

FCC Test Report

Product Name	Active RFID transponder
Model No.	i-Q350 RCM
FCC ID.	OO4-ILR-IQ350WAM2

Applicant	Identec Solutions AG
Address	Millennium Park 2, 6890 Lustenau , Austria

Date of Receipt	July 16, 2015
Issued Date	Oct. 14, 2015
Report No.	1570435R-RFUSP66V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of QuieTek Corporation.

Test Report

Issued Date: Oct. 14, 2015

Report No. : 1570435R-RFUSP66V00



Product Name	Active RFID transponder
Applicant	Identec Solutions AG
Address	Millennium Park 2, 6890 Lustenau , Austria
Manufacturer	Identec Solutions AG
Model No.	i-Q350 RCM
FCC ID.	OO4-ILR-IQ350WAM2
EUT Rated Voltage	DC 3.6V (Power by battery)
EUT Test Voltage	DC 3.6V (Power by battery)
Trade Name	Identec Solutions
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2014 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By

:

Anita Chou

(Senior Engineering Adm. Specialist / Anita Chou)

Tested By

:

Tom chiu

(Engineer / Tom Chiu)

Approved By

:

Vincent Lin

(Manager / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION.....	4
1.1. EUT Description	4
1.2. Operation Description	5
1.3. Tested System Details	6
1.4. Configuration of Test System.....	6
1.5. EUT Exercise Software.....	6
1.6. Test Facility	7
2. Conducted Emission	8
2.1. Test Equipment	8
2.2. Test Setup.....	8
2.3. Limits	9
2.4. Test Procedure	9
2.5. Uncertainty.....	9
2.6. Test Result of Conducted Emission	10
3. Radiated Emission	11
3.1. Test Equipment	11
3.2. Test Setup.....	12
3.3. Limits	13
3.4. Test Procedure.....	14
3.5. Uncertainty.....	14
3.6. Test Result of Radiated Emission	15
4. Band Edge.....	24
4.1. Test Equipment	24
4.2. Test Setup.....	24
4.3. Limit.....	25
4.4. Test Procedure.....	25
4.5. Uncertainty.....	25
4.6. Test Result of Band Edge.....	26
5. EMI Reduction Method During Compliance Testing	32
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Active RFID transponder
Trade Name	Identec Solutions
FCC ID.	OO4-ILR-IQ350WAM2
Model No.	i-Q350 RCM
Frequency Range	919MHz-921MHz
Type of Modulation	GFSK
Number of Channels	3
Channel Control	Auto
Antenna Type	Chip Antenna

Antenna List

No.	Manufacturer	Part number	Antenna Type	Peak Gain
1	Würth Elektronik eiSos GmbH & Co.KG	7488910092	Chip Antenna	-0.7dBi

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	919MHz	Channel 2:	920MHz	Channel 3:	921MHz

Note:

1. The EUT is an Active RFID transponder with a built-in 919MHz-921MHz transmitter.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
-----------	------------------

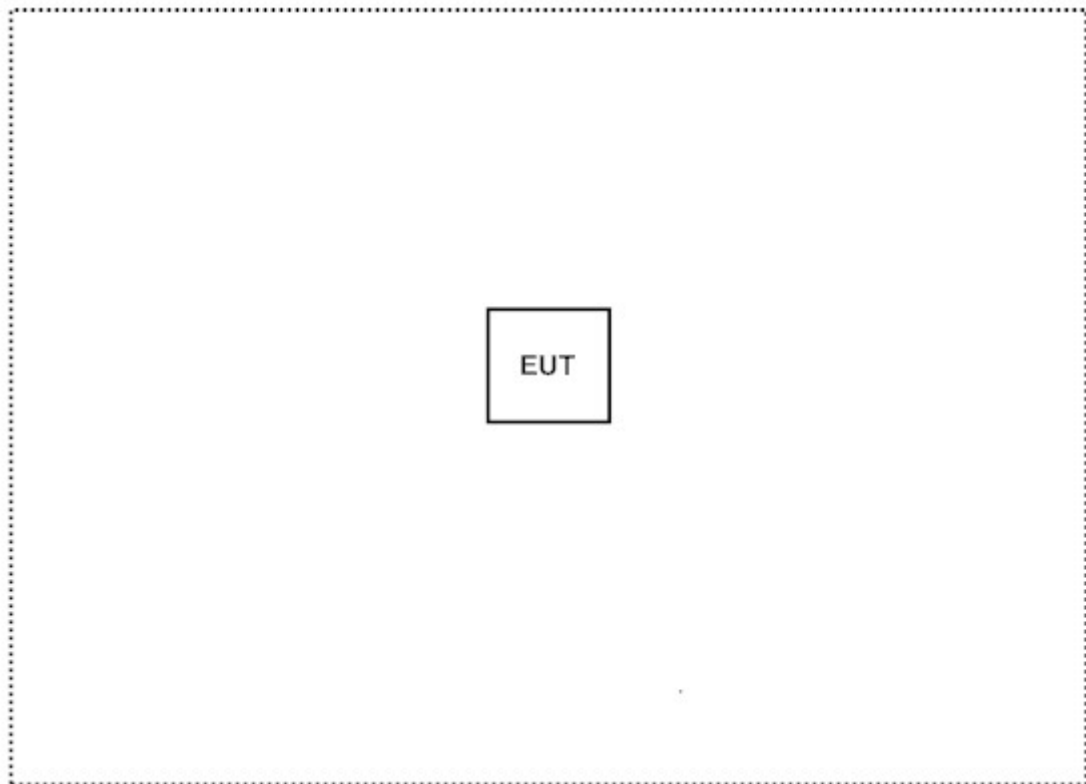
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
N/A				

