FCC TEST REPORT

Product Name	Telematics Terminal
Model Name	MVL-GPS
Applicant	UTOFOS WIRELESS Co., Ltd.
FCC ID	TAVMVL-GPS

ESTECH CO., LTD

Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204

FCC Test Report

Report Number	ESTR0603-010			
Applicant	Company Name	UTOFOS WIRELESS Co., Ltd.		
	Address	152-848, #601, Kolon Science Valley 187-10, Guro 3Dong, GuroGu Seoul Korea		
Product	Product Name	Telematics Terminal		
	Model No.	MVL-GPS	Manufacturer	UTOFOS WIRELESS Co., Ltd.
	Serial No.	NONE	Country of origin	KOREA
Other	Issued Date	2006-03-13	Tested Date	2005-02-17 ~ 2006-03-13
Test Result	**Pass**			
Standard	**FCC PART 22 Subpart H**			
Tested by	S.R. Kim/ Engineer	(Signature)		
Approved by	Jay Kim/ Engineering Manager	(Signature)		

ESTECH CO., LTD

Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204

o This is certified that the above mentioned products have been tested for the sample provided by client.

o No part of this document may not be duplicated or reproduced by any means without the express written permission of Estech Co., Ltd.

Contents

1. General Information	Page 4
2. Laboratory Information	Page 5
3. Summary of Test Results	Page 5
4. RF Output Power	Page 6
5. Occupied Bandwidth	Page 8
6. Spurious and Harmonic Emission at Antenna Terminal	Page 10
7. Field Strength of Spurious Radiation	Page 15
8. Frequency stability	Page 17

1. General Information

1.1 EUT Description

FCC ID	**TAVMVL-GPS**
Product Name	**Telematics Terminal**
Model Name	**MVL-GPS**
Frequency	**Tx :824.82 ~ 848.19 MHz**
	Rx :869.82 ~ 893.19 MHz
Channel	**CDMA (1017/383/773)**
Modulation Type	**CDMA**
Power Rating	**12VDC(9.0 ~ 26VDC)**

2. Laboratory Information

2.1 Laboratory Name Estech Co., Ltd.

2.2 Location

Head Office	Rm. 1015, World Venture Center II, 426-5 Gasan-dong Geumcheon-gu, Seoul, 153-803. Korea.
EMC Lab(Ichon)	58-1, Osan-Ri, GaNam-Myon, YeoJoo-Gun, KyungKi-Do, Korea
EMC Lab(Yanggi)	97-1, Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea

2.3 Quality System Accredited by KOLAS(ISO/IEC 17025)

2.4 Major Accredited Mark

3. Summary of Test Results

Test Item	Standard	Result
RF Output Power	Part 22	PASS
Occupied Bandwidth		PASS
Spurious and Harmonic Emission at Antenna Terminal		PASS
Field Strength of Spurious Radiation		PASS
Frequency stability		PASS

4. RF Output Power

4.1 Test Procedure

The EUT was placed on a wooden turn table 3 meters from the receive antenna. The receive antenna height and turn table rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1MHz, A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For reading 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

4.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model
Receiver	Rohde & Schwarz	ESP17
Signal Generator	HP	83620B
Power Meter	HP	EPM-442A
Pre Amplifier	SONOMA INSTRUMENT	310N
Horn Antenna	SCHWARZBECK	BBHA 9120 D
Horn Antenna	SCHWARZBECK	BBHA 9120 D

4.3. Test Results

Ch No.	Freq (MHz)	Peak Power Meter(dBm)	Peak Power ERP(dBm)
1017	824.82	25.01	21.01
383	836.49	24.98	20.65
773	848.19	24.95	20.29

FREQ (MHz)	Receiver Reading (dBuV)	Correction Factor (dB)		SG Reading (dBm)	ERP (dBm)	Limit (dBm)	POL (H/V)
		Antenna gain(dBd)	Cable Loss (dB)				
824.82	98.04	1.0	3.30	23.31	21.01	38.5	V
836.49	96.07	1.3	3.30	22.65	20.65	38.5	V
848.19	96.03	1.6	3.30	21.99	20.29	38.5	V

