FCC TEST REPORT

For

Shenzhen Aerospace Innotech Corporation Limited

RFID Reader

Model No.: SAAT-F805, SAAT-I801, SAAT-I802, SAAT-D807

Test Report Number : ESTSZ120501205F-1

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shenzhen Aerospace Innotech Corporation Limited
Address of applicant:	Room 803, Block B, SZAAT Building,10th Road Kejinan, Hi-Tech Park, Nanshan District, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen Aerospace Innotech Corporation Limited
Address of manufacturer:	Room 803, Block B, SZAAT Building,10th Road Kejinan, Hi-Tech Park, Nanshan District, Shenzhen, Guangdong, China

General Description of E.U.T

EUT Description:	RFID Reader
Trade Name:	N/A
Model No.:	SAAT-F805, SAAT-I801, SAAT-I802, SAAT-D807
Test Model:	SAAT-F805
Rating:	DC 12V Via Adapter
Test Power Supply:	AC 120V/60Hz
Frequency:	902.75-927.25 MHz (See the table1)

Remark: *The models of EUT are identical except appearance of equipment. Unless otherwise specified, all tests were performed on model SAAT-F805 to represent the other similar models.*

1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

FCC Rules and Regulations Part 15 Subpart C 15.247 15.203 15.205 15.207 15.209: 2008

The objective of the manufacturer is to demonstrate compliance with the described above standards.
Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of EST COMPLIANCE LABORATORY LIMITED.

Date of Test : May 07~Jun. 06 , 2012

Prepared by : (Engineer: David He)

Reviewer : (Project Manager: Ronnie Liu)

Approved & Authorized Signer : (Manager: Alex Chen)

Table1

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	902.75	17	911.25	34	919.75
01	903.25	18	911.75	35	920.25
02	903.75	19	912.25	36	920.75
03	904.25	20	912.75	37	921.25
04	904.75	21	913.25	38	921.75
05	905.25	21	913.75	39	922.25
06	905.75	23	914.25	40	922.75
07	906.25	24	914.75	41	923.25
08	906.75	25	915.25	42	923.75
09	907.25	26	915.75	43	924.25
10	907.75	27	916.25	44	924.75
11	908.25	28	916.75	45	925.25
12	908.75	29	917.25	46	925.75
13	909.25	30	917.75	47	926.25
14	909.75	31	918.25	48	926.75
15	910.25	32	918.75	49	927.25
16	910.75	33	919.25		

EUT		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH00	902.75
middle	CH24	914.75
highest	CH49	927.25

1.3 Test Summary

1.3.1 Test description

For the EUT described above. The standards used were FCC Part 15 Subpart C for Emissions. The EUT was tested in accordance to the FCC's DA 00-705.

Table 1 : Tests Carried Out Under FCC Part 15 Subpart C

Standard	Test Items	Status
Section 15.207	Conduction Emission, 0.15MHz to 30MHz	√
Section 15.247(a)	20dB Bandwidth	√
Section 15.247(b)(2)	Maximum peak conducted output power	√
Section 15.205	Spurious RF conducted emissions	√
Section 15.209	Spurious radiated Emission	√
Section 15.247(a)	Hopping sequence	√
Section 15.247(a)	Equal Hopping Frequency Use	√
Section 15.247(a)(1)(iii)	Number of Hopping Frequency	√
Section 15.247(a)	Dwell time	√
Section 15.247(a)	Channel Separation	√
Section 15.247(a)	Quantity of Hopping Frequency	√
Section 15.247(c)	100kHz Bandwidth of Frequency Band Edges	√
Section 15.203	Antenna requirement	√

√ Indicates that the test is applicable
× Indicates that the test is not applicable

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

The maximum emission levels emanating from the device are compared to the FCC Part 15 Subpart C limits for radiation emissions and the measurement results contained in this test report show that EUT is to be technically compliant with FCC requirements.

Global United Technology Service Co., Ltd at 2nd Floor, Block No.2, Laodong Industrial Zone,Xixiang Road, Baoan District, Shenzhen, China

1.5 Test Facility

All measurement required was performed at laboratory of Global United Technology Service Co., Ltd at 2nd Floor, Block No.2, Laodong Industrial Zone,Xixiang Road, Baoan District, Shenzhen, China

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 600491
Global United Technology Service Co., Ltd has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 600491.

