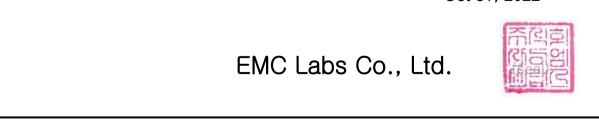


Test Report					
1. Client					
• Name : • Address :	Apulse Technology Co.,Ltd A-1403, 60, Haan-ro, Gwangmyeong-si, Gyeonggi-do, Republic of Korea.				
2. Use of Report :	FCC Approval				
3. Sample Description					
• Product Name: RFID Fixed Reader     • Model Name: a313					
4. Date of Receipt :	2022-10-05				
5. Date of Test :	2022-10-11 ~ 2022-10-24				
6. Test Method :	FCC Part 15 Subpart C 15.247				
7. Test Results :	Refer to the test results				
This test report must not be reproduced or reproduced in any way. The results shown in this test report are the results of testing the samples provided. This test report is prepared according to the requirements of ISO / IEC 17025.					
Tested b	by Technical Manager				
Affirmation Dae-Se	ong, Choi Yong-Min, Won				
·i	Oct 31, 2022				



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# <u>Version</u>

TEST REPORT NO.	DATE	DESCRIPTION
KR0140-RF2210-006	Oct 31, 2022	Initial Issue

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# 1. Applicant & Manufacturer & Test Laboratory Information

#### 1.1 Applicant Information

Applicant Apulse Technology Co.,Ltd	
Applicant Address A-1403, 60, Haan-ro, Gwangmyeong-si, Gyeonggi-do, Repu	
Contact Person	Robin, Jang
Telephone No.	+82-10-5526-0605
Fax No.	+82-70-4222-5686
E-mail	robinjang@apulsetech.com

#### 1.2. Manufacturer Information

Manufacturer	Apulse Technology Co.,Ltd
Manufacturer Address	A-1403, 60, Haan-ro, Gwangmyeong-si, Gyeonggi-do, Republic of Korea.

#### 1.3 Test Laboratory Information

Laboratory	EMC Labs Co., Ltd.
Laboratory Address	100, Jangjateo-ro, Hobeop-myeon, Icheon-si, Gyeonggi-do, Republic of
Laboratory Address	Korea
Contact Person	Yongmin Won
Telephone No.	+82-2-508-7778
Fax No.	+82-2-538-3668
FCC Designation No.	KR0140
FCC Registration No.	58000
IC Site Registration No.	28751

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# 2. Equipment under Test(EUT) Information

#### 2.1 General Information

Product Name	RFID Fixed Reader
Model Name	a313
FCC ID	2AWMDA313
Power Supply	DC 12.0 V

#### 2.2 Additional Information

Operating Frequency	902.75 MHz ~ 927.25 MHz
Number of channel	50
Modulation Type	A1D
Antenna Type	Patch Antenna
Antenna Gain	5.34dBi
Firmware Version	1.0
Hardware Version	1.0
Test software	Certihost/v1.0.2

#### 2.3 Test Frequency

Test mode	Test Frequency (MHz)		
	Low Frequency	Middle Frequency	High Frequency
RFID (900 MHz FHSS)	902.75	915.75	927.25

#### 2.4 Used Test Software Setting Value

Test Mode	Setting Item	
	Power	
RFID (900 MHz FHSS)	27	

#### 2.7 Mode of operation during the test

- The EUT continuous transmission mode during the test with set at Low Channel, Middle Channel, and High Channel. To get a maximum radiated emission levels from the EUT, the EUT was moved throughout the XY, YZ, XZ planes.

#### 2.8 Modifications of EUT

- None

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# 3. Test Summary

Applied	FCC Rule	IC Rule	Test Items	Test Condition	Result
	15.203	_	Antenna Requirement		С
	15.247(a)	_	20 dB Bandwidth		С
	_	RSS GEN (6.7)	Occupied Bandwidth (99%)		С
	15.247(a)	RSS-247 (5.1)	Number of Hopping Frequencies	Conducted	С
	15.247(a)	RSS-247 (5.1)	Time of Occupancy (Dwell Time)	Conducted	С
	15.247(a)	RSS-247 (5.1)	Carrier Frequencies Separation		С
	15.247(b)	RSS-247 (5.4)	Peak Output Power		С
	15.247(d)	RSS-247 (5.5)	Conducted Spurious Emission		С
	15.247(d) 15.205 & 15.209	RSS-247 (5.5) RSS-GEN (8.9 & 8.10)	Radiated Spurious Emission	Radiated	С
	15.207	RSS-GEN (8.8)		AC Line Conducted	С

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

The sample was tested according to the following specification: ANSI C63.10:2013.

Compliance was determined by specification limits of the applicable standard according to customer requirements.



#### 4. Used equipment on test

Description	Manufacturer	Model Name	Serial Name	Next Cal.
TEMP & HUMID CHAMBER	JFM	JFMA-001	20200929-01	2022.12.17
CONTROLLER	AMWON TECHNOLOGY	TEMI2500	S7800VK191 0707	2022.12.17
PSA SERIES SPECTRUM ANALYZER	AGILENT	E4440A	MY45304057	2022.12.15
MXG ANALOG SIGNAL GENERATOR	AGILENT	N5183A	MY50141890	2022.12.15
SYSTEM DC POWER SUPPLY	AGILENT	6674A	MY53000118	2022.12.15
VECTOR SIGNAL GENERATOR	ROHDE & SCHWARZ	SMBV100A	257524	2022.12.15
BLUETOOTH TESTER	TESCOM	TC-3000A	3000A480088	2022.12.15
DIRECTIONAL COUPLER	AGILENT	773D	2839A01855	2022.12.15
ATTENUATOR	AGILENT	8493C	73193	2022.12.15
ATTENUATOR	ACE RF COMM	ATT SMA 20W 20dB 8 GHz	A-0820.SM20.2	2023.04.11
TERMINATIOM	HEWLETT PACKARD	909D	07492	2022.12.15
POWER DIVIDER	HEWLETT PACKARD	11636A	06916	2022.12.15
SLIDE-AC	DAEKWANG TECH	SV-1023	-	_
DIGITAL MULTIMETER	HUMANTECHSTORE	15B+	50561541WS	2022.12.15
ACTIVE LOOP ANTENNA	TESEQ	HLA 6121	55685	2022.12.30
Biconilog ANT	Schwarzbeck	VULB 9160	3260	2023.02.03
Biconilog ANT	Schwarzbeck	VULB9168	902	2023.01.14
Horn Ant.	Schwarzbeck	BBHA9120D	974	2023.01.08
Horn Ant.	S/B	BBHA9120D	1497	2023.01.25
Amplifier	TESTEK	TK-PA18H	200104-L	2023.03.17
EMI TEST RECEIVER	ROHDE& SCHWARZ	ESW44	101952	2023.04.07
PROGRAMMABLE DC POWER SUPPLY	ODA	OPE-305Q	oda-01-09-23-1831	2023.01.10
DC POWER SUPPLY	AGILENT	E3634A	MY40012120	2023.02.03
POWER SENSOR	AGILENT	U2001H	MY51140028	2023.02.19
Test Receiver	ROHDE & SCHWARZ	ESR7	101616	2023.06.28
LISN	ROHDE & SCHWARZ	ENV216	100409	2023.01.10
PULSE LIMITER	lignex1	EPL-30	NONE	2023.01.24

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### 5. Antenna Requirement

According to §15.203 An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

According to §15.247(b)(4) e conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 5.1 Result

#### Complies

(The transmitter has a Patch Antenna. The directional peak gain of the antenna is 5.34 dBi.)



