

EMC TEST REPORT

Report No. : TS14020009-EME(R1)
Model No. : 1200769
Issued Date : Aug. 14, 2014
Remark : C version

Applicant: Jebsee Electronics Co., Ltd.
24-3, Sin Le Road Tainan, Taiwan

Test Method/ Standard: 47 CFR FCC Part 15.239 & ANSI C63.4 2009

Test By: Intertek Testing Services Taiwan Ltd.
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Summary of Tests

Test	Reference	Results
Radiated emission	15.239(b)&(c), 15.209	Complies

1. General information

1.1 Identification of the EUT

Product:	FM transmitter
Model No.:	1200769
FCC ID.:	DT91200769
Frequency Range:	88.1MHz to 107.9MHz
Channel Number:	3 channels
Frequency of Each Channel:	88.1MHz, 98.1MHz, 107.9MHz
Access scheme:	FM
Power Supply:	DC 13.8 V from battery
Power Cord:	N/A
Sample Received:	Aug. 12, 2014
Sample condition:	Workable
Test Date(s):	Aug. 12, 2014

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Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The EUT transmitted continuously as power on and pressed button to change different channel.

Modification (R1) to test report No.: TS14020009-EME (Verification No.: TS14020009-EME)

The original Test Report Ref. No.: TS14020009-EME, dated Feb. 13, 2014 was modified on Aug. 14, 2014 to include the following changes and/or additions, which were considered technical modifications:

The antenna out and general ground are separated, the other circuit has not been changed.

After engineer judgment, Radiated Spurious Emission test (30MHz ~ 1GHz) was considered necessary.

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain: 0 dBi

Antenna Type: Dipole antenna

Connector Type: N/A

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
iPad mini	APPLE	MT531TA/A	F85LG24QF196	FCC DoC Approved

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.239.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

EUT transmits continuously as power on and press button to change different channel.

2.3 Test equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2013/12/03	2014/12/02
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100186	2014/01/20	2015/01/19
Horn Antenna (1-18G)	Schwarzbeck	BBHA 9120 D	9120D-456	2012/09/03	2014/09/02
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2012/09/05	2014/09/04
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-172	2013/08/08	2015/08/07
Loop Antenna	RolfHeine	LA-285	02/10033	2014/03/18	2016/03/16
Pre-Amplifier	MITEQ	AFS44-00102650 --42-10P-44	1495287	2013/10/27	2015/10/26
Pre-Amplifier	MITEQ	JS4-26004000--2 7-8A	828825	2012/9/18	2014/9/17
Power Meter	Anritsu	ML2495A	0844001	2013/10/10	2014/10/09
Power Sensor	Anritsu	MA2411B	0738452	2013/10/10	2014/10/09
Temperature & Humidity Test Chamber	TERCHY	MHU-225LRU (SA)	950838	2014/06/12	2015/06/11
Two-Line -V-Network	Rohde & Schwarz	ESH3-Z5	825562/003	2013/10/12	2014/10/11
Two-Line V-Network	Rohde & Schwarz	ESH3-Z5	838979/014	2013/10/12	2014/10/11
Singal Analyzer	Agilent	N9030A	MY51380492	2013/09/19	2014/09/18

Note: The above equipments are within the valid calibration period.

