FCC 47 CFR PART 15 SUBPART C AND ANSI C63.10:2013 TEST REPORT

For

4-port RFID smart Reader

Model: F741-SD

Data Applies To: F741

Trade Name: Favite

Issued for

Favite Inc.

No.176,Taihe Rd., Jhubei City, Hsinchu County 30267, Taiwan

Issued by

Compliance Certification Services Inc.
Hsinchu Lab.
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Issued Date: March 21, 2016

Testing Laboratory
0240

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	03/21/2016	Initial Issue	All Page 51	Vera Hsu

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1. TEST REPORT CERTIFICATION

Applicant	：	Favite Inc.
Address	：	No.176,Taihe Rd., Jhubei City, Hsinchu County 30267, Taiwan
Equipment Under Test	：	4-port RFID smart Reader
Model	：	F741-SD
Data Applies To	：	F741
Trade Name	：	Favite
Tested Date	：	January 19 ~ March 18, 2016

APPLICABLE STANDARD	
Standard	**Test Result**
FCC Part 15 Subpart C AND ANSI C63.10:2013	PASS

WE HEREBY CERTIFY THAT: The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

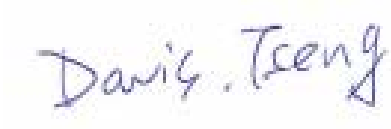
Approved by:

Sb. Lu
Sr. Engineer

Reviewed by:

Gundam Lin
Sr. Engineer

Tested by:



Davis Tseng
Engineer

Kenneth Huang
Engineer

2. EUT DESCRIPTION

Product Name	4-port RFID smart Reader
Model Number	F741-SD
Data Applies To	F741
Identify Number	T160119S03
Received Date	January 19, 2016
Frequency Range	902.75MHz ~ 927.25MHz
Transmit Power	29.86 dBm (0.9683W)
Channel Spacing	500kHz
Channel Number	50 Channels
Transmit Data Rate	250kbps
Type of Modulation	ASK
Antenna Type	Patch Antenna × 4, Antenna Gain: 5.85dBi
Power Rating	19Vdc
Test Voltage	120Vac, 60Hz
AC Power Cord Type	Non-shielded cable, 1.7m × 1 (Detachable)
DC Power Cable Type	Non-shielded cable, 1.5m × 1 (Non-detachable), with one ferrite core
I/O Port	GPIO(VGA) Port × 1, RS232 Port × 1, RJ-45 Port × 1, USB 2.0 Port × 1, FTDI Com(USB) Port × 1, SD Card Port × 1, Power Port × 1

Power Adapter:

No.	Manufacturer	Model No.	Power Input	Power Output
1	Adapter Technology Co., Ltd.	ATS050-P190	100-240Vac, 50-60Hz, 1.2A MAX.	19Vdc, 2.64A

The difference of the series model

Model Number	Difference
F741-SD	With SD Card
F741	Without SD Card

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *For more details, please refer to the User's manual of the EUT.*
3. *This submittal(s) (test report) is intended for FCC ID: XLG-F741-SD filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*
4. *The model F741-SD was considered the main model for testing.*

3. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	902.75
Middle	915.25
High	927.25

For RFID mode (1TX / 1RX): Ant. 2 / Port 2 (worst case).

Conducted Emission / Radiated Emission Test (Below 1 GHz)

1. The following test modes were scanned during the preliminary test:

No.	Pre-Test Mode
1	TX Mode

2. After the preliminary scan, the following test mode was found to produce the highest emission level.

Final Test Mode		
Emission	Radiated Emission	Mode 1
	Conducted Emission	Mode 1

Remark: *Then, the above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.*

Conducted / Radiated Emission Test (Above 1 GHz): TX Mode

Remark: *The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.*

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10:2013 and FCC CFR 47, 15.207, 15.209 and 15.247.

5. FACILITIES AND ACCREDITATION

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

NO. 989-1 Wen Shan Rd., Shang Shan Village,
Qionglin Township, Hsinchu County 30741, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.10:2013 and CISPR 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4 and CISPR 16-1-5.

5.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Taiwan	TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	INDUSTRY CANADA
Japan	VCCI
Taiwan	BSMI
USA	FCC MRA

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

Remark: *FCC Designation Number TW1027.*

5.3 MEASUREMENT UNCERTAINTY

The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4-2.

PARAMETER	UNCERTAINTY
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 30 to 1000 MHz	+/- 3.97
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 1 to 18GHz	+/- 3.58
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 18 to 26 GHz	+/- 3.59
Semi Anechoic Chamber (966 Chamber_B) / Radiated Emission, 26 to 40 GHz	+/- 3.81
Conducted Emission (Mains Terminals), 9kHz to 30MHz	+/- 2.48

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
Consistent with industry standard (e.g. CISPR 22, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.
The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than U_{CISPR} which is 3.6dB and 5.2dB respectively. CCS values (called U_{Lab} in CISPR 16-4-2) is less than U_{CISPR} as shown in the table above. Therefore, MU need not be considered for compliance.

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.
1	Notebook PC	HP	ProBook 4421s	CNF03242PJ

No.	Signal Cable Description
1	Non-shielded RJ-45 cable, 12m × 1

SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

EUT OPERATING CONDITION

1. EUT & peripherals setup diagram is shown in appendix setup photos.
2. TX Mode:
   ⇨ **Power control:**
   902.75 MHz Power set = 303
   915.25 MHz Power set = 303
   927.25 MHz Power set = 303
3. All of the functions are under run.
4. Start test.

7. FCC PART 15.247 REQUIREMENTS

7.1 DUTY CYCLE CORRECTION FACTOR

LIMITS

Limit: N/A

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/19/2016
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP

TEST PROCEDURE

1. Set center frequency of spectrum analyzer = operating frequency.
2. Set the spectrum analyzer as RBW, VBW=100kHz, Span = 0Hz.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/02/22
Test Mode	TX Mode	Temp. & Humidity	22°C, 62%

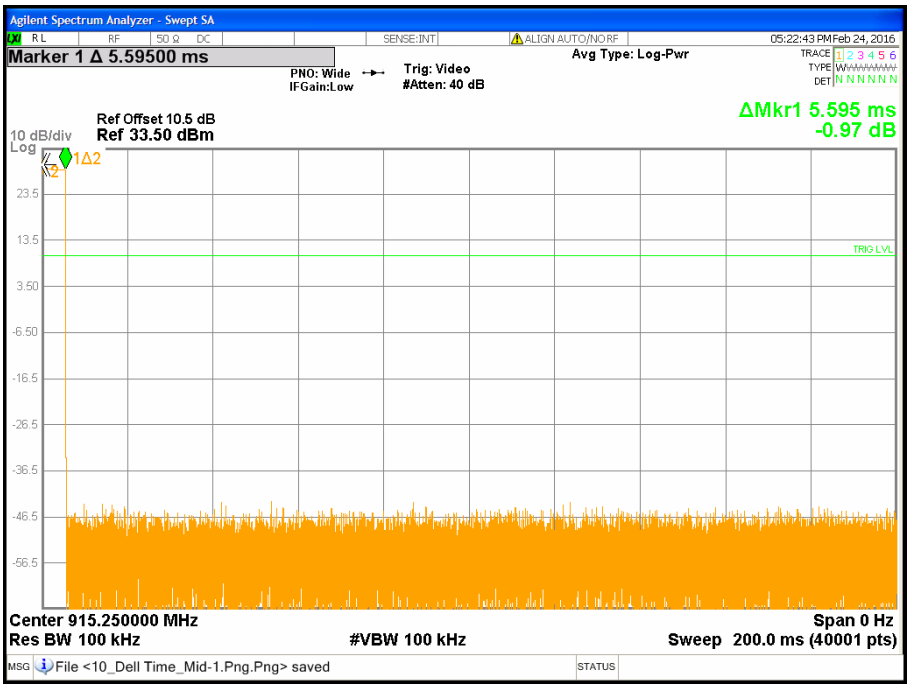
Tp = 100 (ms)

Ton = 5.595 (ms)

Duty Cycle Correction Factor = 20 × log (Ton / Tp)

= 20 × log (5.595 /100) = -25.04 < -20

Because -25.04 less than -20, so the Duty Cycle Correction Factor = -20



7.2 20dB BANDWIDTH FOR HOPPING

LIMITS

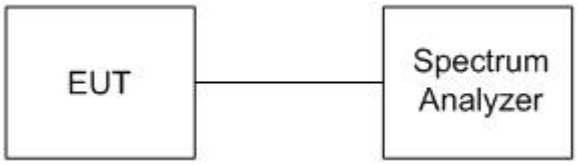
§15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 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.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/19/2016
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

The 20dB band width was measured with a spectrum analyzer connected to RF antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20dB band width of the emission was determined.

