

FCC PART 15 SUBPART C TEST REPORT

for

i-key 4 Transmitter

Model No.: i-key 4-TX

FCC ID: W4920090102

of

Applicant: i-Trak Global Pty Ltd

Address: Unit8,4 Henry Street Loganholme QLD 4129 Australia

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: 930600

Industry Canada filed test laboratory Reg. No. IC 5679A-1

A2LA Accredited No.: 2732.01

Report No.: W6M20901-9531-C-1

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
TEL: 886-2-66068877 FAX: 886-2-66068879 E-mail: wtls@wtls-lab.com

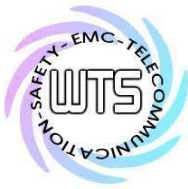
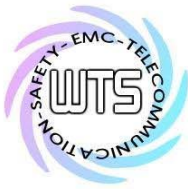


TABLE OF CONTENTS

1	GENERAL INFORMATION	2
1.1	NOTES	2
1.2	TESTING LABORATORY	3
1.2.1	Location	3
1.2.2	Details of accreditation status	3
1.3	DETAILS OF APPROVAL HOLDER	3
1.4	APPLICATION DETAILS	4
1.5	TEST ITEM	4
1.6	TEST STANDARDS	5
2	TECHNICAL TEST	5
2.1	SUMMARY OF TEST RESULTS	5
2.2	TEST ENVIRONMENT	5
2.3	TEST MODE	5
2.4	TEST EQUIPMENT UTILIZED	6
2.5	GENERAL TEST PROCEDURE	8
3	TEST RESULTS (ENCLOSURE)	9
3.1	TRANSMISSION REQUIREMENTS	10
3.1.1	Limit of Transmission Time	10
3.1.2	Active Time	10
3.2	OUTPUT POWER (FIELD STRENGTH)	11
3.3	OUT OF BAND RADIATED EMISSIONS	12
3.4	TRANSMITTER RADIATED EMISSIONS IN RESTRICTED BANDS	13
3.5	SPURIOUS EMISSION RADIATED, TRANSMITTER	14
3.6	CHANNEL BANDWIDTH	16
3.7	ANTENNA REQUIREMENT	17
3.8	DUTY CYCLE	18
3.9	CONDUCTED MEASUREMENT AT (AC) POWER LINE	19
	APPENDIX	20



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

The test report may only be reproduced or published in full.

Reproduction or publication of extracts from the report requires the prior written approval of the Worldwide Testing Services(Taiwan) Co., Ltd.

Tester:

January 14, 2009

Danny

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

January 14, 2009

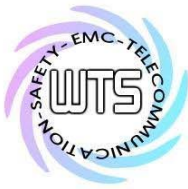
Chang Tse-Ming

Date

WTS

Name

Signature



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

1.2 Testing laboratory

1.2.1 Location

OATS

No.5-1, Shuang Sing Village,
LiShuei Rd., Wanli Township,
Taipei County 207, Taiwan (R.O.C.)

Company

Worldwide Testing Services(Taiwan) Co., Ltd.

6F, NO. 58, LANE 188, RUEY-KUANG RD.

NEIHU, TAIPEI 114, TAIWAN R.O.C.

Tel : 886-2-66068877

Fax : 886-2-66068879

1.2.2 Details of accreditation status

Accredited testing laboratory

A2LA accredited number: 2732.01

FCC filed test laboratory Reg. No. 930600

Industry Canada filed test laboratory Reg. No. IC 5679A-1

Town: ./.

Country: ./.

Telephone: ./.

Fax: ./.

1.3 Details of approval holder

Name: i-Trak Global Pty Ltd

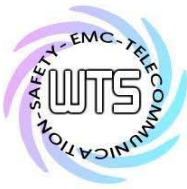
Street: Unit8,4 Henry Street

Town: Loganholme QLD 4129

Country: Australia

Telephone: +61 7 3806 1933

Fax: +61 7 3806 4794



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

1.4 Application details

Date of receipt of test item: January 09, 2009
Date of test: from January 10, 2009 to January 14, 2009

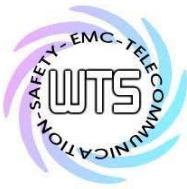
1.5 Test item

Description of test item: i-key 4 Transmitter
Type identification: i-key 4-TX
Brand name: ./.
Multi-listing model number: TX / TXH / TXIN / TXEM / TXK / TXM / TXIC / TXTC
Transmitting frequency: 915 MHz
Operation mode: simplex
Voltage supply: Battery (3 Vdc)
(The device is tested under fresh battery condition.)
Highest clock frequency: 915 MHz
Antenna type: PCB antenna
Photos: see Appendix

Manufacturer (if applicable)

Name: ./.
Street: ./.
Town: ./.
Country: ./.

Additional information: ./.



1.6 Test standards

Technical standard : FCC RULES PART 15 SUBPART C § 15.231 (a) (2008-07)

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.



or

The deviations as specified in 3 were ascertained in the course of the tests performed.



2.2 Test environment

Temperature:	23 °C
Relative humidity content:	20 ... 75 %
Air pressure:	86 ... 103 kPa
Details of power supply:	Battery (3 Vdc)

2.3 Test Mode

This EUT is the portable device. So the EUT was tested on three different axes. Please see assessment test results as section 3 of this test report.

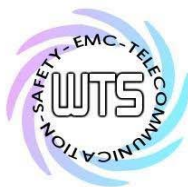


Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

2.4 Test equipment utilized

No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2008/9/18	2009/9/17
ETSTW-CE 002	PREREULATOR MODE DC POWER SUPPLY	None	None	None	Function Test	
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 004	ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK	ESH3-Z5	840731/011	R&S	2008/9/15	2009/9/14
ETSTW-CE 005	Line-Impedance Stabilisation Network	NNBM 8126D	137	Schwarzbeck	2008/9/15	2009/9/14
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2008/5/10	2009/5/09
ETSTW-CE 008	ABSORBING CLAMP	MDS 21	3469	Schwarzbeck	2008/9/18	2009/9/17
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2008/7/25	2009/7/24
ETSTW-CE 015	CISPR 22 TWO BALANCED TELECOM PAIRS IMPEDANCE STABILIZATION NETWORK	FCC-TLISN-T8-02	20307	FCC	2008/9/22	2009/9/21
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2008/9/24	2009/9/23
ETSTW-RE 002	Function Generator	33220A	MY43004982	Agilent	2007/10/12	2009/10/11
ETSTW-RE 003	EMI TEST RECEIVER	ESI 26	831438/001	R&S	2008/10/8	2009/10/7
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2008/9/22	2009/9/21
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2008/9/18	2009/9/17
ETSTW-RE 011	PROGRAMMABLE LINEAR POWER SUPPLY	LPS-305	30503070165	MOTECH	Function Test	
ETSTW-RE 017	Log-Periodic Antenna	HL025	352886/001	R&S	2008/5/5	2009/5/4
ETSTW-RE 018	MICROWAVE HORN ANTENNA	AT4560	27212	AR	2008/10/27	2009/10/26
ETSTW-RE 020	MICROWAVE HORN ANTENNA	AT4002A	306915	AR	Function Test	
ETSTW-RE 021	SWEEP GENERATOR	SWM05	835130/010	R&S	2008/8/27	2009/8/26
ETSTW-RE 028	Log-Periodic DipoleArray Antenna	3148	34429	EMCO	2008/4/23	2009/4/22
ETSTW-RE 029	Biconical Antenna	3109	33524	EMCO	2008/4/23	2009/4/22
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	EMCO	2008/3/26	2009/3/25
ETSTW-RE 032	Millivoltmeter	URV 55	849086/013	R&S	2008/9/1	2009/8/31
ETSTW-RE 033	WaveRunner 6000A Serise Oscilloscope	WAVERUNNER 6100A	LCRY0604P14508	LeCroy	2008/6/27	2009/6/26
ETSTW-RE 034	Power Sensor	URV5-Z4	839313/006	R&S	2008/9/1	2009/8/31
ETSTW-RE 042	Biconical Antenna	HK116	100172	R&S	2009/1/8	2011/1/7
ETSTW-RE 043	Log-Periodic Dipole Antenna	HL223	100166	R&S	2008/5/2	2009/5/1
ETSTW-RE 044	Log-Periodic Antenna	HL050	100094	R&S	2008/5/22	2009/5/21
ETSTW-RE 047	ESA-E SERIES SPECTRUM ANALYZER	E4445A	MY46181369	Agilent	2008/6/26	2009/6/25

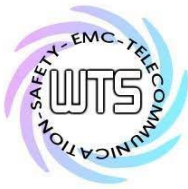


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

ETSTW-RE 048	Triple Loop Antenna	HXYZ 9170	HXYZ 9170-134	Schwarzbeck	2008/9/1	2009/8/31
ETSTW-RE 049	TRILOG Super Broadband test Antenna	VULB 9160	9160-3185	Schwarzbeck	2007/5/2	2009/5/1
ETSTW-RE 055	SPECTRUM ANALYZER	FSU-26	200074	R&S	2008/7/1	2009/6/30
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	2008/9/1	2009/8/31
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2008/10/28	2009/10/27
ETSTW-RE 105	Match Pad	MDCS1500	None	WOKEN	2008/10/9	2009/10/8
ETSTW-RE 106	Match Pad	MDCS1510	None	WOKEN	2008/10/9	2009/10/8
ETSTW-RE 107	LUMPED ELEMENT POWER DIVIDER	PL2-10	146	MCLI	2008/11/24	2009/11/23
ETSTW-GSM 02	Universal Radio Communication Tester	CMU 200	109439	R&S	2008/9/23	2009/9/22
ETSTW-GSM 23	Power Divider	4901.19.A	None	SUHNER	2008/9/22	2009/9/21



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

2.5 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2003 5.2 using a 50μH LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 6.4 using a spectrum analyzer. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was the 100 kHz and the video bandwidth was 300 kHz.

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 dBμV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

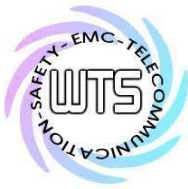
Freq (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
33	20 dBμV + 10.36 dB/m + 6 dB = 36.36 dBμV/m @3m

ANSI STANDARD C63.4-2003 6.2.1 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings.

Measurements were made by Worldwide Testing Services(Taiwan) Co., Ltd. at the registered open field test site located at. The Registration Number: **930600**

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.



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

3 Test results (enclosure)

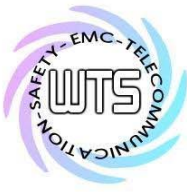
☒ 1st test

☐ test after modification

☐ production test

TEST CASE	Para. Number	Required	Test passed	Test failed
Transmission Requirements	FCC 15.231(a)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emission	FCC 15.231(b)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bandwidth of Emission	FCC 15.231(c)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Frequency Tolerance	FCC 15.231(d)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Period Alternate Field Strength Requirements	FCC 15.231(e)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna Requirement	FCC 15.203	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted Measurement at (AC) Power Line	FCC 15.207	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The follows is intended to leave blank.



