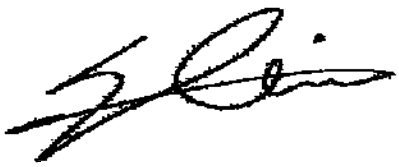
RF TEST REPORT

Test Report No.	:	TK-FR11020 / TK-IR11021
Standards	:	FCC Part 22 & 24 / IC RSS-132 &133
FCC ID	:	U7XMC-7100S
IC Certification	:	7670A-MC7100S
Description of Product	:	M3 SKY
Applicant	:	M3 Mobile Co., Ltd.
Manufacturer	:	M3 mobile Co., Ltd.
Model Name	:	MC-7100S
Date of test(s)	:	2011.04.27 ~ 2011.04.28
Date of issue	:	2011.05.02

The test results relate only to the items tested.

Test and Report Completed by :	**Report Approval by :**
	
Jeff Do Test Engineer	Gyu-cheol Shin Technical Manager

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Revision history

Revision	Date of issue	Test report No.	Description
-	2011.05.01	TK-FR11020 / TK-IR11021	Initial

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1.0 General product description

Equipment model name	:	MC-7100S
2G/3G Module FCC ID	:	QIPHC25
2G/3G Module IC Certification		7830A-HC25
Serial number	:	Prototype
EUT condition	:	Pre-production, not damaged
Frequency Range	:	824.2 ~ 848.8 MHz(GSM850) / 1850.2 ~ 1909.8 MHz(GSM1950)
		826.4 ~ 846.6 MHz(WCDMA-V) / 1852.4 ~ 1907.6 MHz(WCDMA-II)
Max. RF output power	:	1.70 W(GSM850) / 0.91 W(GSM1900)
		0.23 W(WCDMA-V) / 0.20 W(WCDMA-II)
Type of Modulation	:	GSM/WCDMA : GMSK, 8PSK, QPSK
Power Source	:	DC 3.7 V

1.1 Description of test mode

Band	Frequency	Voice	GPRS Data		EDGE Data	
			GPRS	GPRS	EDGE	EDGE
			1 Tx Slot	2 Tx slot	1 Tx Slot	2 Tx slot
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
GSM850	824.2	32.3	32.2	30.8	32.2	30.6
	836.6	32.1	32.0	30.5	32.0	30.4
	848.8	31.7	31.6	30.1	31.7	30.1
GSM1900	1950.2	29.3	29.3	27.6	26.0	25.9
	1880.0	29.6	29.6	27.9	26.2	26.2
	1909.8	29.5	29.5	27.9	26.3	26.2

3GPP release version	Mode	3GPP 34.121	Cellular band			PCS band		
		Subtest	4132	4183	4223	9262	9400	9538
99	WCDMA	12.2 kbps (RMC)	23.69	23.61	23.53	22.84	22.95	22.41
5	HSDPA	Subtest1	23.45	23.30	23.42	22.66	22.79	22.25
5		Subtest2	23.50	23.29	23.25	22.73	22.84	22.36
5		Subtest3	23.66	23.45	23.34	22.66	22.81	22.33
5		Subtest4	23.58	23.41	23.35	22.78	22.83	22.24

We found out the test mode with the highest power level after we analyzer all the data rates.
So we chose GSM850/GSM1900 voice and WCDMA Cellular / PCS band 12.2 kbps RMC as a representative (worst case)

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1.3 Model differences

Not applicable

1.4 Device modifications

The following modifications were necessary for compliance: Not applicable manufacturer

1.5 Peripheral devices

Device	Manufacturer	Model No.	Serial No.
N/A			

1.6 Test facility

The measurement facility is located at 477-6, Hageo-ri, Yeoju-eup, Yeoju-gun, Gyeonggi-do, 469-803, Korea. Tel: +82-31-883-5092/Fax: +82-31-883-5169.
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.7 Laboratory accreditations and listings

Country	Agency	Scope of accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	343818
KOREA	KCC	EMI (10 meter Open Area Test Site and two conducted sites) Radio (3 & 10 meter Open Area Test Sites and one conducted site)	KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	4769B-1

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2.0 Summary of tests

FCC section(s)	RSS section(s)	Parameter	Status
22.913 (a)(2)	RSS-132 4.4	Effective radiated power	C
24.232(c)	RSS-133 6.4	Effective isotropic radiated power	C
2.1053 22.917(a) 24.238(a)	RSS-132 4.5.1 RSS-133 6.5.1	Spurious radiated emission	C
Note 1: C=Complies NC=Not complies NT=Not tested NA=Not applicable			
Note 2: The data in this test report are traceable to the national or international standards.			
Note 3: The sample was tested according to the following specification: FCC Part 15.249, ANSI C63.4-2003			