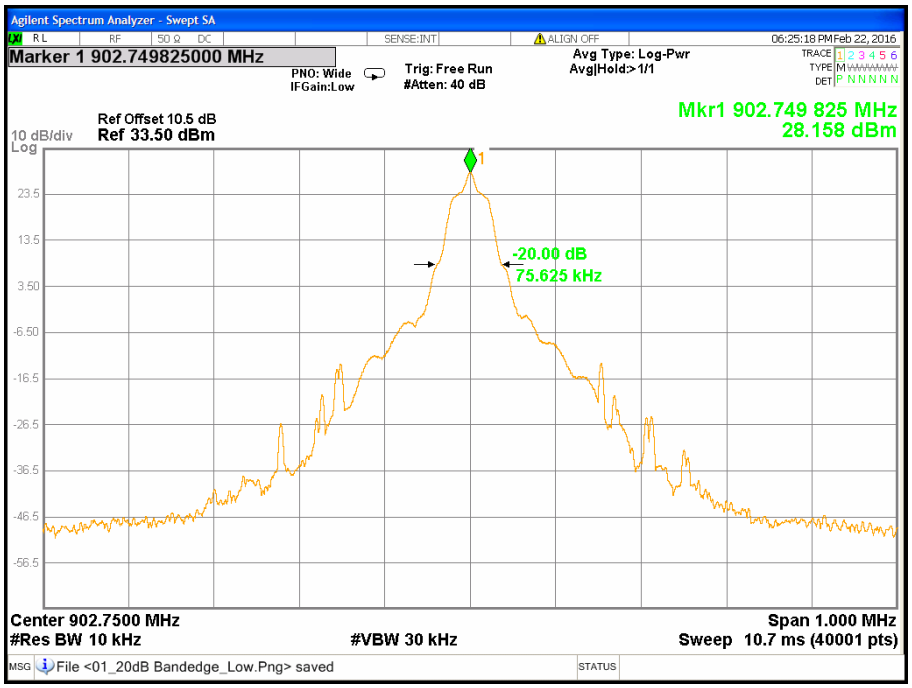
TEST RESULTS

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/02/22
Test Mode	TX Mode	Temp. & Humidity	22°C, 62%

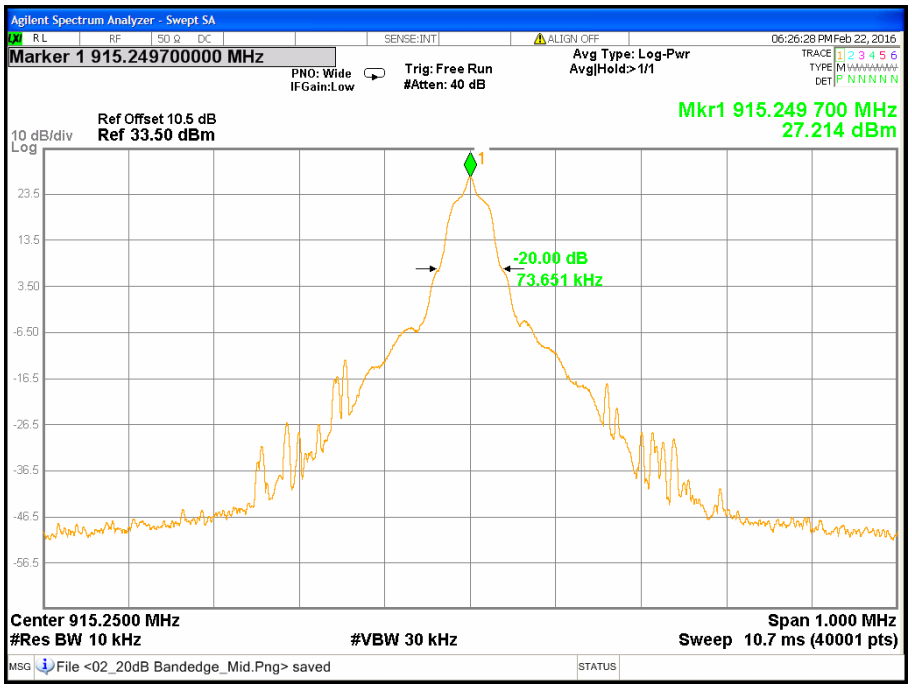
Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Limit	Result
Low	902.75	75.625	＜250	N/A
Middle	915.25	73.651	＜250	N/A
High	927.25	72.814	＜250	N/A

20dB BANDWIDTH

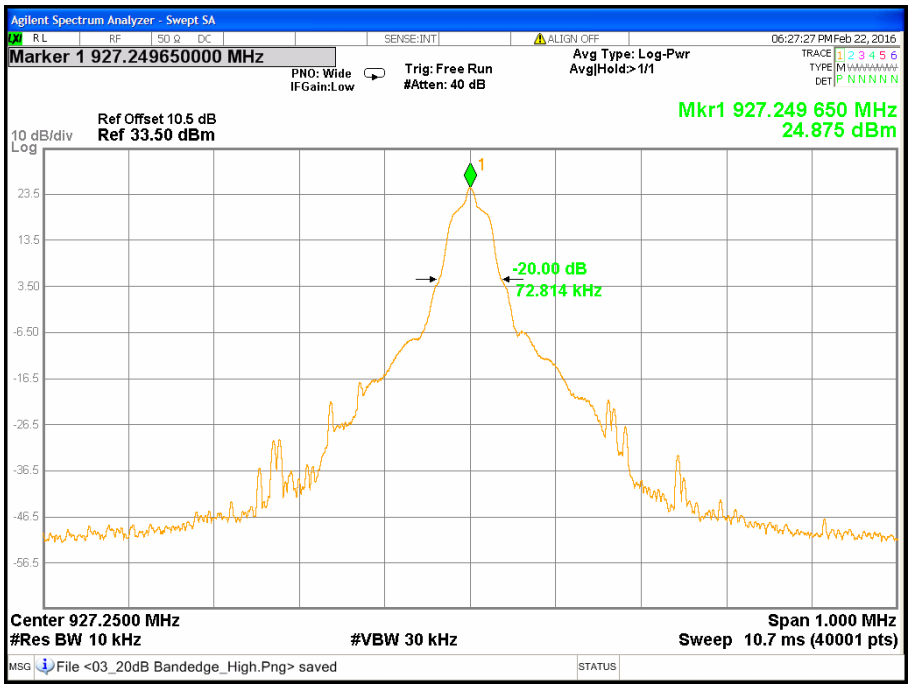
CH Low



CH Middle



CH High



7.3 MAXIMUM PEAK OUTPUT POWER

LIMITS

§15.247(b)(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.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power Meter	Anritsu	ML2495A	1149001	12/08/2016
Power Sensor	Anritsu	MA2411B	1126148	12/08/2016
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP

TEST PROCEDURE

The transmitter output is connected to the power meter. The power meter is set to the peak power detection.

TEST RESULTS

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/18
Test Mode	TX Mode	Temp. & Humidity	22°C, 62%

Channel	Channel Frequency (MHz)	Maximum Peak Output Power				Result
		Measured Value		Limit		
		(dBm)	(W)	(dBm)	(W)	
Low	902.75	29.74	0.9419	30	1	PASS
Middle	915.25	29.86	0.9683	30	1	PASS
High	927.25	29.78	0.9506	30	1	PASS

Remark: *The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.*

7.4 HOPPING CHANNEL SEPARATION

LIMITS

§15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/19/2016
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP

TEST PROCEDURE

1. The transmitter output is connected to a spectrum analyzer.
2. Span = wide enough to capture the peaks of two adjacent channels.
3. The RBW is set to 100 kHz and the VBW is set to 100 kHz.
4. Sweep = auto.
5. Detector function = peak.
6. Trace = max hold.
7. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

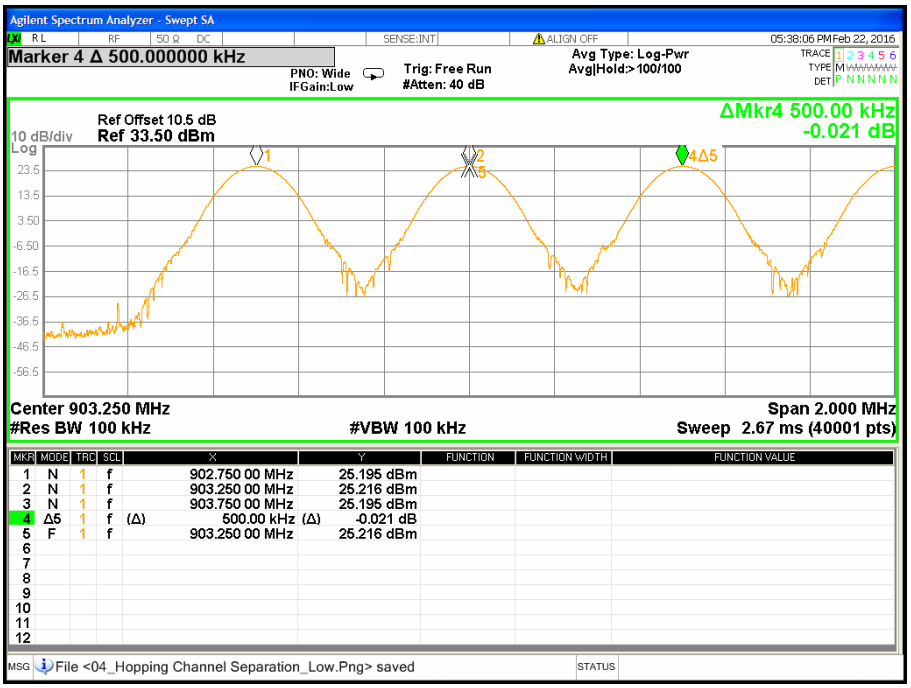
TEST RESULTS

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/02/22
Test Mode	TX Mode	Temp. & Humidity	22°C, 62%