# 6. 20 dB Bandwidth & Occupied Bandwidth (99%)

### 6.1 Test Setup

Refer to the APPENDIX I.

### 6.2 Limit

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 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.

#### 6.3 Test Procedure

- 1. The 20 dB bandwidth & Occupied bandwidth were measured with a spectrum analyzer connected to RF antenna Connector (conducted measurement) while EUT was operating in transmit mode. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer.
- 2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using below setting:
  RBW = 1% to 5% of the 20 dB Bandwidth & Occupied Bandwidth
  VBW ≥ 3 × RBW
  Span = between two times and five times the 20 dB Bandwidth & Occupied Bandwidth
  Sweep = Auto
  Detector function = Peak
  Trace = Max Hold

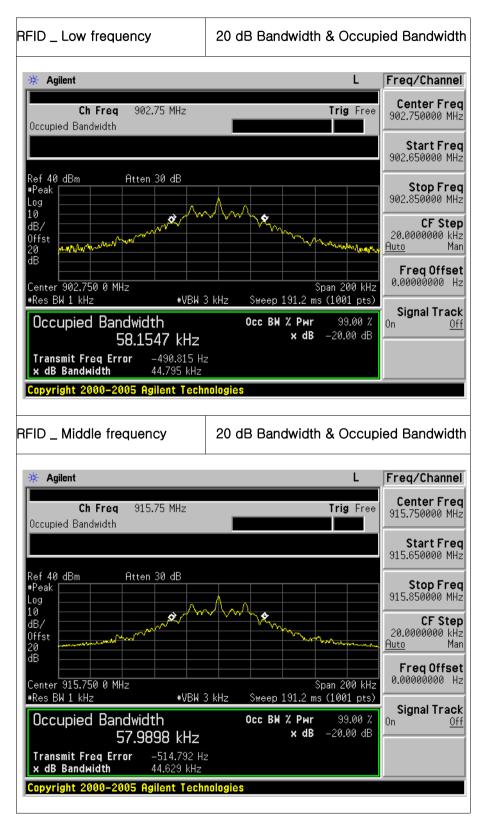
#### 6.4 Test Result

Test Mode	Test Frequency	20 dB Bandwidth (kHz)	Occupied Bandwidth (kHz)
	Low	44.795	58.155
RFID	Middle	44.629	57.990
	High	44.918	58.318

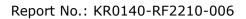
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#### 6.5 Test Plot



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RFID _ High frequency	20 dB Bandwidth & Occup	ied Bandwidth
* Agilent	L	Freq/Channel
<b>Ch Freq</b> 927.25 MHz Occupied Bandwidth	Trig Free	Center Freq 927.250000 MHz
		<b>Start Freq</b> 927.150000 MHz
Ref 40 dBm Atten 30 dB #Peak Log 10		<b>Stop Freq</b> 927.350000 MHz
dB/ Offst 20 dB	A A A A A A A A A A A A A A A A A A A	<b>CF Step</b> 20.0000000 kHz <u>Auto</u> Man
Center 927.250 0 MHz	Span 200 kHz 3 kHz Sweep 191.2 ms (1001 pts)	Freq Offset 0.00000000 Hz
Occupied Bandwidth 58.3183 kHz	Осс В₩ % Рwr 99.00 % x dB -20.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error -44.310 Hz x dB Bandwidth 44.918 kHz		
Copyright 2000-2005 Agilent Tech	nologies	

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# 7. Number of Hopping Frequencies

### 7.1 Test Setup

Refer to the APPENDIX I.

# 7.2 Limit

Limit : >= 50 hops

# 7.3 Test Procedure

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, two frequency ranges for FH mode within the 902  $\sim$  928 MHz were examined.

The spectrum analyzer is set to:

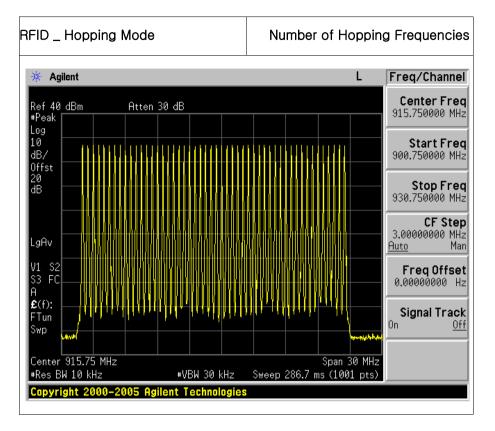
Span = 30 MHzRBW = To identify clearly the individual channels, set the RBW to less than 30% of the<br/>channel spacing or the 20 dB bandwidth, whichever is smaller.VBW ≥ RBWSweep = AutoDetector = PeakTrace = Max hold

#### 7.4 Test Result

Test Mode	Number of Hopping Channels
RFID	50



#### 7.5 Test Plot



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# 8. Time of Occupancy (Dwell Time)

#### 8.1 Test Setup

Refer to the APPENDIX I.

#### 8.2 Limit

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 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.

#### 8.3 Test Procedure

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 = 921.9 MHz Span = Zero RBW = 100 kHz (RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel) VBW ≥ RBW Detector = Peak Trace = Max hold

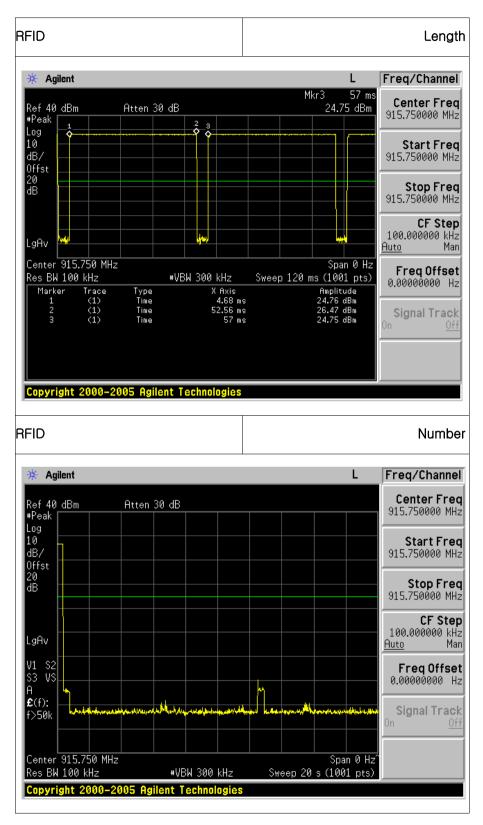
#### 8.4 Test Result

Test Frequency	Length	Number	Dwell Time
(MHz)	(ms)		(ms)
915.75	47.88	1	47.88

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#### 8.5 Test Plot



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### 9. Carrier Frequencies Separation

#### 9.1 Test Setup

Refer to the APPENDIX I.

#### 9.2 Limit

Limit :  $\geq$  25 kHz or  $\geq$  20 dB Bandwidth whichever is greater.