Registration number: W6M20901-9531-C-1
FCC ID: W4920090102

3.1 Transmission Requirements

FCC 15.231(a)

3.1.1 Limit of Transmission Time

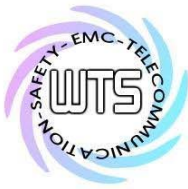
- ☒ According to 15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- ☐ According to 15.231(a)(2), a transmitter activated automatically shall cease transmission within 5 seconds after activation.

3.1.2 Active Time

- ☒ This manually operated transmitter employs a switch that automatically deactivate the transmitter within 1.911090 ms of being released.
- ☐ This transmitter is operated by automatic activation and active will cease transmission in _____ s after activation.

Explanation: See attached appendix.

Test equipment used: ETSTW-RE 055



Registration number: W6M20901-9531-C-1
FCC ID: W4920090102

3.2 Output Power (Field Strength)

Model: i-key 4-TX Date: 2009/1/12
Mode: Tx Power Temperature: 24 °C Engineer: Danny
Polarization: Horizontal Humidity: 51 %

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB) Corr. Duty	Result @3m (dBuV/m) Peak Ave.	Limit @3m (dBuV/m) Peak Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
914.986	44.3343	26.59 -12.23	70.92 58.69	81.9 61.9	-3.21	125	150

Polarization: Vertical

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB) Corr. Duty	Result @3m (dBuV/m) Peak Ave.	Limit @3m (dBuV/m) Peak Ave.	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
914.986	32.54	26.59 -12.23	59.13 46.90	81.90 61.90	-15.00	130	150

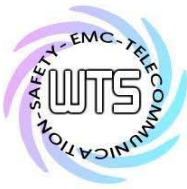
Limit 15.231(b)

Fundamental Frequency (MHz)	Field strength of fundamental, limit $\mu\text{V/m}$
40.66 – 40.70	2,250
70 – 130	1,250
130 – 174	1,250 to 3,750
174 – 260	3,750
260 – 470	3,750 to 12,500**
Above 470	12,500 (81.93 dBuV/m)

** linear interpolation

Explanation: See attached appendix.

Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 028, ETSTW-RE 029
ETSTW-RE 042, ETSTW-RE 043



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

3.3 Out of Band Radiated Emissions

FCC Rule: 15.231(b) , 15.35

For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

Guidance on Measurement of pulsed emission: 15.35(c)

“the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.”

Duty Cycle correction = $20 \log (\text{dwell time}/100\text{ms or one period})$

Limits:

For frequencies (Average measurements)

Correction factor conform 15.35 (c) (Average measurements)

Duty cycle correction :

Max. Peak reading – duty cycle correction

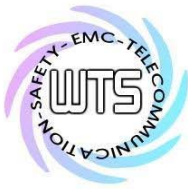
Max permitted average Limits = Max permitted Fundamental limit – 20 dB

For example for 915 fundamental carrier:

Max permitted average Limit: $81.90 \text{ dB}\mu\text{V/m} - 20 \text{ dB} = 71.90 \text{ dB}\mu\text{V/m}$

For frequencies above 1GHz (Peak measurements).

Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

3.4 Transmitter Radiated Emissions in restricted Bands

FCC Rules: 15.231 (b), 15.205, 15.209, 15.35

Radiated emission measurements were performed from 30 MHz to 8000 MHz.

For radiated emission tests, the analyzer setting was as followings:

RES BW VID BW

Frequency <1 GHz 100 kHz 100 kHz (Peak measurements)

Frequency >1 GHz 1 MHz 1 MHz (Peak measurements)

1 MHz 1 MHz (Average measurements)

Limits:

For frequencies below 1GHz :

Frequency of Emission (MHz)	Field strength (microvolts/meter)	Field Strength (dB microvolts/meter)
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

For frequencies above 1GHz (Average measurements).

Guidance on Measurement of pulsed emission:

“If the emission is pulsed, modify the unit for continues operation , use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

For frequencies above 1GHz (Average measurements).

The correction factor, based on the channel dwell time in a 100 ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the value.

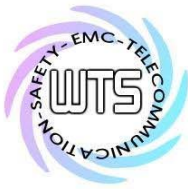
Duty cycle correction = $20 \log (\text{dwell time}/100\text{ms})$

No duty cycle correction was added to the reading

Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)

Above 960 MHz

For mode DSSS CW: $54 \text{ dB}\mu\text{V/m} + 20 \text{ dB} = 74 \text{ dB}\mu\text{V/m}$



3.5 Spurious Emission radiated, Transmitter

Spurious emission was measured with modulation (declared by manufacturer).

The limits on the field strength of the spurious emission in the table § 15.231(b) are based on the fundamental frequency of the intentional radiator. Spurious emission shall be attenuated to the average (or alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

In addition, radiated emission which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

SAMPLE CALCULATION OF LIMIT. All results will be updated by an automatic measuring system in accordance to point 2.3.

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results. This is done by using validated test software and calibrated test system according the accreditation requirements.

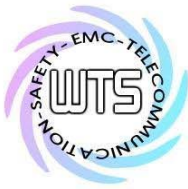
The peak and average spurious emission plots was measured with the average limits.

In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

Summary table with radiated data of the test plots

Model: i-key 4-TX Date: 2009/1/12
Mode: Tx Temperature: 24 °C Engineer: Danny
Polarization: Horizontal Humidity: 51 %

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
		Corr.	Duty	Peak	Ave.	Peak	Ave.			
43.527	23.93	13.65	-12.23	37.58	25.35	81.90	61.90	-36.55	110	150
608.617	5.88	22.22	0.00	28.10	28.10	46.00	46.00	-17.90	125	150
1831.663	54.43	-8.37	-12.23	46.06	33.83	81.90	61.90	-28.07	135	150
2745.491	65.92	-3.87	-12.23	62.05	49.82	74.00	54.00	-4.18	135	150
3663.327	48.90	-0.20	-12.23	48.70	36.47	74.00	54.00	-17.53	140	150
4569.138	61.46	-1.82	-12.23	59.64	47.41	74.00	54.00	-6.59	145	150
5490.982	49.20	2.61	-12.23	51.81	39.58	81.90	61.90	-22.32	150	150
6404.810	43.89	3.83	-12.23	47.72	35.49	81.90	61.90	-26.41	140	150
7326.653	47.37	1.85	-12.23	49.22	36.99	74.00	54.00	-17.01	135	150



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

Polarization: Vertical

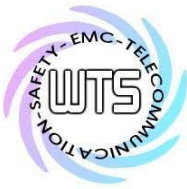
Frequency (MHz)	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
		Corr.	Duty	Peak	Ave.	Peak	Ave.			
147.956	21.00	15.27	-12.23	36.27	24.04	81.90	61.90	-37.86	115	150
610.020	6.73	22.22	0.00	28.95	28.95	46.00	46.00	-17.05	130	150
1829.659	48.07	-8.38	-12.23	39.69	27.46	81.90	61.90	-34.44	135	150
2745.491	53.15	-3.87	-12.23	49.28	37.05	74.00	54.00	-16.95	135	150
3659.319	49.58	-0.25	-12.23	49.33	37.10	74.00	54.00	-16.90	140	150
4569.138	59.11	-1.82	-12.23	57.29	45.06	74.00	54.00	-8.94	145	150
5490.982	47.53	2.61	-12.23	50.14	37.91	81.90	61.90	-23.99	140	150
6404.810	43.73	3.83	-12.23	47.56	35.33	81.90	61.90	-26.57	150	150
7326.653	42.79	1.85	-12.23	44.64	32.41	74.00	54.00	-21.59	135	150

- Note**
1. **Correction Factor = Antenna factor + Cable loss - Preamplifier**
 2. **The formula of measured value as: Test Result = Reading + Correction Factor**
 3. **Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average**
 4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
 5. **See the attached diagram as appendix.**

All other not noted test plots do not contain significant test results in relation to the limits
Test results: The unit meets the FCC requirements.

Explanation: See attached appendix.

Test equipment used: ETSTW-RE 003, ETSTW-RE 004, ETSTW-RE 017, ETSTW-RE 028,
ETSTW-RE 029, ETSTW-RE 030, ETSTW-RE 042, ETSTW-RE 043,



Registration number: W6M20901-9531-C-1
FCC ID: W4920090102

3.6 Channel Bandwidth

Measurement of Necessary Bandwidth (BN)

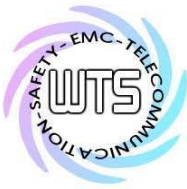
Used frequency	Bandwidth	Limit
915 MHz	57.6923 kHz	4.575 MHz

Explanation: The bandwidth fulfills the requirements of FCC § 15.231,
See attached appendix.

Limits:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test equipment used: ETSTW-RE 055



Registration number: W6M20901-9531-C-1

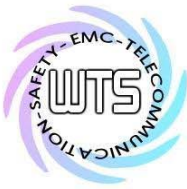
FCC ID: W4920090102

3.7 Antenna requirement

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

Explanation: This PCB antenna is integral antenna which passes antenna requirement.

The equipment meets the requirements	yes <input checked="" type="checkbox"/>	no <input type="checkbox"/>
--------------------------------------	--	--------------------------------



Registration number: W6M20901-9531-C-1
FCC ID: W4920090102

3.8 Duty Cycle

The correction factor, based on the channel dwell time in a 100ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the measured value.

Average Reading = Peak Reading (dBuV/m) + Duty Cycle Correction

Duty Cycle Correction = $20 \log (\text{Cycle})$

In order to determine the Duty Cycle, the EUT is measured as:

Testing Mode	T period (ms)	T on (ms)	Duty Cycle	Duty Cycle Correction $20*\log(\text{Duty Cycle})$
Transmitting mode	100	24.469	0.24469	-12.23

Explanation: See attached appendix.

Test equipment used: ETSTW-RE 055



3.9 Conducted Measurement at (AC) Power Line

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table bellows with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

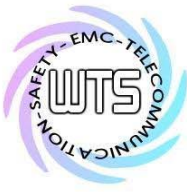
Frequency	Level	
	quasi-peak (dB μ V/m)	average (dB μ V/m)
-- kHz	--	--

Limits:

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Explanation: This test is not required because the sample uses a battery.