Signal Cable Type	Signal cable Description
N/A	

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute program “Gen3 Tag Certification Tool V1.0.0.28465”
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Start transmits continually.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from

QuieTek Corporation's Web Site : <http://www.quietek.com/chinese/about/certificates.aspx?bval=5>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :

<http://www.quietek.com/>

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng Linkou Dist., New Taipei City
24451, Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

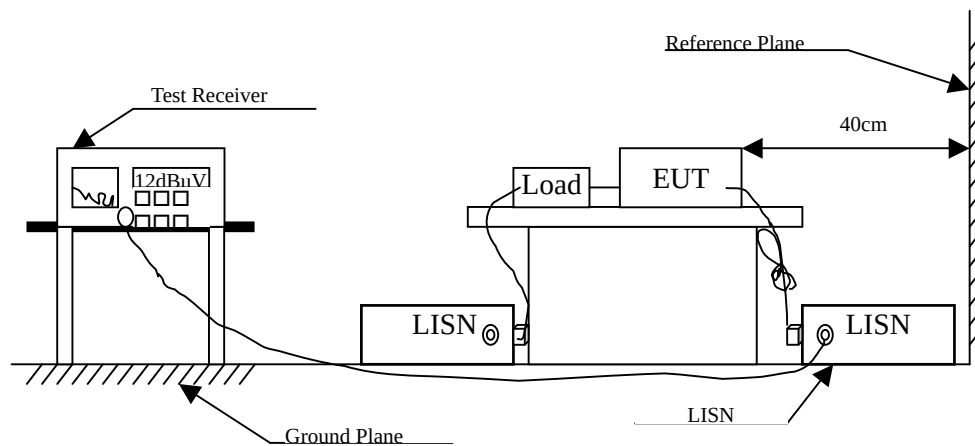
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2015	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2015	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2015	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2015	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2015	
	No.8 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2013 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Owing to the DC operation of EUT, this test item is not performed.

3. Radiated Emission

3.1. Test Equipment

The following test equipments are used during the radiated emission test:

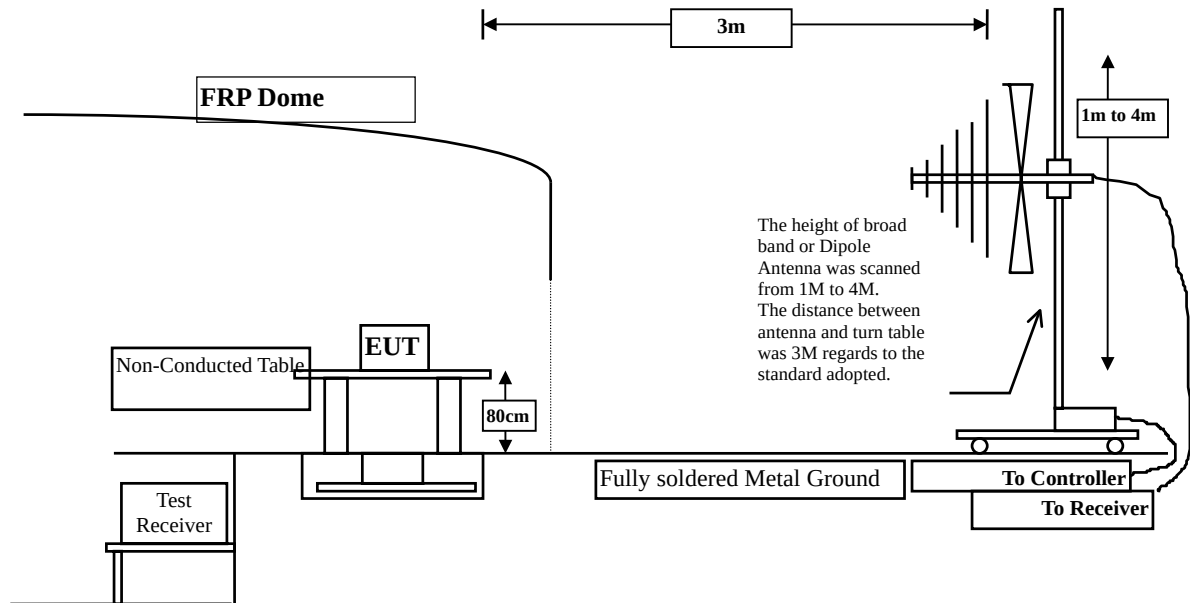
Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2015
	X Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2015
	X EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2015
	X Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2015
	X Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2015