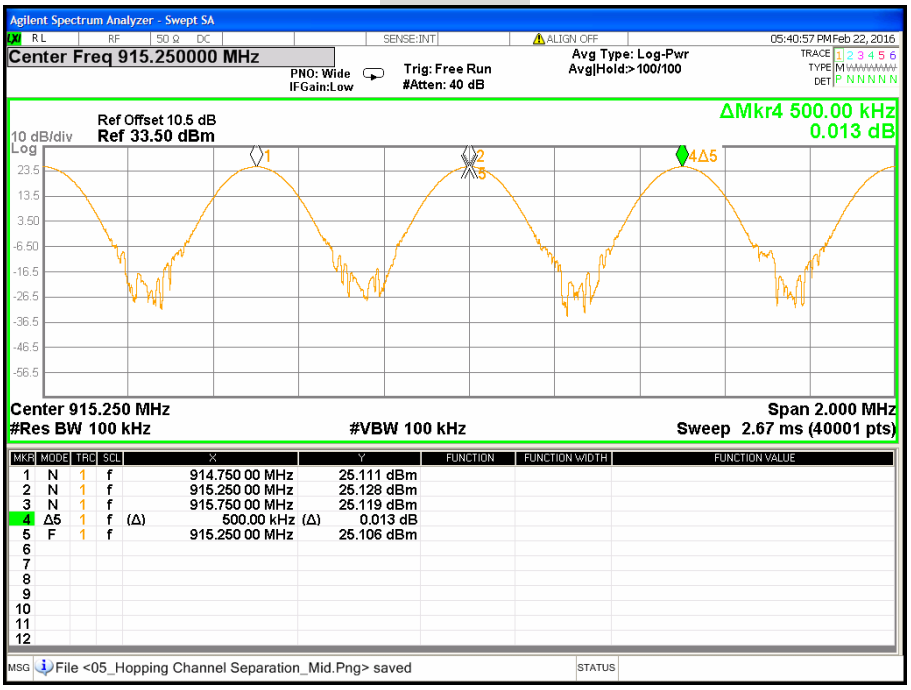
Channel	Channel Frequency (MHz)	Adjacent Hopping Channel Separation (kHz)	20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
Low	902.75	500	75.625	25	PASS
Middle	915.25	500	73.651	25	PASS
High	927.25	500	72.814	25	PASS

HOPPING CHANNEL SEPARATION

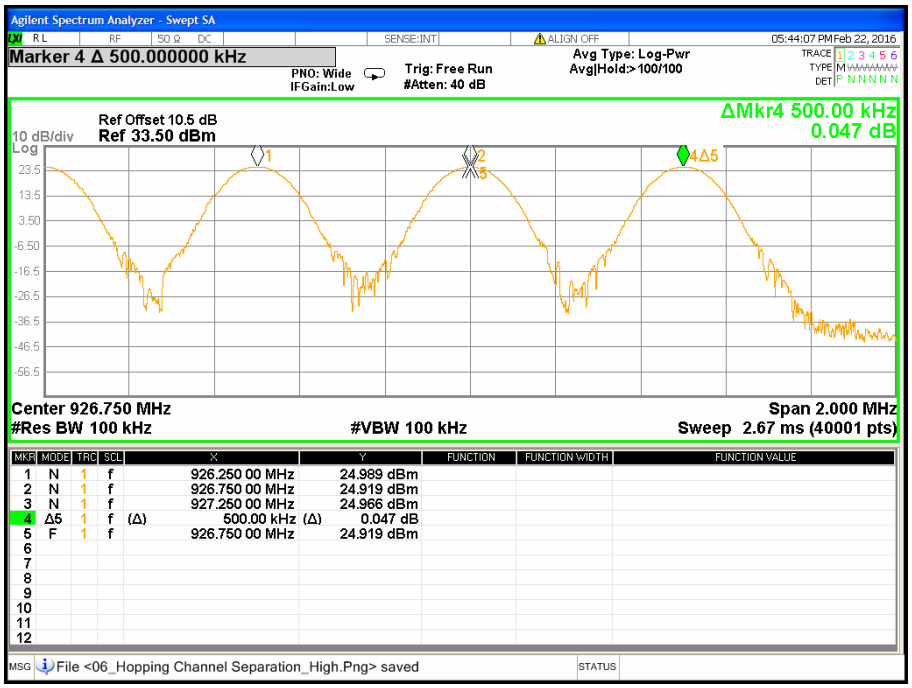
CH Low



CH Middle



CH High



7.5 NUMBER OF HOPPING FREQUENCY USED

LIMITS

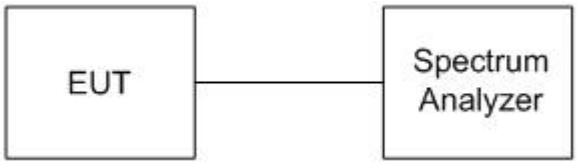
§15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 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.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/19/2016
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
5. Repeat above procedures until all frequencies measured were complete.

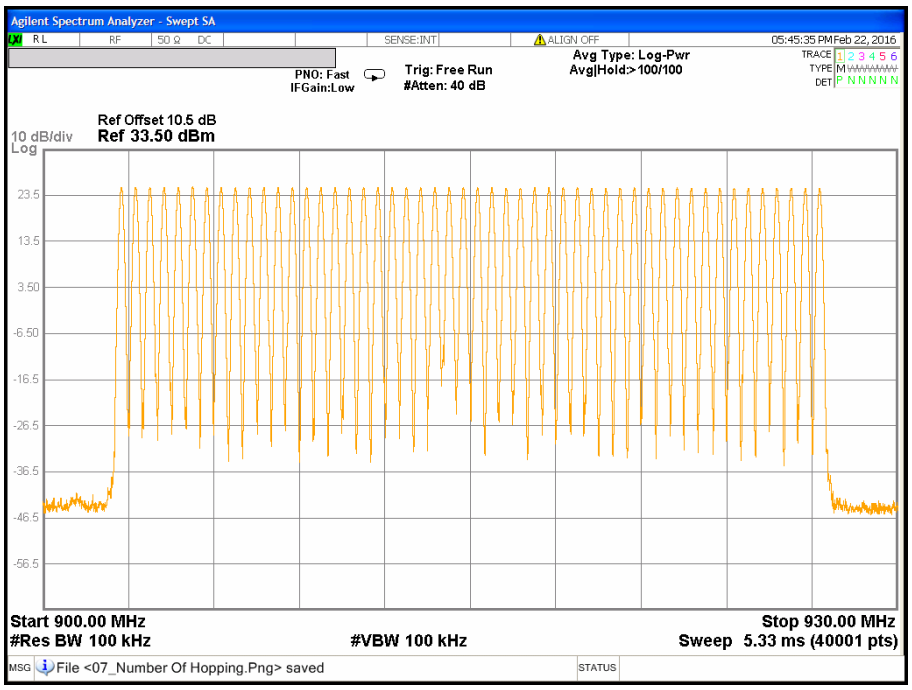
TEST RESULTS

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/02/22
Test Mode	TX Mode	Temp. & Humidity	22°C, 62%

Refer to the attached plot.

There are 50 hopping frequencies in a hopping sequence.

NUMBER OF HOPPING FREQUENCY USED



7.6 AVERAGE TIME OF OCCUPANCY

LIMITS

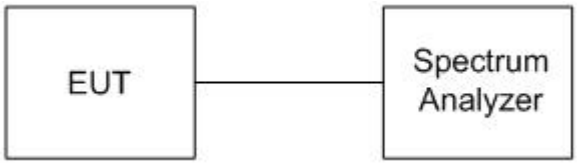
§15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 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.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/19/2016
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan.
The number of pulses is measured in a slow scan.

