TEST REPORT

Dt&C

DT&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC1810-0250
2. Customer
   - Name : My Call Co.,Ltd.
   - Address : 2-10-13 Kotobuki, Taito-ku, Tokyo 111-0042,Japan
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : WIRELESS CALL SYSTEM / MCFSB-101
   FCC ID : 2ARHF-MCFSB-101
5. Test Method Used : ANSI C63.10-20131
   Test Specification : FCC Part 15 Subpart C.249
6. Date of Test : 2018.10.01 ~ 2018.10.17
7. Testing Environment : See appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by Name : JaeHyeok Bang (Signature)	Reviewed by Name : GeunKi Son (Signature)

2018 . 10. 22 .

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1810-0250	Oct. 22, 2018	Initial issue

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1. General Information

1.1 Testing Laboratory

DT&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014. **- FCC MRA Accredited Test Firm No. : KR0034**		
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
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1.2 Test Environment

Ambient Condition	
▪ Temperature	+23 ℃ ~ +25 ℃
▪ Relative Humidity	43 % ~ 46 %

1.3 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Test items	Measurement uncertainty
AC conducted emission	2.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz Below)	5.1 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	5.4 dB (The confidence level is about 95 %, k = 2)

1.4 Details of Applicant

Applicant : My Call Co.,Ltd.
Address : 2-10-13 Kotobuki, Taito-ku, Tokyo 111-0042,Japan
Contact person : Hiroaki Inaba

1.5 Description of EUT

EUT	DIGTAL WIRELESS CALL SYSTEM
Model Name	MCFSB-101
Add Model Name	NA
Power Supply	DC 3.0 V
Hardware version	VER 11
Software version	VER 10
Frequency Range	925.7 MHz
Modulation Type	FSK
Antenna Specification	Antenna Type: COIL Antenna Gain: -3.39 dBi (PK)

1.6 Operating Mode

Test Mode	Description
Operating Mode 1	This device was tested with continuous TX mode for field strength and 20dB Bandwidth measurements.
Operating Mode 2	Normal operating mode was used to determine the worst-case duty cycle.

1.7 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

1.8 Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	17/12/16	18/12/16	MY50200828
EMI Test Receiver	Rohde Schwarz	ESR7	18/02/13	19/02/13	101061
Spectrum Analyzer	Agilent Technologies	N9020A	18/07/09	19/07/09	MY46471251
DC Power Supply	Agilent	66332A	18/07/02	19/07/02	MY43001172
Loop Antenna	Schwarzbeck	FMZB1513	18/01/30	20/01/30	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	18/07/13	20/07/13	3359
Horn Antenna	ETS-LINDGREN	3117	18/05/10	20/05/10	00140394
PreAmplifier	TSJ	8447D	17/12/26	18/12/26	2944A07774
PreAmplifier	Agilent Technologies	8449B	18/07/05	19/07/05	3008A02108
Signal Generator	Rohde Schwarz	SMBV100A	17/12/27	18/12/27	255571
Multimeter	FLUKE	17B+	17/12/26	18/12/26	36390701WS
Thermohygrometer	BODYCOM	BJ5478	18/01/03	19/01/03	120612-1
Thermohygrometer	BODYCOM	BJ5478	18/01/03	19/01/03	120612-2
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	18/07/05	19/07/05	7
CABLE	Radiall	TESTPRO3	18/07/06	19/07/06	M-01
CABLE	HUBER+SUHNER	SUCOFLEX103	18/07/06	19/07/06	M-03
CABLE	DTNC	CABLE	18/07/06	19/07/06	M-04
CABLE	DTNC	CABLE	18/06/25	19/06/25	RF-08

Note: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017
Note: The cable is not a regular calibration item, so it has been calibrated by DT & C itself

2. Summary of Test

FCC Part	Parameter	Limit	Test Condition	Status Note 1
15.215(c)	20dB Bandwidth	NA	Conducted	C
15.249 (a)	Field Strength Limits	FCC 15.249(a)	Radiated	C
15.205, 15.209 15.249	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209, FCC 15.249 limits		C
15.207	AC Conducted Emissions	FCC 15.207 limits	AC Line Conducted	NA Note3
15.203	Antenna Requirements	FCC 15.203	-	C

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

Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.