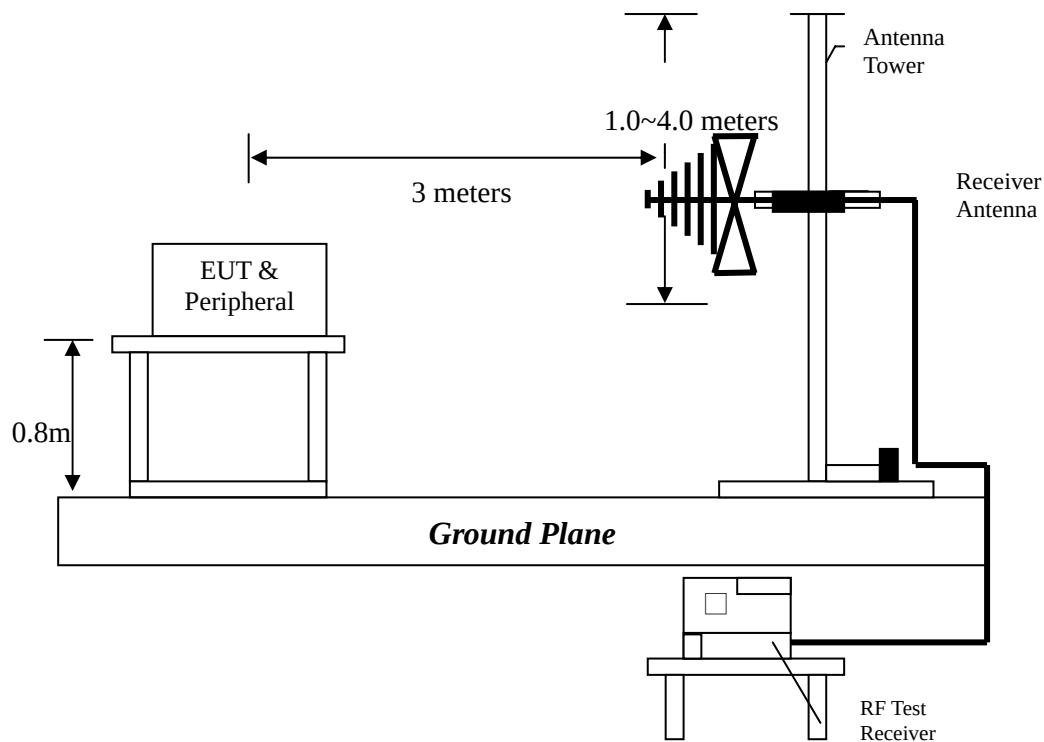
3. Radiated emission test FCC 15.239 (b) & (c)

3.1 Operating environment

Temperature:	20	°C
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa
Test data:	Aug. 12, 2014	

3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraphs), the Peak reading (1MHz RBW/ 3MHz VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

3.3 Emission limit

3.3.1 Fundamental emission limit

Frequency (MHz)	Field Strength of Fundamental	
	(uV/m@3m)	(dBuV/m@3m)
88-108	250	48

The emission limit above is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

3.3.2 General radiated emission limits

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

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring antenna and the closed point of any part of the device or system

Measurement uncertainty was calculated in accordance with TR 100 028-1.

Parameter	Uncertainty		
Radiated Emission	Below 1 GHz	Vertical	3.90 dB
		Horizontal	3.86 dB
	Above 1 GHz	Vertical	5.74 dB
		Horizontal	5.55 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