Test equipment used: ETSTW-CE 001, ETSTW-CE 003, ETSTW-CE 004, ETSTW-CE 006



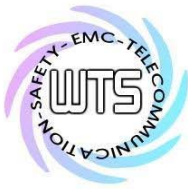
Appendix

A Measurement diagrams

1. Active Time
2. Output Power
3. Spurious Emissions radiated
4. Bandwidth
5. Duty Cycle

B Photos

1. External Photos
2. Internal Photos
3. Set Up Photo of Radiated Emission

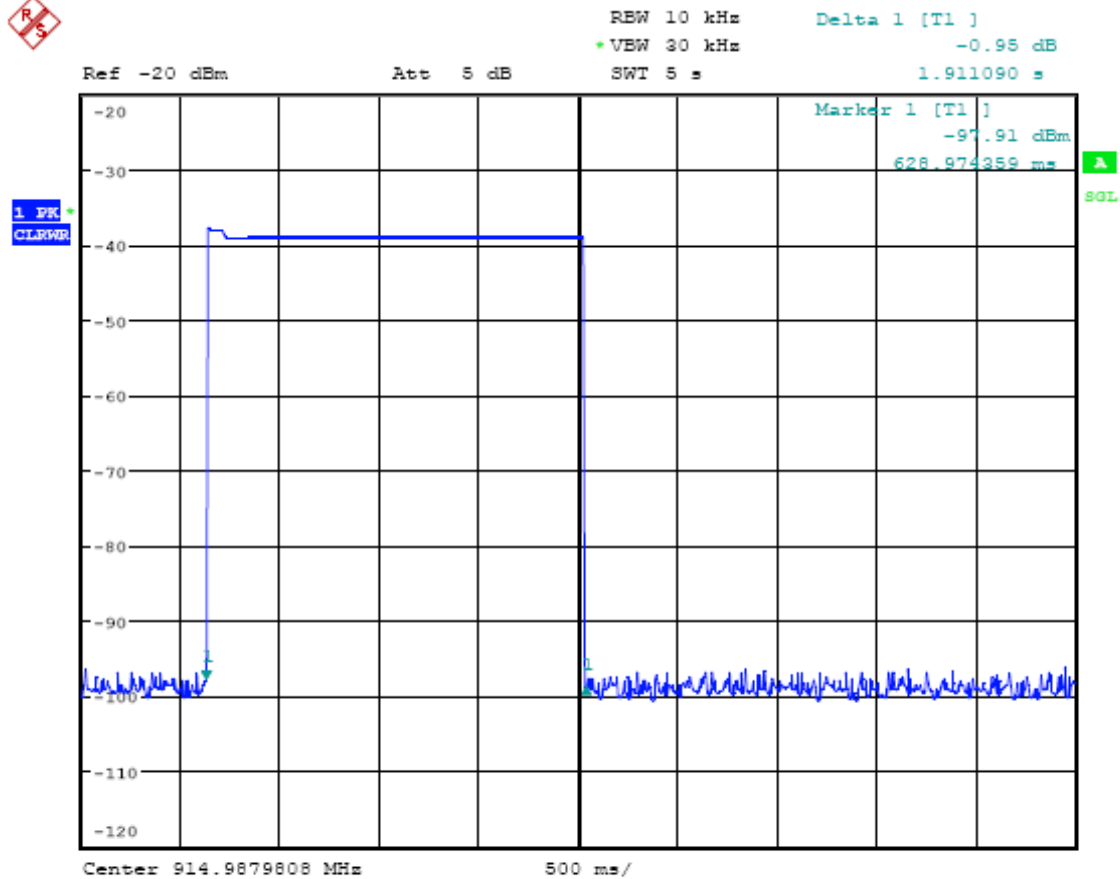


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

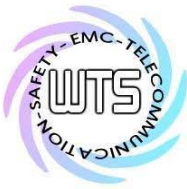
FCC ID: W4920090102

Active Time



Duration Time

Date: 12.JAN.2009 12:46:35

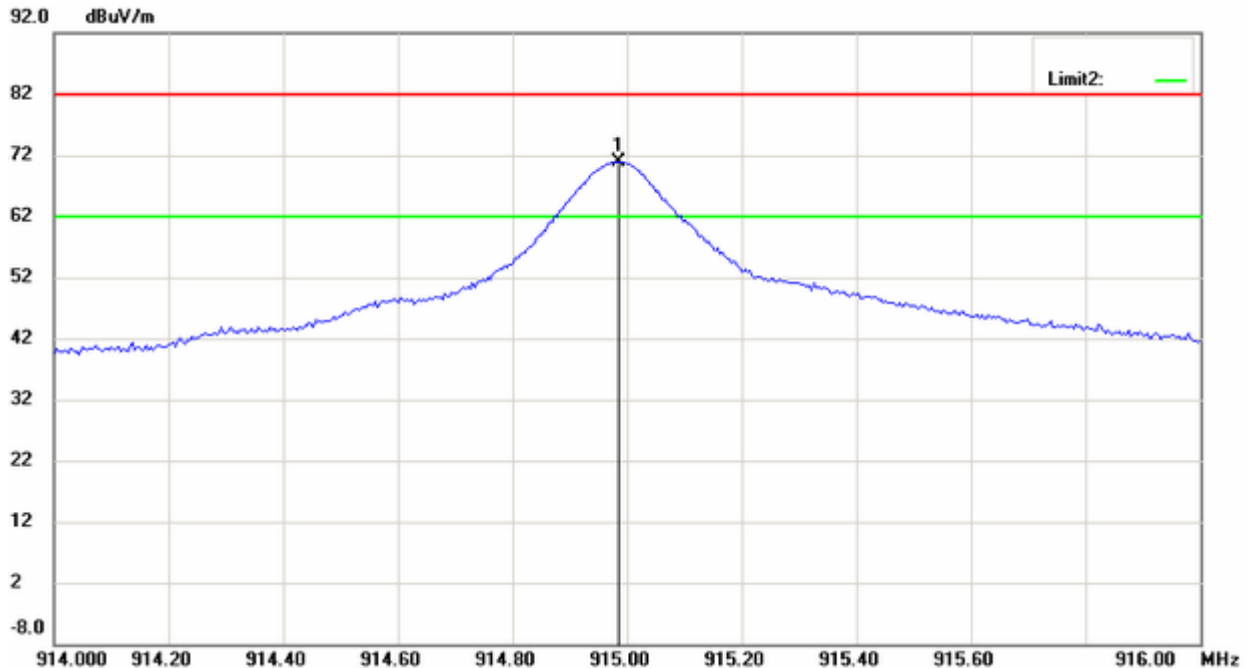


Registration number: W6M20901-9531-C-1

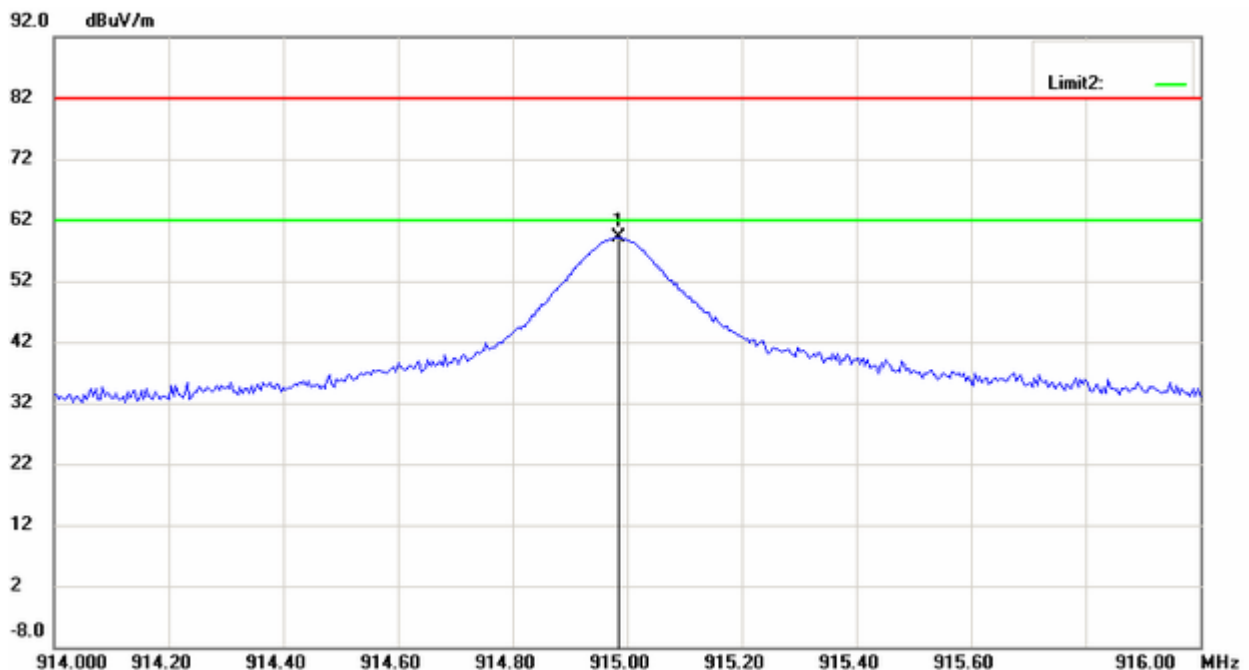
FCC ID: W4920090102

Output Power

Antenna Polarization H



Antenna Polarization V

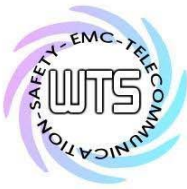


Up Line: Peak Limit Line

Down Line: Ave Limit Line

Note:

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.

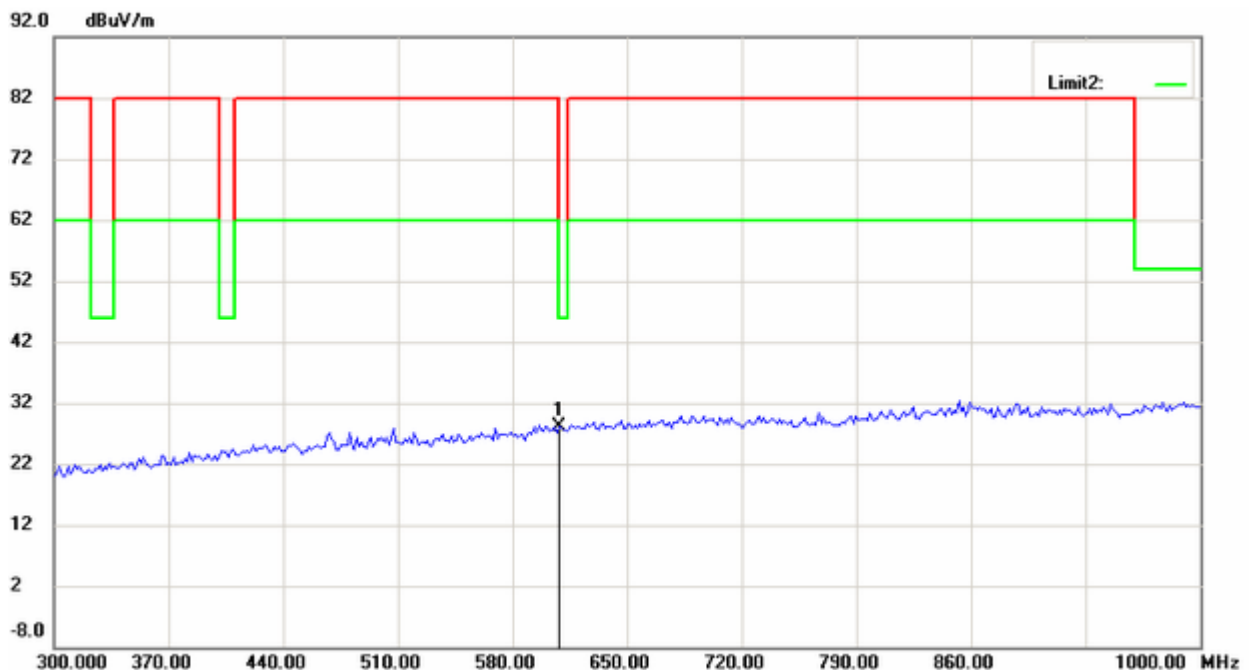
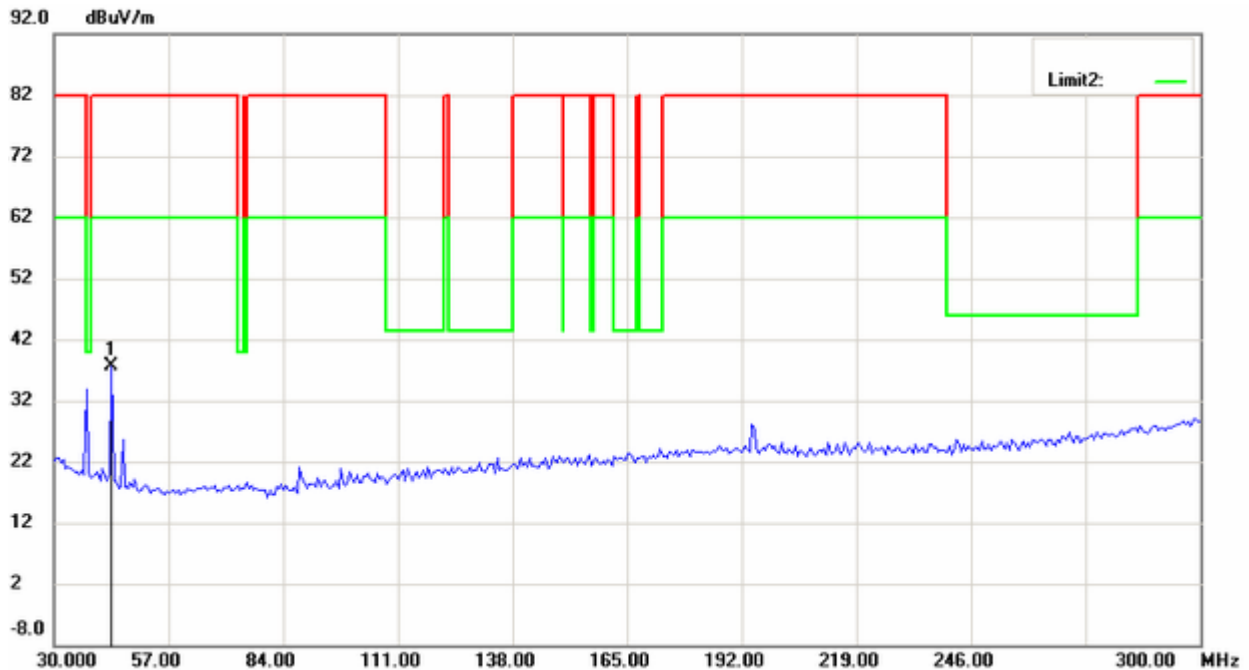


Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

Spurious Emissions radiated

Antenna Polarization H

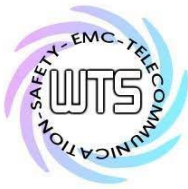


Up Line: Peak Limit Line

Down Line: Ave Limit Line

Note:

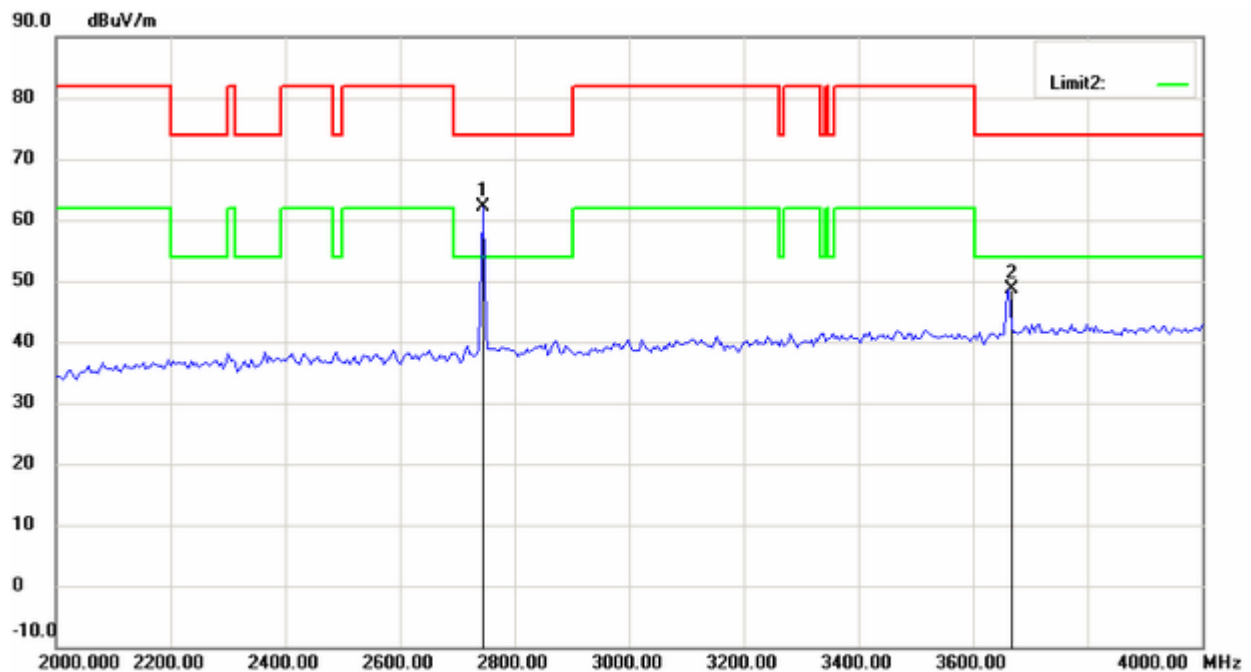
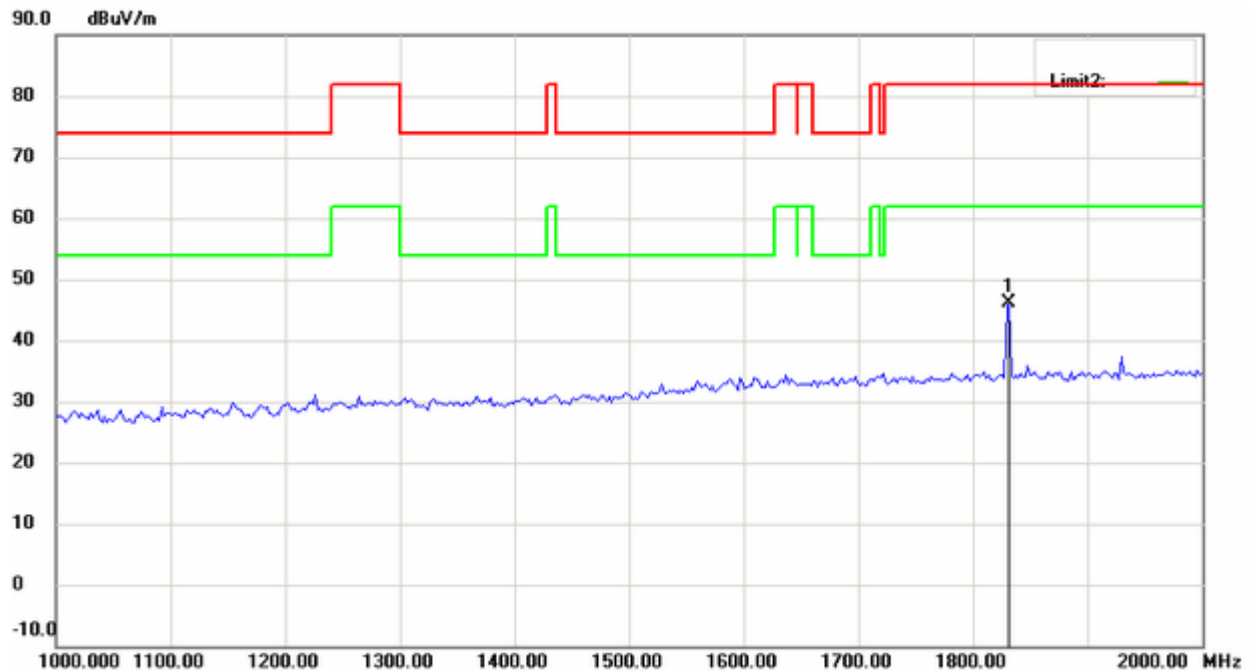
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

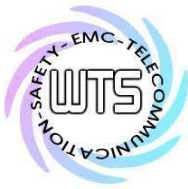
FCC ID: W4920090102



Up Line: Peak Limit Line
Down Line: Ave Limit Line

Note:

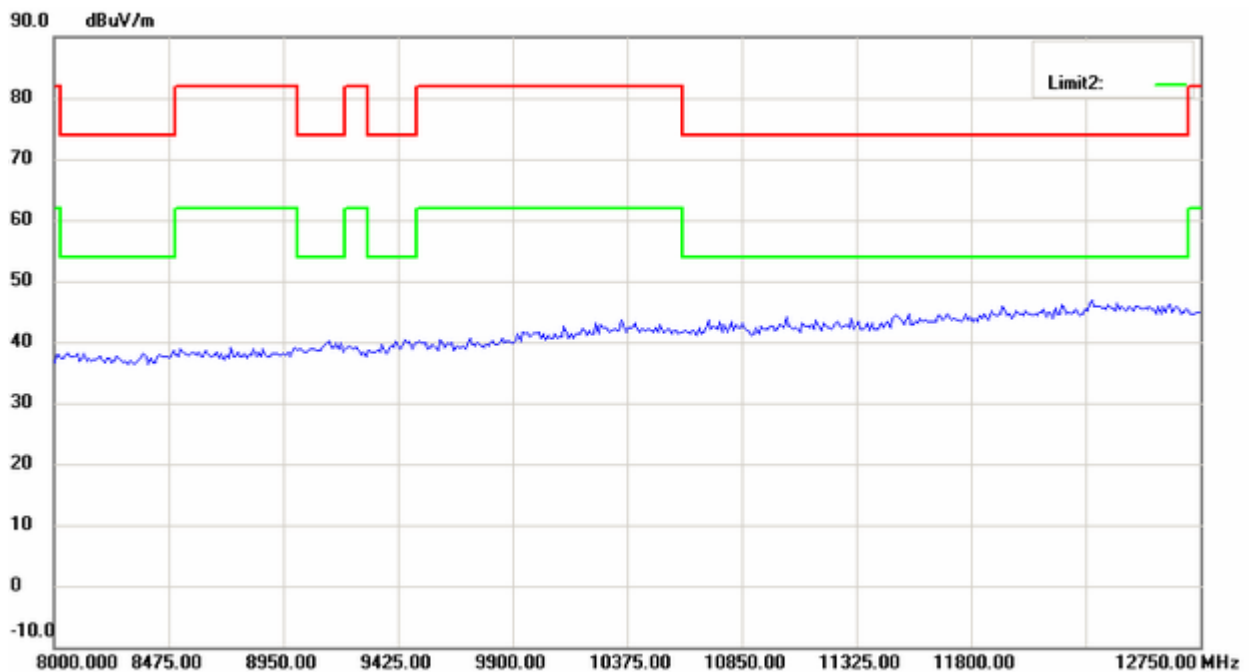
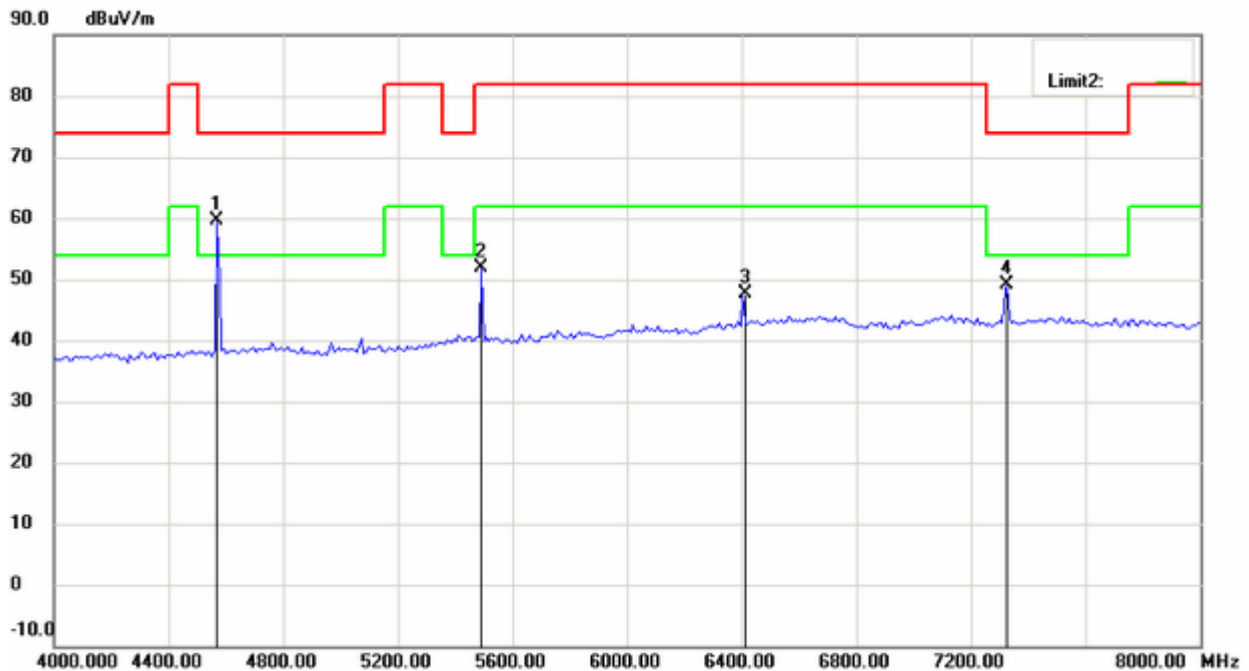
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