Note 3: This device employ battery power only. And there is no port available to connect with AC power line.

3. Transmitter requirements

3.1 20dB Bandwidth

3.1.1 Test Requirements and limit, §15.215

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

3.1.2 Test Configuration

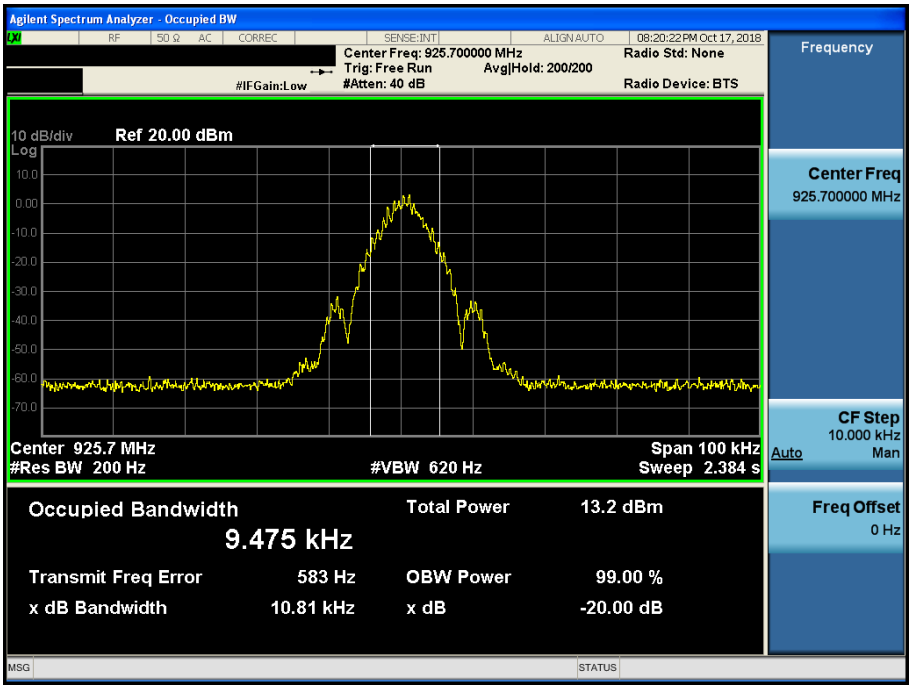
Refer to the APPENDIX I.

3.1.3 Test Procedure

The 20dB Bandwidth were measured according to the ANSI C63.10.

1. Center frequency = EUT channel center frequency
2. Span = 2 ~ 5 times the OBW
3. RBW = 1 % ~ 5 % OBW
4. VBW ≥ 3 x RBW
5. Detector = Peak
6. Trace = Max hold
7. The trace was allowed to stabilize
8. Determine the reference value = Set the spectrum analyzer marker to the highest level of the displayed trace.
9. Using the marker-delta function of the instrument, determine the "−xx dB down amplitude" using [(reference value) − xx].
10. Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

3.1.4 Test Results



3.2 AC Conducted Emissions

3.2.1 Test Requirements and limit, §15.207

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.

Frequency Range (MHz)	Conducted Limit (dBuV)	
	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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

3.2.2 Test Configuration

Refer to the next page.

3.2.3 Test Procedure

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

1. 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.
2. 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.