#### 9.3 Test Procedure

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:

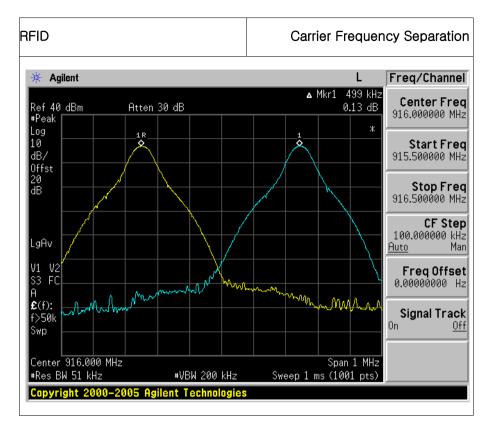
#### 9.4 Test Result

Test Mode	Carrier Frequencies Separation (kHz)	Min. Limit (kHz)
RFID	499.00	57.99

Note: Limit (kHz) = Test Result of 20 dB BW



#### 9.5 Test Plot



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### 10. Peak Output Power

#### 10.1 Test Setup

Refer to the APPENDIX I.

### 10.2 Limit

The maximum peak output power of the intentional radiator shall not exceed the following:

\$15.247(b)(2) and RSS-247(5.4) (a), 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) and 5.4(a) of this section.

#### 10.3 Test Procedure

- 1. The RF output power was measured with a spectrum analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, a spectrum analyzer was used to record the shape of the transmit signal.
- 2. The peak output power of the fundamental frequency was measured with the spectrum analyzer using;

Span = approximately 5 times of the 20 dB bandwidth, centered on a hopping channel PRW > 20 dR Received with

RBW ≥ 20 dB Bandwidth VBW ≥ RBW Sweep = Auto Detector function = Peak Trace = Max Hold



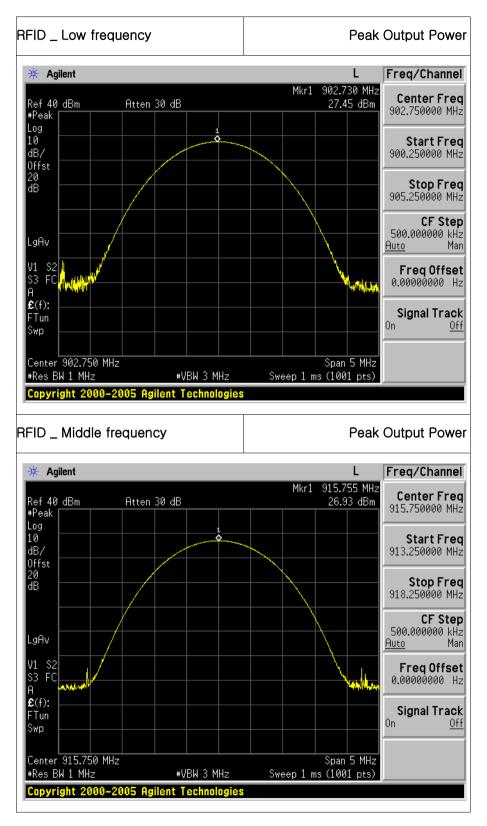
#### 10.4 Test Result

Test Mode	Test Frequency	Peak Out	out Power
Test Mode	Test Frequency	dBm	mW
	Low	27.45	555.90
RFID	Middle	26.93	493.17
	High	26.90	489.78

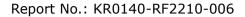
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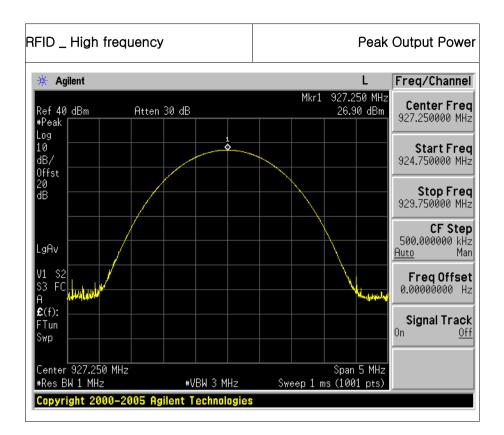
#### 10.5 Test Plot



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# 11. TX Radiated Spurious Emission and Conducted Spurious Emission

#### 11.1 Test Setup

Refer to the APPENDIX I.

#### 11.2 Limit

According to §15.247(d), 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. Attenuation below the general limits specified in section §15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))

According to § 15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional

	nola strongth levels specifica in	the following table
Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1705	24000/F (kHz)	30
1705 ~ 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

radiator shall not exceed the field strength levels specified in the following table

\*\* 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.

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		N 41 1-	015
MHz	MHz	MHz	GHz
0.009 ~ 0.110	16.42 ~ 16.423	399.90 ~ 410	4.5 ~ 5.15
$0.495 \sim 0.505$	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.	1435 ~ 1626.5	9.0 ~ 9.2
4.20725 ~ 4.20775	25 73 ~ 74.6	1645.5 ~ 1646.5	9.3 ~ 9.5
4.17725 ~ 4.17775	74.8 ~ 75.2	1660 ~ 1710	10.6 ~ 12.7
6.215 ~ 6.218	108 ~ 121.94	1718.8 ~ 1722.2	13.25 ~ 13.4
6.26775 ~ 6.26825	149.9 ~ 150.05	2200 ~ 2300	14.47 ~ 14.5
6.31175 ~ 6.31225	156.52475 ~ 156.52525	2310 ~ 2390	15.35 ~ 16.2
8.291 ~ 8.294	156.7 ~ 156.9	2483.5 ~ 2500	17.7 ~ 21.4
8.362 ~ 8.366	162.0125 ~ 167.17	2690 ~ 2900	22.01 ~ 23.12
8.37625 ~ 8.38675	3345.8 ~ 3358	3260 ~ 3267	23.6 ~ 24.0
8.41425 ~ 8.41475	3600 ~ 4400	3332 ~ 3339	31.2 ~ 31.8
12.51975 ~ 12.52025	3345.8 ~ 3358	240 ~ 285	36.43 ~ 36.5
12.57675 ~ 12.57725	3600 ~ 4400	322 ~ 335.4	Above 38.6
13.36 ~ 13.41			

According to § 15.205(a) and (b), only spurious emissions are permitted in any of The frequency bands listed below:

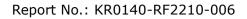
The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.



#### 11.3 Test Procedure for Radiated Spurious Emission

- 1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2. During performing radiated emission below 1 <sup>GHz</sup>, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 <sup>GHz</sup>, the EUT was set 3.75 meter away from the interference-receiving antenna.
- 3. For measurements above 1 <sup>GHz</sup> absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 <sup>GHz</sup>, the absorbers are removed.
- 4. 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 polarizations of the antenna are set to make the measurement.
- 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.
   (The EUT was pre-tested with three axes (X, Y, Z) and the final test was performed at the worst case.)
- 6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 7. 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.