The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

1.5 Test Equipment List and Details

Test equipments list of Global United Technology Service Co., Ltd

Equipment	Manufacturer	Model#	Serial #	Data of Cal.	Due Data
3m Semi-Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS201	Mar. 30 2012	Mar. 30 2013
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS202	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Sept. 10 2011	Sept. 10 2012
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Coaxial Cable	GTS	N/A	GTS400	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS401	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS402	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS407	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS408	Apr. 01 2012	Apr. 01 2013
BiConiLog Antenna (26-3000MHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS204	Feb. 26 2012	Feb. 26 2013
Pre-amplifier(0.1-3000MHz)	HP	8347A	GTS210	Aug. 03 2011	Aug. 03 2012
Double-ridged horn (1-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS205	Feb. 26 2012	Feb. 26 2013
Pre-amplifier(1-18GHz)	Rohde & Schwarz	8349B	GTS224	Aug. 03 2011	Aug. 03 2012
Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	GTS250	Oct. 28 2011	Oct. 28 2012
Barometer	ChangChun	DYM3	GTS251	Feb. 26 2012	Feb. 26 2013
Shielding Room	ZhongYu Electron	7.0(L)*3.0(W)*3.0(H)	GTS206	Apr. 10 2012	Apr. 10 2013
EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS208	Sept. 14 2011	Sept. 14 2013
10dB Pulse Limiter	Rohde & Schwarz	N/A	GTS209	Sept. 14 2011	Sept. 14 2012
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS207	Apr. 14 2012	Apr. 14 2013
Coaxial Cable	GTS	N/A	GTS406	Apr. 01 2012	Apr. 01 2013
Loop Antenna	ETS-Lindgren	6502	00082431	Apr. 14 2012	Apr. 14 2013

2 - Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of EST Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:
Freq (MHz) METER READING + ACF = FS
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3 DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

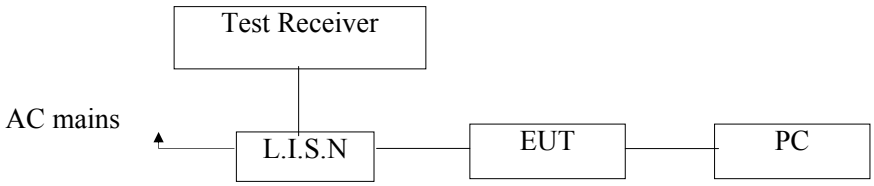
The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ±2.4 dB.

3.2 Requirements (15.207):

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66~56	56~46
0.500～5.000	56	46
5.000～30.00	60	50

Note: (1)The tighter limit shall apply at the edge between two frequency bands.

3.3 EUT Setup



The EUT was placed center and the back edge of the test table.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range……150 KHz to 30 MHz
Detector……..Peak & Quasi-Peak & Average
Sweep Speed……Auto
IF Band Width……..…..9 KHz

3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dBμV of specification limits). Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with a "**AV**".

3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Part 15 Subpart B Conducted margin, with the *worst* margin reading of:

3.7 Disturbance Voltage Test Data

Temperature (°C)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	Standby

Test data see following pages.

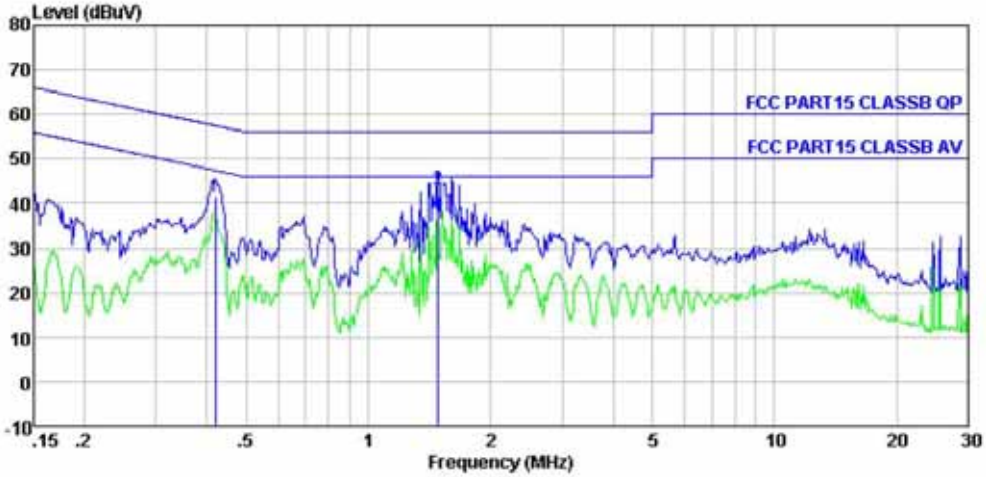
Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

3.8 Test Results

PASS.

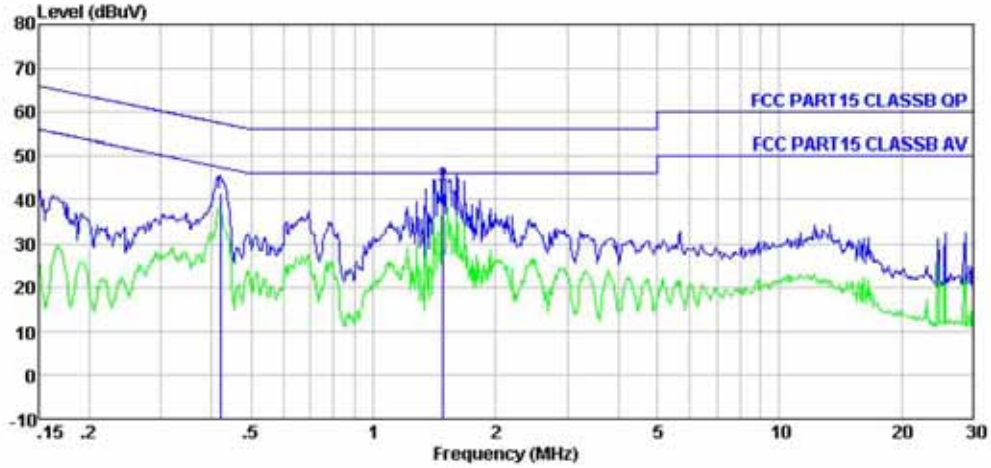
Please refer the following pages.