5. Occupied Bandwidth

5.1 Test Procedure

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% of the Emission bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

5.2 Test Equipments

The following test equipments are used during tests

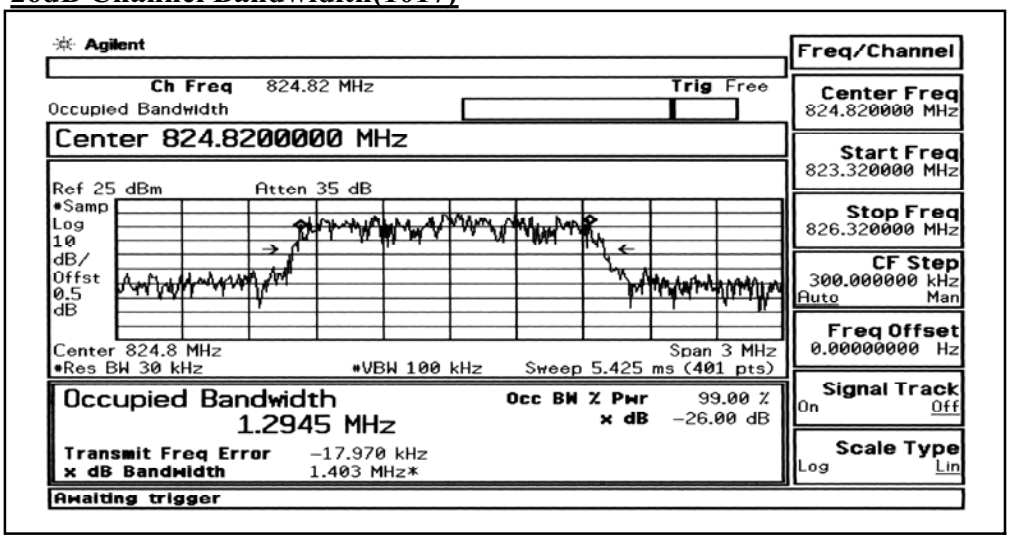
Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E4407B
-		

5.3 Test Results

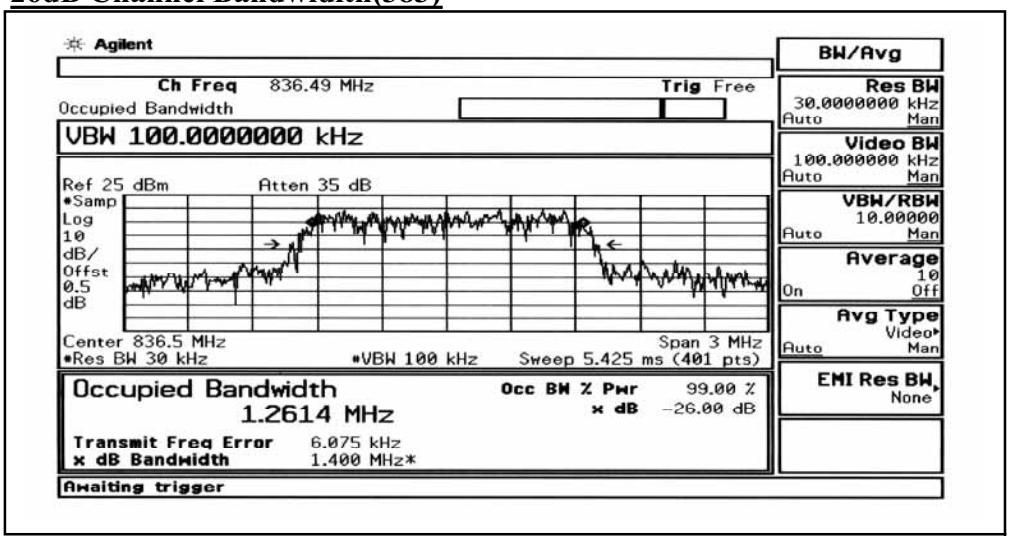
Channel	Frequency(MHz)	26dB Bandwidth(MHz)
1017	824.82	1.403
383	836.49	1.400
773	848.19	1.418