3.2.4 Test Results

NA

3.3 Radiated Emission

Test Requirements and limit, §15.249, §15.205, §15.209

▪ **FCC Part 15.249**

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency (MHz)	Limit @ 3m	
	Field strength of fundamental (mV/m)	Field strength of harmonics (uV/m)
902 ~ 908	50	500
2400 ~ 2483.5	50	500
5725 ~ 5825	50	500
24,000 ~ 24,250	250	2500

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

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

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

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
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

** 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.

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

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	12.29 ~ 12.293	149.9 ~ 150.05	1645.5 ~ 1646.5	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.51975 ~	156.52475 ~	1660 ~ 1710	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.52025	156.52525	1718.8 ~ 1722.2	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~	156.7 ~ 156.9	2200 ~ 2300	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57725	162.0125 ~ 167.17	2310 ~ 2390	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	13.36 ~ 13.41	167.72 ~ 173.2	2483.5 ~ 2500	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.42 ~ 16.423	240 ~ 285	2655 ~ 2900	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.69475 ~	322 ~ 335.4	3260 ~ 3267	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	16.69525	399.90 ~ 410	3332 ~ 3339		
8.291 ~ 8.294	16.80425 ~	608 ~ 614	3345.8 ~ 3358		
8.362 ~ 8.366	16.80475	960 ~ 1240	3600 ~ 4400		
8.37625 ~ 8.38675	25.5 ~ 25.67	1300 ~ 1427			
8.41425 ~ 8.41475	37.5 ~ 38.25	1435 ~ 1626.5			
	73 ~ 74.6				
	74.8 ~ 75.2				
	108 ~ 121.94				
	123 ~ 138				

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.

3.3.1 Test Configuration

Refer to the APPENDIX I.

3.3.2 Test Procedure

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.
2. The table was rotated 360 degrees to determine the position of the highest radiation.
3. During performing radiated emission below 1 GHz, 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 GHz, the EUT was set 1 or 3 meter away from the interference-receiving antenna.
4. For measurements above 1GHz 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 GHz, the absorbers are removed.
5. 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.
6. 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.
7. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
8. 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.

Measurement Instrument Setting

1. Frequency Range Below 1GHz
   RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak
2. Frequency Range Range > 1 GHz
   Peak Measurement
   RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes
   Average Measurement> 1GHz
   RBW = 1MHz, VBW ≥ 1/T, Detector = Peak, Sweep Time = Auto, Trace Mode = Max Hold until the trace stabilizes
3. For pulse operation, the result of Average measurement is calculated using Peak result and duty cycle reduction factor.
   Note: Refer to the appendix II for duty cycle correction factor.

3.3.3 Test Result

Frequency Range : 9 kHz ~ 10 GHz

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*925.70	H	X	PK	63.22	33.33	N/A	N/A	96.55	113.98	17.43
*925.70	H	X	AV	63.22	33.33	-11.70	N/A	84.85	93.98	9.13
1851.49	H	X	PK	61.20	0.02	N/A	N/A	61.22	74.00	12.78
1851.49	H	X	AV	61.20	0.02	-11.70	N/A	49.52	54.00	4.48
2777.14	V	Y	PK	54.90	2.10	N/A	N/A	57.00	74.00	17.00
2777.14	V	Y	AV	54.90	2.10	-11.70	N/A	45.30	54.00	8.70
3703.02	H	X	PK	53.89	2.75	N/A	N/A	56.64	74.00	17.36
3703.02	H	X	AV	53.89	2.75	-11.70	N/A	44.94	54.00	9.06
4628.59	H	X	PK	53.61	4.90	N/A	N/A	58.51	74.00	15.49
4628.59	H	X	AV	53.61	4.90	-11.70	N/A	46.81	54.00	7.19
5554.12	H	X	PK	56.73	5.89	N/A	N/A	62.62	74.00	11.38
5554.12	H	X	AV	56.73	5.89	-11.70	N/A	50.92	54.00	3.08
6479.92	H	X	PK	50.88	7.28	N/A	N/A	58.16	74.00	15.84
6479.92	H	X	AV	50.88	7.28	-11.70	N/A	46.46	54.00	7.54
7405.71	H	Y	PK	55.67	7.80	N/A	N/A	63.47	74.00	10.53
7405.71	H	Y	AV	55.67	7.80	-11.70	N/A	51.77	54.00	2.23
8331.06	V	Z	PK	43.56	8.33	N/A	N/A	51.89	74.00	22.11
8331.06	V	Z	AV	43.56	8.33	-11.70	N/A	40.19	54.00	13.81
9257.18	H	Y	PK	44.90	9.14	N/A	N/A	54.04	74.00	19.96
9257.18	H	Y	AV	44.90	9.14	-11.70	N/A	42.34	54.00	11.66