TEST RESULTS

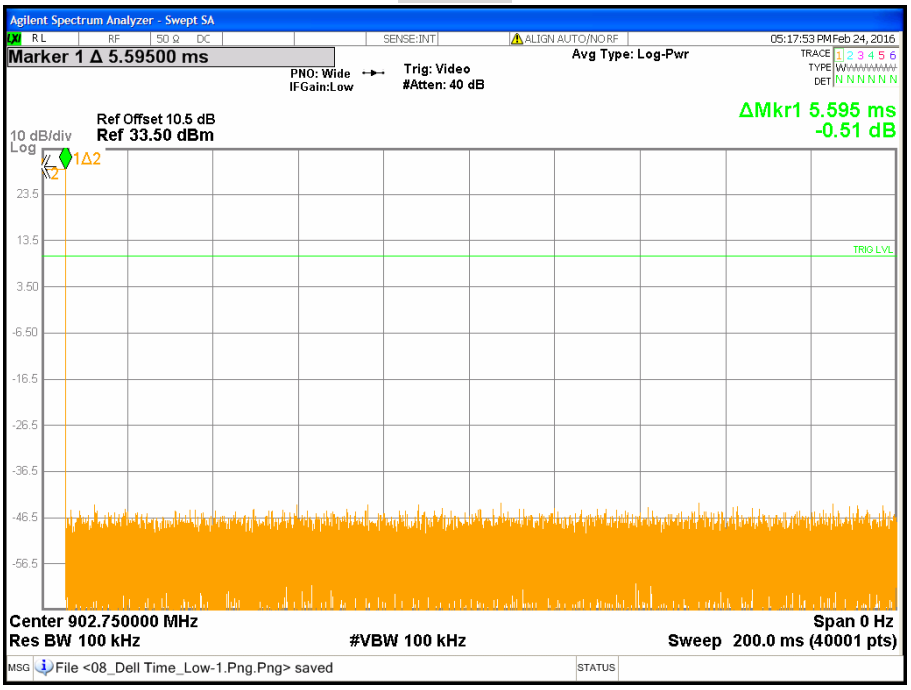
Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/02/22
Test Mode	TX Mode	Temp. & Humidity	22°C, 62%

Channel	Channel Frequency (MHz)	Pulse Width (ms)	Number of Pulse in 20 Seconds	Average Time of Occupancy (ms)	Limit (ms)	Results
Low	902.75	5.595	4	22.38	400	PASS
Middle	915.25	5.595	4	22.38	400	PASS
High	927.25	5.595	4	22.38	400	PASS

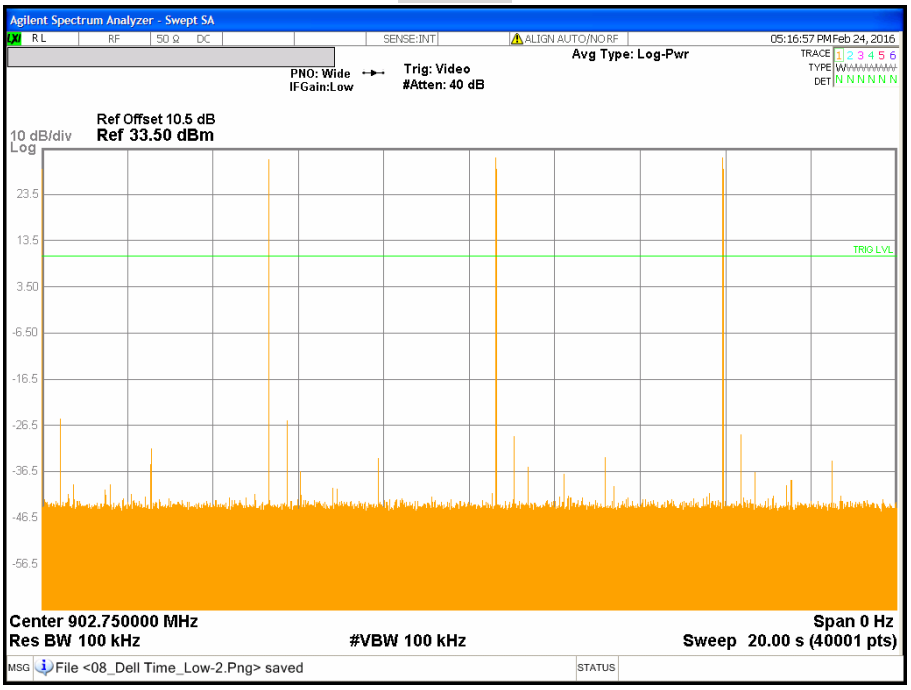
Remark: *Average Time of Occupancy = Pulse Width × Hopping Channel*
Ch Low = 5.595ms × 4 = 22.38ms
Ch Middle = 5.595ms × 4 = 22.38ms
Ch High = 5.595ms × 4 = 22.38ms

AVERAGE TIME OF OCCUPANCY

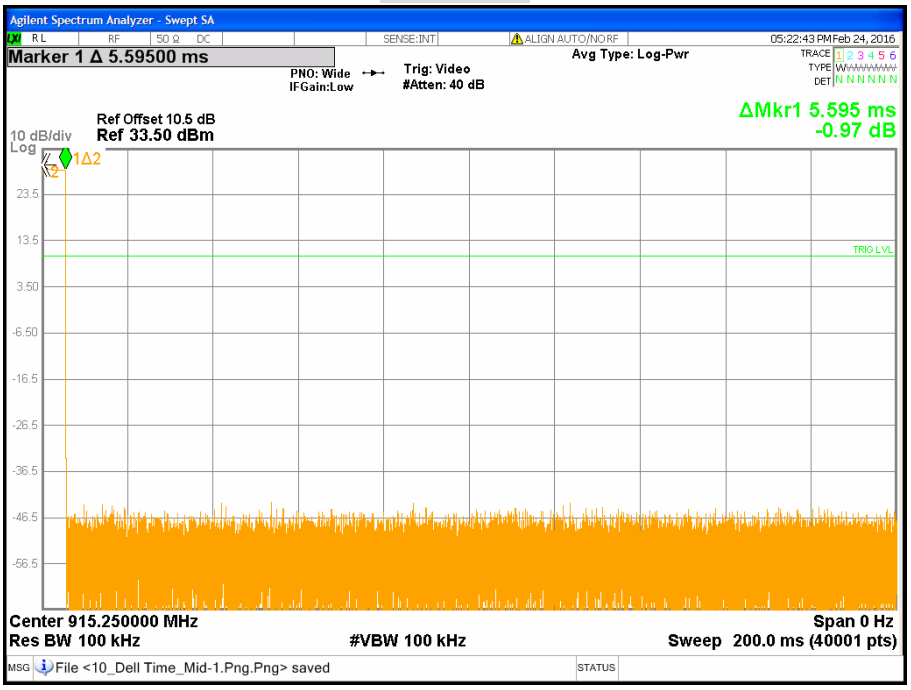
CH Low



CH Low



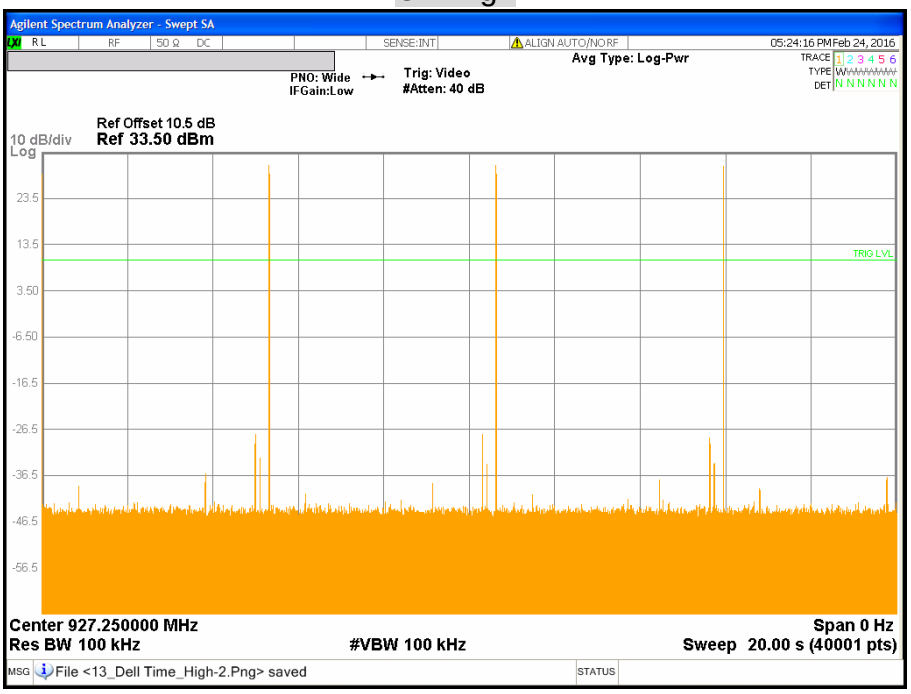
CH Middle



CH Middle

CH High

CH High



7.7 CONDUCTED SPURIOUS EMISSION

LIMITS

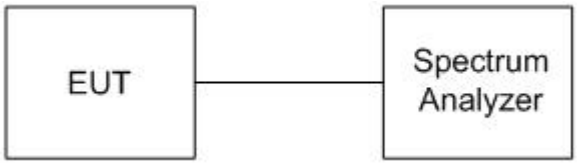
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/19/2016
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