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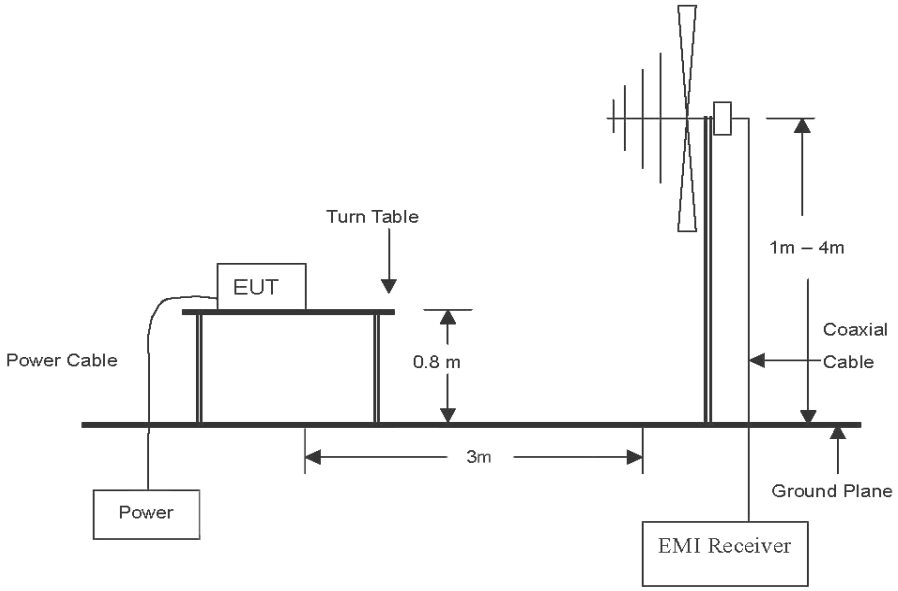
2.1 Technical characteristic test

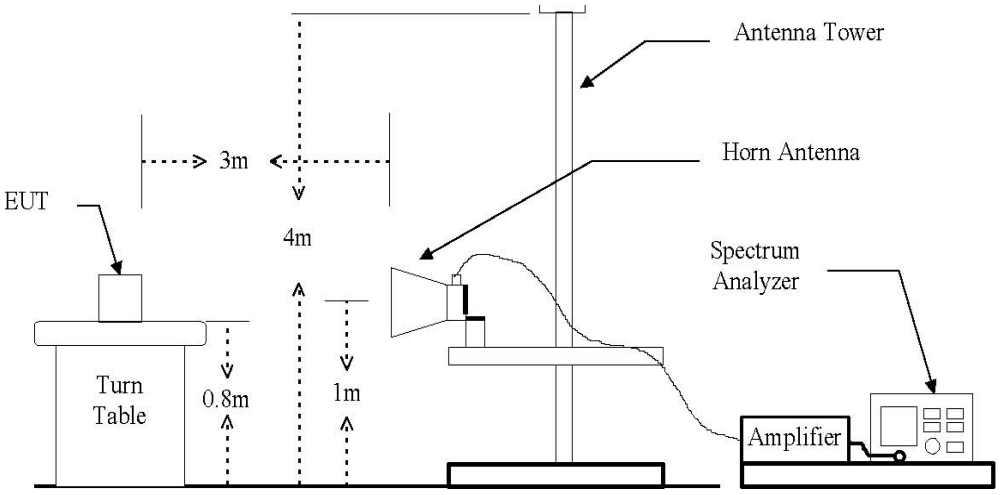
2.1.1 E.I.R.P.(E.R.P.) & spurious radiated emission

Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz emissions.