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2015
	X Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2015
	X Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X Horn Antenna	TRC	AH-0801/95051	Aug, 2015
	X Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2015
	X Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2015

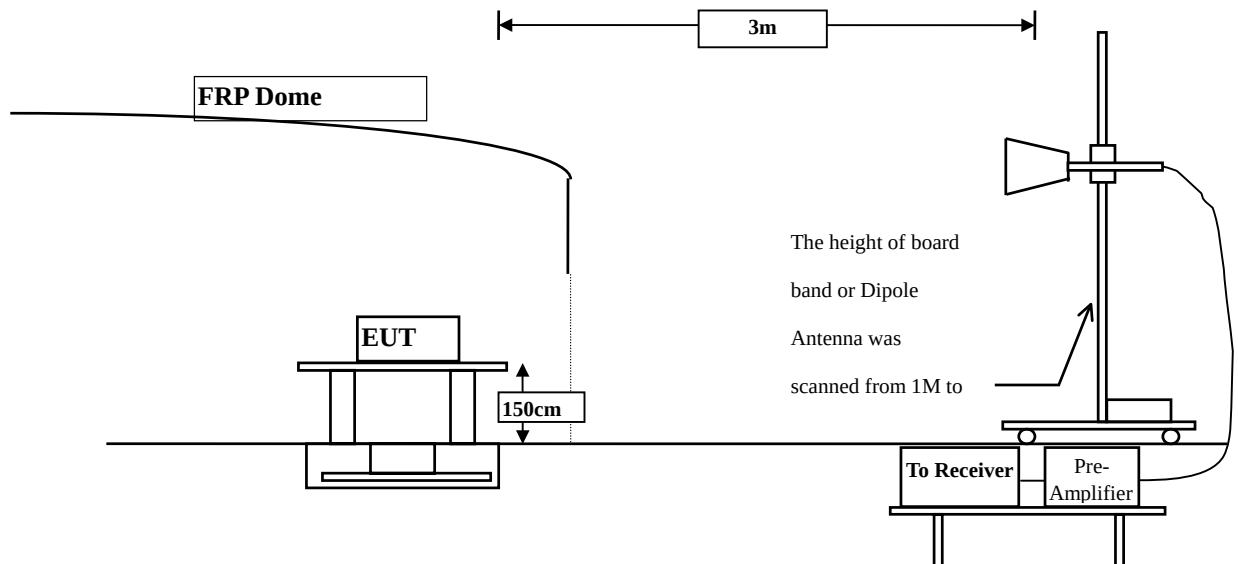
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

Below 1GHz



Above 1GHz



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBuV/m @3m)	(uV/m @3m)	(dBuV/m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