5.4 Test Plot

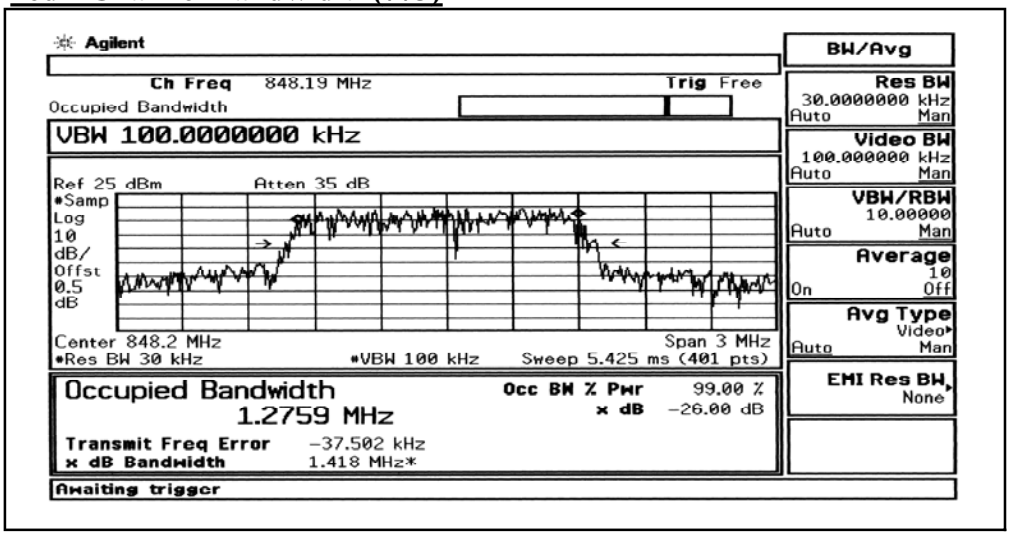
26dB Channel Bandwidith(1017)



26dB Channel Bandwidith(383)



26dB Channel Bandwidith(773)



6. Spurious and Harmonic Emission at Antenna Terminal

6.1 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to 10GHz. Set the RES BW to 1% of the emission bandwidth to show compliance with the -13dBm, limit, in the 1MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

For the Out-of-Band measurements a 1MHz RBW was used to scan from 10MHz to 10xfo of the fundamental carrier for all frequency block. A display line was placed at -13dBm to show compliance for spurious, and harmonics.

22.917(f): Mobile emission in base frequency range. The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitter operated must be attenuated to a level not to exceed -80dBm at the transmit antenna connector.

6.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E4407B
-		

6.3 Test Results

CDMA (Spurious Emission: Band Edge)

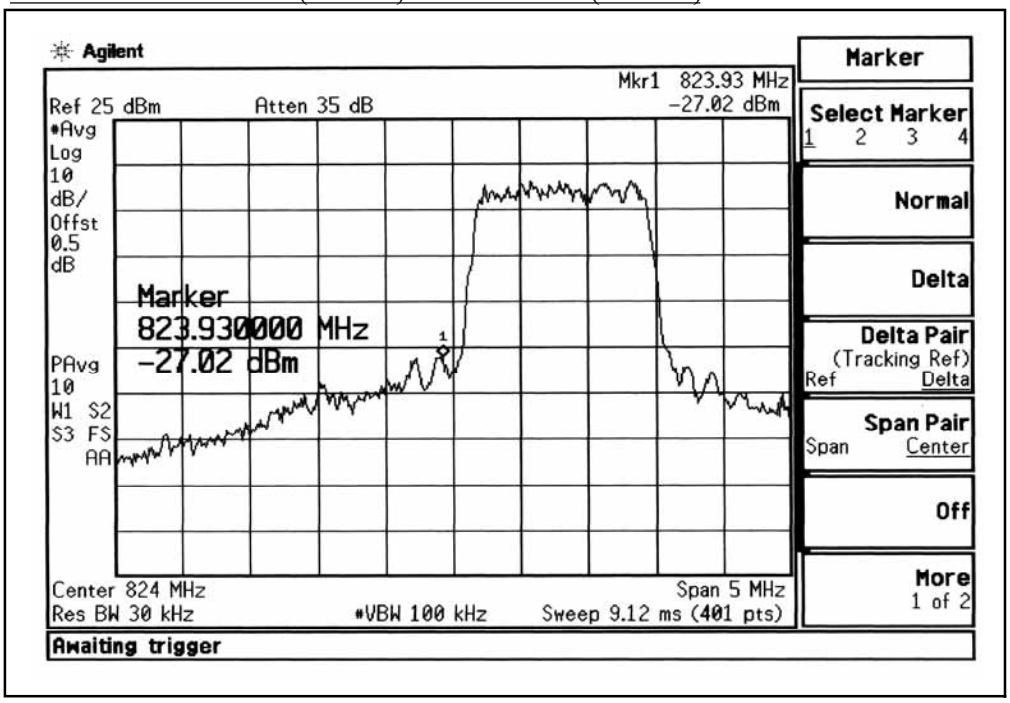
Channel	Frequency	Result	Limit	Margin
1017	824.82	-27.02	-13.00	14.02
773	848.19	-30.97	-13.00	17.97

