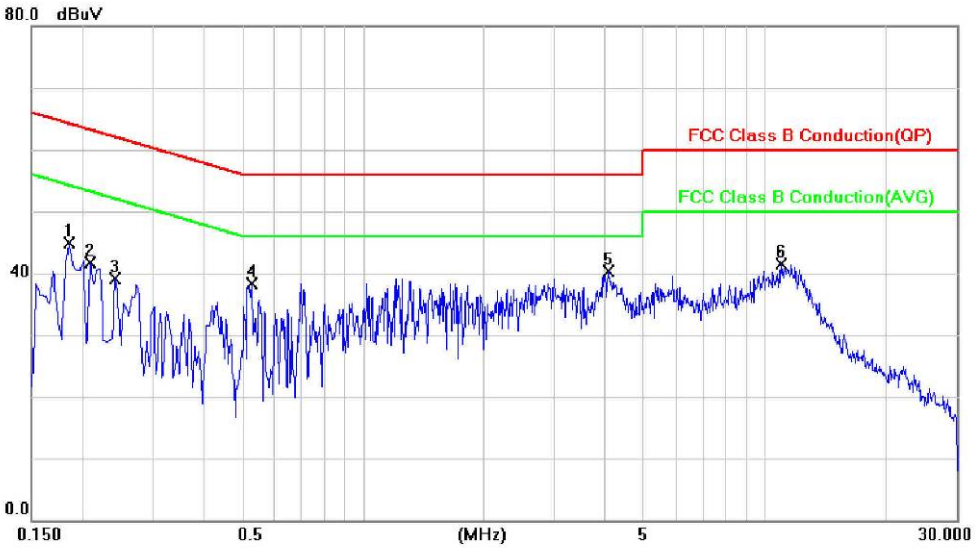


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	38.24	0.06	38.30	65.36	-27.06	peak	
2		0.1980	43.20	0.06	43.26	63.69	-20.43	peak	
3		0.2220	40.01	0.06	40.07	62.74	-22.67	peak	
4		1.6740	35.78	0.08	35.86	56.00	-20.14	peak	
5	*	3.9700	36.22	0.13	36.35	56.00	-19.65	peak	
6		11.4900	38.72	0.30	39.02	60.00	-20.98	peak	

Site Conduction Room	Phase: N	Temperature: 24 ℃
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 60 %
Mode: Operation		
Note: Adapter: PSA10F-050Q		

Conducted Emission

File :B0007A Data :#1 Date: 2015/11/12 Time: 下午 06:14:57



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1860	44.82	0.06	44.88	64.21	-19.33	peak	
2		0.2100	41.70	0.06	41.76	63.21	-21.45	peak	
3		0.2420	39.13	0.06	39.19	62.03	-22.84	peak	
4		0.5300	38.15	0.06	38.21	56.00	-17.79	peak	
5	*	4.0740	40.26	0.14	40.40	56.00	-15.60	peak	
6		10.9900	41.18	0.30	41.48	60.00	-18.52	peak	

7. PEAK OUTPUT POWER MEASUREMENT

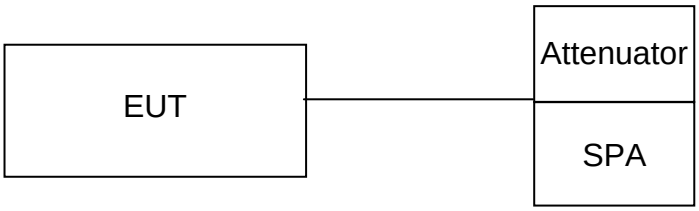
7.1. Standard Applicable:

According to §15.247(b)(2), for frequency hopping systems operating in the 902-928 MHz band employing at least 50 hopping channels, The Limit: 1Watt. For systems employing less than 50 hopping channels, The Limit: 0.25 Watts. But at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

7.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/20/2014	12/19/2015
Power Sensor	Anritsu	MA2411B	917032	12/20/2014	12/19/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2015	01/28/2016
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/02/2015	01/01/2016
Spectrum Analyzer	Agilent	E4440A	MY45304525	05/05/2015	05/04/2016
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2015	01/01/2016
Splitter	Agilent	11636B	N/A	01/02/2015	01/01/2016

7.3. .Test Set-up:



7.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max peak function, >20dB bandwidth, >=RBW)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

7.5. Measurement Result:

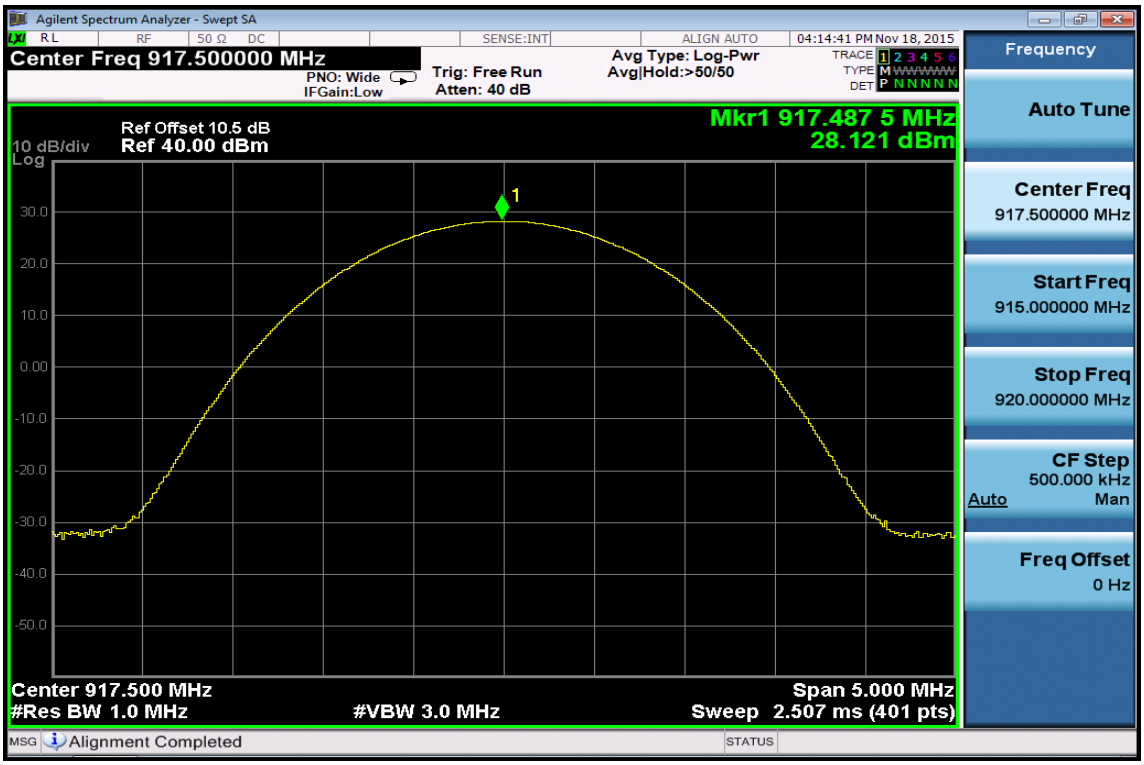
Peak Power:

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
917.50	28.12	0.64878	1
920.00	28.11	0.64670	1
922.50	28.10	0.64565	1

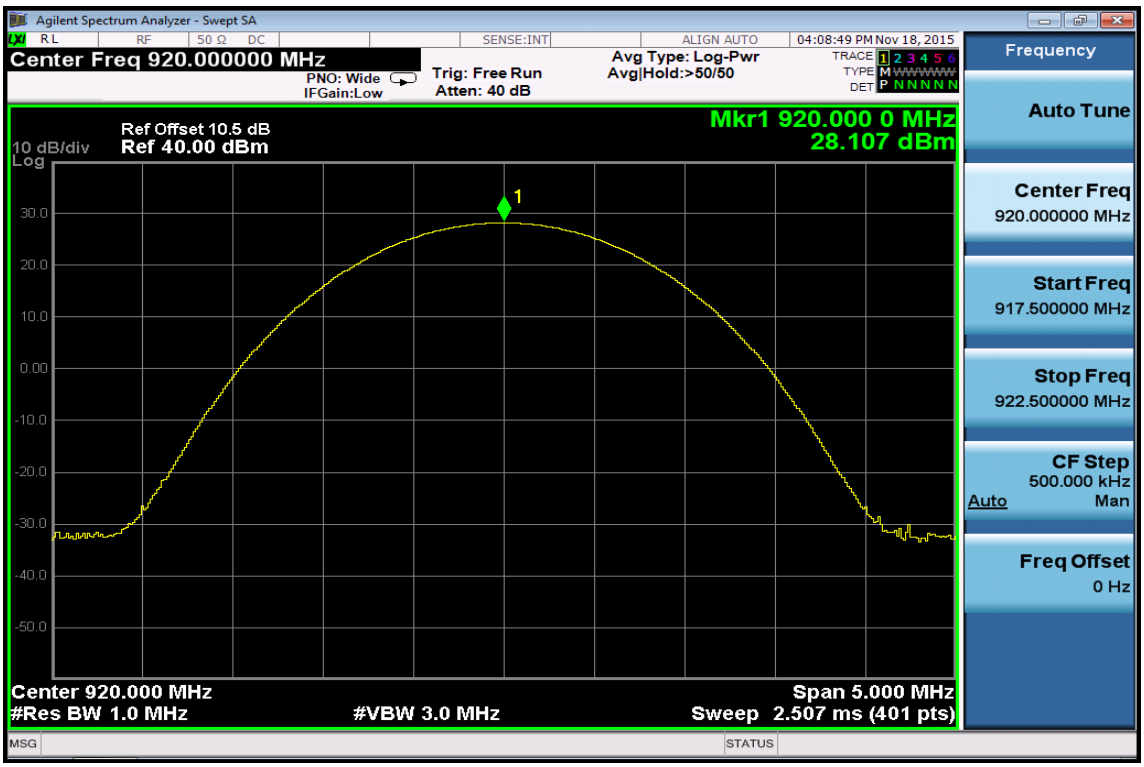
**Note: offset 10.5dB*

**Note: Refer to next page for plots.*

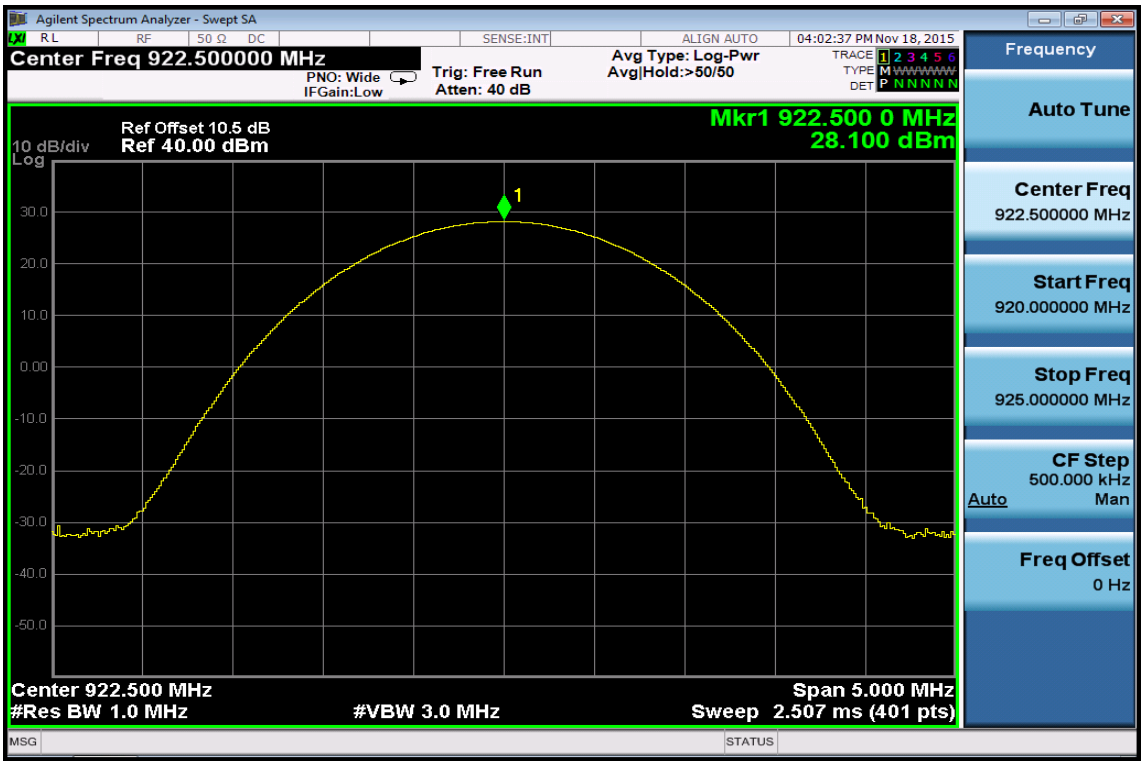
Peak Power Output Data Plot (CH Low)



Peak Power Output Data Plot (CH Mid)



Peak Power Output Data Plot (CH High)



8. SPURIOUS RADIATED EMISSION TEST

8.1 Standard Applicable:

According to §15.247(d),

Emission at antenna port:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Radiated Spurious Emission

Attenuation below the general limits specified in § 15.209(a) is not required.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

8.2. Measurement Equipment Used:

8.2.1. Conducted Emission at antenna port:

Refer to section 7.2 for details.