3.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

3.6. Test Result of Radiated Emission

Product : Active RFID transponder
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (X-axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
919.000	-6.959	100.360	93.401	-0.599	94.000
920.000	-6.960	100.370	93.410	-0.590	94.000
921.000	-6.961	100.700	93.739	-0.261	94.000
Vertical					
919.000	-5.914	95.600	89.686	-4.314	94.000
920.000	-6.960	100.370	93.410	-0.590	94.000
921.000	-5.937	95.686	89.749	-4.251	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : Active RFID transponder
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit (Y-asix)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
919.000	-6.959	95.900	88.941	-5.059	94.000
920.000	-6.960	93.600	86.640	-7.360	94.000
921.000	-5.937	95.686	89.749	-4.251	94.000
Vertical					
919.000	-5.914	98.800	92.886	-1.114	94.000
920.000	-5.925	93.095	87.170	-6.830	94.000
921.000	-5.937	97.826	91.889	-2.111	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : Active RFID transponder
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit (Z-asix)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
919.000	-6.959	93.900	86.941	-7.059	94.000
920.000	-6.960	95.150	88.190	-5.810	94.000
921.000	-6.961	96.865	89.904	-4.096	94.000
Vertical					
919.000	-6.959	93.900	86.941	-7.059	94.000
920.000	-5.925	98.157	92.232	-1.768	94.000
921.000	-5.937	96.051	90.114	-3.886	94.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : Active RFID transponder
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (919MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
1838.000	-4.274	38.770	34.497	-39.503	74.000
2757.000	-0.864	36.520	35.656	-38.344	74.000
3676.000	-0.831	36.050	35.218	-38.782	74.000
4595.000	2.022	35.520	37.542	-36.458	74.000
5514.000	4.776	35.830	40.607	-33.393	74.000
6433.000	7.162	35.920	43.081	-30.919	74.000

Average Detector:

--

Vertical

Peak Detector:

1838.000	-2.852	38.010	35.159	-38.841	74.000
2757.000	-1.039	40.680	39.641	-34.359	74.000
3676.000	0.218	36.080	36.297	-37.703	74.000
4595.000	5.819	35.210	41.029	-32.971	74.000
5514.000	6.232	35.690	41.923	-32.077	74.000
6433.000	8.501	35.840	44.340	-29.660	74.000

Average Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Active RFID transponder
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (920MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
1840.000	-4.262	41.280	37.018	-36.982	74.000
2760.000	-0.845	37.170	36.326	-37.674	74.000
3680.000	-0.873	36.120	35.247	-38.753	74.000
4600.000	2.041	35.710	37.751	-36.249	74.000
5520.000	4.729	36.180	40.909	-33.091	74.000
6440.000	7.229	36.090	43.319	-30.681	74.000

Average Detector:

--

Vertical

Peak Detector:

1840.000	-2.873	41.620	38.746	-35.254	74.000
2760.000	-1.022	36.640	35.619	-38.381	74.000
3680.000	0.202	36.560	36.762	-37.238	74.000
4600.000	5.860	35.400	41.260	-32.740	74.000
5520.000	6.194	35.120	41.314	-32.686	74.000
6440.000	8.542	35.640	44.182	-29.818	74.000

Average Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Active RFID transponder
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (921MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
1842.000	-4.252	41.970	37.718	-36.282	74.000
2763.000	-0.825	36.360	35.535	-38.465	74.000
3684.000	-0.915	36.820	35.906	-38.094	74.000
4605.000	2.059	35.490	37.549	-36.451	74.000
5526.000	4.680	35.620	40.300	-33.700	74.000
6447.000	7.297	35.580	42.877	-31.123	74.000

Average Detector:

--

Vertical

Peak Detector:

1842.000	-2.897	38.040	35.144	-38.856	74.000
2763.000	-1.003	36.790	35.787	-38.213	74.000
3684.000	0.186	36.400	36.587	-37.413	74.000
4605.000	5.897	35.110	41.007	-32.993	74.000
5526.000	6.156	36.300	42.456	-31.544	74.000
6447.000	8.583	35.450	44.033	-29.967	74.000