CDMA (Spurious Emission: Out of Band)

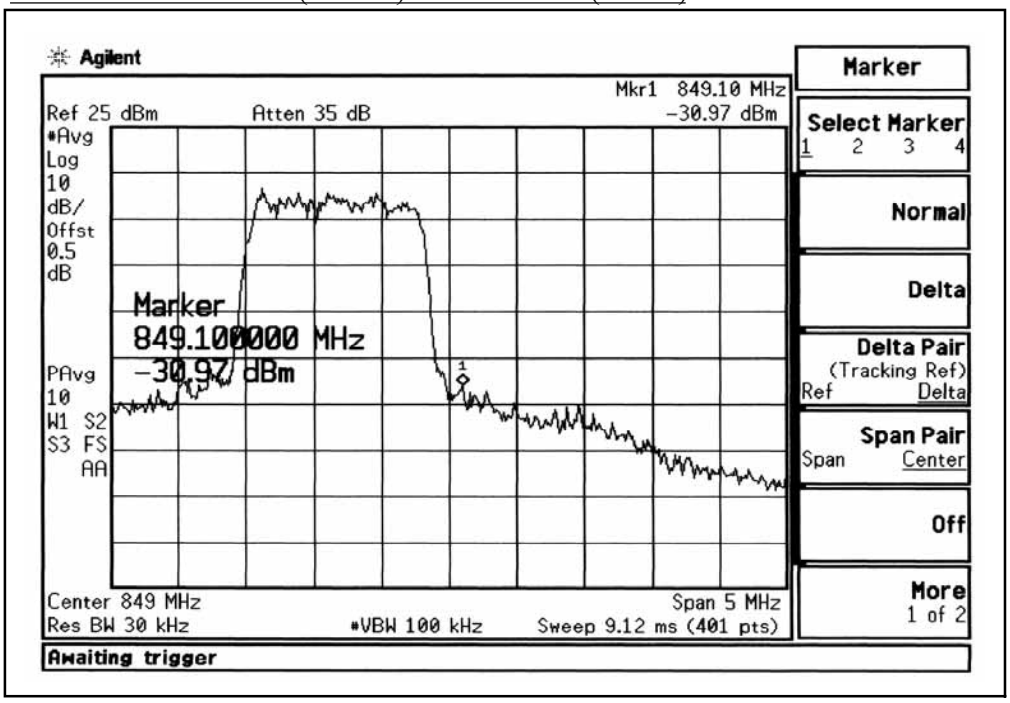
Channel	Frequency	Result	Limit	Margin
1017	824.82	-22.00	-13.00	9.00
383	836.49	-22.17	-13.00	9.17
773	848.19	-20.83	-13.00	7.83