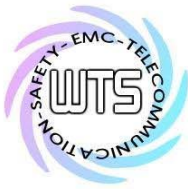


Up Line: Peak Limit Line

Down Line: Ave Limit Line

Note:

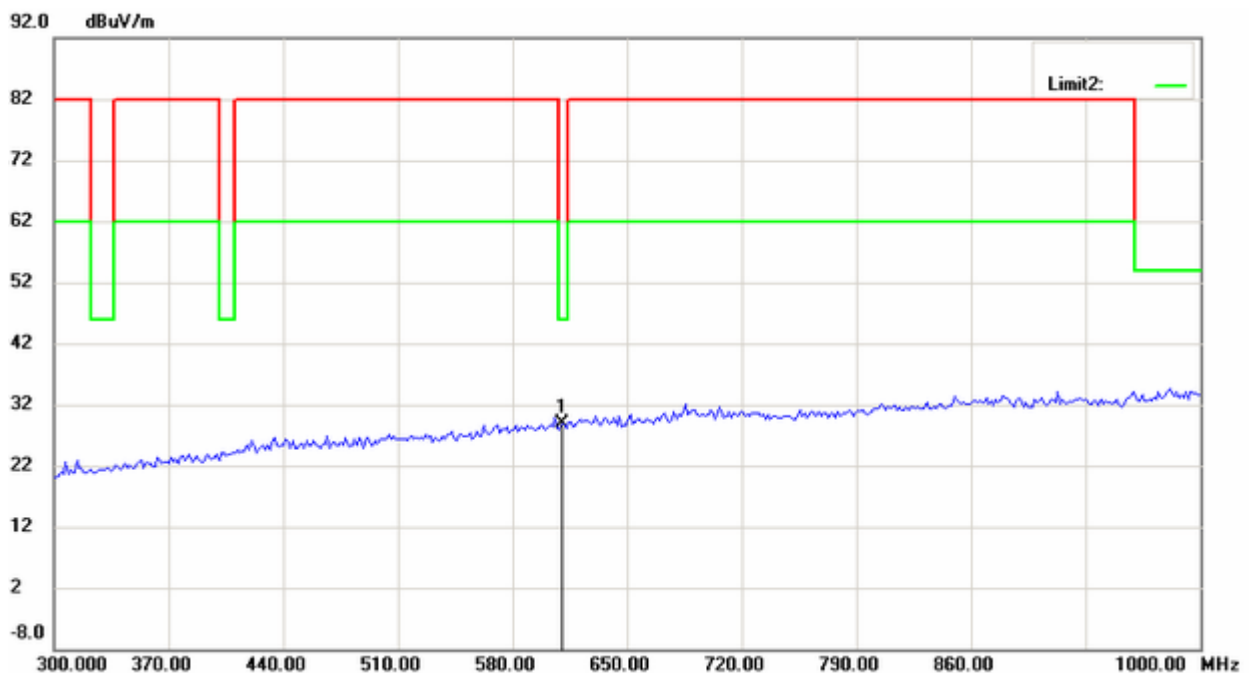
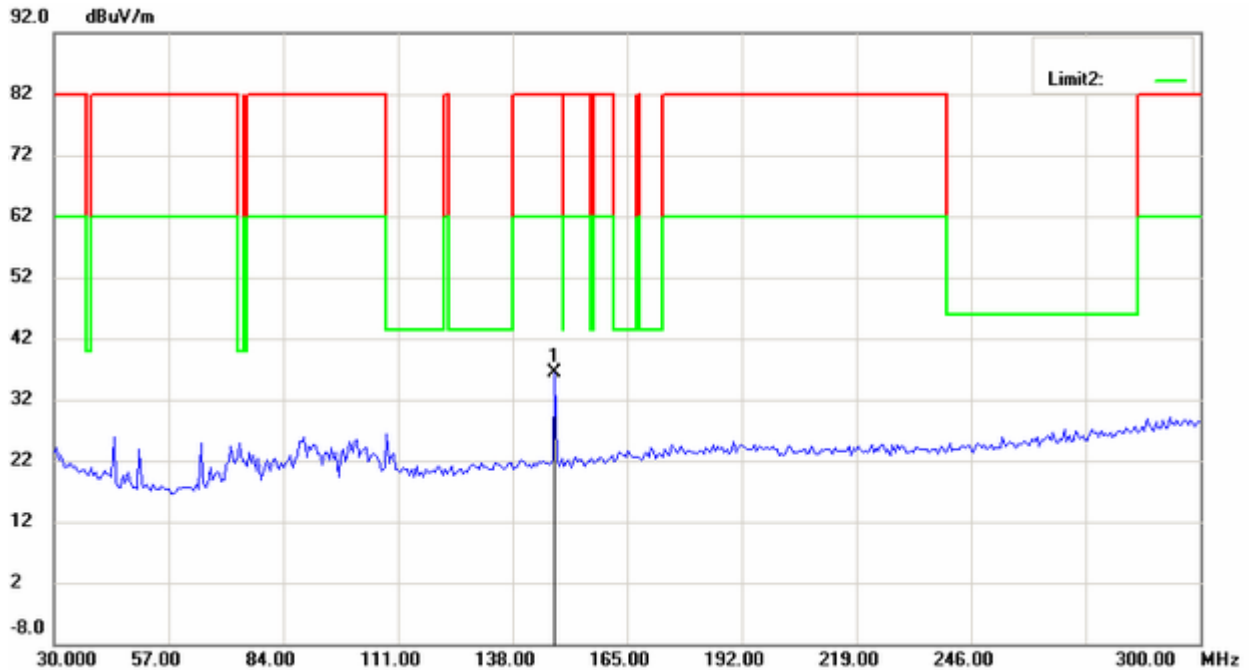
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

Antenna Polarization V

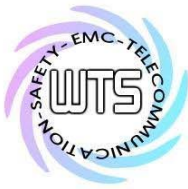


Up Line: Peak Limit Line

Down Line: Ave Limit Line

Note:

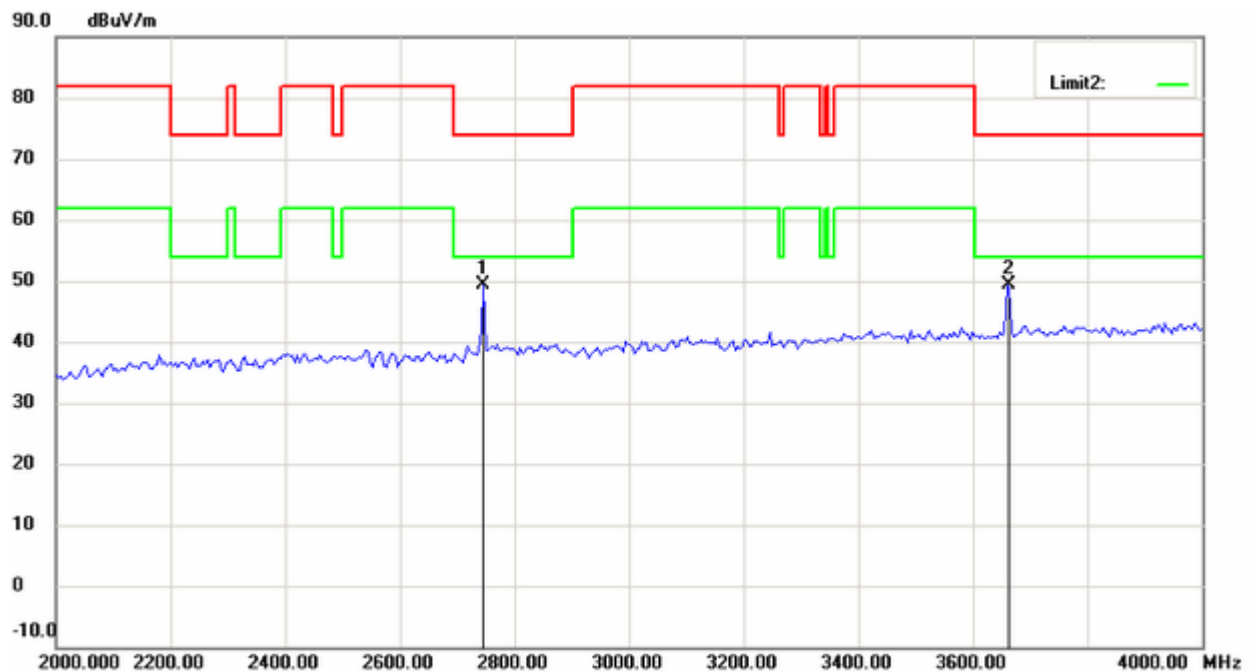
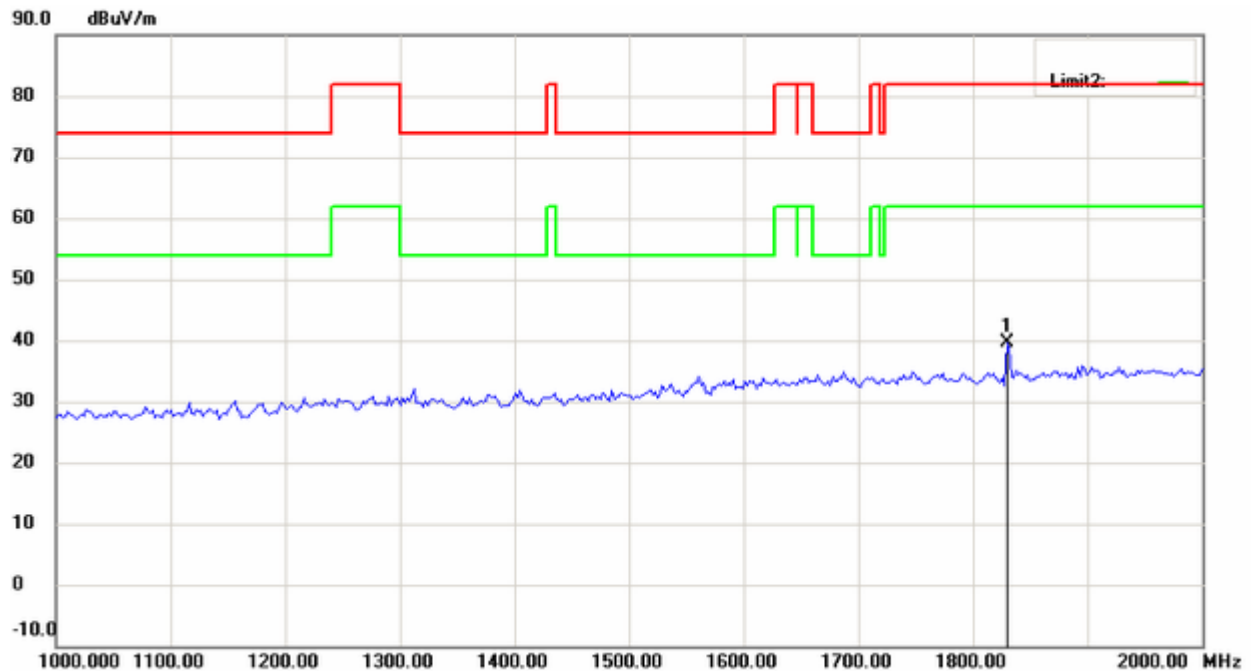
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