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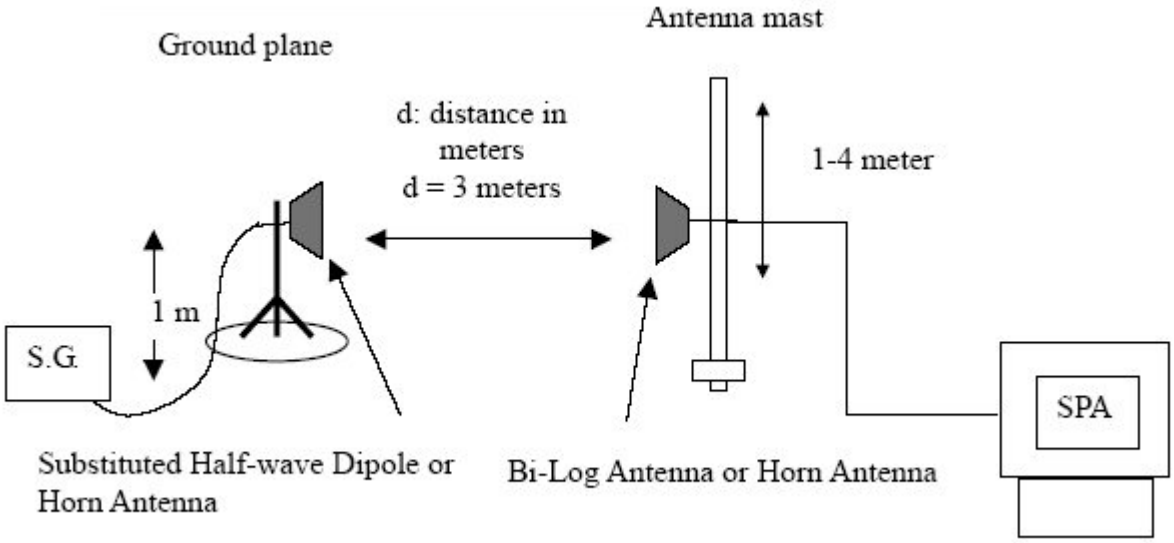
The diagram below shows the test setup for substituted method



Test procedure : Based on ANSI/TIA 603C: 2004

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
7. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824~849 MHz) or horn antenna (1850 ~1910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

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15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Limit

FCC §22.913(a), the ERP of mobile transmitters must not exceed 7 watts. FCC §24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

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Test results for E.I.R.P. (E.R.P.)

A. GSM850

Frequency	Ant. Pol.	S.G. Level	Correction factor	E.R.P.	
(MHz)	(H/V)	(dBm)	(dB)	(dBm)	(W)
824.2	H	21.14	5.96	27.10	0.51
836.4	H	22.54	6.00	28.54	0.71
848.8	H	23.34	6.04	29.38	0.87
824.2	V	21.80	5.96	27.76	0.60
836.4	V	22.52	6.00	28.52	0.71
848.8	V	21.97	6.04	28.01	0.63

B. GSM1900

Frequency	Ant. Pol.	S.G. Level	Correction factor	E.I.R.P.	
(MHz)	(H/V)	(dBm)	(dB)	(dBm)	(W)
1850.2	H	16.25	11.28	27.53	0.57
1880.0	H	16.19	11.26	27.45	0.56
1909.8	H	16.45	11.19	27.64	0.58
1850.2	V	18.72	11.28	30.00	1.00
1880.0	V	19.40	11.26	30.66	1.16
1909.8	V	19.27	11.19	30.46	1.11

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C. WCDMA(Cellular band)

Frequency	Ant. Pol.	S.G. Level	Correction factor	E.R.P.	
(MHz)	(H/V)	(dBm)	(dB)	(dBm)	(W)
826.4	H	12.82	5.97	18.79	0.08
836.4	H	13.11	6.00	19.11	0.08
846.6	H	13.23	6.04	19.27	0.08
826.4	V	16.52	5.97	22.49	0.18
836.4	V	15.38	6.00	21.38	0.14
846.6	V	14.71	6.04	20.75	0.12

D. WCDMA(PCS band)

Frequency	Ant. Pol.	S.G. Level	Correction factor	E.I.R.P.	
(MHz)	(H/V)	(dBm)	(dB)	(dBm)	(W)
1852.4	H	9.41	11.27	20.68	0.12
1880.0	H	11.91	11.26	23.17	0.21
1907.6	H	9.18	11.20	20.38	0.11
1852.4	V	12.76	11.27	24.03	0.25
1880.0	V	13.19	11.26	24.45	0.28
1907.6	V	13.63	11.20	24.83	0.30

Remark;
1. Correction factor: Substitution antenna gain – Tx cable loss
2. E.R.P. & E.I.R.P = S.G. Level + correction factor
3. The E.R.P. & E.I.R.P was measured in three orthogonal EUT position(x-axis, y-axis and z-axis). Worst cases are x-axis.

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Test results for spurious radiated emission.