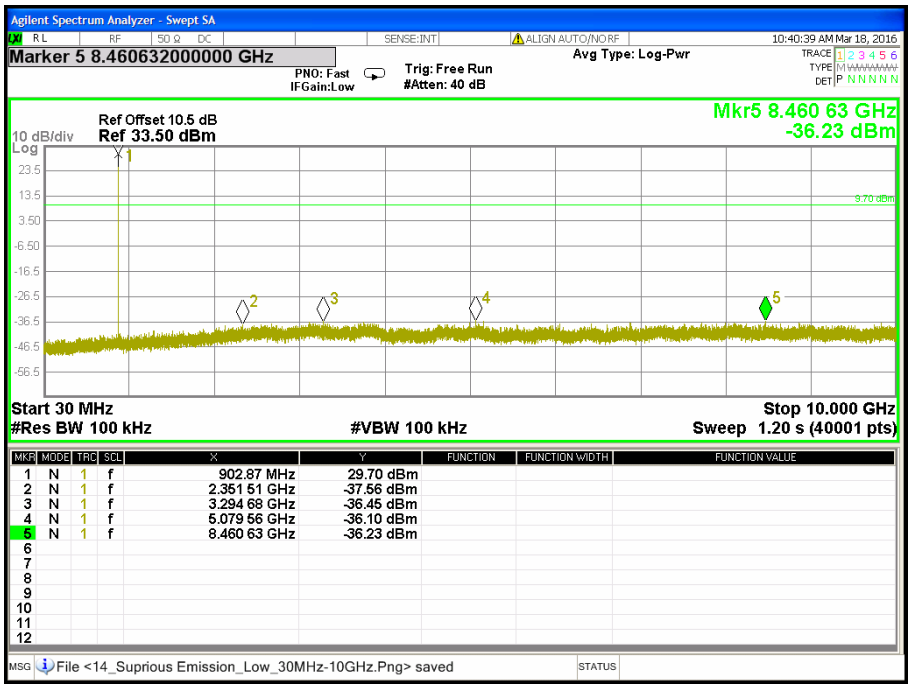
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.
The spectrum from 30 MHz to 10 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 902-928 MHz band.

TEST RESULTS

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/18
Test Mode	TX Mode	Temp. & Humidity	22°C, 62%

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

CH Low



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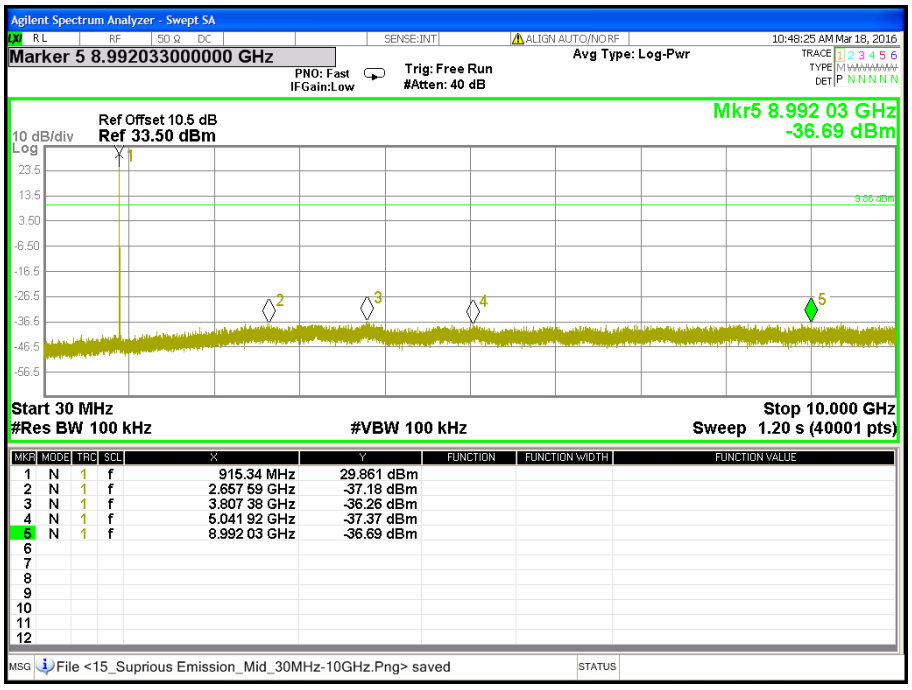
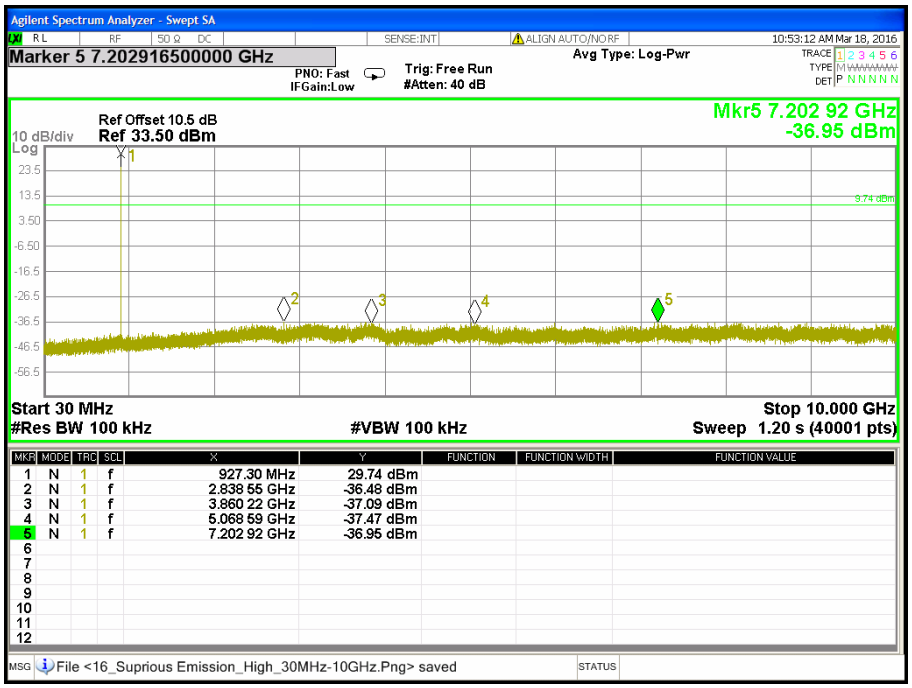


CH High



7.8 RADIATED EMISSION

LIMITS

(1) According to § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

Remark:
1. [1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2. [2] Above 38.6

(2) According to § 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

(3) According to § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

Remark: ***Except as provided in paragraph (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., Sections 15.231 and 15.241.*

(4) According to § 15.209 (b) in the emission table above, the tighter limit applies at the band edges.

TEST EQUIPMENT

Radiated Emission / 966Chamber_B

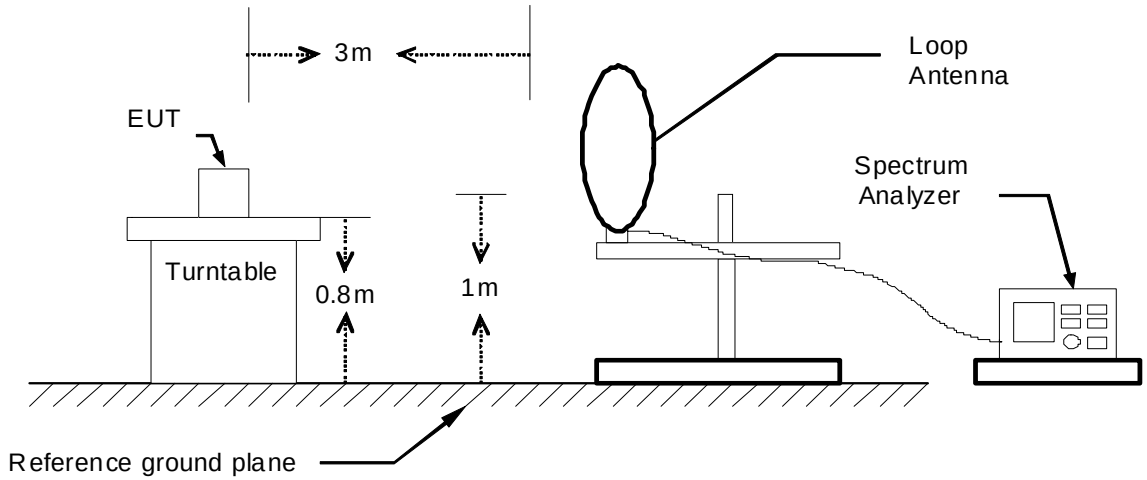
Name of Equipment	Manufacture	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY46180323	04/14/2016
EMI Test Receiver	Rohde & Schwarz	ESCI	101131	03/19/2016
Bi-log Antenna	TESEQ	CBL6112D	35403	08/04/2016
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-778	08/09/2016
Double-Ridged Waveguide Horn	ETS-LINDGREN	3117	00078733	11/25/2016
Horn Antenna	COM-POWER	AH-840	03077	12/08/2016
Pre-Amplifier	Agilent	8447D	2944A10052	07/14/2016
Pre-Amplifier	Agilent	8449B	3008A01916	07/14/2016
LOOP Antenna	COM-POWER	AL-130	121060	05/24/2016
Test S/W	E3.815206a			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