Conducted Emission Test Data



Condition : FCC PART15 CLASSB QP LISN(2011) LINE
EUT : RFID Reader
Model : SAAT-F805
Test Mode : Standby
Power Rating : AC 120V/60Hz
Test Engineer: David

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.419	40.86	0.57	0.10	41.53	57.46	-15.93	QP
2	1.480	42.24	0.43	0.10	42.77	56.00	-13.23	QP



Condition : FCC PART15 CLASSB QP LISN(2011) NEUTRAL
EUT : RFID Reader
Model : SAAT-F805
Test Mode : Standby
Power Rating : AC 120V/60Hz
Test Engineer: David

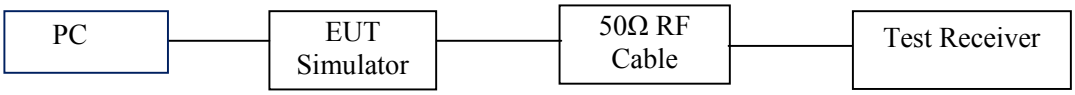
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.420	40.43	0.57	0.10	41.10	57.46	-16.36	QP
2	1.477	42.10	0.43	0.10	42.63	56.00	-13.37	QP

4- 20 dB Bandwidth

4.1 Requirements (15.247(a)):

According to FCC Part 15 C, Section 15.247(a)
Frequency hopping systems shall have hopping carrier frequencies separated by a minimum of 25 kHz or 20 dB bandwidth of the hopping channel, which is greater

4.2 Test Setup



4.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 100 kHz, VBW = 300kHz, Span = 2 MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Mark the peak frequency and -20dB (upper and lower) frequency.
e. Repeat until all the rest channels are investigated.

4.4 Test Results

Pass.

4.5 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	TX

Test data as follows

Channel	Frequency(MHz)	20dB Down BW(kHz)
CH00	902.75	359.68
CH24	914.75	370.67
CH49	927.25	357.20

Bandwidth limit according to FCC part 15 C, Section 15.247(a)

Frequency(MHz)	Hopping channels	Limit -20 dB bandwidth
902-928	≥25	>250

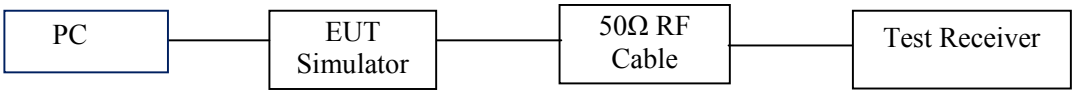
5- Maximum peak conducted output power

5.1 Requirements (15.247(b)):

According to FCC Part 15 C, Section 15.247(b)

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.

5.2 Test Setup



5.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 500kHz, VBW = 500kHz, Span = 2 MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Mark the peak power
e. Repeat until all the rest channels are investigated.

5.4 Test Results

Pass.

5.5 Test Data

Temperature (°C)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	ON

Test data as follows

Channel	Frequency(MHz)	Output Power(dBm)	Limit	margin
CH00	902.75	25.86	30	4.14
CH24	914.75	25.28	30	4.72
CH49	927.25	25.48	30	4.52

Peak Power limit according to FCC part 15 C, Section 15.247(a)

Frequency (MHz)	Hopping channels	Peak Power Limit	
		dBm	W
902-928	≥50	30	1

6- Spurious radiated Emission

6.1 Requirements (15.247(b)):

According to FCC Part 15 C, Section 15.247(b)

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. 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)).

15.205(a) – Restricted Frequency Bands

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 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

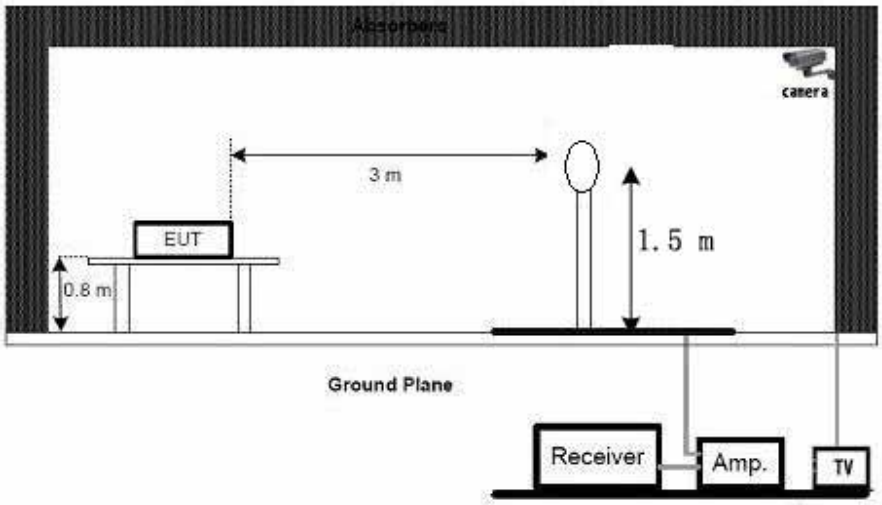
[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