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#### Measurement Instrument Setting

- 1. Frequency Range: Below 1 <sup>GHz</sup> RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak
- Frequency Range: Above 1 <sup>GHz</sup> Peak Measurement RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes

Average Measurement RBW = 1MHz, VBW ≥ 1/T, Detector = Peak, Sweep Time = Auto, Trace Mode = Max Hold until the trace stabilizes

#### 11.4 Test Procedure for Conducted Spurious Emission

- 1. The transmitter output was connected to the spectrum analyzer.
- The reference level of the fundamental frequency was measured with the spectrumanalyzer using RBW = 100 kHz, VBW = 300 kHz.
- The conducted spurious emission was tested each ranges were set as below. Frequency range: 30 MHz ~ 26.5 ଔ RBW = 100 kHz, VBW = 300 kHz, Sweep Time = Auto, Detector = Peak, Trace = Max Hold

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

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#### 11.5 Test Result

#### 9 kHz $\sim$ 10 GHz Data

#### • Low frequency

Frequency	Rea	ding			0.005	Lin	nits	Re	sult	Ма	rgin
Frequency	(dBu	V/m)	Pol.	T.F (dB)	DCCF (dB)	(dBu	V/m)	(dBu	V/m)	(d	IB)
(MHz)	AV ,	/ Peak			(00)	AV /	Peak	AV /	Peak	AV /	Peak
1 805.48	44.09	50.60	V	-11.56	N/A	54.0	74.0	32.5	39.0	21.5	35.0
2 708.33	55.59	60.47	V	-6.89	N/A	54.0	74.0	48.7	53.6	5.3	20.4

#### Middle frequency

Fraguanay	Rea	ding			0.005	Lin	nits	Re	sult	Ма	rgin
Frequency	(dBu	V/m)	Pol.	T.F (dB)	DCCF (dB)	(dBu	V/m)	(dBu	V/m)	(d	в)
(MHz)	AV /	/ Peak		(60)	(60)	AV /	Peak	AV /	Peak	AV /	Peak
1 831.37	45.45	52.10	V	-11.56	N/A	54.0	74.0	33.9	40.5	20.1	33.5
2 747.28	49.94	55.84	V	-6.89	N/A	54.0	74.0	43.1	49.0	11.0	25.1

#### • High frequency

Fraguapay	Rea	ding				Lin	nits	Re	sult	Ма	rgin
Frequency	(dBu	V/m)	Pol.	T.F (dB)	DCCF (dB)	(dBu	IV/m)	(dBu	V/m)	(d	B)
(MHz)	AV ,	/ Peak		(48)	(00)	AV /	Peak	AV /	Peak	AV /	Peak
1 854.51	48.39	54.05	V	-11.46	N/A	54.0	74.0	36.9	42.6	17.1	31.4
2 781.75	58.34	63.76	V	-6.59	N/A	54.0	74.0	51.8	57.2	2.2	16.8

Note 1: The radiated emissions were inverstigated 9 kHz to 10 <sup>GHz</sup>. And no other spurious and harmonic emissions were found above listed frequencies.

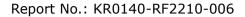
Note 2: DCCF(Duty Cycle Correction Factor)

Note 3: Sample Calculation.

Margin = Limit - Result / Peak Result = Peak Reading + TF / Average Result = Average Reading + TF

TF = Ant factor + Cable Loss + Filter Loss - Amp Gain + Distance Factor

Distance Factor = 20log(applied distance/required distance) = 20log(3.75m/3m) = 1.94





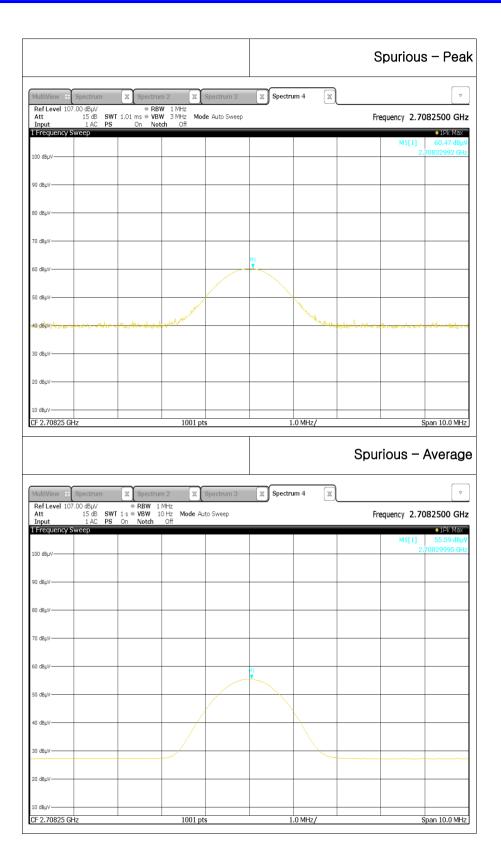
### 11.6 Test Plot for Radiated Spurious Emission

#### • RFID \_ Low frequency

MultiView 🕀	Spectrum	X Spectro	um 2 🕅	Spectrum 3	Spectru	im 4 🕱			▽
Ref Level 107 Att Input	15 dB SWT 15 dB SWT 1 AC PS	● RI 1.01 ms ● VE On No	3W 1 MHz 3W 3 MHz Moo otch Off	<b>le</b> Auto Sweep			Fre	equency 1.80	55000 GH
Frequency S								M1[1]	●1Pk Max 50.60 dBµ'
00 dBµV								1.	80548000 GH
) dBµV									
I dBµV									
dBµV									
dBµV									
din ar					4				
dBµV	Muhmun	Mercela - de	Langenam Mere	and a start and a start and a start a st	and the second second	the way and the start and the	mound	walderstation	antick consistents.
dBµV									
dΒμ∨−−−−									
dBµV									
о dвµv F 1.8055 GH	2		1001 pt	S	1	.0 MHz/	Spu		
1.8055 GH		X Spectri		s Spectrum 3	1		Spui	rious – ,	
altiView	Spectrum .00 dBµV 15 dB SWT	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3					Averag
LI.8055 GH	Spectrum 100 dBµV 15 dB SWI 1 AC PS	RBW	um 2 🕅 🕱 🕽	Spectrum 3				rious — , equency 1.80	Averag 555000 GH 1Pk Max 44.09 dBµ
I 1.8055 GH	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3				rious — , equency 1.80	Averag 555000 GH 1Pk Max 44.09 dBµ
ultiView = tef Level 107 ttt rrequency S 0 d8µV	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
ultiview e kef Level 107 trequency S 0 dBµV	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
ultiView         Fi           ultiView         Fi           ultiView         Fi           tef Level         107           trequency         S           0         d8µV           d8µv         d8µv	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
ultiview         #           ultiview         #           tef Level 107         tt           приt         #           requency S         dbµv           dbµv            dbµv            dbµv	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
ultiView         FF           ultiView         FF           tef Level         107           requency         S           dBµV	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
ultiView         FF           ultiView         FF           tef Level         107           requency         S           dBµV	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
ultiview         Fi           ultiview         Fi           ultiview         Fi           tef Level 107         It           requency         G           dBµV         G	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3 ito Sweep				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
ultiview         E           ultiview         E           tef Level         IO           dbµv         G           dbµv         G	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3 ito Sweep				rious — , equency 1.80	Averag 555000 GH • 1Pk Max 44.09 dBµ
	Spectrum 100 dBµV 15 dB SWI 1 AC PS	● RBW 1 s ● VBW	um 2 🕅 1 MHz 10 Hz Mode Au	Spectrum 3 ito Sweep				rious — , equency 1.80	▽