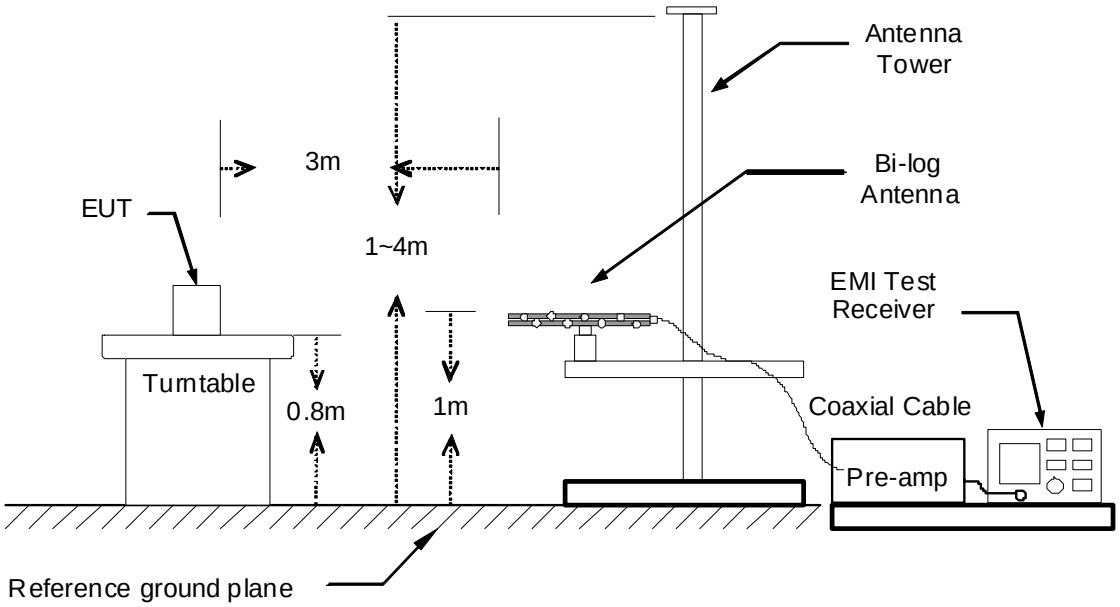
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission below 1GHz.

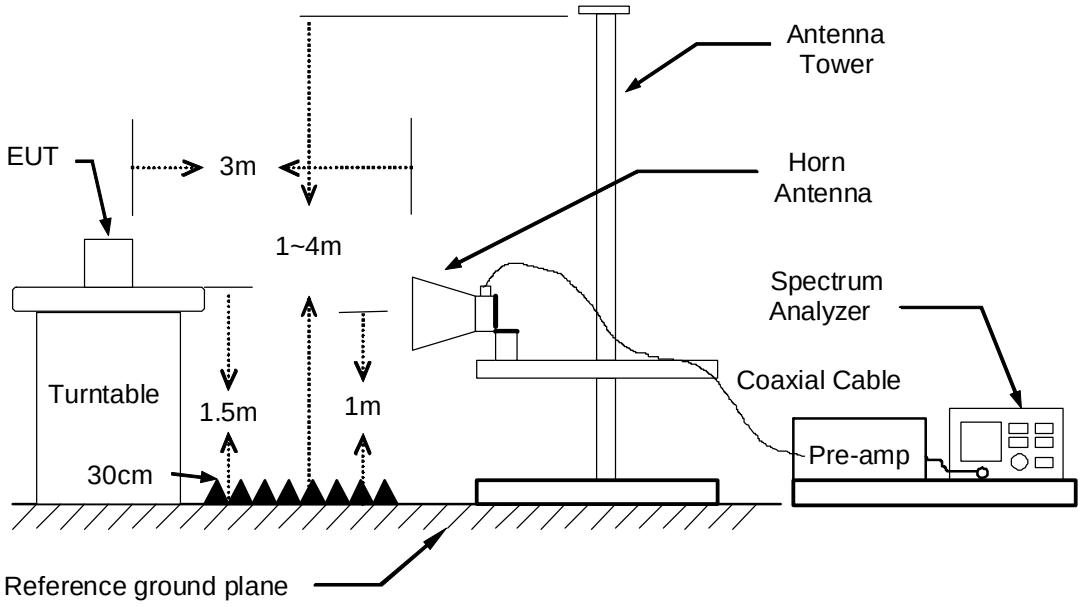
9kHz ~ 30MHz



30MHz ~ 1GHz



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 0.8 and 1.5 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
2. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Remark:

1. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.*
2. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.*
3. *The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.*

TEST RESULTS

Below 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

Below 1 GHz (30MHz ~ 1GHz)

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/17
Test Mode	Mode 1 / CH Low	Temp. & Humidity	25°C, 50%

966Chamber_B at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
97.90	52.07	-16.07	36.00	43.50	-7.50	156	300	Peak
199.75	54.28	-15.95	38.33	43.50	-5.17	63	100	Peak
250.19	58.22	-12.67	45.55	46.00	-0.45	164	100	QP
324.88	53.91	-10.88	43.03	46.00	-2.97	132	100	Peak
385.02	51.24	-9.45	41.79	46.00	-4.21	108	100	Peak
500.45	45.69	-8.13	37.56	46.00	-8.44	181	100	Peak
960.23	35.71	-2.30	33.41	54.00	-20.59	330	100	Peak

966Chamber_B at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
74.62	57.70	-20.20	37.50	40.00	-2.50	147	100	Peak
108.57	52.31	-15.01	37.30	43.50	-6.20	213	100	Peak
199.75	59.21	-15.95	43.26	43.50	-0.24	357	100	QP
250.19	55.98	-12.67	43.31	46.00	-2.69	133	200	Peak
324.88	49.57	-10.88	38.69	46.00	-7.31	142	100	Peak
750.71	39.51	-4.98	34.53	46.00	-11.47	116	100	Peak
960.23	35.31	-2.30	33.01	54.00	-20.99	328	100	Peak

Remark:

1. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
2. *Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)*
3. *Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)*
4. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/17
Test Mode	Mode 1 / CH Middle	Temp. & Humidity	25°C, 50%

966Chamber_B at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
98.87	51.93	-15.86	36.07	43.50	-7.43	141	400	Peak
174.53	52.84	-16.47	36.37	43.50	-7.13	66	200	Peak
199.75	53.38	-15.95	37.43	43.50	-6.07	250	100	Peak
250.19	58.19	-12.67	45.52	46.00	-0.48	153	100	QP
324.88	53.69	-10.88	42.81	46.00	-3.19	122	100	Peak
381.14	51.74	-9.53	42.21	46.00	-3.79	96	100	Peak
749.74	39.40	-4.99	34.41	46.00	-11.59	135	100	Peak
960.23	35.08	-2.30	32.78	54.00	-21.22	327	100	Peak

966Chamber_B at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
74.62	56.93	-20.20	36.73	40.00	-3.27	6	100	Peak
108.57	53.05	-15.01	38.04	43.50	-5.46	188	100	Peak
199.75	58.68	-15.95	42.73	43.50	-0.77	353	100	QP
250.19	55.48	-12.67	42.81	46.00	-3.19	118	200	Peak
324.88	50.26	-10.88	39.38	46.00	-6.62	163	100	Peak
749.74	38.61	-4.99	33.62	46.00	-12.38	123	100	Peak
960.23	35.43	-2.30	33.13	54.00	-20.87	335	100	Peak

Remark:

1. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
2. *Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)*
3. *Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)*
4. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/17
Test Mode	Mode 1 / CH High	Temp. & Humidity	25°C, 50%

966Chamber_B at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
98.87	50.99	-15.86	35.13	43.50	-8.37	163	200	Peak
199.75	53.21	-15.95	37.26	43.50	-6.24	243	200	Peak
250.19	58.34	-12.67	45.67	46.00	-0.33	157	100	QP
324.88	52.29	-10.88	41.41	46.00	-4.59	148	100	Peak
384.05	51.54	-9.47	42.07	46.00	-3.93	209	100	Peak
749.74	37.82	-4.99	32.83	46.00	-13.17	146	100	Peak
960.23	35.45	-2.30	33.15	54.00	-20.85	335	100	Peak

966Chamber_B at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
30.97	44.25	-8.70	35.55	40.00	-4.45	356	100	Peak
68.80	57.00	-20.65	36.35	40.00	-3.65	174	100	Peak
199.75	58.91	-15.95	42.96	43.50	-0.54	28	100	QP
250.19	54.62	-12.67	41.95	46.00	-4.05	110	200	Peak
324.88	49.70	-10.88	38.82	46.00	-7.18	161	100	Peak
749.74	39.11	-4.99	34.12	46.00	-11.88	146	100	Peak
960.23	35.26	-2.30	32.96	54.00	-21.04	358	100	Peak

Remark:

1. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
2. *Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)*
3. *Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)*
4. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

Above 1 GHz

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/17
Test Mode	TX / CH Low	Temp. & Humidity	25°C, 50%

966Chamber_B at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	duty cycle dB	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1810.00	40.53	0.26	20	40.79	54.00	-13.21	69	300	Average
1810.00	60.53	0.26		60.79	74.00	-13.21	69	300	Peak
1945.00	49.21	1.57		50.78	74.00	-23.22	230	300	Peak
2710.00	35.61	3.51	20	39.12	54.00	-14.88	49	200	Average
2710.00	55.61	3.51		59.12	74.00	-14.88	49	200	Peak
3943.00	42.12	6.21		48.33	74.00	-25.67	47	200	Peak
4609.00	41.60	7.90		49.50	74.00	-24.50	116	100	Peak
8128.00	24.34	13.00	20	37.34	54.00	-16.66	39	100	Average
8128.00	44.34	13.00		57.34	74.00	-16.66	39	100	Peak