15.209(a) – Field Strength Limits within Restricted Frequency Bands

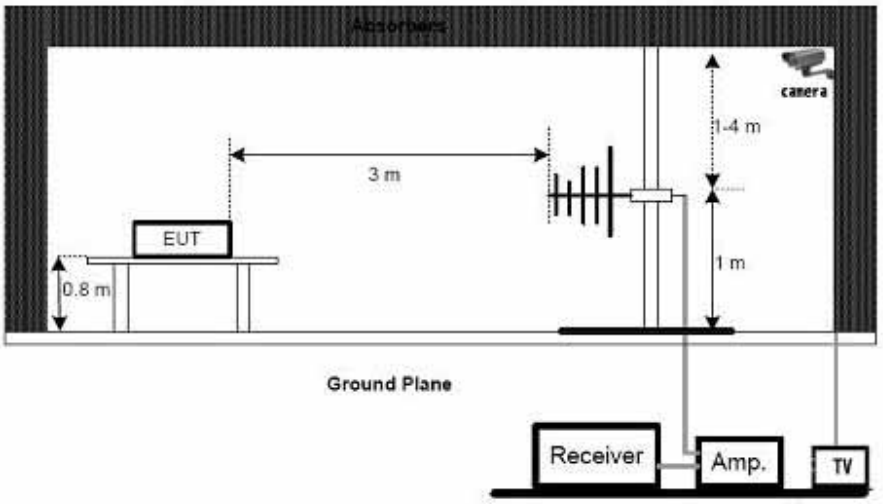
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

6.2 Test Setup

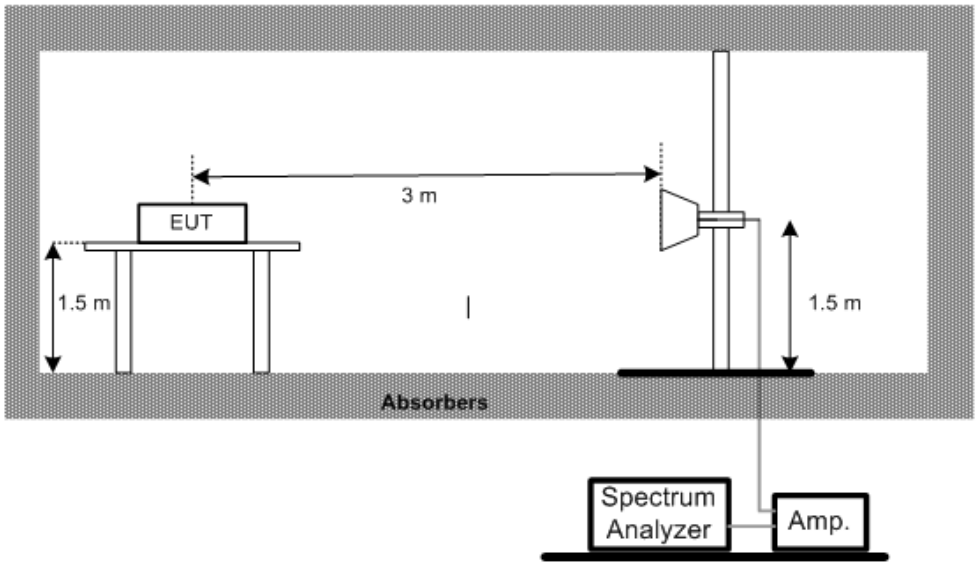
From 9kHz ~ 30MHz



From 30MHz ~ 1GHz



From 1GHz ~ 10GHz



6.3 Test Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

6.4 Test Results

Pass.

6.4 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	TX

Test data as follows

6.3.1 Radiated emission test f<1GHz

From 9KHz ~ 30MHz:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
12.81	51.40	5.33	0.31	25.64	31.40	69.5	-38.10	QP	-
18.01	50.48	5.48	0.37	25.65	30.69	69.5	-38.81	QP	
25.70	52.77	5.68	0.42	25.68	33.19	69.5	-36.31	QP	-

Emissions attenuated more than 20 dB below the permissible value are not reported.

Data (From 30MHz ~ 1GHz):

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
150.010	51.16	10.52	0.36	31.98	29.26	43.50	-14.24	QP	H
251.253	54.12	11.63	0.56	32.28	33.50	46.00	-12.50	QP	H
501.203	44.31	19.37	1.00	31.60	32.78	46.00	-13.22	QP	H
					0				
144.012	51.02	12.11	0.31	31.95	31.35	43.5	-12.15	QP	V
250.445	55.08	10.88	0.56	32.28	33.97	46.00	-12.03	QP	V
501.228	48.01	17.31	1.00	31.60	34.70	46.00	-11.30	QP	V

Emissions attenuated more than 20 dB below the permissible value are not reported.