Average Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Active RFID transponder
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (919MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
115.754	2.080	31.588	33.667	-9.833	43.500
239.464	2.556	37.283	39.839	-6.161	46.000
384.261	3.036	32.688	35.724	-10.276	46.000
492.507	3.287	32.310	35.597	-10.403	46.000
600.754	3.534	31.451	34.985	-11.015	46.000
925.493	3.878	30.826	34.704	-11.296	46.000
Vertical					
285.855	6.192	26.589	32.781	-13.219	46.000
343.493	6.325	26.613	32.938	-13.062	46.000
458.768	6.643	26.314	32.957	-13.043	46.000
614.812	6.965	24.405	31.370	-14.630	46.000
711.812	7.207	23.912	31.119	-14.881	46.000
794.754	7.371	23.713	31.084	-14.916	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Active RFID transponder
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (920MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
207.130	2.406	27.635	30.041	-13.459	43.500
259.145	2.628	30.559	33.187	-12.813	46.000
311.159	2.792	26.844	29.636	-16.364	46.000
515.000	3.317	25.643	28.960	-17.040	46.000
745.551	3.864	27.461	31.325	-14.675	46.000
926.899	3.879	29.663	33.542	-12.458	46.000
Vertical					
228.217	28.096	25.235	31.168	-14.832	46.000
315.377	28.183	27.458	33.662	-12.338	46.000
458.768	28.453	25.980	32.623	-13.377	46.000
509.377	28.489	24.825	31.558	-14.442	46.000
606.377	28.606	24.476	31.442	-14.558	46.000
732.899	28.758	24.217	31.481	-14.519	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Active RFID transponder
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (921MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
148.087	2.243	32.038	34.281	-9.219	43.500
278.826	2.743	33.352	36.094	-9.906	46.000
326.623	2.828	30.185	33.013	-12.987	46.000
630.275	3.583	30.395	33.978	-12.022	46.000
745.551	3.864	26.757	30.621	-15.379	46.000
863.638	3.928	28.144	32.072	-13.928	46.000
Vertical					
211.348	5.854	24.849	30.703	-12.797	43.500
257.739	6.047	27.078	33.125	-12.875	46.000
357.551	6.375	26.275	32.650	-13.350	46.000
557.174	6.841	24.222	31.063	-14.937	46.000
711.812	7.207	28.364	35.571	-10.429	46.000
803.188	7.380	24.202	31.582	-14.418	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

4. Band Edge

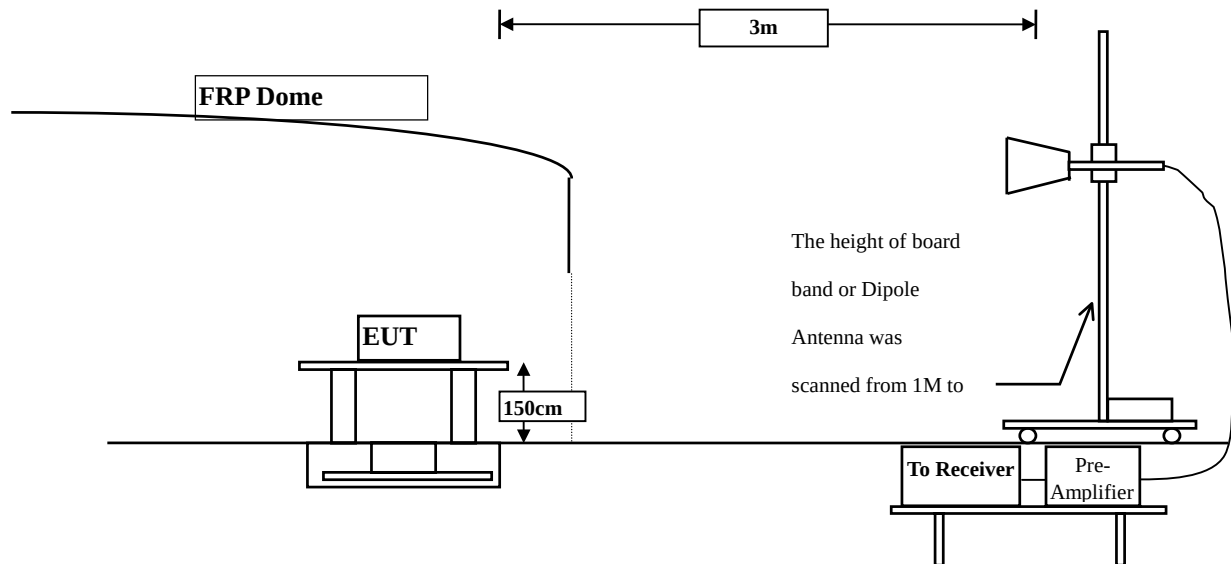
4.1. Test Equipment

The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2015
	X Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2015
	X Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X Horn Antenna	TRC	AH-0801/95051	Aug, 2015
	X Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2015
	X Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2015

- Note:
1. All equipments are calibrated every one year.
 2. The test equipments marked by “X” are used to measure the final test results.

4.2. Test Setup



4.3. Limit

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.4. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

4.5. Uncertainty

Radiated is ± 3.9 dB.