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• RFID \_ Middle frequency

							S	purious	s - Pea
1ultiView 🕀	Spectrum	X Spectru	m 2 🕱	Spectrum 3	X Spectru	ım 4 🕱			▽
RefLevel 107 Att	15 dB SW	T 1.01 ms 🖶 VB	WF 1 MHz WF 3 MHz Mo	de Auto Sweep			Fr	equency 1.8	315000 GH
Input Frequency S	1 AC PS weep	On No	tch Off						• 1Pk Max
00 dBµV								M1[1] 1	52.10 dBµ\ .83137013 GH
0 dBµV									
) dвµV									
) dBµV									
) dBµV									
				M1					
) dBµV				Annue Marine	and a second second				
) dBµV	homono		manuture	1		and the second and	monumber	mensherman	all the same the
I dBµV									
) dBµV									
о dBµV F 1.8315 GHz	2		1001 p	lts	1	.0 MHz/	Spu	rious –	
		X Spectru		ts Spectrum 3	1 X Spectru		Spu		
F 1.8315 GHz	Spectrum .00 dBµV 15 dB SW	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A						Averag
F 1.8315 GHz	Spectrum .00 dBµV 15 dB SW 1 AC PS	• RBW 1	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag 315000 GH
F 1.8315 GHz HultiView = Ref Level 107 Att Input Frequency S	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
F 1.8315 GHz	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag 315000 GH 1Pk Max 45.45 dBp
F 1.8315 GHz	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag 315000 GH 1Pk Max 45.45 dBp
E 1.8315 GHz	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
F 1.8315 GHz IuliiView E Ref Level 107 Att Input Frequency S 10 dbµV 0 dbµV 0 dbµv 0 dbµv	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
F 1.8315 GHz IuliiView E Ref Level 107 Att Input Frequency S 10 dbµV 0 dbµV 0 dbµv 0 dbµv	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
F 1.8315 GHz IuliiView Ref Level 107 Att Input Frequency S 30 dbµV 0 dbµV 0 dbµV	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
E 1.8315 GHz  IultiView E  Ref Level 107 Att Input Frequency S  0 dBµV  0 dBµV  0 dBµV  0 dBµV  0 dBµV	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
F 1.8315 GHz IuliiView Ref Level 107 Att Input Frequency S 30 dbµV 0 dbµV 0 dbµV	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
E 1.8315 GHz  IultiView E  Ref Level 107 Att Input Frequency S  0 dBµV  0 dBµV  0 dBµV  0 dBµV  0 dBµV	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
E 1.8315 GHz  IultiView E  Ref Level 107 Att Input Frequency S  0 dBµV  0 dBµV	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
E 1.8315 GHz  IultiView E  Ref Level 107 Att Input Frequency S  0 dBµV  0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV 0 d	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
1.8315 GHz           Iultiview           Vef Level 107           Yet Level 107           In dbµv	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	Averag v 315000 GH • 1Pk Max 45.45 dBµ
E 1.8315 GHz  IultiView E  Ref Level 107 Att Input Frequency S  0 dBµV  0 dBµV	Spectrum .00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	m 2 🕱 MHz 10 Hz Mode A	Spectrum 3				rious — equency 1.83	▽

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Spurious – Pea							
_ ⊽	ım 4 🕱	Spectr	Spectrum 3	m 2 🕱	X Spectru	Spectrum	MultiView 🕀
Frequency 2.7472500 GF				W 1 MHz	● RB 「 1.01 ms ● VB	7.00 dBuV	Ref Level 107
• 1Pk Max				tch Off	On No		Input Frequency S
M1[1] 55.84 dBµ 2.74727997 GH							100 dBµV
							Ю dBµV
							80 dBµV
							'0 dBµV
		1					0 dBµV
							0 dBµV
men have march with which	Marmon Marcala			and the second second	anon markan	Marine	0 dBµV
							0 dBµV
							0 dBµV
					1	1	
Span 10.0 MH Spurious – Averag	.0 MHz/	1	ts	1001 p		Hz	
		1 X Spectri	ts Spectrum 3		X Spectru	Hz	F 2.74725 G
Spurious – Averag				m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB S₩	F 2.74725 Gł AultiView H Ref Level 107 Att
Spurious – Averag			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 Gł MultiView Ref Level 107 Att Input
Spurious - Averag Trequency 2.7472500 GH			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 Gł AultiView : Ref Level 107 Att Input Frequency S
Spurious – Averag Frequency 2.7472500 GH			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G AultiView F Ref Level 107 Att Input Frequency S 00 dBµV
Spurious – Averag Frequency 2.7472500 GH			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G AultiView F Reflevel 107 Att Input Frequency S 00 dBµV
Spurious – Averag Frequency 2.7472500 GH			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G AultiView F Reflevel 107 Att Input Frequency S 00 dBµV
Spurious – Averag Frequency 2.7472500 GH			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G           AultiView         F           Reflevel         107           Att         Input           Input         F           Frequency S         0           0         dBμV           0         dBμV           0         dBμV
Spurious – Averag Frequency 2.7472500 GH			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	T 2.74725 G           MultiView         F           Reflexel         107           Att         Input           Frequency S         00           00         dbµV           00         dbµV           00         dbµV           00         dbµV           10         dbµV           10         dbµV
Spurious – Averag Frequency 2.7472500 GH			Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	T 2.74725 G           MultiView         F           Reflexel         107           Att         Input           Frequency S         00           00         dbµV           00         dbµV           00         dbµV           00         dbµV           10         dbµV           10         dbµV
Spurious – Averag Frequency 2.7472500 GH		Spectre	Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G           AultiView         F           Reflexel 107         Att           Input         Frequency S           00 dbμV            00 dbμV            00 dbμV            00 dbμV            00 dbμV            00 dbμV
Spurious – Averag Frequency 2.7472500 GH		Spectre	Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	IF 2.74725 G           Autriview           Reflevel 107           Att           Input           Frequency S           00 dbµv
Spurious – Averag Frequency 2.7472500 GH		Spectre	Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G           Autriview         F           Reflexel         107           Att         Input           Reflexel         107           Att         Input           Frequency S         0           0         dbµV
Spurious – Averag Frequency 2.7472500 GH		Spectre	Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G           Autriview         F           Reflexel         107           Att         Input           Reflexel         107           Att         Input           Frequency S         0           0         dbµV
Spurious – Averag Frequency 2.7472500 GH		Spectre	Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	F 2.74725 G           Autüview E           Ref evel 107           Att Input           Frequency S           0 dbµV
Spurious – Averag Frequency 2.7472500 GH		Spectre	Spectrum 3	m 2 🛛 🕅 MHz O Hz Mode A	● RBW 1 「1s ● VBW	Spectrum 7.00 dBμV 15 dB SW 1 AC PS	0         dbµV           F         2.74725 Gi           AultiView El         Ci           Ref Level 107         Alti           Input         Frequency Si           0         dbµV           0         dbµV