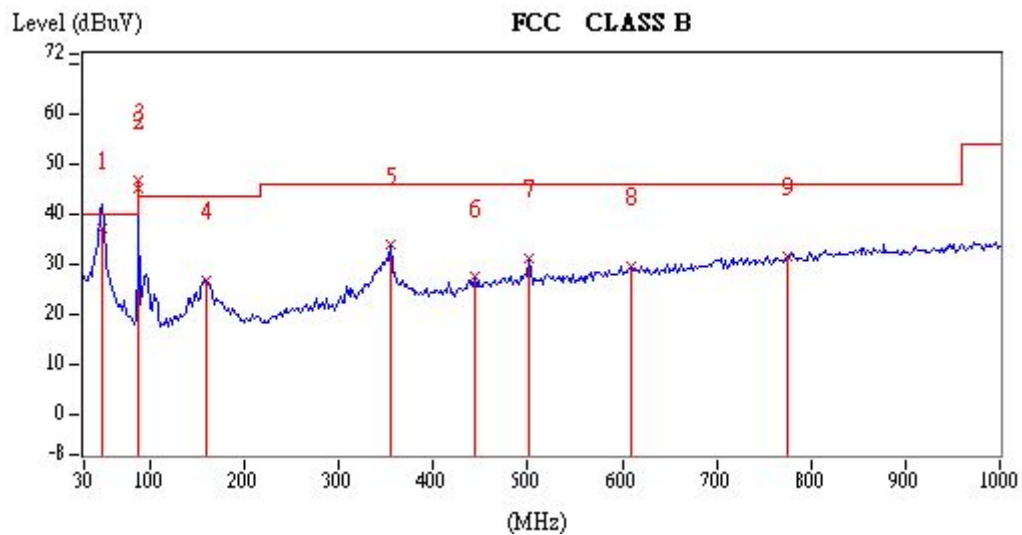
3.4 Radiated emission test data

EUT : 1200769
 Test Condition : Tx at low channel
 Polarization : Horizontal

Polarization (circle)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
Horizontal	49.4	QP	17.06	21.65	38.72	40.00	-1.28
Horizontal	88.10	AV	10.82	33.41	44.23	48.00	-3.77
Horizontal	88.10	PK	10.82	37.12	47.94	68.00	-20.06
Horizontal	159.98	QP	16.42	14.92	31.34	43.50	-12.16
Horizontal	274.44	QP	16.66	12.71	29.37	46.00	-16.63
Horizontal	350.10	QP	18.74	17.88	36.62	46.00	-9.38
Horizontal	470.38	QP	21.54	5.73	27.27	46.00	-18.73
Horizontal	705.12	QP	25.79	6.52	32.31	46.00	-13.69
Horizontal	827.34	QP	27.70	5.99	33.69	46.00	-12.31

Remark:

1. Calculated = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. 88.1 MHz = Fundamental Emission

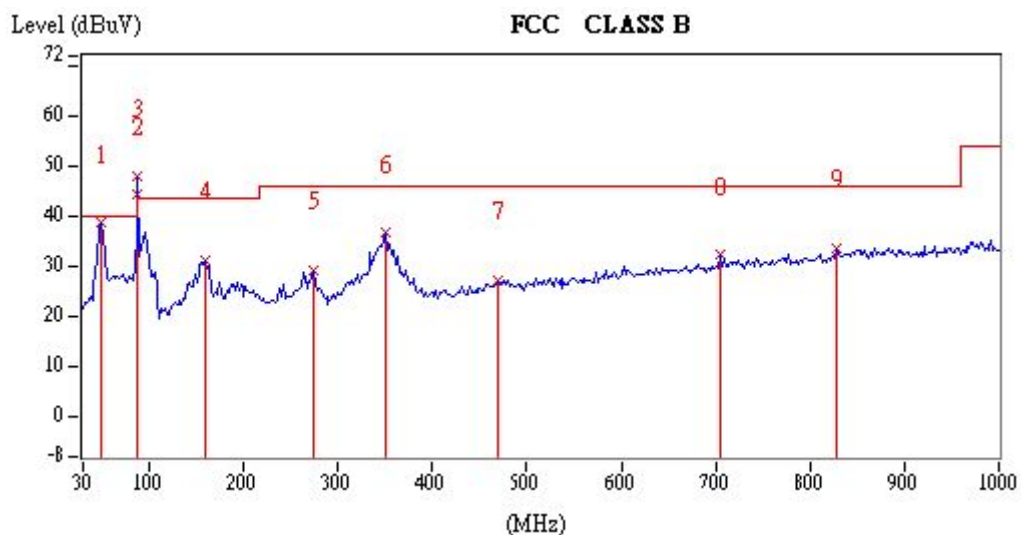


EUT : 1200769
Test Condition : Tx at low channel
Polarization : Vertical

Polarization (circle)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
Vertical	49.04	QP	17.06	20.14	37.2	40.00	-2.8
Vertical	88.10	AV	10.84	34.30	45.14	48.00	-2.86
Vertical	88.10	PK	10.84	35.89	46.73	68.00	-21.27
Vertical	159.98	QP	16.42	10.55	26.97	43.50	-16.53
Vertical	353.98	QP	18.83	15.03	33.86	46.00	-12.14
Vertical	443.22	QP	21.03	6.55	27.58	46.00	-18.42
Vertical	501.42	QP	22.06	9.18	31.24	46.00	-14.76
Vertical	610.06	QP	24.35	5.38	29.73	46.00	-16.27
Vertical	774.96	QP	26.92	4.69	31.61	46.00	-14.39

Remark:

1. Calculated = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. 88.00 MHz = Fundamental emission

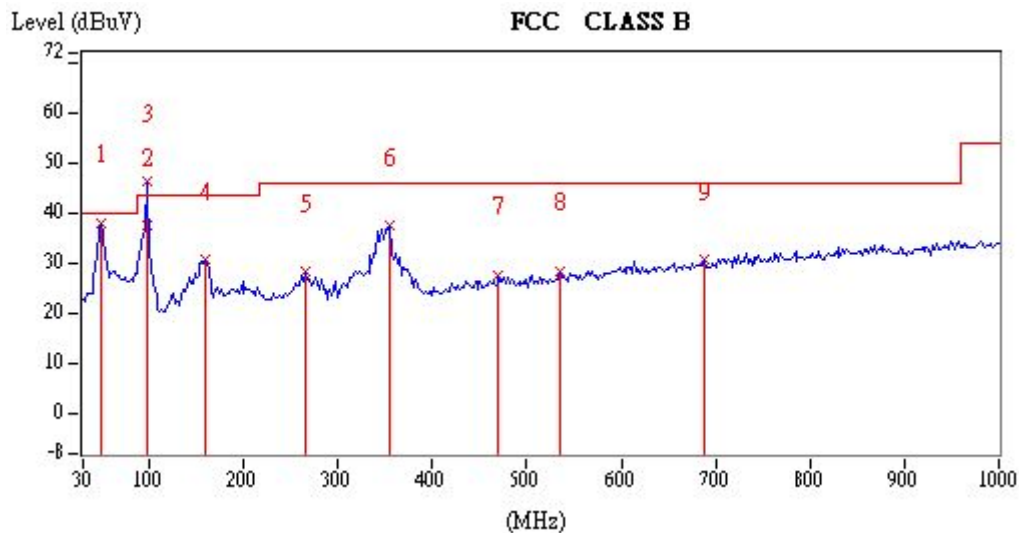


EUT : 1200769
Test Condition : Tx at middle channel
Polarization : Horizontal

Polarization (circle)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
Horizontal	49.4	QP	17.06	20.99	38.06	40.00	-1.94
Horizontal	98.1	AV	11.25	26.18	37.43	48.00	-10.57
Horizontal	98.1	PK	11.25	35.14	46.39	68.00	-21.61
Horizontal	159.98	QP	16.42	14.30	30.72	43.50	-12.78
Horizontal	264.74	QP	16.25	12.06	28.31	46.00	-17.69
Horizontal	353.98	QP	18.83	18.60	37.43	46.00	-8.57
Horizontal	470.38	QP	21.54	6.14	27.68	48.00	-20.32
Horizontal	534.40	QP	22.71	5.86	28.57	46.00	-17.43
Horizontal	687.66	QP	25.46	5.24	30.70	46.00	-15.30

Remark:

1. Calculated = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. 97.90 MHz = Fundamental emission

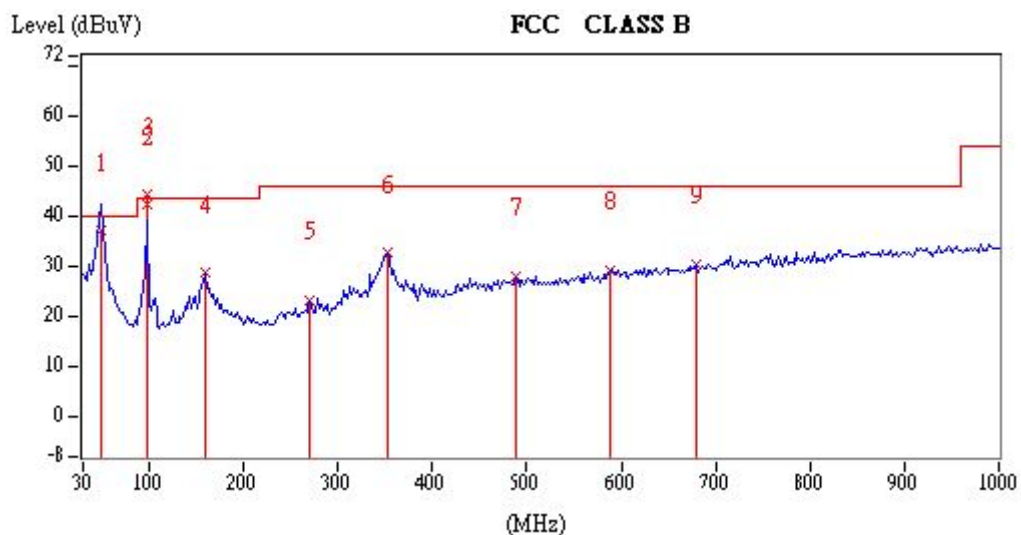


EUT : 1200769
 Test Condition : Tx at middle channel
 Polarization : Vertical

Polarization (circle)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
Vertical	49.4	QP	17.06	20.04	37.10	40.00	-2.90
Vertical	98.10	AV	11.25	31.03	42.28	48.00	-5.72
Vertical	98.10	PK	11.25	33.13	44.38	68.00	-23.62
Vertical	159.98	QP	16.42	12.30	28.72	43.50	-14.78
Vertical	270.56	QP	16.49	6.82	23.31	46.00	-22.69
Vertical	352.04	QP	18.79	13.94	32.73	46.00	-13.27
Vertical	487.84	QP	21.83	6.27	28.10	46.00	-17.90
Vertical	588.72	QP	23.98	5.31	29.29	46.00	-16.71
Vertical	679.90	QP	25.31	5.27	30.58	46.00	-15.42