966Chamber_B at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	duty cycle dB	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1810.00	42.93	0.26	20	43.19	54.00	-10.81	198	100	Average
1810.00	62.93	0.26		63.19	74.00	-10.81	198	100	Peak
2710.00	39.08	3.51	20	42.59	54.00	-11.41	315	100	Average
2710.00	59.08	3.51		62.59	74.00	-11.41	315	100	Peak
4510.00	23.96	7.76	20	31.72	54.00	-22.28	205	200	Average
4510.00	43.96	7.76		51.72	74.00	-22.28	205	200	Peak
5419.00	23.93	9.36	20	33.29	54.00	-20.71	36	100	Average
5419.00	43.93	9.36		53.29	74.00	-20.71	36	100	Peak
6319.00	24.03	11.23	20	35.26	54.00	-18.74	124	100	Average
6319.00	44.03	11.23		55.26	74.00	-18.74	124	100	Peak
7219.00	24.81	12.36	20	37.17	54.00	-16.83	201	200	Average
7219.00	44.81	12.36		57.17	74.00	-16.83	201	200	Peak
8128.00	24.80	13.00	20	37.80	54.00	-16.20	0	100	Average
8128.00	44.80	13.00		57.80	74.00	-16.20	0	100	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)
5. *For Fundamental & Harmonics: Result-AV = Result(PK) + Duty Cycle Correction Factor.*

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/17
Test Mode	TX / CH Middle	Temp. & Humidity	25°C, 50%

966Chamber_B at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	duty cycle dB	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1828.00	44.22	0.44	20	44.66	54.00	-9.34	78	300	Average
1828.00	64.22	0.44		64.66	74.00	-9.34	78	300	Peak
2746.00	34.36	3.59	20	37.95	54.00	-16.05	69	300	Average
2746.00	54.36	3.59		57.95	74.00	-16.05	69	300	Peak
3997.00	41.43	6.41		47.84	74.00	-26.16	224	200	Peak
4726.00	41.26	8.05		49.31	74.00	-24.69	218	300	Peak
6409.00	21.42	11.38	20	32.80	54.00	-21.20	8	100	Average
6409.00	41.42	11.38		52.80	74.00	-21.20	8	100	Peak
7318.00	24.34	12.37	20	36.71	54.00	-17.29	141	100	Average
7318.00	44.34	12.37		56.71	74.00	-17.29	141	100	Peak

966Chamber_B at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	duty cycle dB	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1828.00	46.47	0.44	20	46.91	54.00	-7.09	199	100	Average
1828.00	66.47	0.44		66.91	74.00	-7.09	199	100	Peak
2746.00	38.31	3.59	20	41.90	54.00	-12.10	38	100	Average
2746.00	58.31	3.59		61.90	74.00	-12.10	38	100	Peak
4573.00	26.58	7.85	20	34.43	54.00	-19.57	194	100	Average
4573.00	46.58	7.85		54.43	74.00	-19.57	194	100	Peak
5491.00	26.09	9.52	20	35.61	54.00	-18.39	150	200	Average
5491.00	46.09	9.52		55.61	74.00	-18.39	150	200	Peak
6409.00	26.89	11.38	20	38.27	54.00	-15.73	145	100	Average
6409.00	46.89	11.38		58.27	74.00	-15.73	145	100	Peak
7318.00	26.62	12.37	20	38.99	54.00	-15.01	130	200	Average
7318.00	46.62	12.37		58.99	74.00	-15.01	130	200	Peak
8236.00	24.26	13.03	20	37.29	54.00	-16.71	359	100	Average
8236.00	44.26	13.03		57.29	74.00	-16.71	359	100	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)
5. *For Fundamental & Harmonics: Result-AV = Result(PK) + Duty Cycle Correction Factor.*

Product Name	4-port RFID smart Reader	Test By	Davis Tseng
Test Model	F741-SD	Test Date	2016/03/17
Test Mode	TX / CH High	Temp. & Humidity	25°C, 50%

966Chamber_B at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	duty cycle dB	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1855.00	32.39	0.70	20	33.09	54.00	-20.91	78	300	Average
1855.00	52.39	0.70		53.09	74.00	-20.91	78	300	Peak
2782.00	36.29	3.66	20	39.95	54.00	-14.05	61	200	Average
2782.00	56.29	3.66		59.95	74.00	-14.05	61	200	Peak
5545.00	40.46	9.64		50.10	74.00	-23.90	257	200	Peak
6490.00	24.39	11.52	20	35.91	54.00	-18.09	330	100	Average
6490.00	44.39	11.52		55.91	74.00	-18.09	330	100	Peak
7417.00	23.15	12.38	20	35.53	54.00	-18.47	278	100	Average
7417.00	43.15	12.38		55.53	74.00	-18.47	278	100	Peak
8344.00	21.42	13.06	20	34.48	54.00	-19.52	290	100	Average
8344.00	41.42	13.06		54.48	74.00	-19.52	290	100	Peak

966Chamber_B at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	duty cycle dB	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1855.00	39.61	0.70	20	40.31	54.00	-13.69	201	100	Average
1855.00	59.61	0.70		60.31	74.00	-13.69	201	100	Peak
2782.00	37.65	3.66	20	41.31	54.00	-12.69	63	100	Average
2782.00	57.65	3.66		61.31	74.00	-12.69	63	100	Peak
4636.00	25.95	7.93	20	33.88	54.00	-20.12	160	100	Average
4636.00	45.95	7.93		53.88	74.00	-20.12	160	100	Peak
5563.00	25.19	9.68	20	34.87	54.00	-19.13	161	200	Average
5563.00	45.19	9.68		54.87	74.00	-19.13	161	200	Peak
6490.00	27.06	11.52	20	38.58	54.00	-15.42	187	100	Average
6490.00	47.06	11.52		58.58	74.00	-15.42	187	100	Peak
7417.00	25.62	12.38	20	38.00	54.00	-16.00	140	100	Average
7417.00	45.62	12.38		58.00	74.00	-16.00	140	100	Peak
8344.00	24.89	13.06	20	37.95	54.00	-16.05	199	100	Average
8344.00	44.89	13.06		57.95	74.00	-16.05	199	100	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)
5. *For Fundamental & Harmonics: Result-AV = Result(PK) + Duty Cycle Correction Factor.*

7.9 CONDUCTED EMISSION

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

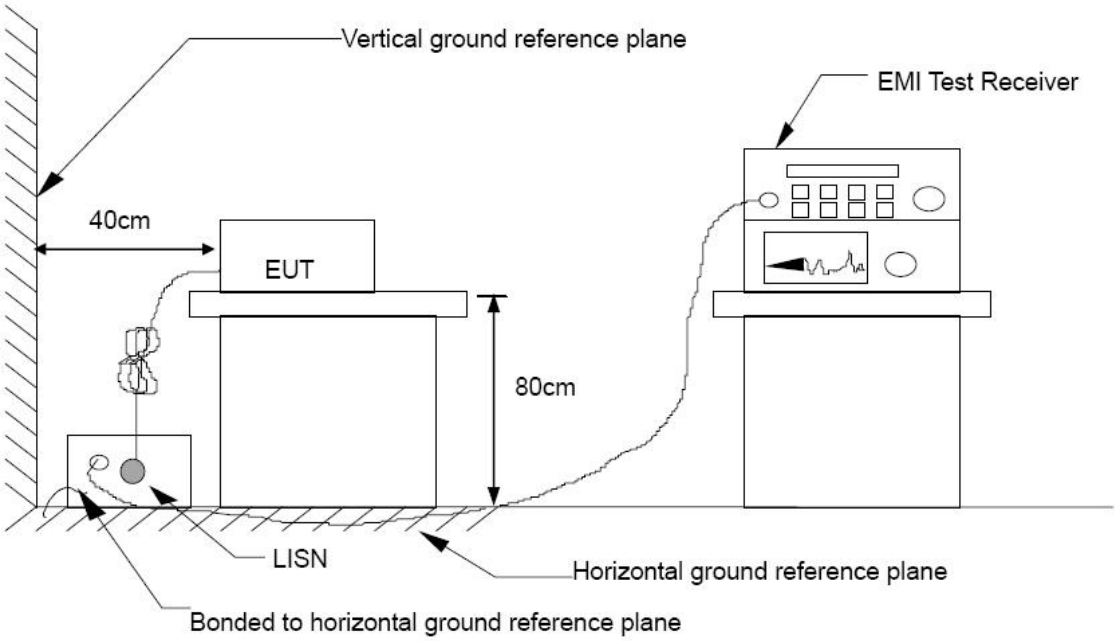
Frequency Range (MHz)	Conducted Limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5.00	56	46
5.00 - 30.0	60	50