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• RFID \_ High frequency

							5	Spuriou	s - Pea
1ultiView ⊞	Spectrum	X Spectru		Spectrum 3	Spectrur	m 4 🕱	L		$\Box$
Ref Level 103 Att Input	15 dB SW 1 AC PS	T 1.01 ms ⊜ VB		Mode Auto Sweep			F	requency 1.8	8545000 GH
Frequency S	Sweep							M1[1]	<ul> <li>1Pk Max</li> <li>54.05 dBµ\</li> <li>1.85451000 GH;</li> </ul>
00 dBµV									1.85451000 GH
0 dBµV									
0 dBµV									
) dвµV									
I dBµV					1				
) dBµV−−−−					- Way	×			
) dBµV	kennennen	Anthender	granger glar			- Marka	and all and	which we have	Menninan
) dBµV									
) dBµV									
і dbµv = 1.8545 GH	Iz		100	)1 pts					
			100	51 pts	1.0	0 MHz/	Spu	rious –	-
	Spectrum	X Spectru	im 2	X Spectrum 3	1.1		Spu	rious –	Averag
Ref Level 10 Att Input	7.00 dBµV 15 dB SW 1 AC PS	Spectru BBW 1 T 1s • VBW On Notch	im 2						Averag
Ref Level 10 Att Input Frequency S	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBµ</li> </ul>
Ref Level 10 Att Input Frequency S	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBµ</li> </ul>
Ref Level 107 Att Input Frequency S	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBµ</li> </ul>
Ref Level 10: Att Input Frequency S ID dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBµ</li> </ul>
Ref Level 107           Att           Input           Frequency 9           00 dBµV           0 dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBµ</li> </ul>
IultiView         Image: Comparison of the compariso	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBy</li> </ul>
RefLevel 107 Att Input Frequency 9 00 dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBy</li> </ul>
RefLevel 107           Att           Input           Frequency 5           0 dBµV           0 dBµV           0 dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	8545000 GH
RefLevel 107 Att Frequency 9 Ю dBµV 0 dBµV 0 dBµV 0 dBµV 0 dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBy</li> </ul>
Ref Level 107           Att           nput           Frequency S           0 dBµV           1 dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBµ</li> </ul>
RefLevel 107           Att           nput           Frequency S           0 dBµV           1 dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBy</li> </ul>
Ref Level 107           Att nput           Frequency S           0 dBµV           0 dBµV           1 dBµV	7.00 dBµV 15 dB SW 1 AC PS	● RBW 1 T 1 s ● VBW	im 2	X Spectrum 3				requency 1.8	<ul> <li>Averag</li> <li>▼</li> <li>▼</li> <li>■ 19k Max</li> <li>■ 48.39 dBy</li> </ul>

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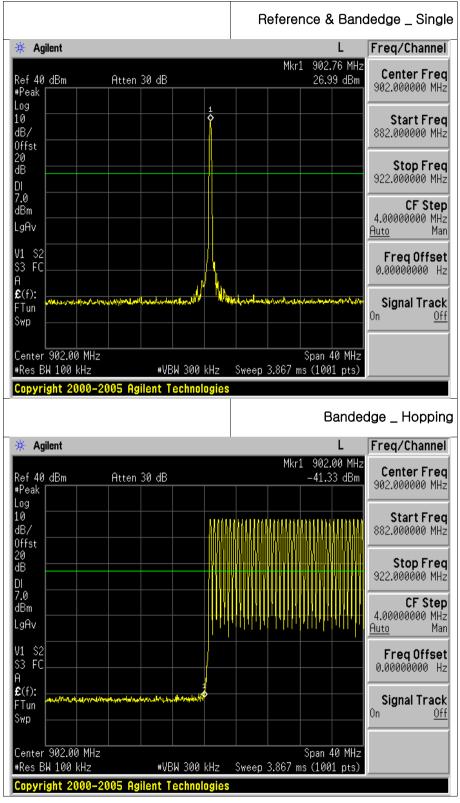
				S	purious –	Pea
AultiView 🕀 Spectrum	X Spectrum 2	Spectrum 3	Spectrum 4	Ĵ		
RefLevel 107.00 dBµV Att 15 dB S	● RBW 1 MH WT 1.01 ms ● VBW 3 MH			L	quency 2.78175	600 GH
Input 1 AC P Frequency Sweep	S On Notch O	ff			•	1Pk Max
00 dBµV						3.76 dBµ' 5000 GH
) dBµV						
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ungen and with the	moundmallow	AND I	Martin	matchnowhow	u have month	whenha
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F 2.78175 GHz		1001 pts	1.0 MHz/	Spuri	<sub>span</sub>	
2.78175 GHz		1001 pts	1.0 MHz/	9		erag
2.78175 GHz	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz			]		erag
Spectrum           Ref Level 107.00 dBµV           Att         15 dB           Sinput         1 AC	Spectrum 2 • RBW 1 MHz	X Spectrum 3		]	ious – Ave quency 2.78175	erag v
F 2.78175 GHz IultiView E Spectrum Ref Level 107.00 dBµV Att 15 dB S Input 1AC P Frequency Sweep	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBp
2.78175 GHz	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
2.78175 GHz	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
2.78175 GHz	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
2.78175 GHz           IultiView ::         Spectrum           Ref Level 107.00 dBµV           Att 15 dB S           Input 1 AC P           Frequency Sweep           10 dBµV           10 dBµV	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
F 2.78175 GHz	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3 Aode Auto Sweep		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
F 2.78175 GHz           IultiView         Espectrum           Ref Level 107.00 dBµV           Att         15 dB S           Input         1 AC P           Frequency Sweep         0 dBµV           0 dBµV         0 dBµV	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
F 2.78175 GHz           IultiView. # Spectrum           Ref Level 107.00 dBµV           Att         15 dB           Input         1 AC           P         Frequency Sweep           30 dBµV         0           0 dBµV         0	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3 Aode Auto Sweep		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
E2.78175 GHz           IultiView         E Spectrum           Ref Level 107.00 dBµV         15 dB S           Att         15 dB S           Input         1 AC P           Frequency Sweep         0           00 dBµV         0	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3 Aode Auto Sweep		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
E2.78175 GHz           IultiView         E Spectrum           Ref Level 107.00 dBµV         15 dB S           Att         15 dB S           Input         1 AC P           Frequency Sweep         0           00 dBµV         0	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3 Aode Auto Sweep		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
F 2.78175 GHz           IultiView         E Spectrum           Ref Level 107.00 dBµV           Att         15 dB S           Input         1 AC P           Frequency Sweep         0 dBµV           10 dBµV         0           10 dBµV         0           10 dBµV         0           10 dBµV         0	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3 Aode Auto Sweep		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
2.78175 GHz           IultiView E         Spectrum           Xef Level 107.00 dBµV           Att 15 dB S           input 1 AC P           Frequency Sweep           10 dBµV           10 dBµV           10 dBµV           10 dBµV           11 dBµV	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3 Aode Auto Sweep		]	ious – Ave quency 2.78175 M1[1] 58	erag ⊽ 500 GH 1Pk Max 3.34 dBµ
F 2.78175 GHz           IultiView E Spectrum           Ref Level 107.00 dBµV           Att 15 dB S           Input 1 AC P           Frequency Sweep           00 dBµV         0           0 dBµV         0	Spectrum 2     BBW 1 MHz WT 1s = VBW 10 Hz	X Spectrum 3 Aode Auto Sweep		]	ious – Ave quency 2.78175 M1[1] 58	▽

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#### 11.7 Test Plot for Conducted Spurious Emission

• RFID \_ Low frequency



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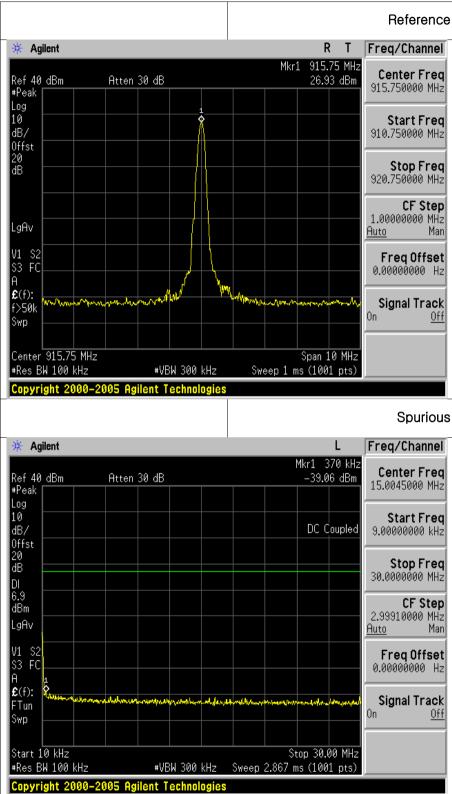