▪ **Note.**

1. The radiated emissions were investigated 9kHz to 10GHz. And no other spurious and harmonic emissions were found above listed frequencies.
2. * is fundamental frequency.
3. Information of Distance Factor
   For finding emissions, the test distance might be reduced from 3 m to 1 m. In this case, the distance factor (-9.54 dB) is applied to the result.
   - Calculation of distance factor = 20 log(applied distance / required distance) = **20 log(1 m / 3 m)** = **-9.54 dB**
   When distance factor is “N/A”, the distance is 3 m and distance factor is not applied.
4. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F + D.C.F / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

3.4 Antenna Requirements

- **According to FCC 47 CFR §15.203:**

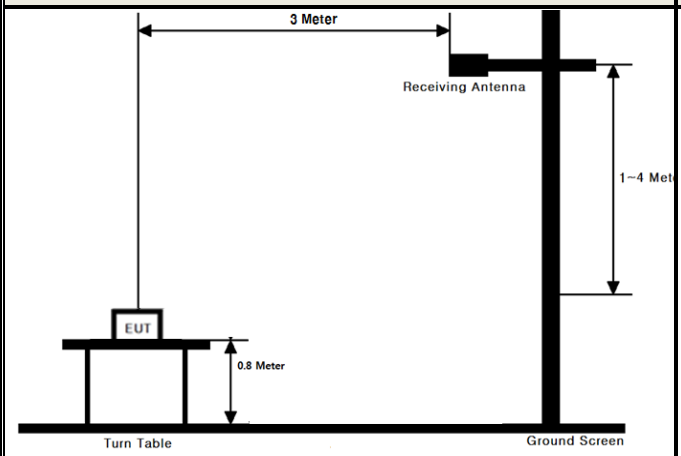
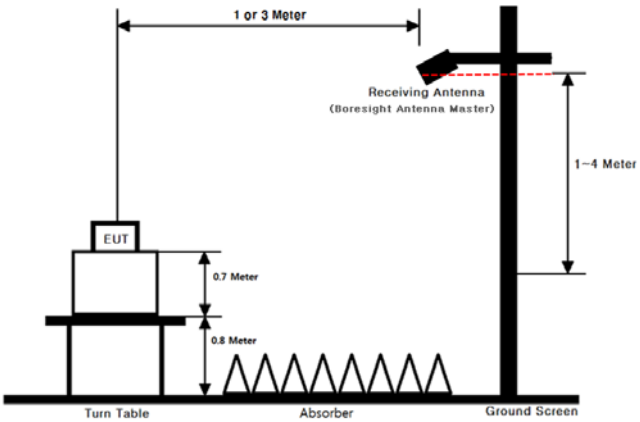
An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna is permanently attached on PCB.(Refer to Internal Photo file.)
Therefore this E.U.T Complies with the requirement of §15.203