6.3.2 From 1GHz ~ 10GHz):

CH00

Frequency (GHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
1.805	46.89	26.62	2.96	34.65	41.82	54.00	-12.18	QP	H
2.708	41.13	28.30	4.24	35.04	38.63	54.00	-15.37	QP	H
3611	37.59	29.51	5.10	35.24	36.96	54.00	-17.04	QP	H
1.805	45.04	26.62	2.96	34.65	39.97	54.00	-14.03	QP	V
2.708	39.51	28.30	4.24	35.04	37.01	54.00	-16.99	QP	V
3611	36.40	29.51	5.10	35.24	35.77	54.00	-18.23	QP	V

CH24

Frequency (GHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
1.829	46.66	26.65	2.98	34.68	41.61	54.00	-12.39	QP	H
2.744	40.37	28.35	4.26	35.06	37.92	54.00	-16.08	QP	H
3.659	37.40	29.55	5.11	35.28	36.78	54.00	-17.22	QP	H
1.829	44.76	26.65	2.98	34.68	39.71	54.00	-14.29	QP	V
2.744	39.00	28.35	4.26	35.06	36.55	54.00	-17.45	QP	V
3.659	36.01	29.55	5.11	35.28	35.39	54.00	-18.61	QP	V

CH49

Frequency (GHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
1.854	45.86	26.68	2.99	34.69	40.84	54.00	-13.16	QP	H
2.781	40.39	28.39	4.27	35.08	37.97	54.00	-16.03	QP	H
3.708	36.76	29.57	5.13	35.31	36.15	54.00	-17.85	QP	H
1.854	44.80	26.68	2.99	34.69	39.78	54.00	-14.22	QP	V
2.781	38.58	28.39	4.27	35.08	36.16	54.00	-17.84	QP	V
3.708	36.16	29.57	5.13	35.31	35.55	54.00	-18.45	QP	V

Emissions attenuated more than 20 dB below the permissible value are not reported.

7- Spurious RF conducted emissions

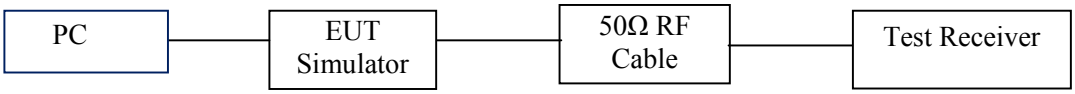
7.1 Requirements (15.247(d)):

According to FCC Part 15 C, Section 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. 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)).

7.2 Test Setup



7.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 100kHz, VBW = 300kHz, Sweep = auto, Detector function = peak, Trace = max hold
d. Mark the peak power
e. Repeat until all the rest channels are investigated.

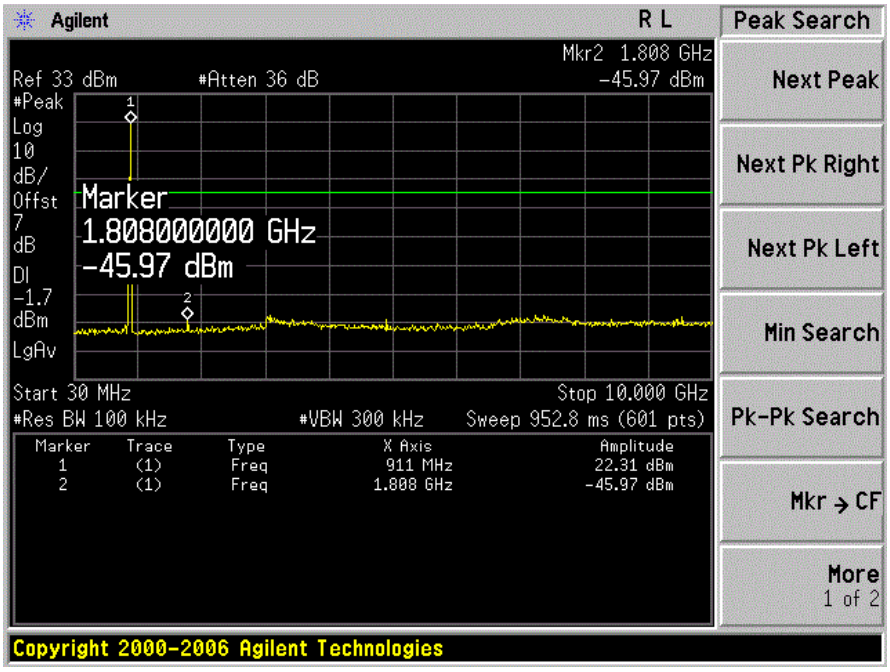
7.4 Test Results

Pass.