								Spurio
Agilent							L	Freq/Channe
40 dBm	Atten 3	30 dB					10 kHz 7 dBm	Center Fre
ak								15.0045000 MH
/						DC C	oupled	<b>Start Fre</b> 9.00000000 kH
								<b>Stop Fre</b> 30.0000000 M⊦
1								<b>CF Ste</b> 2.99910000 MH <u>Auto</u> Ma
S2 FC								<b>FreqOffse</b> 0.00000000 ⊦
): <b>\$</b> in <sup>14</sup> ************************************	ittive and a startest	<b>Ya</b> iline Washiriki Manad	hymrogenad	andronal terres	Improvation	q <sup>da.</sup> noranyyattilija <sup>(</sup>	drale Marson	<b>Signal Trac</b> On <u>O</u>
rt 10 kHz						op 30.0		
s BW 100 kHz	2	#VRM	1300 kHz	Sween	2.867 m	ารเเทศ	i nts)	
yright 2000		lent Te	chnologie				1 pto/	Spurio
		lent Te	chnologie				L	
oyright 2000 Agilent	)–2005 Agi		chnologie			r1 2.7	L 12 GHz	Freq/Channe
Agilent 40 dBm			chnologie			r1 2.7	L	Freq/Channe Center Fre
Agilent 40 dBm ak	)–2005 Agi		chnologie			r1 2.7	L 12 GHz	Freq/Channe Center Fre 5.01500000 GH
yright 2000 Agilent 40 dBm ak	)–2005 Agi		chnologie			r1 2.7	L 12 GHz	Freq/Channel Center Fre 5.01500000 GH Start Fre 30.0000000 MH Stop Fre
yright 2000 Agilent 40 dBm ak it	)–2005 Agi		chnologie 			r1 2.7	L 12 GHz	Freq/Channel Center Fre 5.01500000 GH Start Fre 30.0000000 MH Stop Fre 10.0000000 GH CF Ste 997.000000 MH
yright         2000           Agilent         40           40         dBm           ak         1           ak         1           yr         1           yr         1           \$2         1	)–2005 Agi		chnologie 			r1 2.7	L 12 GHz	Spurio Freq/Channel Center Fre 5.01500000 GH Start Fre 30.0000000 MH Stop Fre 10.0000000 GH OF Ste 997.000000 MH Auto Ma Freq Offse 0.00000000 H
Agilent           40         dBm           ak	Atten 3	30 dB	chnologie 			r1 2.7	L 12 GHz	Start Fre           30.0000000 GH           Start Fre           30.0000000 MH           Stop Fre           10.0000000 GH           CF Ste           997.000000 MH           Auto           Mathematical
Agilent 40 dBm ak , , , , , , , , , , , , ,	Atten 3	30 dB			Mk	r1 2.7 -27.3	L 12 GHz 9 dBm	Freq/Channel           Center Fre           5.01500000 GH           Start Fre           30.0000000 MH           Stop Fre           10.0000000 GH           CF Ste           997.000000 MH           Auto           Freq Offse           0.0000000 H           Signal Trac
Agilent           40 dBm           ak           /           st           n           S2           FC	Atten 3	30 dB		S  S  A  A  A  A  A  A  A  A  A  A  A  A	Mk	r1 2.7 -27.3	L 12 GHz 9 dBm	Freq/Channel           Center Fre           5.01500000 GH           Start Fre           30.0000000 MH           Stop Fre           10.0000000 GH           CF Ste           997.000000 MH           Auto           Freq Offse           0.0000000 H           Signal Trac

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• RFID \_ Middle frequency

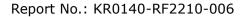


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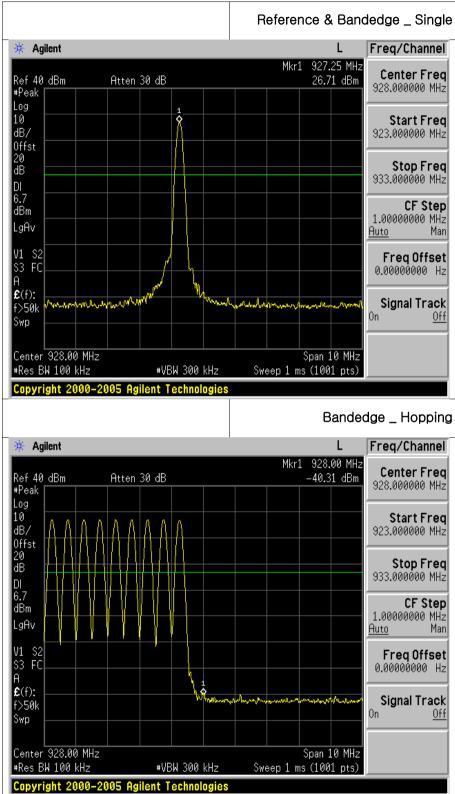
							Spuriou
🔆 Agilent						L	Freq/Channel
Ref 40 dBm	Atten 30 dB			Mkr		52 GHz 8 dBm	Center Freq 5.01500000 GHz
ŧPeak _og							
10 dB/							Start Freq 30.0000000 MHz
Offst 20 dB							Stop Freq 10.0000000 GHz
DI 6.9 dBm							CF Step 997.000000 MHz
LgAv							Auto Mar
V1 S2 S3 FC							Freq Offset 0.00000000 Hz
n €(f): FTun	and gal it has a been preserved and a second s	Nord the second state of the second	de agental f	ور ا <sup>ر</sup> مارد ارد.	raha-gagaaharatiga	and shirts and go	Signal Track
Swp							0n <u>0ff</u>
Start 30 MHz					o 10.00		
#Res BW 100 kHz Copyright 2000-2		3W 300 kHz	Sweep S	952.9 m	s (100	1 pts)	