8.2.2. Radiated emission:

966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100760	05/04/2015	05/03/2016
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2015	01/28/2016
EXA Spectrum Ana-lyzer	Agilent	N9010A	MY50420195	12/22/2014	12/21/2015
Spectrum Analyzer	R&S	FSV-30	101398	09/23/2015	09/22/2016
Loop Antenna	ETS.LINDGREN	6502	00143303	12/9/2014	12/08/2015
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/23/2014	12/22/2015
Horn antenna	ETS.LINDGREN	3117	123995	05/05/2015	05/04/2016
Horn Antenna	Schwarzbeck	BBHA9170	184	12/25/2014	12/24/2015
Pre-Amplifier	Agilent	8447D	2944A07676	01/02/2015	01/01/2016
Pre-Amplifier	Agilent	8449B	3008A00578	01/02/2015	01/01/2016
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/02/2015	01/01/2016
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	004	01/02/2015	01/01/2016
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	060776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/02/2015	01/01/2016
3m Site NSA	SGS	966 chamber	N/A	07/01/2015	06/30/2016

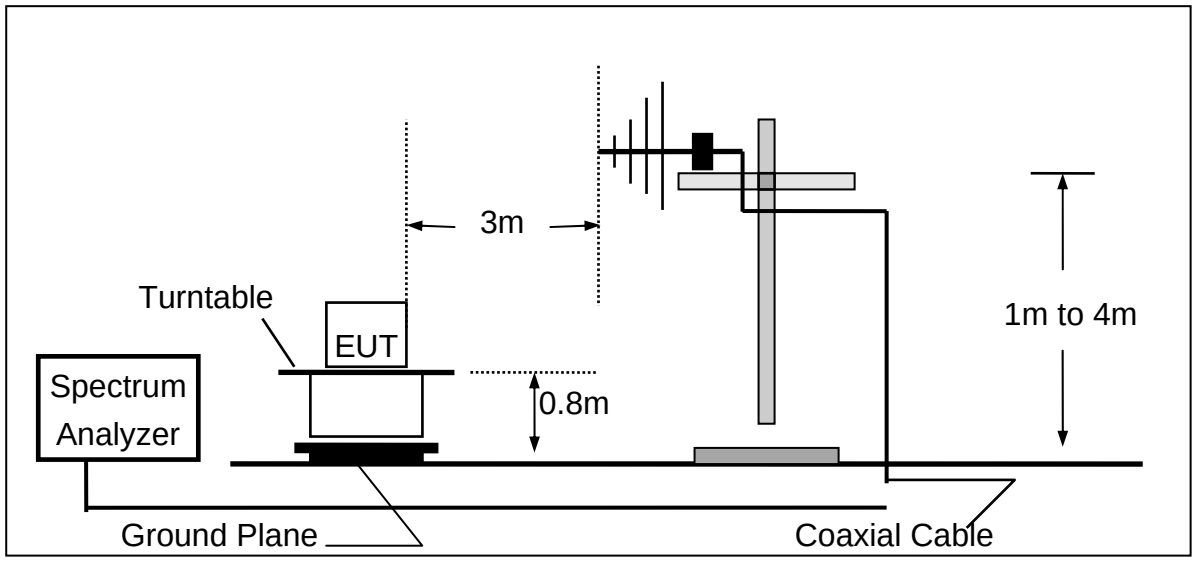
8.3. Test SET-UP:

8.3.1. Conducted Emission at antenna port:

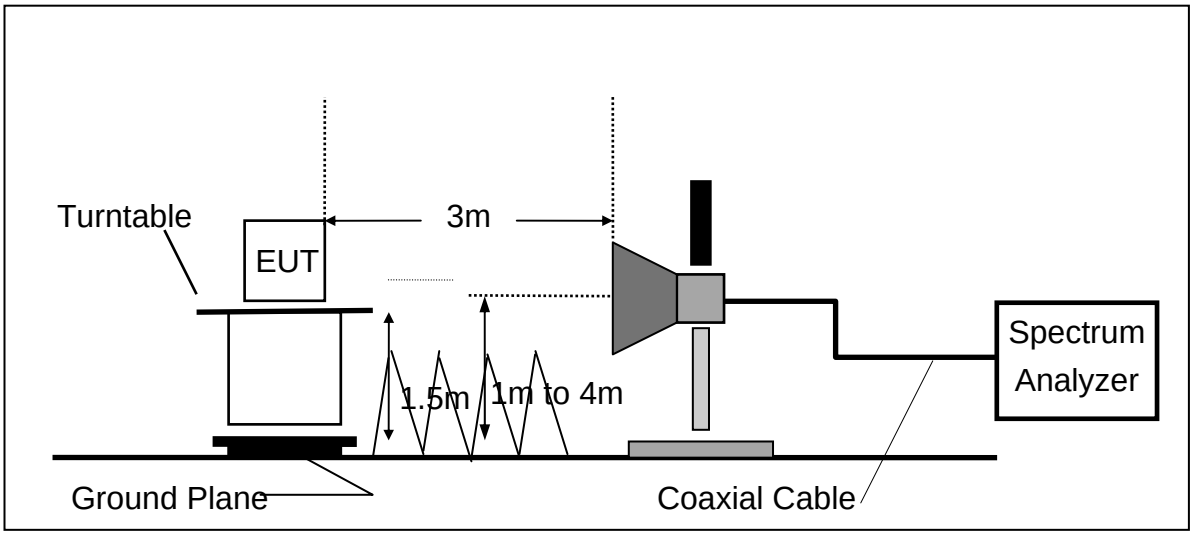
Refer to section 7.3 for details.

8.3.2. Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



8.4 Measurement Procedure:

Radiated Emission:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

Auxiliary Procedure (Setting on Spectrum to capture the reading of emission level):
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

Conducted Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 100K & VBW = 300K on Spectrum.
3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz.
4. Via Software, combine 5 spans of frequency range into two plots containing the range of 30MHz to 3GHz, and 3GHz to 26.5GHz.