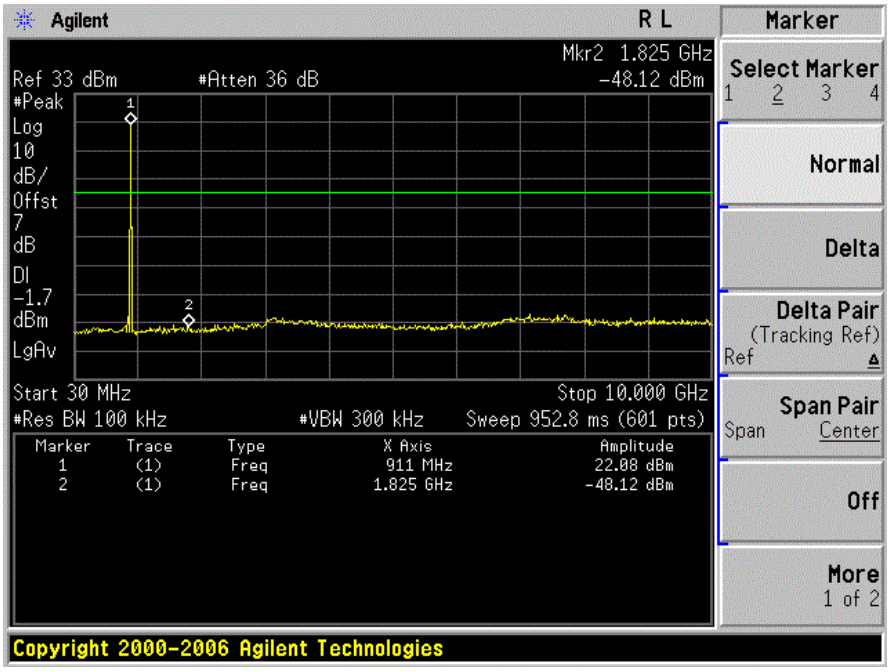
7.5 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	ON

CH Low



CH Middle


Agilent
R L
Marker
Mkr2 1.825 GHz
Ref 33 dBm
#Atten 36 dB
-48.12 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-1.7
dBm
LgAv
Start 30 MHz
Stop 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 952.8 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 911 MHz 22.08 dBm
2 (1) Freq 1.825 GHz -48.12 dBm
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
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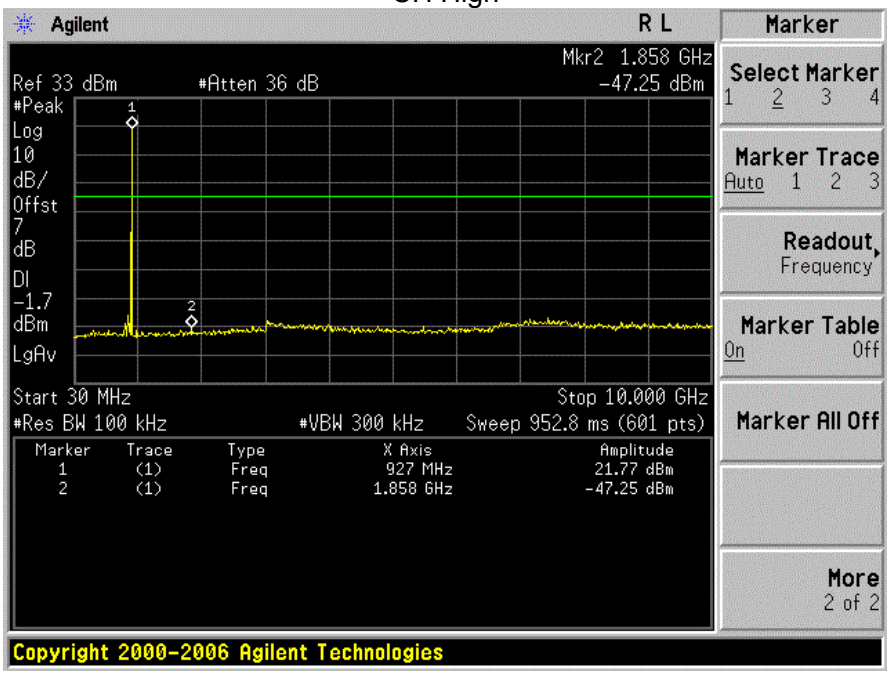
CH High


Agilent
R L
Marker
Mkr2 1.858 GHz
Ref 33 dBm
#Atten 36 dB
-47.25 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-1.7
dBm
LgAv
Start 30 MHz
Stop 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 952.8 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 927 MHz 21.77 dBm
2 (1) Freq 1.858 GHz -47.25 dBm
Select Marker
1 2 3 4
Marker Trace
Auto 1 2 3
Readout
Frequency
Marker Table
On Off
Marker All Off
More
2 of 2
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8- Hopping sequence

8.1 Requirements (15.247(a)):

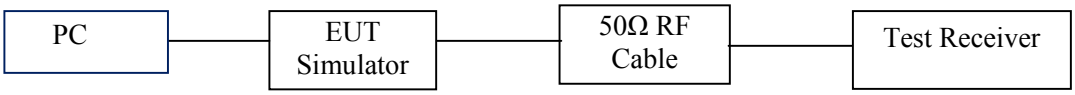
According to FCC Part 15 C, Section 15.247(a)
The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered of hopping frequencies.

The system receivers shall have input bandwidth that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signal.