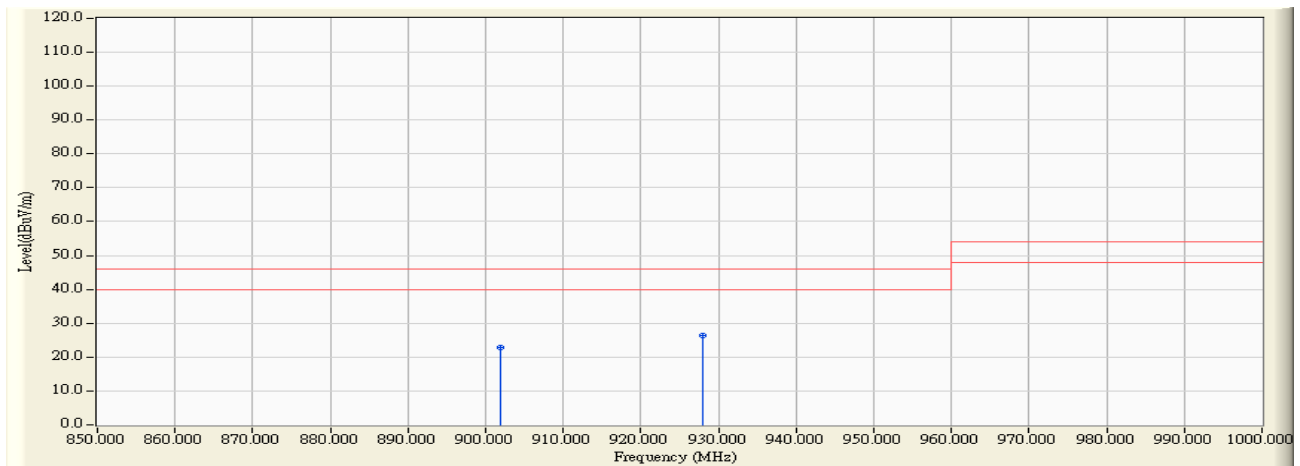
4.6. Test Result of Band Edge

Product : Active RFID transponder
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (919MHz)

RF Radiated Measurement (Horizontal):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-7.018	29.800	22.781	46.000	Pass
02(Quasi-Peak)	928.000	-6.984	33.300	26.316	46.000	Pass

Figure Channel 01: Horizontal (Quasi-Peak)



Note:

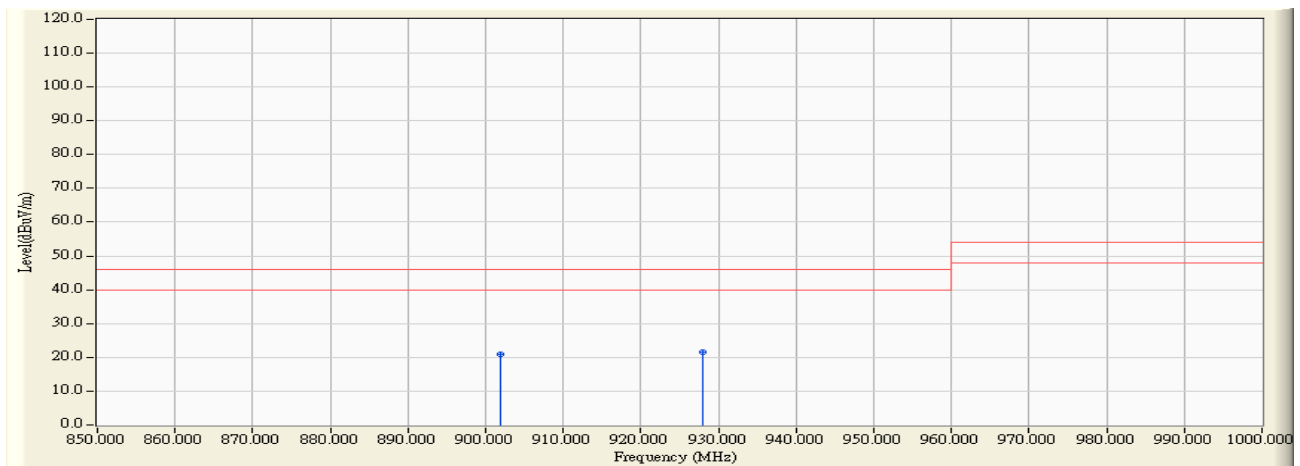
1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : Active RFID transponder
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (919MHz)

RF Radiated Measurement (Vertical):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-5.868	26.700	20.832	46.000	Pass
02(Quasi-Peak)	928.000	-6.004	27.500	21.496	46.000	Pass

Figure Channel 01: Vertical (Quasi-Peak)



Note:

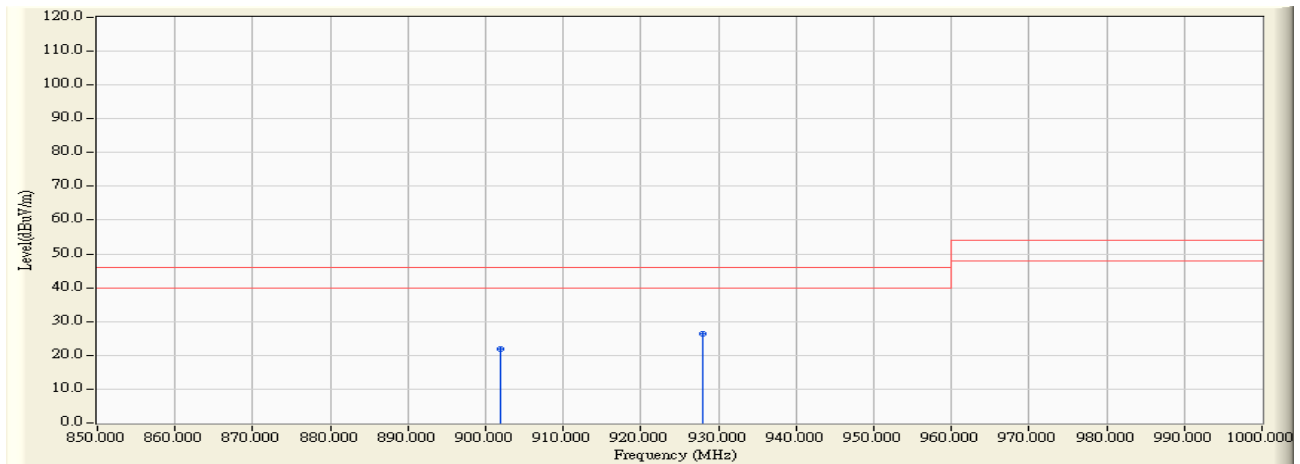
1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : Active RFID transponder
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (920MHz)

RF Radiated Measurement (Horizontal):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-7.018	29.000	21.981	46.000	Pass
02(Quasi-Peak)	928.000	-6.984	33.500	26.516	46.000	Pass

Figure Channel 02: Horizontal (Quasi-Peak)



Note:

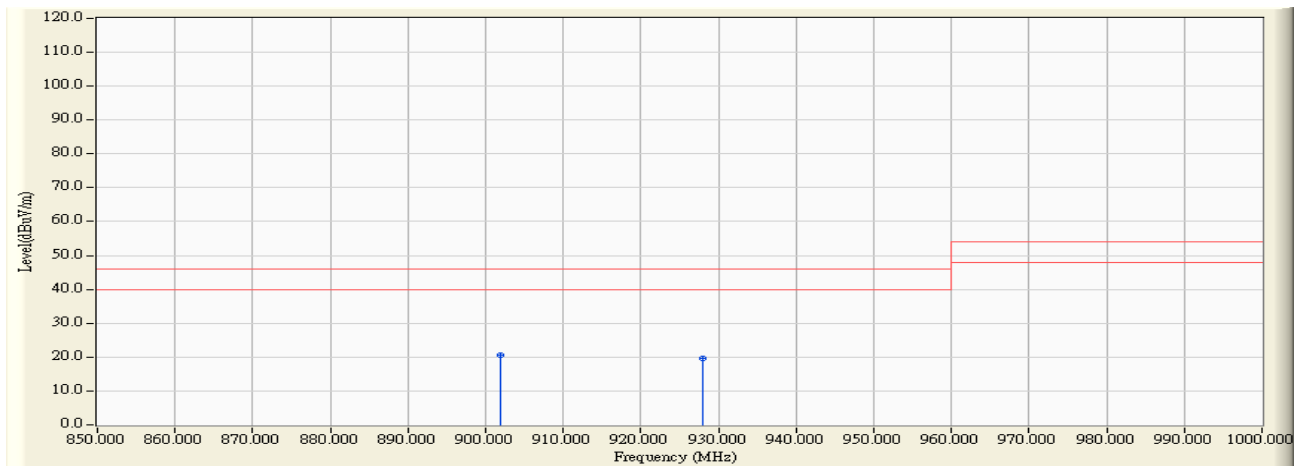
1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : Active RFID transponder
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (920MHz)

RF Radiated Measurement (Vertical):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-5.868	26.500	20.632	46.000	Pass
02(Quasi-Peak)	928.000	-6.004	25.600	19.596	46.000	Pass

Figure Channel 02: Vertical (Quasi-Peak)



Note:

1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

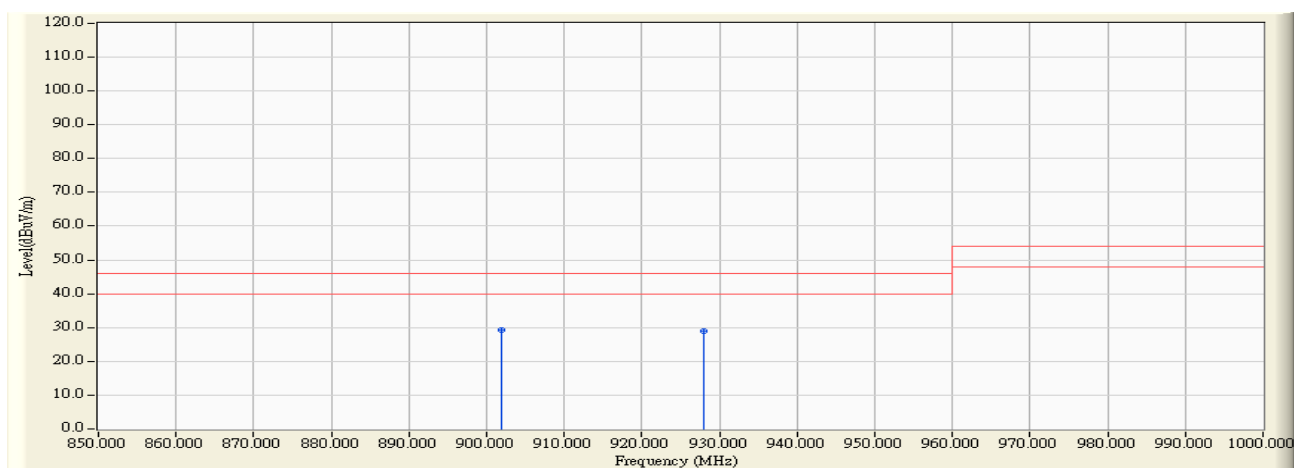
Product : Active RFID transponder
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (921MHz)

RF Radiated Measurement (Horizontal):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-7.018	36.200	29.181	46.000	Pass
02(Quasi-Peak)	928.000	-6.984	35.800	28.816	46.000	Pass

Figure Channel 03:

Horizontal (Quasi-Peak)



Note:

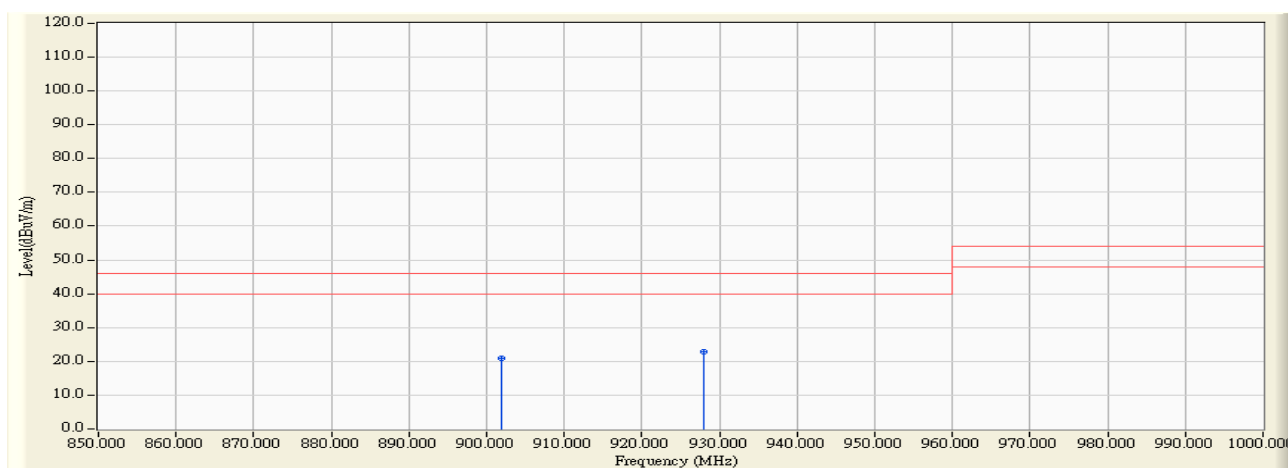
1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : Active RFID transponder
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (921MHz)

RF Radiated Measurement (Vertical):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-5.868	26.700	20.832	46.000	Pass
02(Quasi-Peak)	928.000	-6.004	28.800	22.796	46.000	Pass

Figure Channel 03: Vertical (Quasi-Peak)



Note:

1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1 : EUT Test Photographs

Attachment 2 : EUT Detailed Photographs