8.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Remark:

1. The limit of the emission level is expressed in dBuV/m, which converts 20*log(uV/m)
2. Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

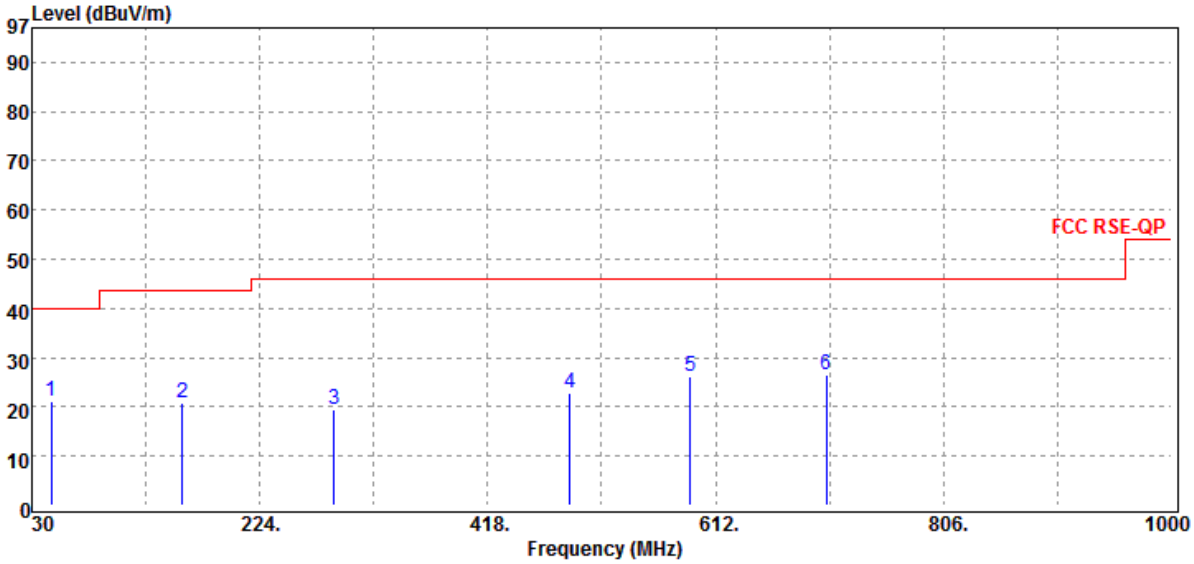
8.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Note: For the tabular table as presents below, “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency. “E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency. “---“ : denotes Noise Floor

Radiated Spurious Emission Measurement Result (Below 1GHz)

Operation Band	:RFID	Test Date	:2015-10-28
Fundamental Frequency	:917.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

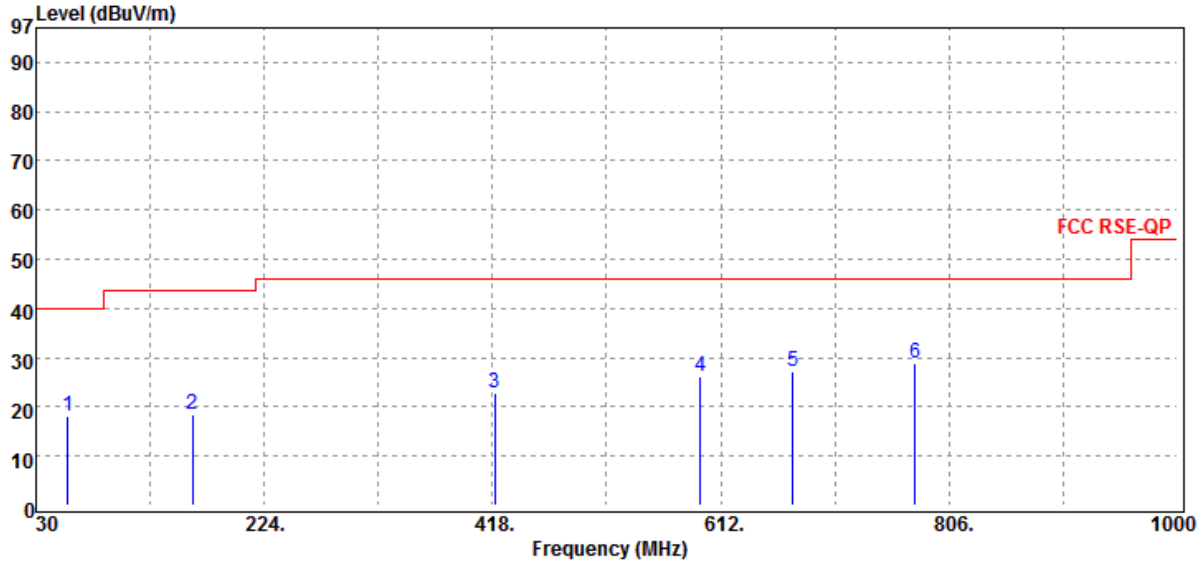
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
46.49	S	Peak	30.63	-9.35	21.28	40.00	-18.72
158.04	S	Peak	29.86	-8.89	20.97	43.50	-22.53
287.05	S	Peak	27.68	-8.25	19.43	46.00	-26.57
487.84	S	Peak	27.21	-4.34	22.87	46.00	-23.13
590.66	S	Peak	27.82	-1.53	26.29	46.00	-19.71
706.09	S	Peak	27.71	-1.30	26.41	46.00	-19.59

Operation Band	:RFID	Test Date	:2015-10-28
Fundamental Frequency	:917.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

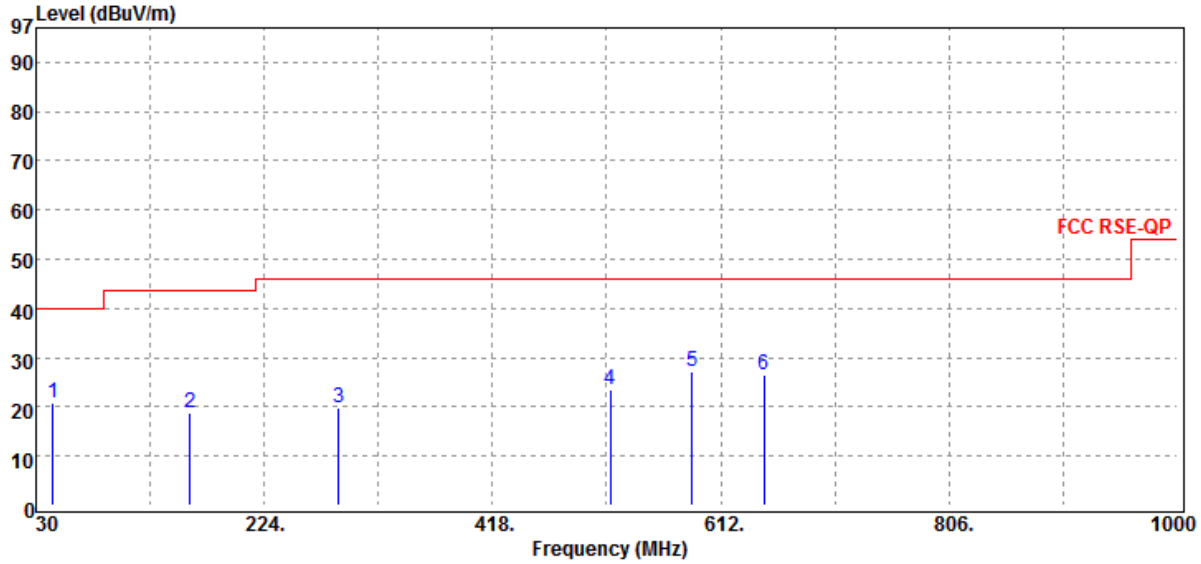
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
57.16	S	Peak	27.93	-9.95	17.98	40.00	-22.02
162.89	S	Peak	27.17	-8.88	18.29	43.50	-25.21
419.94	S	Peak	28.37	-5.68	22.69	46.00	-23.31
594.54	S	Peak	27.86	-1.63	26.23	46.00	-19.77
673.11	S	Peak	28.47	-1.14	27.33	46.00	-18.67
776.90	S	Peak	28.30	0.58	28.88	46.00	-17.12