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• RFID \_ High frequency



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							Spurio
Agilent						L	Freq/Channe
10 dBm	Atten 30	0 dR			Mkr1 61 -40.37	0 kHz dBm	Center Fre
					-40.37	UDIII	15.0045000 MH
							Start Fre
					DC Co	upled	9.00000000 kł
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							30.0000000 MH
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2							Freq Offse
C							0.00000000
-	monoraneted	-Walter demonstra	- Manual Manuary	and the state of the	ANN Mayber	AND HAVE	Signal Trac
							0n <u>0</u>
10 kHz					top 30.00	) MU-	
BW 100 kHz		#VBW 300	)kHz Swe	ep 2.867 r			
BW 100 kHz	-2005 Agila						
BW 100 kHz •right 2000					ns (1001	pts)	Spurio
BW 100 kHz				ep 2.867 r	ns (1001	pts) L	Freq/Channe
BW 100 kHz rright 2000 Agilent 10 dBm		ent Techno		ep 2.867 r	ns (1001	pts) L 2 GHz	Freq/Channe Center Fre
BW 100 kHz rright 2000 Agilent	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 GH
BW 100 kHz right 2000 Agilent 0 dBm	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 GH Start Fre
BW 100 kHz right 2000 Agilent 40 dBm 40 dBm	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 GH Start Fre 30.0000000 MH
BW 100 kHz right 2000 Agilent 10 dBm	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 Gi Start Fre 30.0000000 Mi Stop Fre
BW 100 kHz rright 2000 Agilent 10 dBm	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 Gl Start Fre 30.0000000 Ml Stop Fre 10.0000000 Gl
BW 100 kHz right 2000 Agilent 10 dBm	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channel Center Fre 5.01500000 GH Start Fre 30.0000000 MH Stop Fre 10.0000000 GH CF Ste 997.000000 MH
BW 100 kHz  Agilent  d dBm	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 GH Start Fre 30.0000000 MH Stop Fre 10.0000000 GH CF Ste 997.000000 MH
BW 100 kHz  right 2000  Agilent  d dBm	Atten 30	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channel Center Fre 5.01500000 GF 30.0000000 MF 30.0000000 GF 10.0000000 GF 10.0000000 GF 20000000 MF 00000000 MF 2000000 MF Auto Me
BW 100 kHz rright 2000 Agilent	–2005 Agila	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 Gf Start Fre 30.0000000 Mf Stop Fre 10.0000000 Gf CF Ste 997.000000 Mf <u>Auto</u> M
BW 100 kHz  right 2000  Agilent  d dBm	Atten 30	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 Gf 30.0000000 Mf Stop Fre 10.0000000 Gf CF Ste 997.000000 Mf <u>Auto M</u> Freq Offse 0.00000000 f Signal Trac
BW 100 kHz right 2000 Agilent	Atten 30	ent Techno		ep 2.867 r	ns (1001 r1 2.78	pts) L 2 GHz	Freq/Channe Center Fre 5.01500000 Gl Start Fre 30.0000000 Ml Stop Fre 10.0000000 Gl CF Ste 997.000000 Ml <u>Auto</u> M
BW 100 kHz right 2000 Agilent	-2005 Agila	ent Techno		Mk	r1 2.78 -31.27	pts)	Freq/Channe Center Fre 5.01500000 Gf 30.0000000 Mf Stop Fre 10.0000000 Gf CF Ste 997.000000 Mf <u>Auto M</u> Freq Offse 0.00000000 f Signal Trac

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# 12. Conducted Emission

#### 12.1 Test Setup

See test photographs for the actual connections between EUT and support equipment.

### 12.2 Limit

According to §15.207(a) 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 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

	Conducted Limit (dBuV)				
Frequency Range (MHz)	Quasi-Peak	Average			
0.15 ~ 0.5	66 to 56 *	56 to 46 *			
0.5 ~ 5	56	46			
5 ~ 30	60	50			

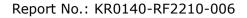
\* Decreases with the logarithm of the frequency

#### 12.3 Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10.

- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m 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.
- 3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
- 4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

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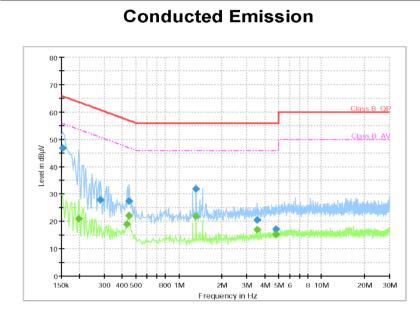




#### 12.4 Test Result

• AC Line Conducted Emission (Graph)

a313\_RFID\_L1

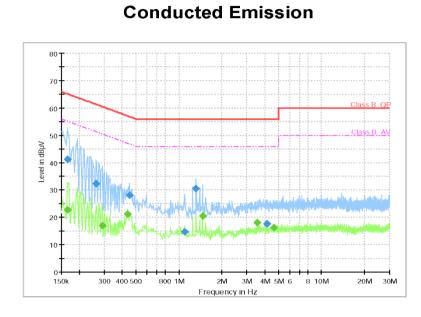


#### Final\_Result

Frequency	QuasiPeak	CAverage	Limit	Margin	Bandwidth	Line	Corr.
(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(kHz)		(dB)
0.154	46.88		65.78	18.90	9	L1	19.3
0.198		21.00	53.69	32.69	9	L1	19.4
0.282	27.86		60.76	32.90	9	L1	19.4
0.430		19.04	47.25	28.21	9	L1	19.8
0.446		21.99	46.95	24.96	9	L1	19.8
0.446	27.41		56.95	29.54	9	L1	19.8
1.320	31.76		56.00	24.24	9	L1	19.7
1.320		21.93	46.00	24.07	9	L1	19.7
3.530	20.54		56.00	35.46	9	L1	19.8
3.530		17.03	46.00	28.97	9	L1	19.8
4.770		15.26	46.00	30.74	9	L1	19.8
4.770	17.07		56.00	38.93	9	L1	19.8

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# a313\_RFID\_N

#### Final\_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.166	(ubµv) 	22.77	55.16	32.39	9	N	19.5
0.166	41.13		65.16	24.02	9	N	19.5
0.262	32.40		61.37	28.97	9	N	19.3
0.290		16.98	50.52	33.54	9	N	19.4
0.438		21.28	47.10	25.82	9	N	19.8
0.450	28.16		56.88	28.72	9	N	19.8
1.100	14.79		56.00	41.21	9	N	19.7
1.320	30.44		56.00	25.56		N	19.7
1.470		20.56	46.00	25.44	9	N	19.7
3.530		17.98	46.00	28.02	9	N	19.8
4.120	17.54		56.00	38.46	9	N	19.8
4.630		16.25	46.00	29.75	9	N	19.8

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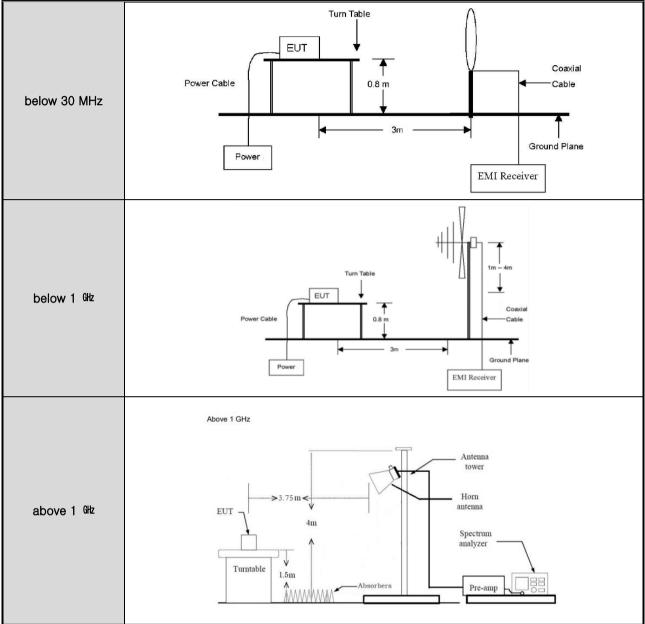
APPENDIX I

TEST SETUP

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#### Radiated Measurement



#### • Conducted Measurement

Conducted	EUT	Attenuator	Spectrum Analyzer

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APPENDIX II

UNCERTAINTY

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Measurement Item	Expanded Uncertainty U = <i>k</i> Uc ( <i>k</i> =2)		
Conducted RF power	0.32 dB		
Conducted Spurious Emissions	0.32 dB		
Radiated Spurious Emissions	6.34 dB		
Conducted Emissions	1.74 dB		