6.5 Test Plot

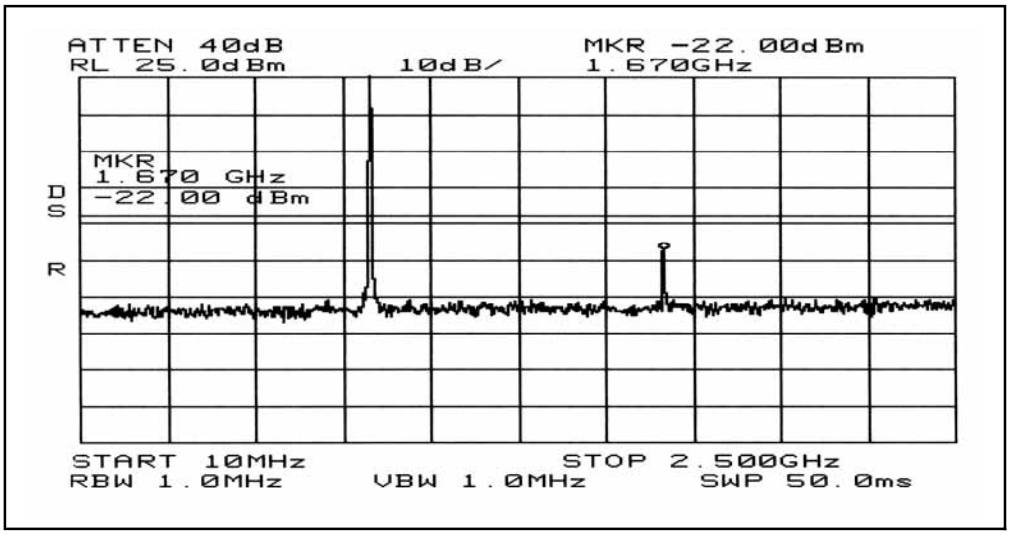
PLOTS OF EMISSION (CDMA): BAND EDGE(Ch1017)

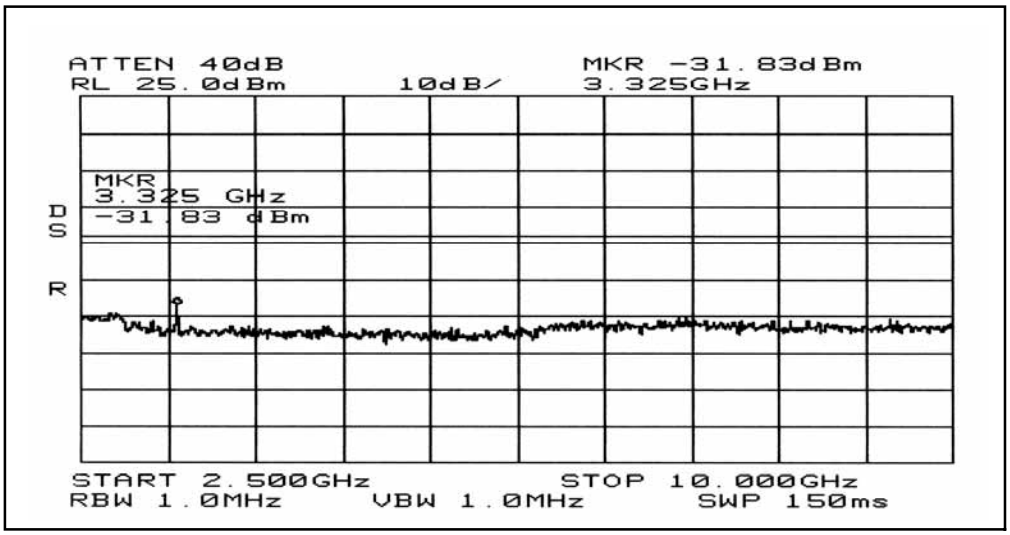


PLOTS OF EMISSION (CDMA): BAND EDGE(Ch773)