Operation Band	:RFID	Test Date	:2015-10-28
Fundamental Frequency	:920 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

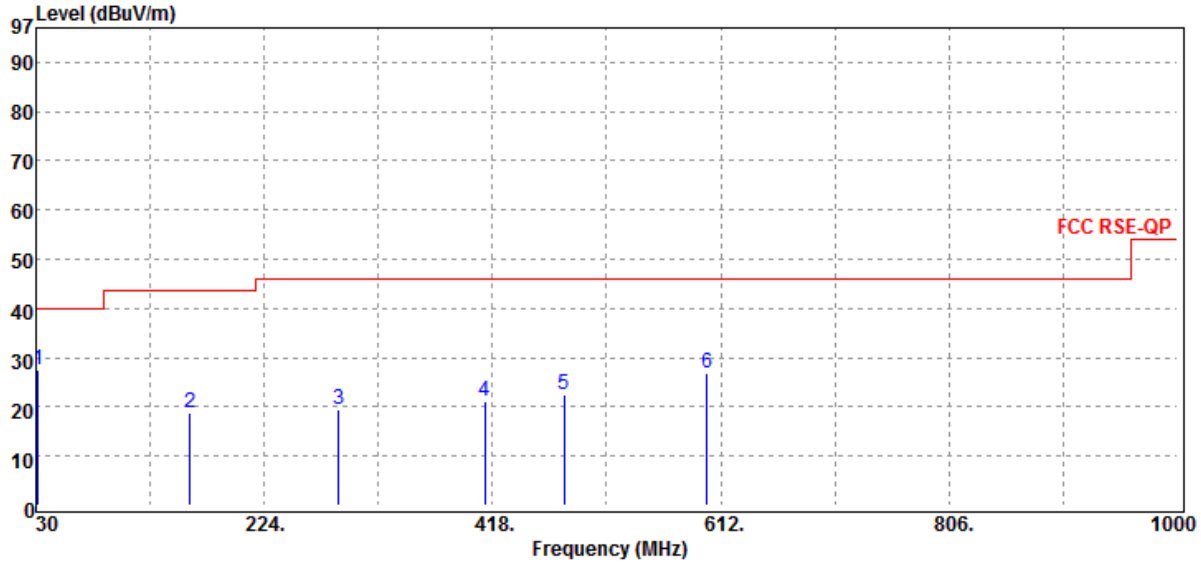
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
44.55	S	Peak	30.24	-9.38	20.86	40.00	-19.14
160.95	S	Peak	27.48	-8.83	18.65	43.50	-24.85
287.05	S	Peak	28.00	-8.25	19.75	46.00	-26.25
517.91	S	Peak	27.90	-4.47	23.43	46.00	-22.57
587.75	S	Peak	28.71	-1.60	27.11	46.00	-18.89
648.86	S	Peak	27.82	-1.41	26.41	46.00	-19.59

Operation Band	:RFID	Test Date	:2015-10-28
Fundamental Frequency	:920 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Actual FS(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)

Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

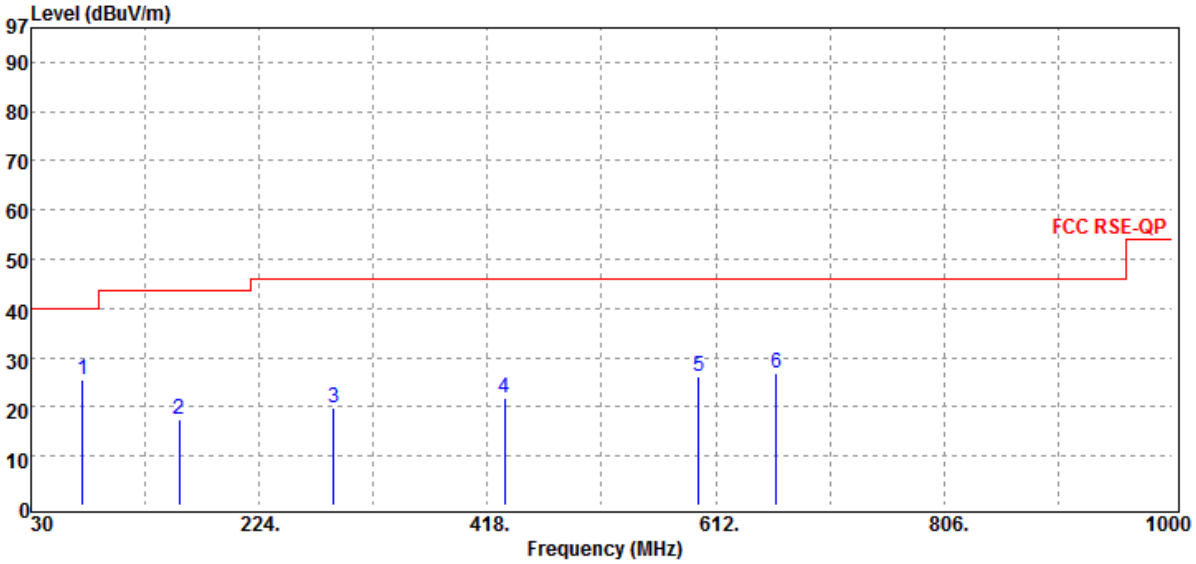
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
31.94	S	Peak	37.89	-10.22	27.67	40.00	-12.33
160.95	S	Peak	27.50	-8.83	18.67	43.50	-24.83
287.05	S	Peak	27.84	-8.25	19.59	46.00	-26.41
411.21	S	Peak	26.89	-5.83	21.06	46.00	-24.94
479.11	S	Peak	27.11	-4.63	22.48	46.00	-23.52
600.36	S	Peak	29.06	-2.05	27.01	46.00	-18.99