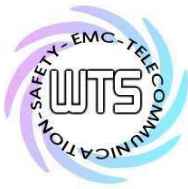
FCC ID: W4920090102



Up Line: Peak Limit Line
Down Line: Ave Limit Line

Note:

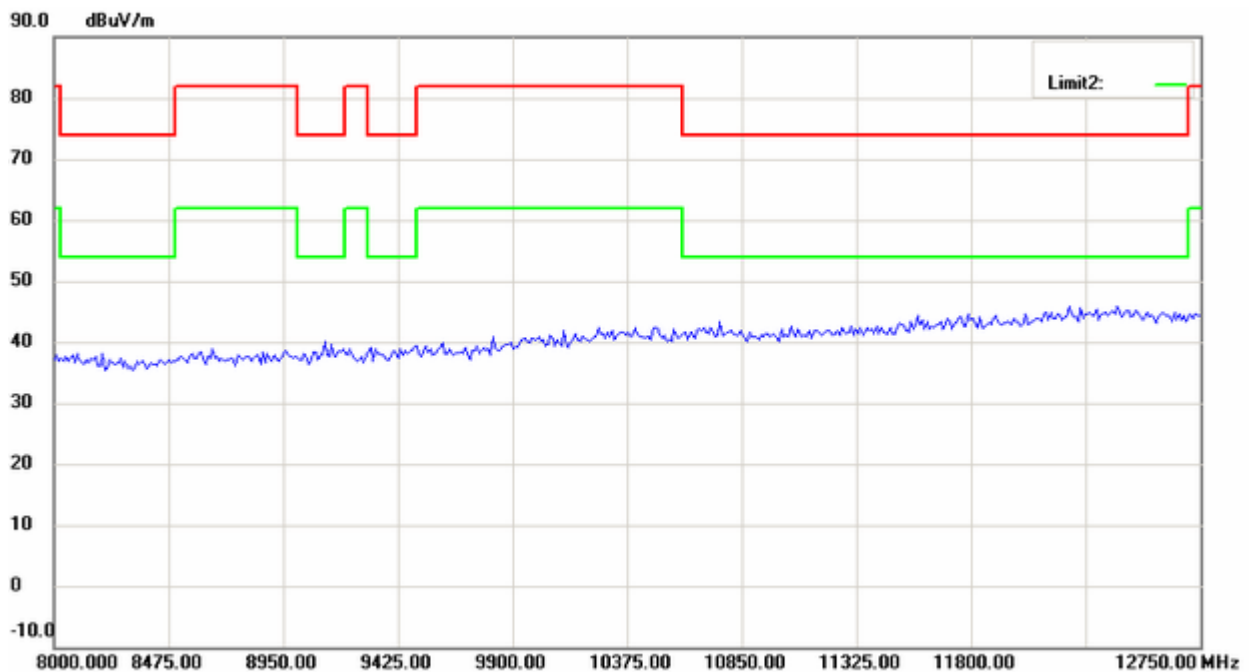
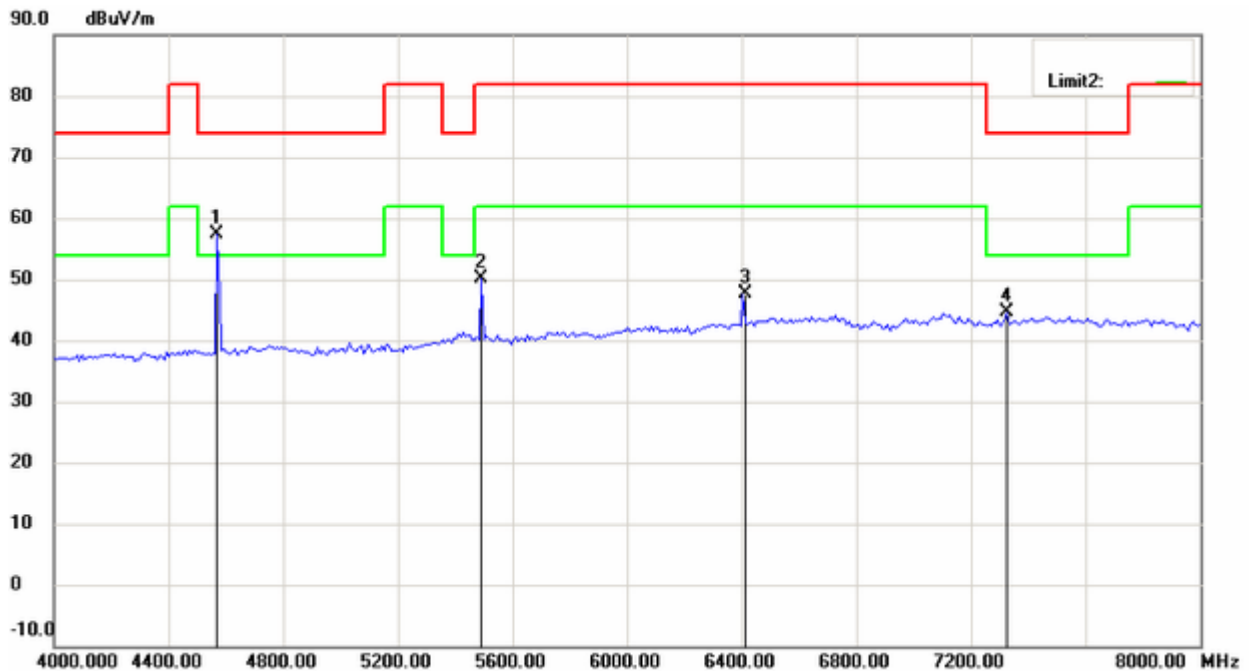
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

FCC ID: W4920090102

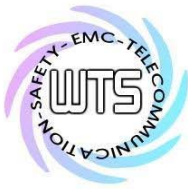


Up Line: Peak Limit Line

Down Line: Ave Limit Line

Note:

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.