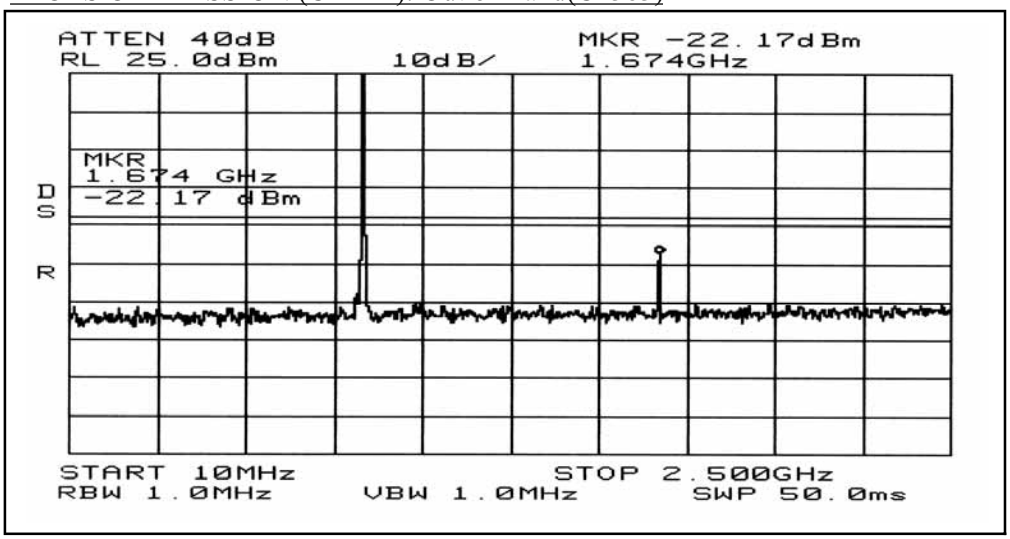


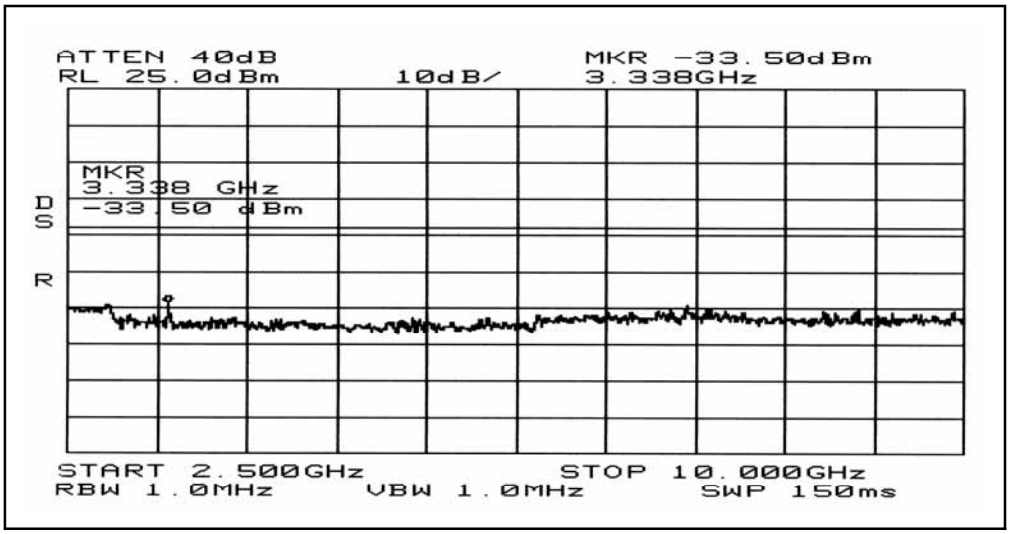
PLOTS OF EMISSION (CDMA): Out of Band(Ch1017)