Operation Band	:RFID	Test Date	:2015-10-28
Fundamental Frequency	:922.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

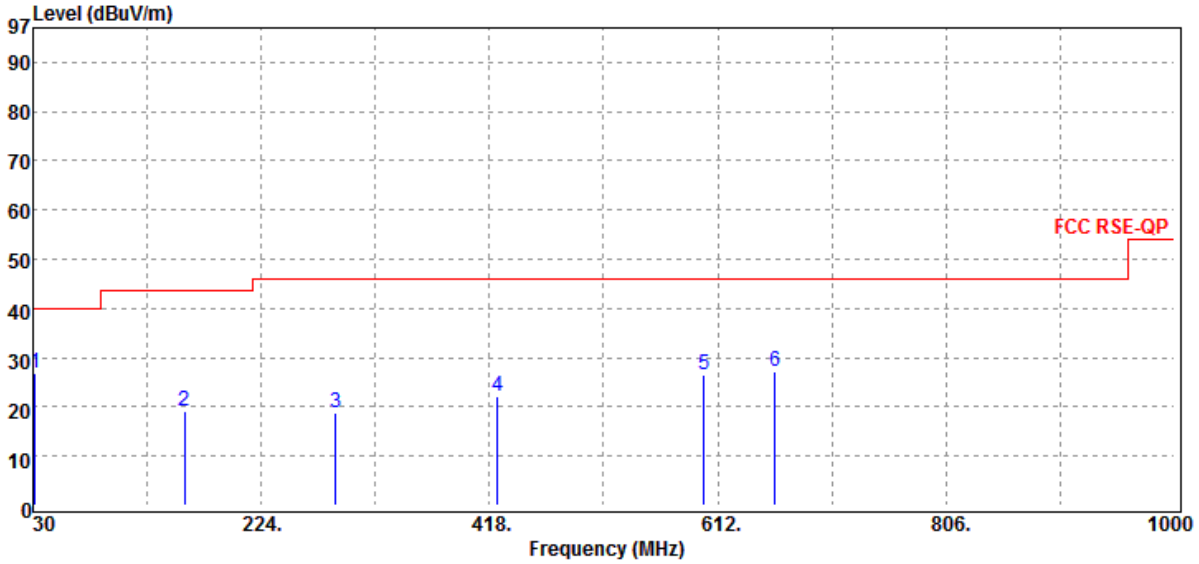
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
73.65	S	Peak	37.79	-12.28	25.51	40.00	-14.49
156.10	S	Peak	26.53	-8.98	17.55	43.50	-25.95
287.05	S	Peak	28.13	-8.25	19.88	46.00	-26.12
432.55	S	Peak	27.50	-5.81	21.69	46.00	-24.31
597.45	S	Peak	27.90	-1.80	26.10	46.00	-19.90
663.41	S	Peak	27.97	-1.16	26.81	46.00	-19.19

Operation Band	:RFID	Test Date	:2015-10-28
Fundamental Frequency	:922.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

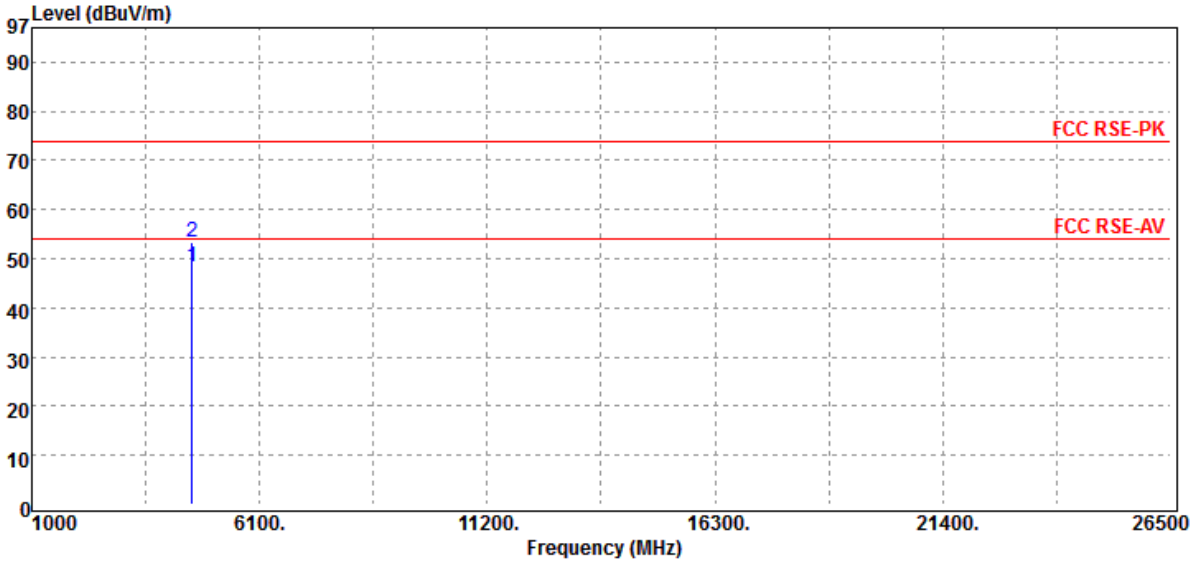
"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
31.94	S	Peak	37.14	-10.22	26.92	40.00	-13.08
159.01	S	Peak	27.82	-8.85	18.97	43.50	-24.53
287.05	S	Peak	27.05	-8.25	18.80	46.00	-27.20
424.79	S	Peak	27.71	-5.71	22.00	46.00	-24.00
600.36	S	Peak	28.70	-2.05	26.65	46.00	-19.35
660.50	S	Peak	28.17	-1.12	27.05	46.00	-18.95

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Band	:RFID	Test Date	:2015-11-09
Fundamental Frequency	:917.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