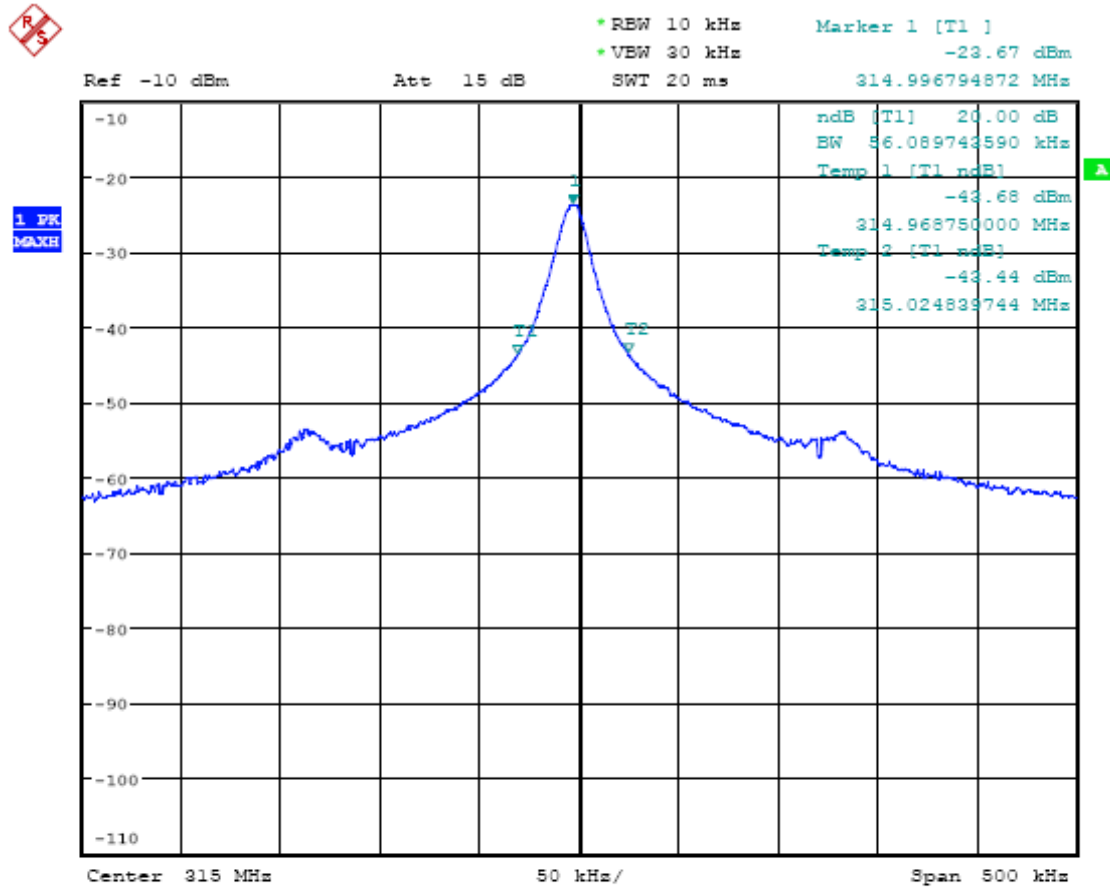


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

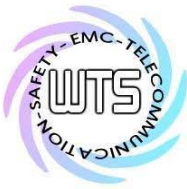
FCC ID: W4920090102

Bandwidth



20dB Bandwidth

Date: 12.JAN.2009 11:41:21

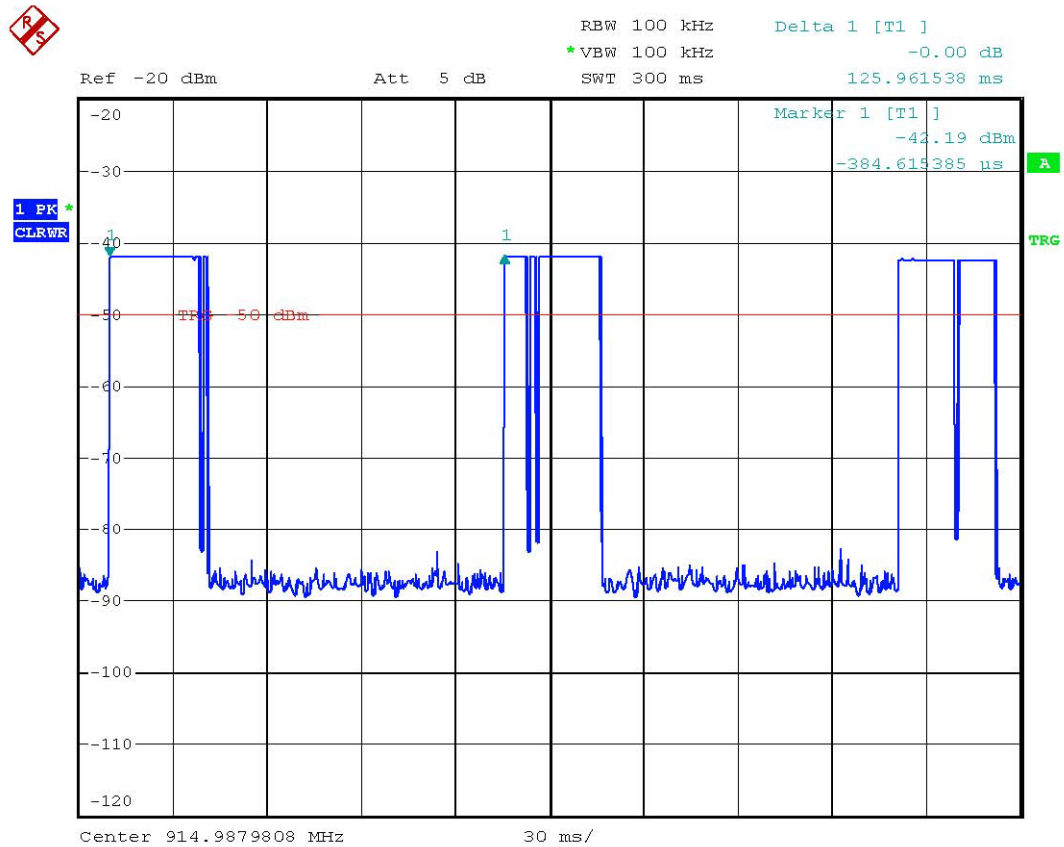


Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1

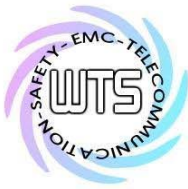
FCC ID: W4920090102

Duty Cycle



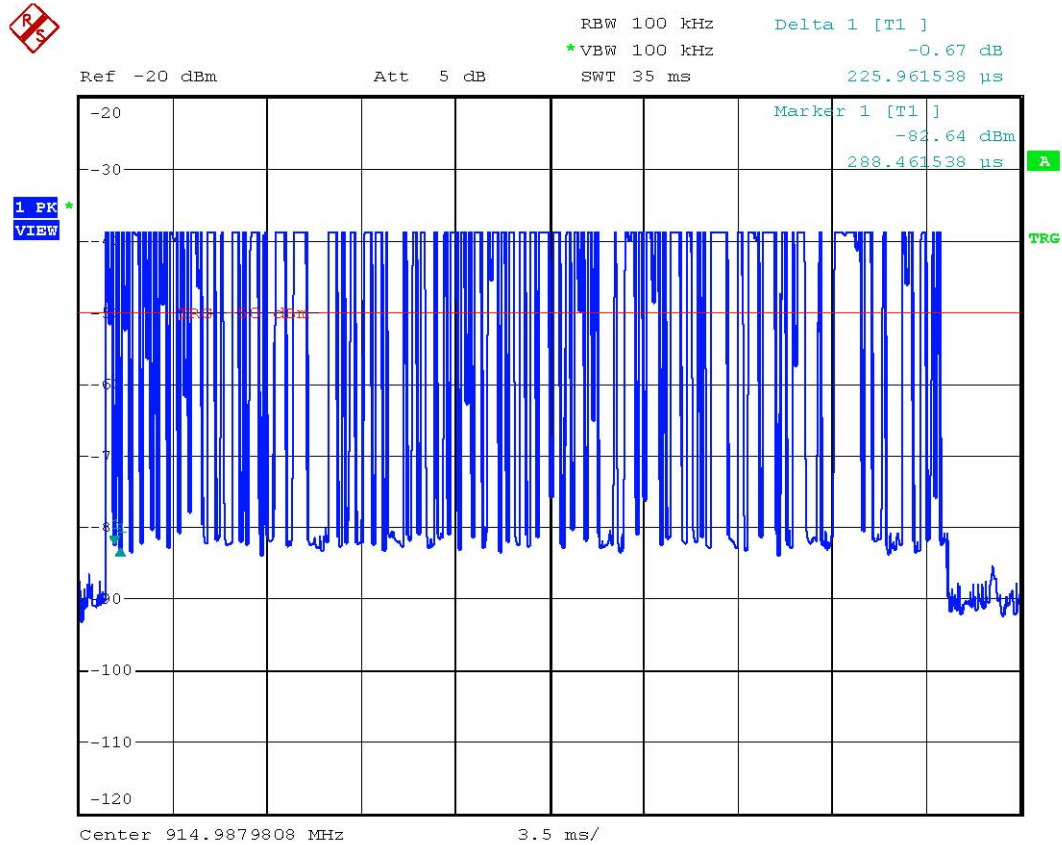
Duty Cycle

Date: 12.JAN.2009 12:48:23



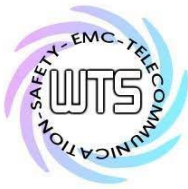
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1
FCC ID: W4920090102



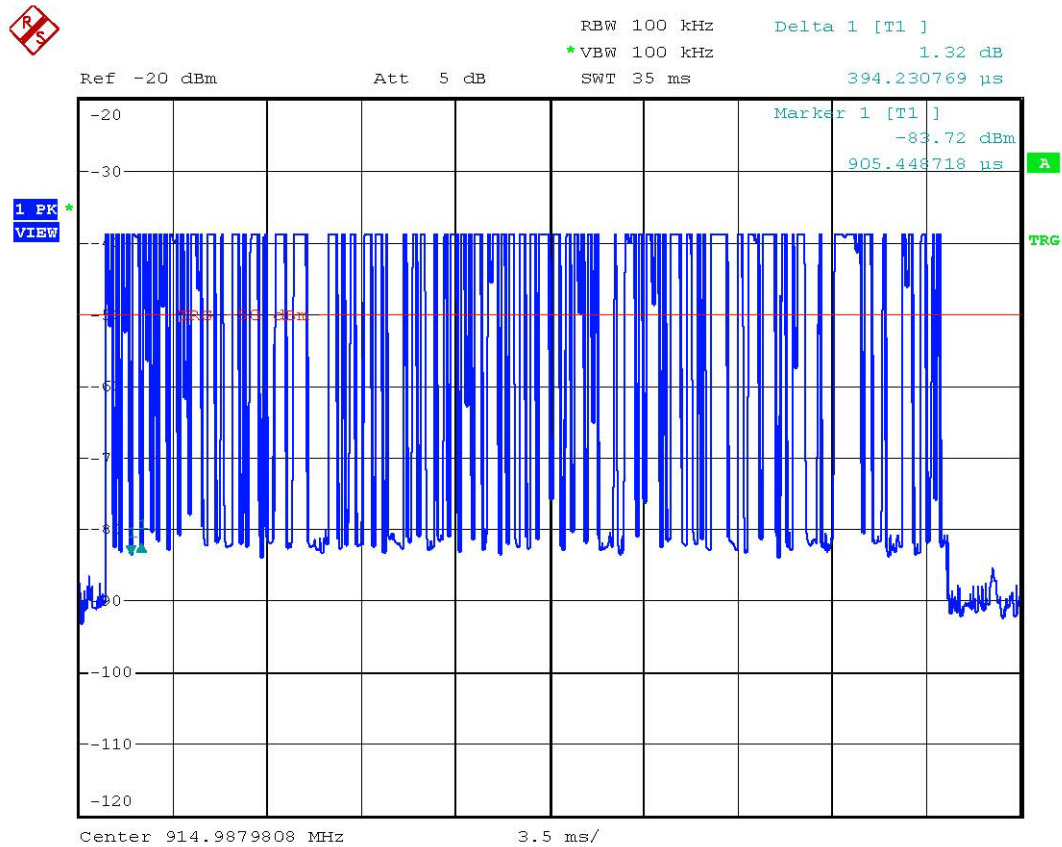
Duty Cycle

Date: 12.JAN.2009 12:50:50



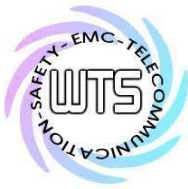
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1
FCC ID: W4920090102