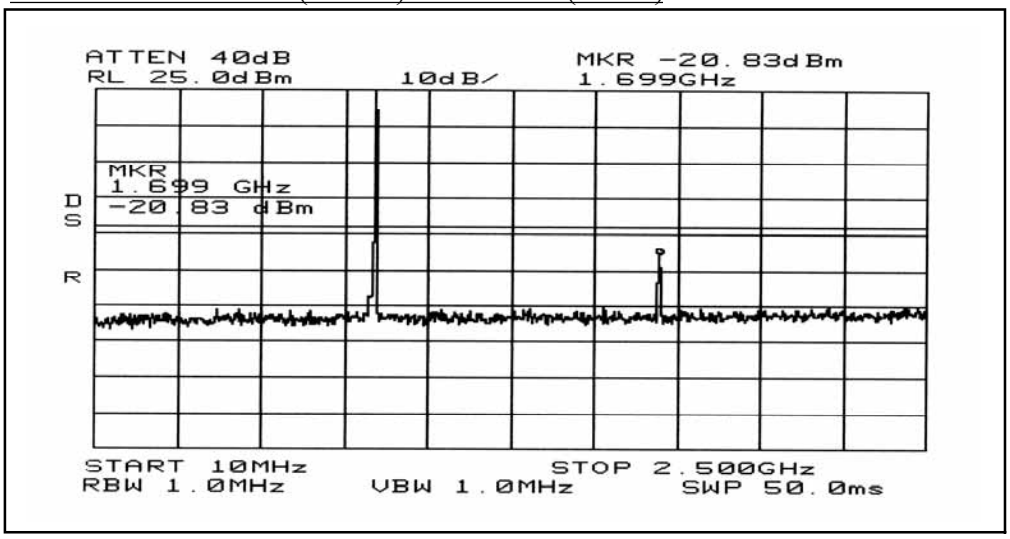


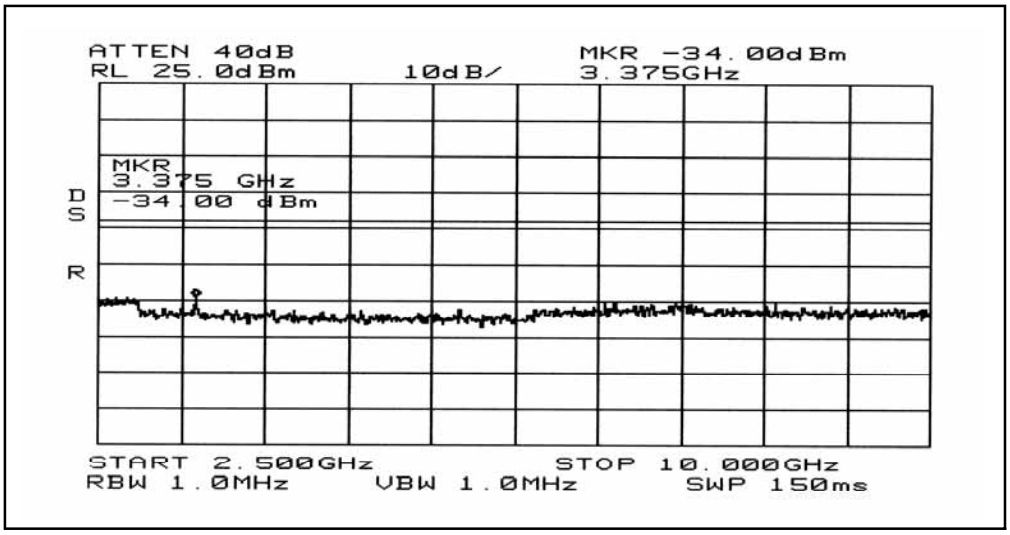
PLOTS OF EMISSION (CDMA): Out of Band(Ch383)