APPENDIX I

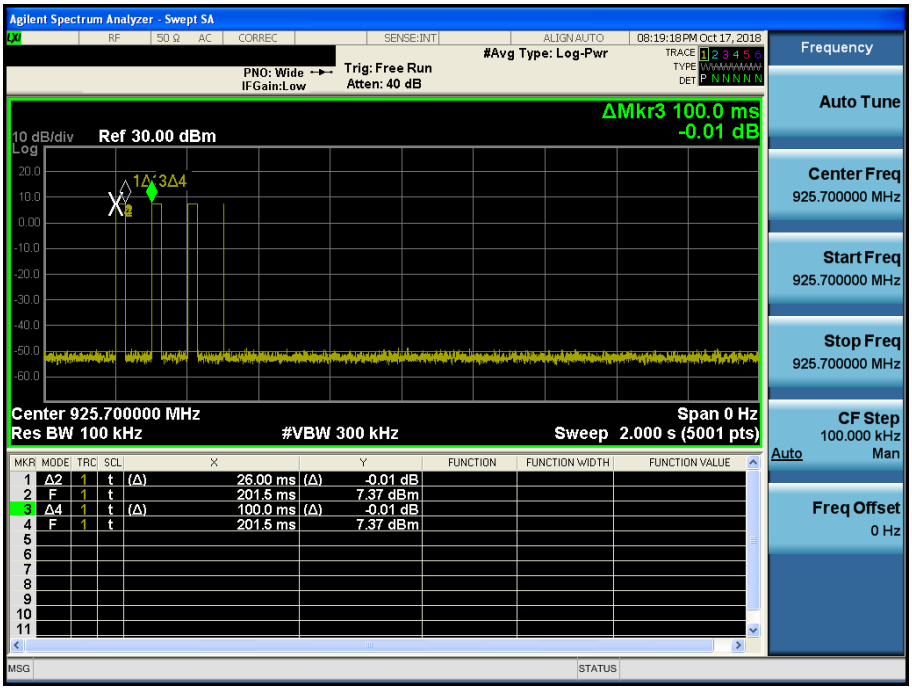
Test set up diagrams

- **Radiated Measurement**

Below 1GHz	Above 1GHz
	

APPENDIX II

- **Duty cycle correction factor**



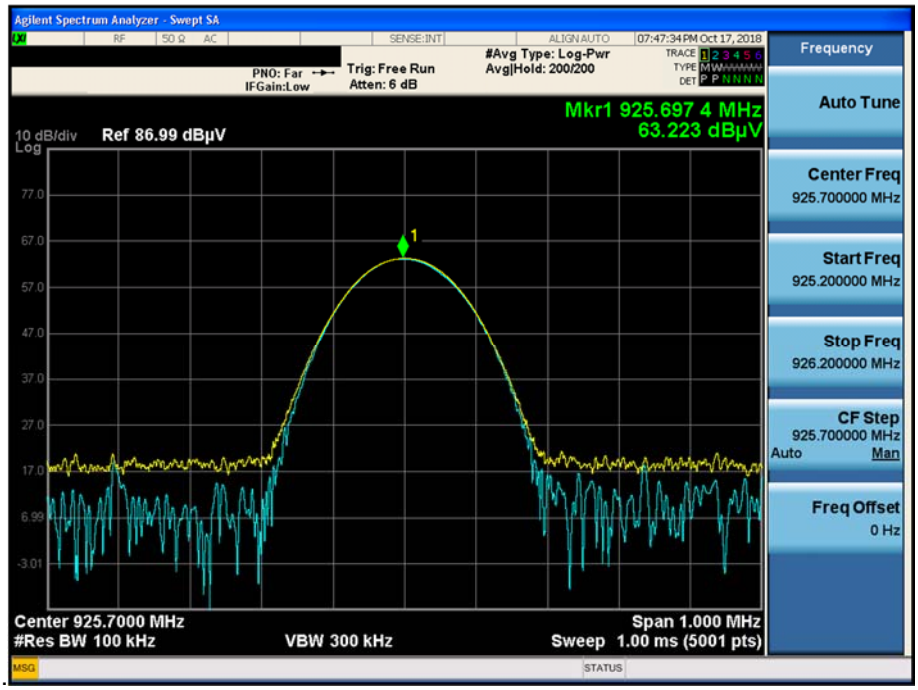
Worst case transmit time per 100ms	**26.00 ms**
Duty cycle correction factor(Worst case)	**20 x log (26.00ms/100ms) = -11.70 dB**

APPENDIX III

Worst data plot of radiated test (Reading value)

Field strength of fundamental

Z axis & Hor **Detector Mode : PK**



Note: The resolution bandwidth was set enough larger than occupied bandwidth of fundamental.

Spurious emission

Y axis & Hor **Detector Mode : PK**