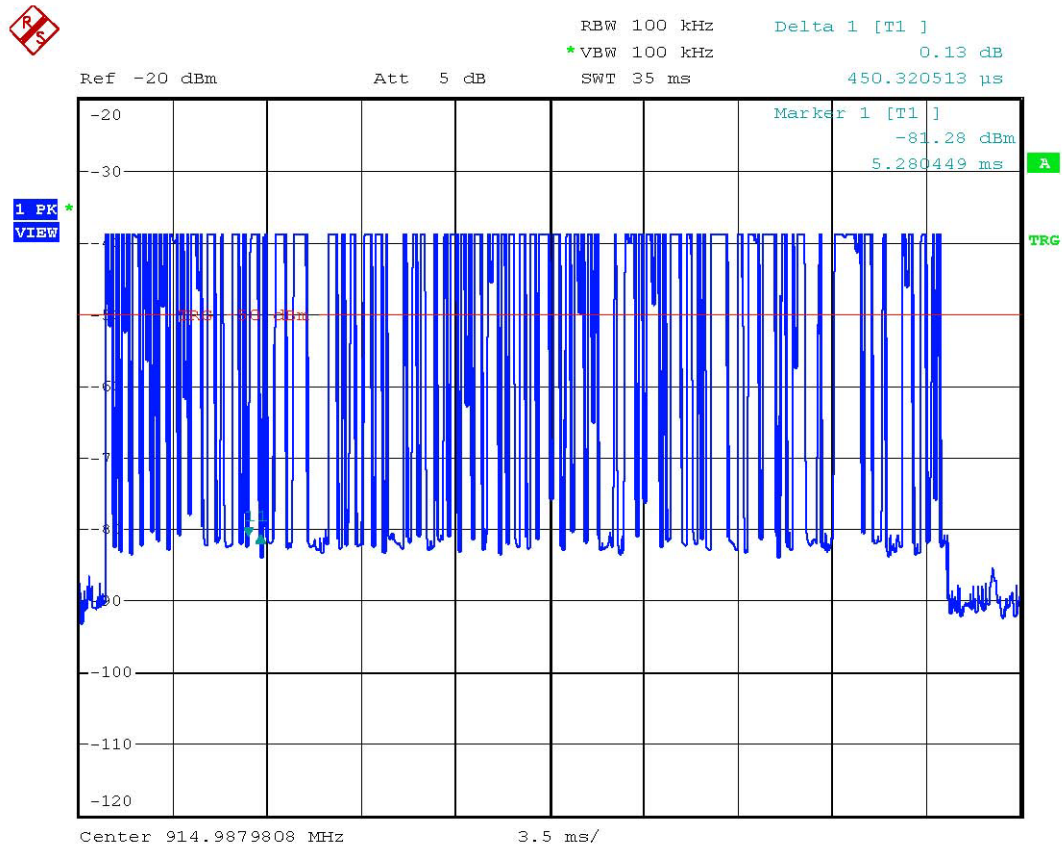
Duty Cycle

Date: 12.JAN.2009 12:51:28



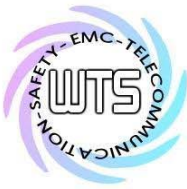
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1
FCC ID: W4920090102



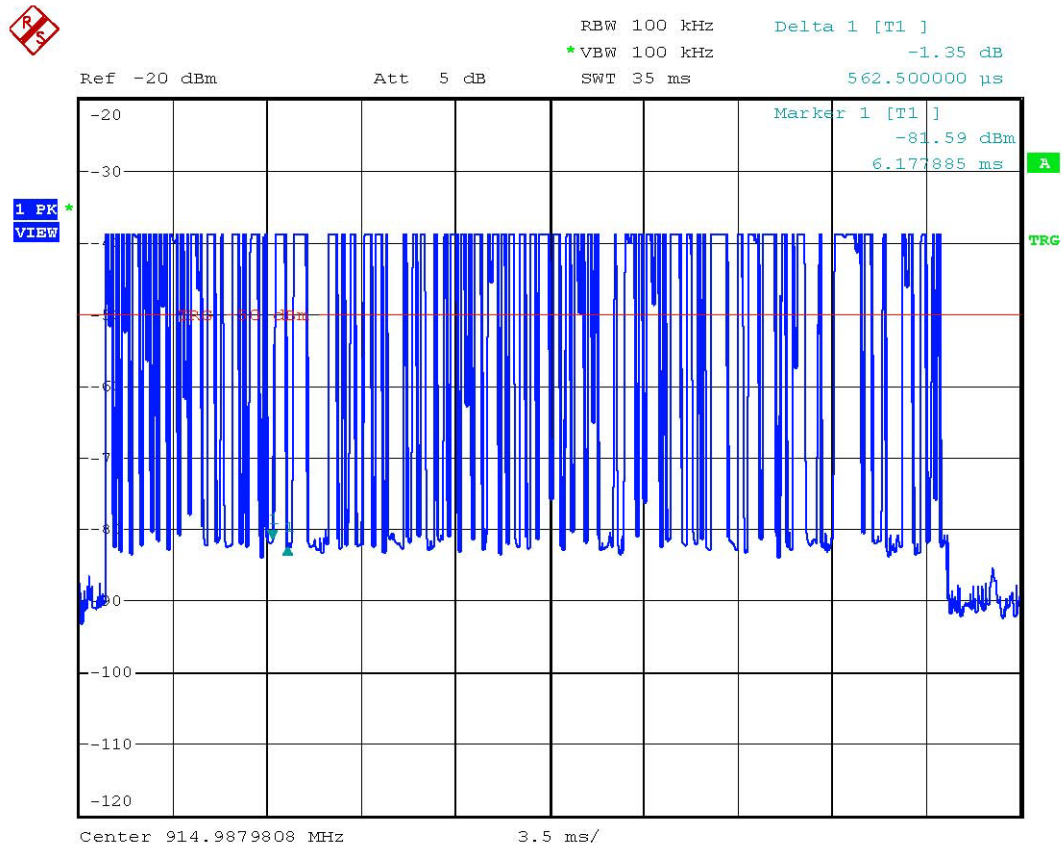
Duty Cycle

Date: 12.JAN.2009 12:54:08



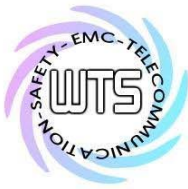
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1
FCC ID: W4920090102



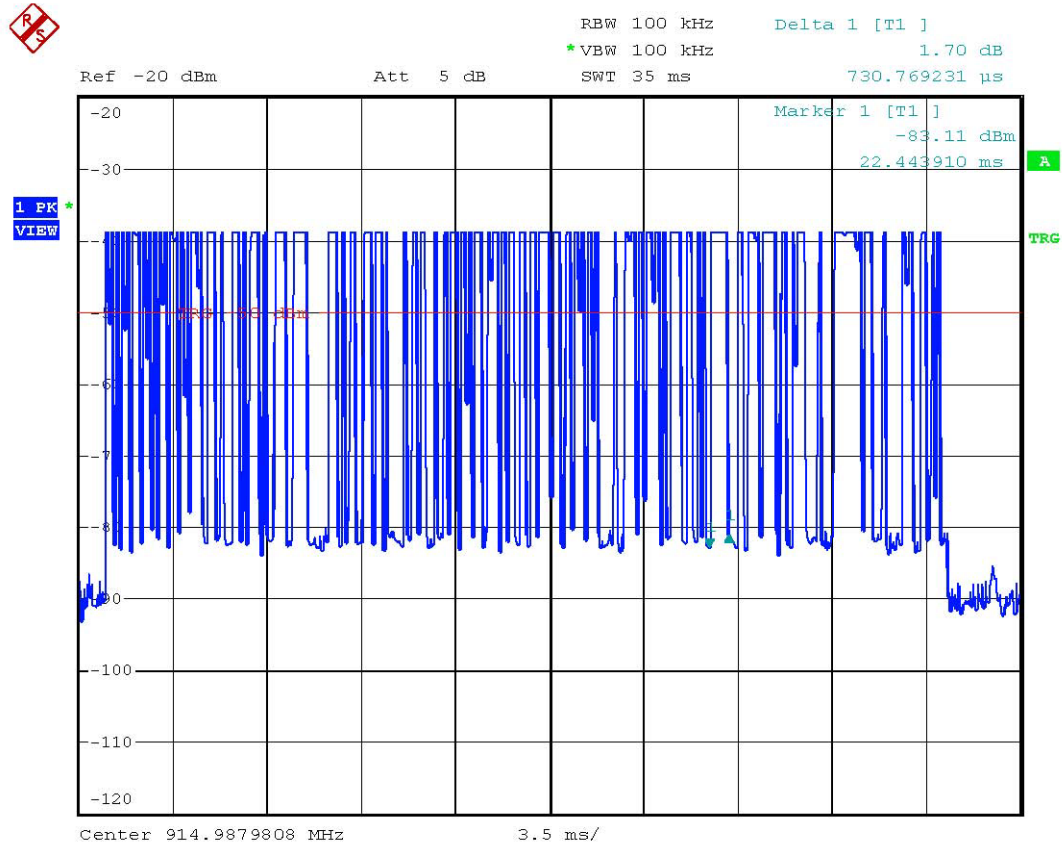
Duty Cycle

Date: 12.JAN.2009 12:55:13



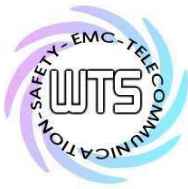
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1
FCC ID: W4920090102



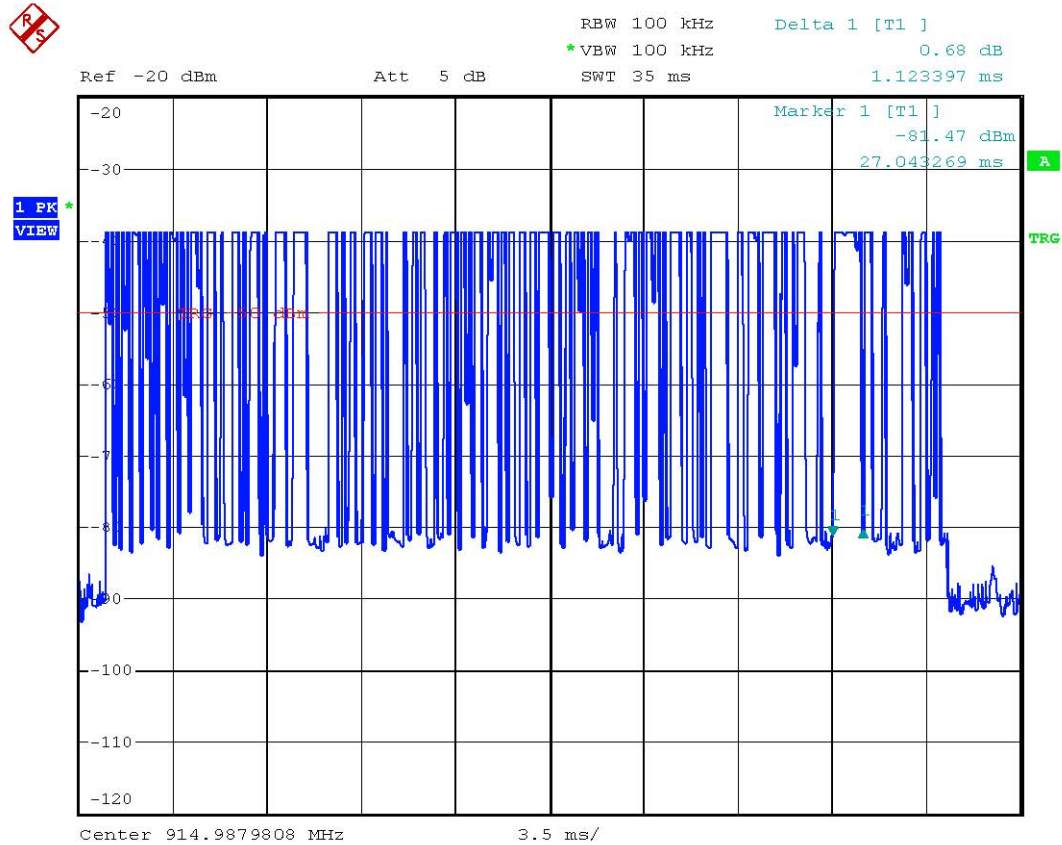
Duty Cycle

Date: 12.JAN.2009 13:07:17



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M20901-9531-C-1
FCC ID: W4920090102



Duty Cycle

Date: 12.JAN.2009 13:08:49