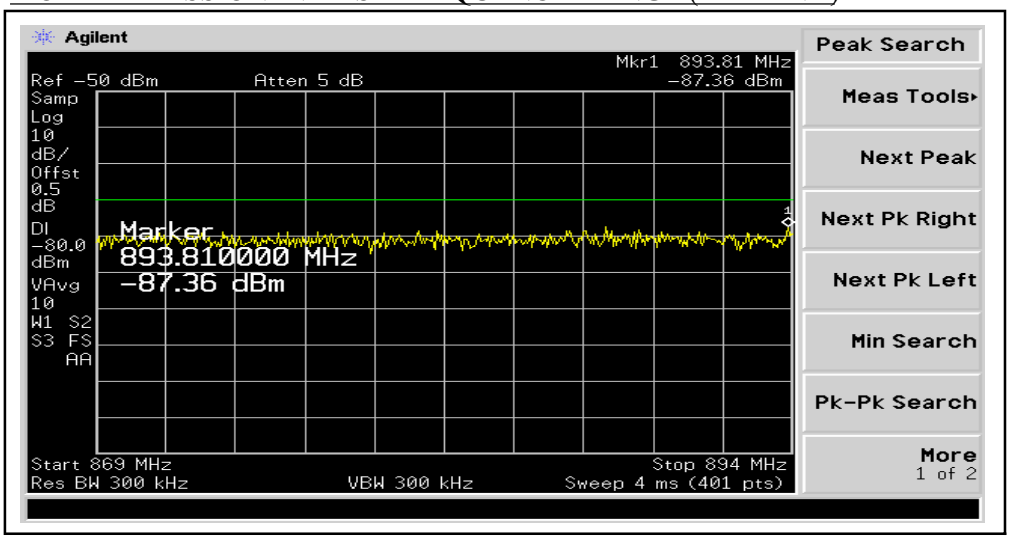


PLOTS OF EMISSION (CDMA): Out of Band(Ch773)





MOBILE EMISSION IN BASE FREQUENCY RANGE (RX BAND)



7. Field Strength of Spurious Radiation

7.1 Test Procedure

Radiation and harmonic emission are measured outdoors at our 3 meters test range. The equipment under test is placed on a wooden turntable 3 meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer (or receiver). A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

7.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model
Receiver	Rohde & Schwarz	ESP17
Signal Generator	HP	83620B
Pre Amplifier	SONOMA INSTRUMENT	310N
Horn Antenna	SCHWARZBECK	BBHA 9120 D
Horn Antenna	SCHWARZBECK	BBHA 9120 D

7.3 Test Results

CDMA(Ch 1017)

Frequency (MHz)	Receiver Reading(dBuV	Correction Factor(dB)		ERP(dBm)		Limit(dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
1649.64	89.01	7.25	3.05	-26.81	-22.61	-13.00	V
2474.46	71.20	8.45	4.36	-39.54	-35.45	-13.00	H

CDMA(Ch 383)

Frequency (MHz)	Receiver Reading(dBuV	Correction Factor(dB)		ERP(dBm)		Limit(dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
1672.98	90.00	7.25	3.05	-27.49	-23.29	-13.00	V
2509.47	75.42	8.45	4.36	-36.36	-32.27	-13.00	H

CDMA(Ch 773)

Frequency (MHz)	Receiver Reading(dBuV	Correction Factor(dB)		ERP(dBm)		Limit(dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
1696.38	86.00	7.25	3.05	-31.31	-27.11	-13.00	V
2544.57	75.76	8.45	4.36	-37.42	-33.33	-13.00	H

8. Frequency stability

8.1 Test Procedure

The frequency stability of the transmitter is measured by:

a) Temperature: The temperature is varied from -30℃ to +60℃ using an environmental chamber.

b) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

※ The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±2.5ppm of the center frequency.

8.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model
DC Power Supply	INTERACT	AK-5007
Tem/Hum Chamber	Myung Technology	SM-150-2

8.3 Test Results

Operting Frequency :	836,490,000
Channel :	383
Reference Voltage :	12.00
Deviatin Limit :	0.00025

Voltage (%)	Power (VDC)	Temperature (℃)	Frequency (Hz)	Deviation
100	12.00	+20℃(Ref)	836,490,005	0.000000
100		-30	836,489,955	0.000006
100		-20	836,489,960	0.000005
100		-10	836,489,960	0.000005
100		**0**	836,489,965	0.000005
100		10	836,489,962	0.000005
100		20	836,490,005	0.000000
100		25	836,489,968	0.000004
100		30	836,489,965	0.000005
100		40	836,489,960	0.000005
100		50	836,489,972	0.000004
100		60	836,489,970	0.000004
85	10.2	20	836,489,975	0.000004
115	13.8	20	836,489,980	0.000003
Power EndPoint	9.00	20	836,489,980	0.000003