For frequency hopping systems operating in the 902-928 MHz band:
If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies

Frequency range (MHz)	Limit(Quantity of Hopping Channels)			
	20dB Bandwidth <250kHz	20dB Bandwidth >250kHz	20dB Bandwidth <1MHz	20dB Bandwidth >1MHz
902-928	50	25	N/A	N/A

8.2 Test Setup



8.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set spectrum analyzer Start = 902.00MHz, Stop = 928.00MHz, RBW = 300kHz, VBW = 300kHz, Sweep = auto.
d. Max hold, view and count how many channel in the band.

8.4 Test Results

PASS

The channel is represented by a pseudo-random hopping sequence hopping through the 50 RF-channels.

8.5 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	ON

Test data as follows

Hopping channel frequency range	Quantity of hopping channels value	Quantity of hopping channels minimum limit
902-928	50	25

9- Equal hopping frequency

9.1 Requirements (15.247(a)):

According to FCC Part 15 C, Section 15.247(a)
Each frequency must be used equally on the average by each transmitter

9.2 Test Results

The manufacturer declares in the system manual that this function is controlled via software.

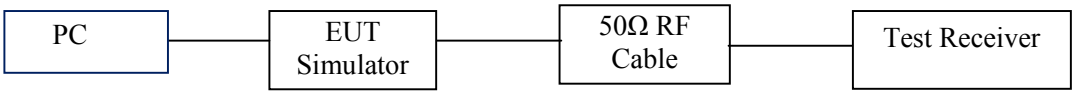
10- Dwell time

10.1 Requirements (15.247(a)):

According to FCC Part 15 C, Section 15.247(a)
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.

Frequency(MHz)	Hopping channels	Time of one period(s)	Limited dwell time, AV(ms)
902-928	≥25	10	400

10.2 Test Setup



10.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set center frequency of spectrum analyzer = operating frequency, Span = 0, RBW = 1MHz, VBW = 1MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Repeat above procedures until all frequency measured were complete.

10.4 Test Results

Pass.

10.5 Test Data

Temperature (°C)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	TX

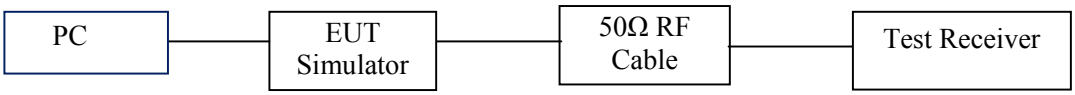
Number of transmission 10s	Length of transmission Time(ms)	Result(ms)	Limit(ms)
8times	23	184	400

11- Channel separation

11.1 Requirements (15.247(a)):

According to FCC Part 15 C, Section 15.247(a)
Frequency hopping systems shall have hopping carrier frequencies separated by a minimum of 25 kHz or 20 dB bandwidth of the hopping channel, which is greater

11.2 Test Setup



11.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 30kHz, VBW =30kHz, Span = 1MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Set center frequency spectrum analyzer = middle of hopping channel.

11.2 Test Results

Pass.

11.3 Test Data

Temperature (°C)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	TX

Channel 1(MHz)	Channel 2(MHz)	Channel separation(kHz)
902.75	903.25	500

Channel 49(MHz)	Channel 50(MHz)	Channel separation(kHz)
914.75	915.25	500

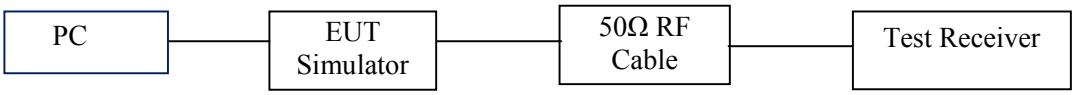
Channel 49(MHz)	Channel 50(MHz)	Channel separation(kHz)
926.75	927.25	500

12- 100kHz Bandwidth of Frequency Band Edges

12.1 Requirements (15.247(d)):

According to §15.247(c), in any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

12.2 Test Setup



12.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 100kHz, VBW =300kHz, Span = 10MHz, Sweep = auto.
d. The band edges was measured and recorded.