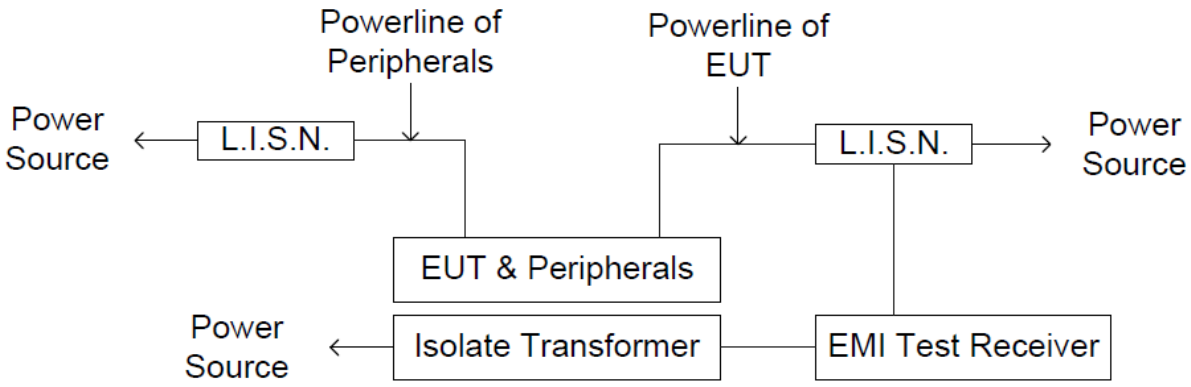
TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N	Schwarzbeck	NSLK 8127	8127465	08/05/2016
L.I.S.N	Schwarzbeck	NSLK 8127	8127473	03/09/2016
EMI Test Receiver	Rohde & Schwarz	ESHS 30	838550/003	10/31/2016
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100111	06/28/2016
Test S/W	E3.815206a			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP





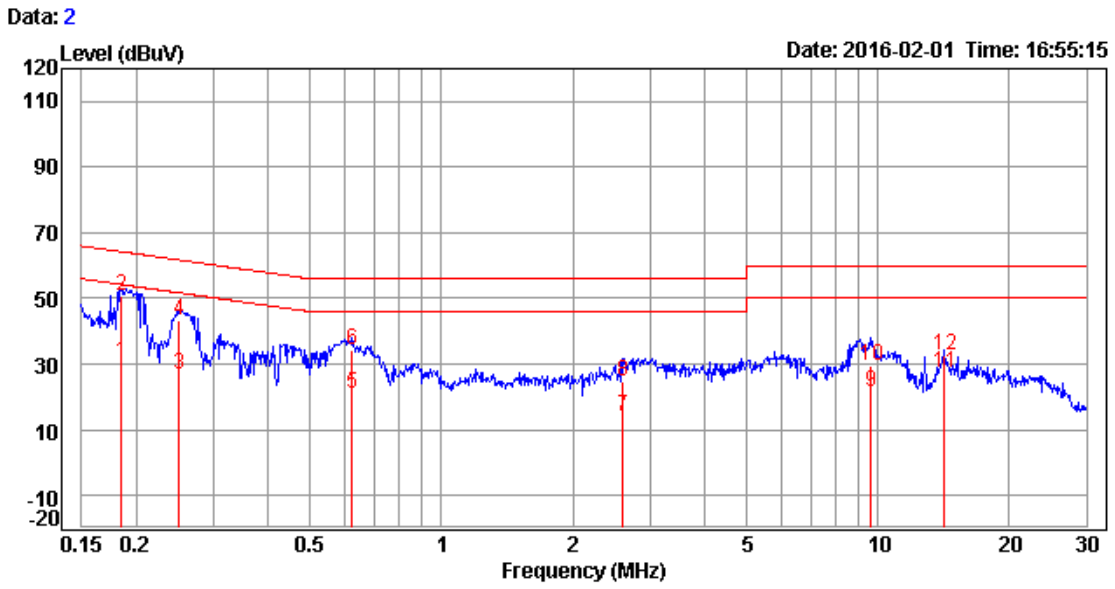
TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.10:2013.
The test procedure is performed in a 4m × 3m × 2.4m (L×W×H) shielded room.
The EUT along with its peripherals were placed on a 1.0m (W) × 1.5m (L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
The EUT was located so that the distance between the boundary of the EUT and the closest surface of the LISN is 0.8 m. Where a mains flexible cord was provided by the manufacturer shall be 1 m long, or if in excess of 1 m, the excess cable was folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

TEST RESULTS

Product Name	4-port RFID smart Reader	Test By	Kenneth Huang
Test Model	F741-SD	Test Date	2016/02/01
Test Mode	Mode 1	Temp. & Humidity	20.9°C, 47%

LINE



Trace:

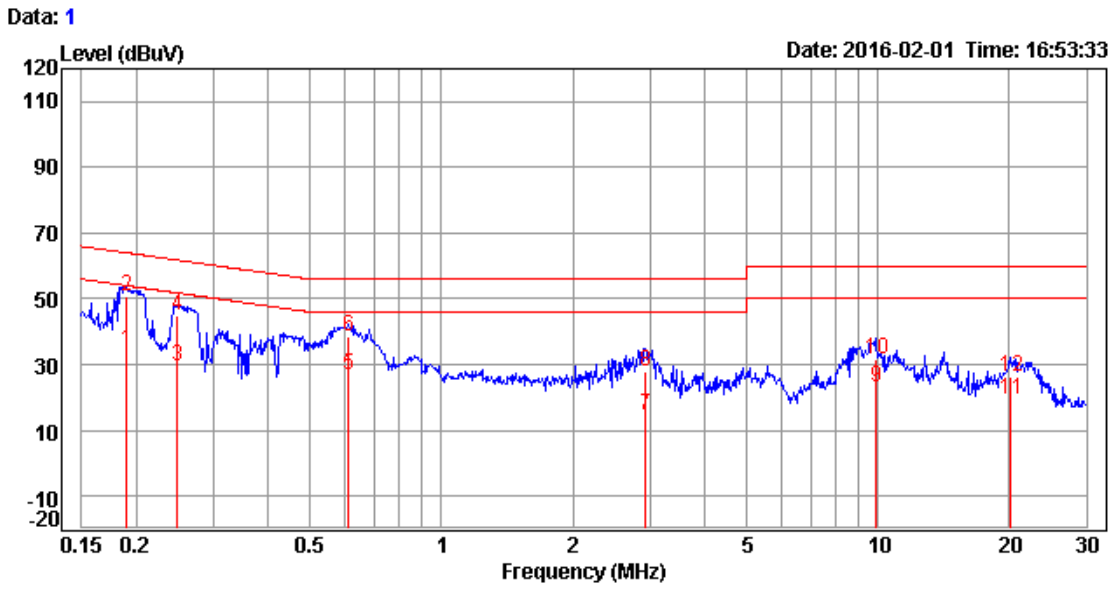
Freq. MHz	Reading dBuV Q.P.	Reading dBuV AV.	C.F. dB	Result dBuV Q.P.	Result dBuV AV.	Limit dBuV Q.P.	Limit dBuV AV.	Margin dB Q.P.	Margin dB AV.
0.184	40.68	20.82	9.98	50.66	30.80	64.28	54.28	-13.62	-23.48
0.249	33.32	16.74	9.99	43.31	26.73	61.78	51.78	-18.47	-25.05
0.621	24.10	11.18	10.00	34.10	21.18	56.00	46.00	-21.90	-24.82
2.594	14.73	3.95	10.09	24.82	14.04	56.00	46.00	-31.18	-31.96
9.654	19.19	11.36	10.39	29.58	21.75	60.00	50.00	-30.42	-28.25
14.213	21.87	16.70	10.58	32.45	27.28	60.00	50.00	-27.55	-22.72

Remark:

1. *Correction Factor = Insertion loss + Cable loss*
2. *Emission level = Reading Value + Correction factor*
3. *Margin value = Emission level – Limit value*

Product Name	4-port RFID smart Reader	Test By	Kenneth Huang
Test Model	F741-SD	Test Date	2016/02/01
Test Mode	Mode 1	Temp. & Humidity	20.9°C, 47%

NEUTRAL



Trace:

Freq. MHz	Reading dBuV Q.P.	Reading dBuV AV.	C.F. dB	Result dBuV Q.P.	Result dBuV AV.	Limit dBuV Q.P.	Limit dBuV AV.	Margin dB Q.P.	Margin dB AV.
0.189	40.87	24.22	10.00	50.87	34.22	64.07	54.07	-13.20	-19.85
0.249	35.09	19.68	10.01	45.10	29.69	61.80	51.80	-16.70	-22.11
0.614	28.80	16.85	10.02	38.82	26.87	56.00	46.00	-17.18	-19.13
2.931	17.87	4.43	10.12	27.99	14.55	56.00	46.00	-28.01	-31.45
9.861	21.51	12.83	10.34	31.85	23.17	60.00	50.00	-28.15	-26.83
20.162	15.52	9.07	10.59	26.11	19.66	60.00	50.00	-33.89	-30.34

Remark:

1. *Correction Factor = Insertion loss + Cable loss*
2. *Emission level = Reading Value + Correction factor*
3. *Margin value = Emission level – Limit value*