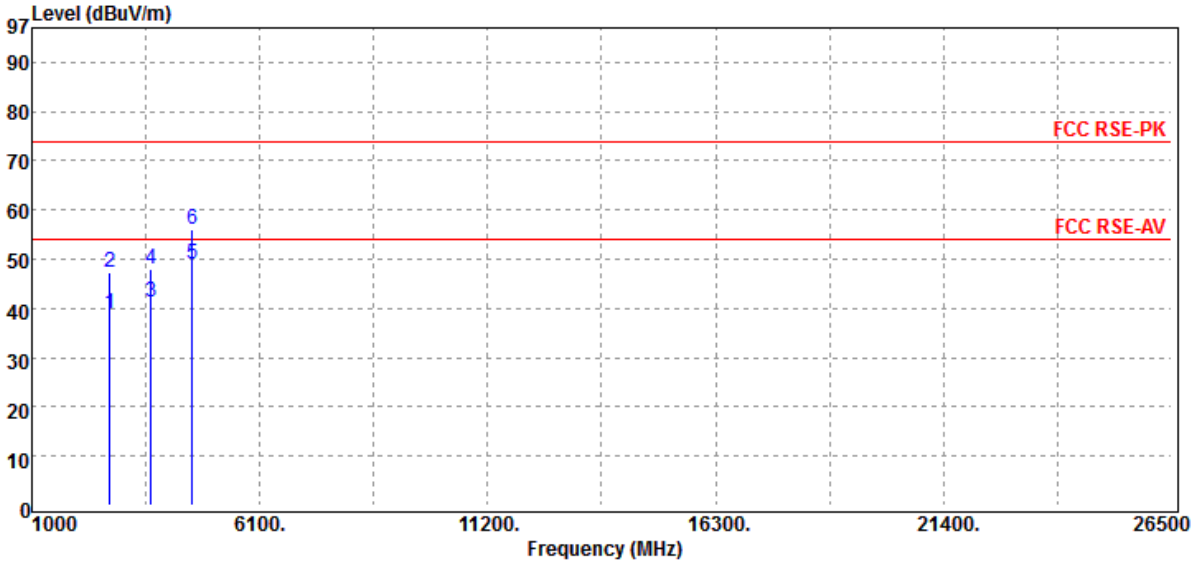
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4585.00	H	Average	39.00	9.32	48.32	54.00	-5.68
4585.00	H	Peak	43.95	9.32	53.27	74.00	-20.73

Operation Band	:RFID	Test Date	:2015-11-09
Fundamental Frequency	:917.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

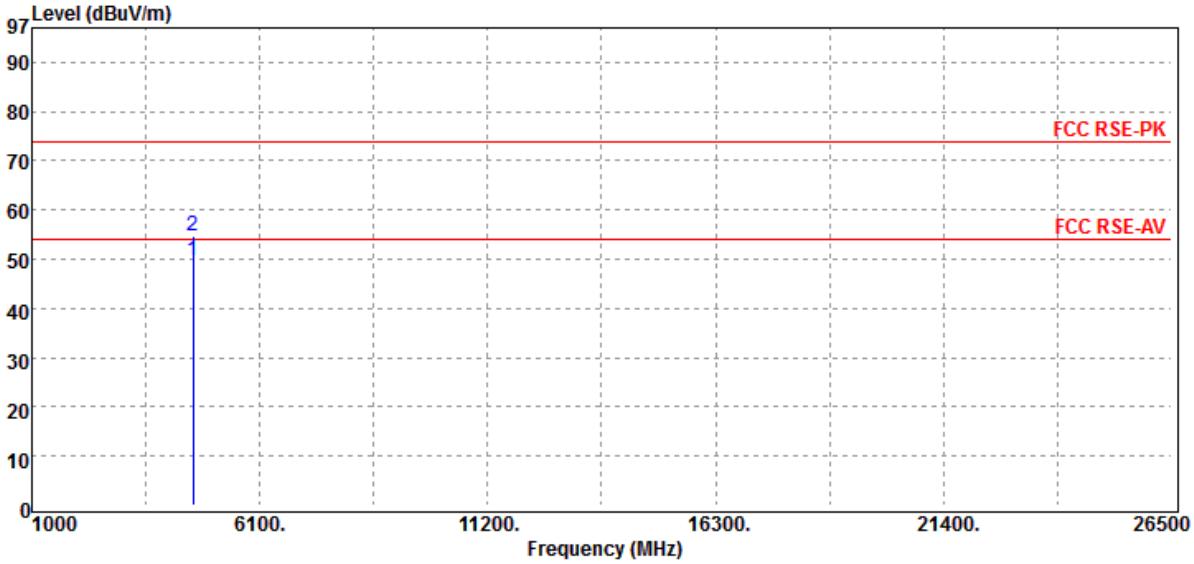
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2751.00	H	Average	32.72	6.21	38.93	54.00	-15.07
2751.00	H	Peak	41.26	6.21	47.47	74.00	-26.53
3668.00	H	Average	33.73	7.55	41.28	54.00	-12.72
3668.00	H	Peak	40.45	7.55	48.00	74.00	-26.00
4585.00	H	Average	39.63	9.32	48.95	54.00	-5.05
4585.00	H	Peak	46.87	9.32	56.19	74.00	-17.81

Operation Band	:RFID	Test Date	:2015-11-12
Fundamental Frequency	:920 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

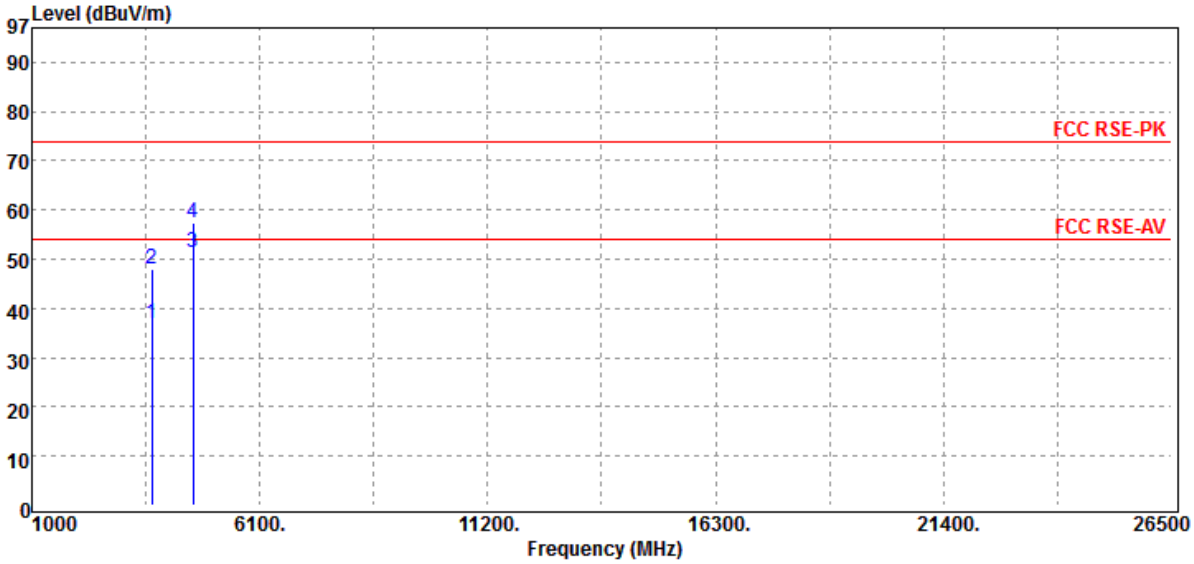
“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4600.00	H	Average	40.19	9.41	49.60	54.00	-4.40
4600.00	H	Peak	45.42	9.41	54.83	74.00	-19.17