Remark:

1. Calculated = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. 97.90 MHz = Fundamental emission

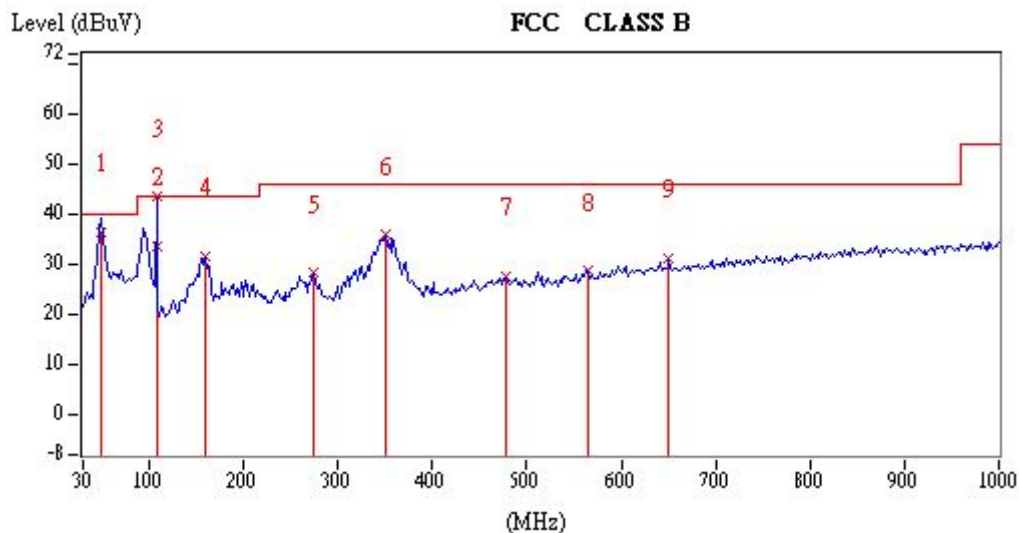


EUT : 1200769
Test Condition : Tx at high channel
Polarization : Horizontal

Polarization (circle)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
Horizontal	49.40	QP	17.06	19.35	36.41	40.00	-3.59
Horizontal	107.90	AV	12.73	20.95	33.68	48.00	-14.32
Horizontal	107.90	PK	12.73	30.72	43.46	68.00	-24.54
Horizontal	159.98	QP	16.42	15.36	31.78	43.50	-11.72
Horizontal	274.44	QP	16.66	11.59	28.25	46.00	-17.75
Horizontal	350.10	QP	18.74	17.25	35.99	46.00	-10.01
Horizontal	478.14	QP	21.67	5.95	27.62	46.00	-18.38
Horizontal	565.44	QP	23.40	5.22	28.62	46.00	-17.38
Horizontal	650.80	QP	24.74	6.49	31.23	46.00	-14.77

Remark:

1. Calculated = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. 107.60 MHz = Fundamental emission



EUT : 1200769
Test Condition : Tx at high channel
Polarization : Vertical

Polarization (circle)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
Vertical	49.40	QP	17.06	20.30	37.36	40.00	-2.64
Vertical	107.90	AV	12.73	25.92	38.65	48.00	-9.35
Vertical	107.90	PK	12.73	28.03	40.76	68.00	-27.24
Vertical	161.92	QP	16.35	9.68	26.03	43.50	-17.47
Vertical	280.26	QP	16.90	7.32	24.22	46.00	-21.78
Vertical	352.04	QP	18.79	13.56	32.35	46.00	-13.65
Vertical	478.14	QP	21.67	6.82	28.49	46.00	-17.51
Vertical	575.14	QP	23.64	5.42	29.06	46.00	-16.94
Vertical	650.80	QP	24.74	6.28	31.02	46.00	-14.98

Remark:

1. Calculated = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. 107.60 MHz = Fundamental emission