12.4 Test Results

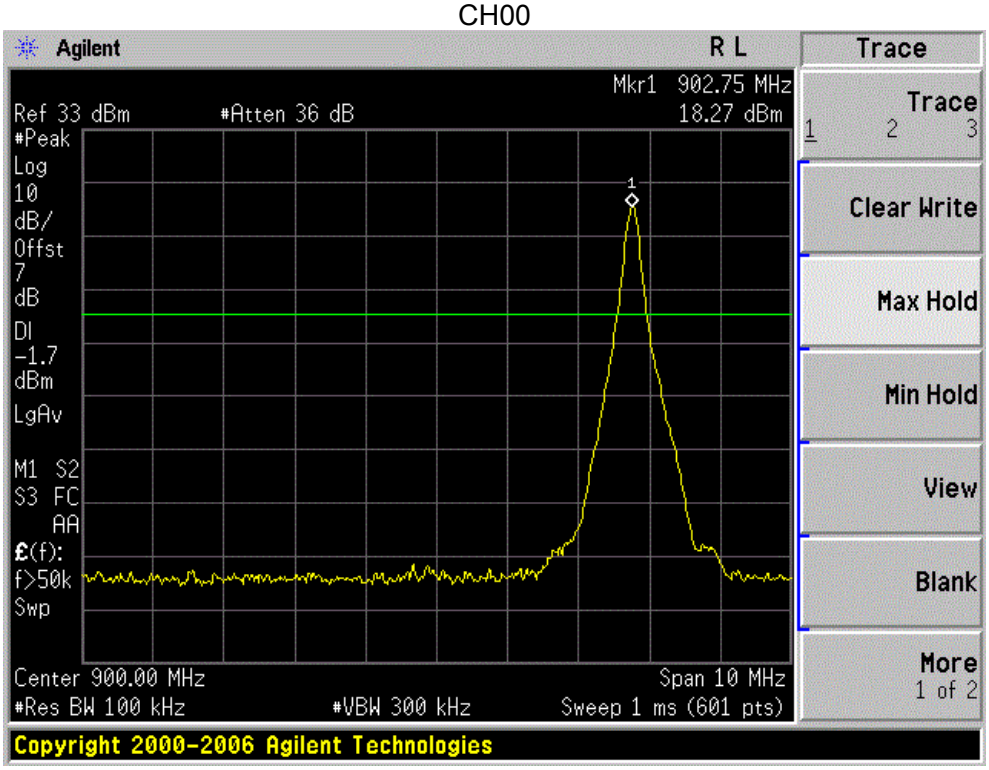
Pass.

12.5 Test Data

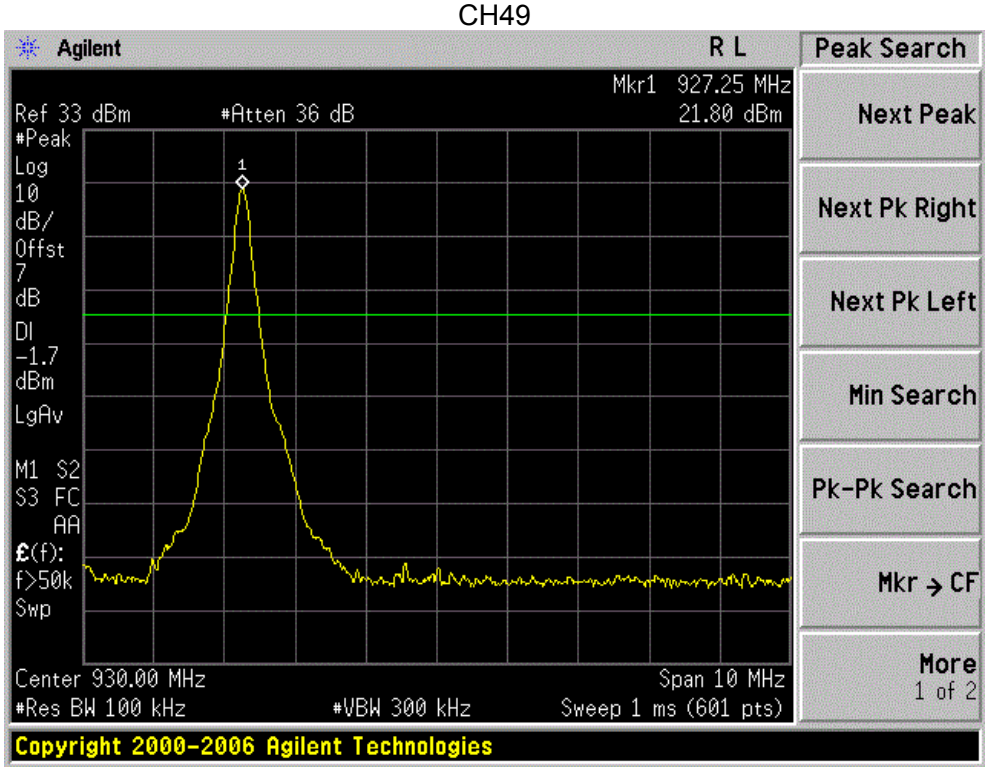
Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	RFID Reader
M/N	SAAT-F805
Operating Mode	TX

Data as follows

CH00


Agilent
R L
Trace
Mkr1 902.75 MHz
18.27 dBm
Ref 33 dBm
#Atten 36 dB
#Peak
Log
10
dB/
Offst
7
dB
Dl
-1.7
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2
Center 900.00 MHz
Span 10 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Copyright 2000-2006 Agilent Technologies

CH49


Agilent
R L
Peak Search
Mkr1 927.25 MHz
21.80 dBm
Ref 33 dBm
#Atten 36 dB
#Peak
Log
10
dB/
Offst
7
dB
Dl
-1.7
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 930.00 MHz
Span 10 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Copyright 2000-2006 Agilent Technologies

13 Antenna

13.1 Antenna requirement

FCC section 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 Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited

According to FCC Part 15, Section 15.247(b)4
The 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.

1.3.2.2 Antenna Type

This is a professional installation antenna. The User must hire professional technician to Install the device and antennas.

Table2: The antenna gain

	Antenna gain(dBi)
Antenna 1	5.5
Antenna 2	5.5
Antenna 3	5.5
Antenna 4	5.5