Operation Band	:RFID	Test Date	:2015-11-12
Fundamental Frequency	:920 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX MID	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Actual FS(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)

Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

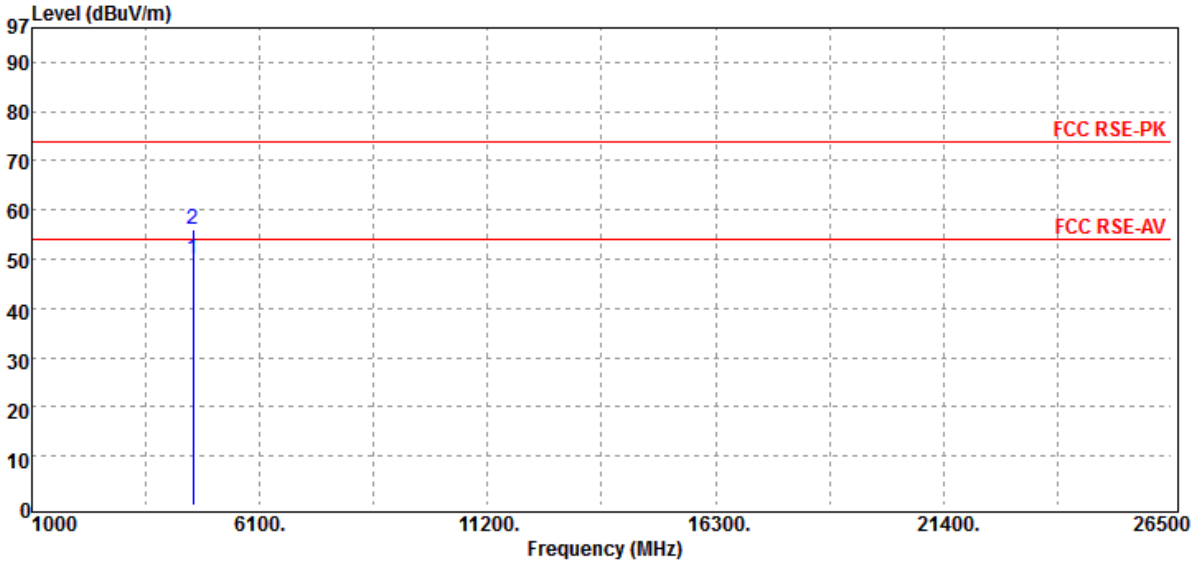
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
3680.00	H	Average	29.13	7.65	36.78	54.00	-17.22
3680.00	H	Peak	40.27	7.65	47.92	74.00	-26.08
4600.00	H	Average	41.85	9.41	51.26	54.00	-2.74
4600.00	H	Peak	48.09	9.41	57.50	74.00	-16.50

Operation Band	:RFID	Test Date	:2015-11-09
Fundamental Frequency	:922.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

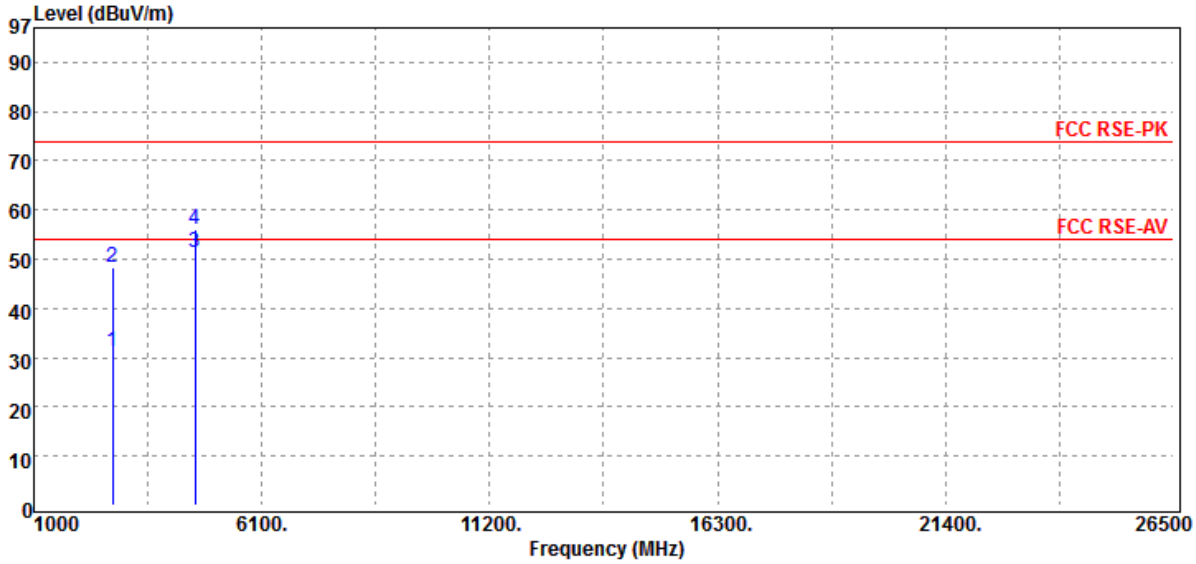
“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4612.50	H	Average	40.57	9.52	50.09	54.00	-3.91
4612.50	H	Peak	46.52	9.52	56.04	74.00	-17.96

Operation Band	:RFID	Test Date	:2015-11-09
Fundamental Frequency	:922.5 MHz	Temp./Humi.	:23 deg_C / 60 RH
Operation Mode	:TX HIGH	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL



Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2767.50	H	Average	24.89	6.30	31.19	54.00	-22.81
2767.50	H	Peak	41.96	6.30	48.26	74.00	-25.74
4612.50	H	Average	41.91	9.52	51.43	54.00	-2.57
4612.50	H	Peak	46.60	9.52	56.12	74.00	-17.88

9. ANTENNA REQUIREMENT

9.1. Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

9.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 0.17dBi, and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.