- Test mode: GSM850
- Measured output power: 29.38 dBm = 0.87 W
- Distance: 3 m
- Limit: $43+10\log_{10}(W)$ = 42.40 dBc

A. GSM850

Channel	Frequency	Ant. Pol.	S.G. Level	Correction factor	E.R.P.	dBc	Margin
	(MHz)	(H/V)	(dBm)	(dB)	(dBm)		(dB)
Low	1648.4	H	-65.56	9.44	-56.12	85.50	43.10
Low	1648.4	V	-64.56	9.44	-55.12	84.50	42.10
Middle	1672.8	H	-64.71	9.48	-55.23	84.61	42.21
Middle	1672.8	V	-64.08	9.48	-54.60	83.98	41.58
High	1697.6	H	-65.08	9.53	-55.55	84.93	42.53
High	1697.6	V	-65.14	9.53	-55.61	84.99	42.59

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- Test mode: GSM1900
- Measured output power: 30.66 dBm = 1.16 W
- Distance: 3 m
- Limit: $43+10\log_{10}(W) = 43.64$ dBc

B. GSM1900

Channel	Frequency	Ant. Pol.	S.G. Level	Correction factor	E.I.R.P.	dBc	Margin
	(MHz)	(H/V)	(dBm)	(dB)	(dBm)		(dB)
Low	3700.4	H	-63.46	13.44	-50.02	80.68	37.04
Low	3700.4	V	-63.07	13.44	-49.63	80.29	36.65
Middle	3760.0	H	-62.31	13.23	-49.08	79.74	36.10
Middle	3760.0	V	-63.92	13.23	-50.69	81.35	37.71
High	3819.6	H	-62.27	12.46	-49.81	80.47	36.83
High	3819.6	V	-63.30	12.46	-50.84	81.50	37.86

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- Test mode: WCDMA(Cellular band)
- Measured output power: 22.49 dBm = 0.18 W
- Distance: 3 m
- Limit: $43+10\log_{10}(W) = 35.55$ dBc

C. WCDMA(Cellular band)

Channel	Frequency	Ant. Pol.	S.G. Level	Correction factor	E.R.P.	dBc	Margin
	(MHz)	(H/V)	(dBm)	(dB)	(dBm)		(dB)
Low	1652.8	H	-64.38	9.44	-54.94	77.43	41.88
Low	1652.8	V	-65.55	9.44	-56.11	78.60	43.05
Middle	1672.8	H	-65.30	9.48	-55.82	78.31	42.76
Middle	1672.8	V	-65.06	9.48	-55.58	78.07	42.52
High	1693.2	H	-65.06	9.53	-55.53	78.02	42.47
High	1693.2	V	-64.72	9.53	-55.19	77.68	42.13

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- Test mode: WCDMA(Cellular band)
- Measured output power: 24.83 dBm = 0.30 W
- Distance: 3 m
- Limit: $43+10\log_{10}(W) = 37.77$ dBc

D. WCDMA(PCS band)

Channel	Frequency	Ant. Pol.	S.G. Level	Correction factor	E.I.R.P.	dBc	Margin
	(MHz)	(H/V)	(dBm)	(dB)	(dBm)		(dB)
Low	3704.8	H	-63.56	13.43	-50.13	74.96	37.19
Low	3704.8	V	-62.89	13.43	-49.46	74.29	36.52
Middle	3760.0	H	-63.68	13.23	-50.45	75.28	37.51
Middle	3760.0	V	-63.78	13.23	-50.55	75.38	37.61
High	3815.2	H	-63.52	12.47	-51.05	75.88	38.11
High	3815.2	V	-62.75	12.47	-50.28	75.11	37.34

Remark;
1. Correction factor: Substitution antenna gain – Tx cable loss
2. E.R.P. & E.I.R.P = S.G. Level + correction factor
3. The E.R.P. & E.I.R.P was measured in three orthogonal EUT position(x-axis, y-axis and z-axis). Worst cases are x-axis.

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Appendix A – Test equipment used for test

Equipment	Manufacturer	Model	Calibration due.
Spectrum Analyzer	R&S	FSV30	2012.01.07
Vector Signal Generator	R&S	SMBV2100A	2012.01.07
Synthesized Signal Generator	HP	2708A00448	2011.06.25
High Pass Filter	Wainwright Instrument	WHJS3000-10TT	2012.01.07
Band Reject Filter	K&L	3TNF-500/1000-N/N	2011.12.02
Band Reject Filter	K&L	3TNF-1000/2000-N-N	2011.12.02
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	2012.03.05
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	2013.03.18
Horn Antenna	A.H. System	SAS-571	2013.03.22
Horn Antenna	A.H. System	SAS-571	2012.10.10
Preamplifier	HP	8449B	2011.07.27
Radio Communication Tester	R&S	CMU200	2011.12.02

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Test setup photo and configuration

Radiated field emissions

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