

FCC TEST REPORT

Product Name: Machine Control Terminal

Trade Mark: FJDynamics

Model No.: MT-10

Report Number: 24102114224RFM-1

Test Standards: FCC 47 CFR Part 22 Subpart H
FCC 47 CFR Part 24 Subpart E

FCC ID: 2A2LL-MT10

Test Result: PASS

Date of Issue: February 7, 2025

Prepared for:

FJ Dynamics Co., Ltd.

**21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District,
Shenzhen, China**

Prepared by:

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Version

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V1.0	February 7, 2025	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	FJ Dynamics Co., Ltd.
Address of Applicant:	21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District, Shenzhen, China
Manufacturer:	FJ Dynamics Co., Ltd.
Address of Manufacturer:	21F, Das Tower, No. 28, 1st South Keji Road, Nanshan District, Shenzhen, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Machine Control Terminal		
Model No.:	MT-10		
Trade Mark:	FJDynamics		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	GSM Bands:	GSM850/PCS 1900	
	CDMA:	BC0	
	UTRA Bands:	WCDMA Band II/ Band V	
	E-UTRA Bands:	FDD Band 2/ 4/ 5/ 7	
		TDD Band 38/ 40/ 41	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n Bluetooth 5.0	
	RNSS Rx Band:	1559 MHz to 1610 MHz	GLONASS/ GPS
Software Version:	Android 13 (Provided by the customer)		
Hardware Version:	RC_NF209_UX1.1 (Provided by the customer)		
Sample Received Date:	October 21, 2024		
Sample Tested Date:	November 1, 2024 to December 2, 2024		
Remark:	The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.		

1.2.2 Description of Accessories

Battery	
Model No.:	446596PN3-1S2P
Battery Type:	Rechargeable Li-ion Battery
Rated Voltage:	3.8 Vdc
Limited Charge Voltage:	4.35Vdc
Typical Capacity:	10000 mAh

Others
Others metal structural parts DC car charger x 1

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, CDMA	
Type of Modulation:	GSM/GPRS:	GMSK
	EDGE:	GMSK, 8PSK
	WCDMA	BPSK
	HSDPA:	QPSK
	HSUPA:	QPSK
	CDMA BC0 1xRTT:	QPSK
Frequency Range:	GSM/GPRS/EDGE 850:	824.2-848.8 MHz
	GSM/GPRS/EDGE 1900:	1850.2-1909.8 MHz
	WCDMA Band II:	1852.4-1907.6 MHz
	WCDMA Band V:	826.4-846.6 MHz
	CDMA BC0 1xRTT:	824.7-848.31 MHz
Max. ERP/EIRP:	GSM/GPRS 850:	25.17 dBm
	EDGE 850:	20.23 dBm
	GSM/GPRS 1900:	29.67 dBm
	EDGE 1900:	26.16 dBm
	WCDMA Band II:	23.75 dBm
	WCDMA Band V:	16.64 dBm
	CDMA BC0 1xRTT:	17.03 dBm
Emission Designator:	GSM/GPRS 850:	247KGXW
	EDGE 850:	248KG7W
	GSM/GPRS 1900:	247KGXW
	EDGE 1900:	250KG7W
	WCDMA Band II:	4M15F9W
	WCDMA Band V:	4M15F9W
	CDMA BC0 1xRTT:	1M28F9W
Antenna Type: (Provided by the customer)	FPCB Antenna	
Antenna Gain: (Provided by the customer)	GSM 850:	-6.06 dBi
	PCS 1900:	-1.29 dBi
	WCDMA Band II:	-1.29 dBi
	WCDMA Band V:	-6.06 dBi
	CDMA BC0:	-6.06 dBi
GPRS/EDGE Class:	Class 12	
Sample No.:	Radiated: S202410284527-ZJB01/1	
	Conducted: S202410214484-ZJB01/1	
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.5 to 4.3Vdc	
Extreme Test Temperature:	-30 °C to +50 °C	

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1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Dummy battery	N/A	N/A	N/A	Applicant

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.3 Meter	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China

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1.6 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

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1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted Output Power	±0.7 dB
2	99%&26dB Bandwidth	±1.86 %
3	Emission Mask	±2.7 dBm
4	Spurious emissions at antenna terminals	±2.7 dBm
5	Field strength of spurious radiation	30 MHz-1 GHz: ±4.9 dB 1 GHz-18 GHz: ±4.8 dB 18 GHz-40 GHz: ±5.1 dB
6	Frequency stability	±6.5 x 10 ⁻⁸
7	Humidity	±3.9 %
8	Temperature	±0.62 °C
9	DC Voltages	±0.68 %

2. TEST SUMMARY

FCC 47 CFR Part 22 Subpart H Test Cases			
Test Item	Test Requirement	Test Method	Result
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

FCC 47 CFR Part 24 Subpart E Test Cases			
Test Item	Test Requirement	Test Method	Result
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 24.232(d)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

Disclaimer and Explanations:

The declared of product specification and data (e.g. antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	3m SAC	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☒	Receiver	R&S	ESIB26	100114	25-Oct-2024	24-Oct-2025
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	28-Oct-2024	27-Oct-2025
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	29-Oct-2024	28-Oct-2025
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	29-Oct-2024	28-Oct-2025
☒	Preamplifier	HP	8447F	2805A02960	25-Oct-2024	24-Oct-2025
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	01-Apr-2024	31-Mar-2025
☒	Pre-amplifier	ETS-LINDGREN	00118385	00201874	01-Apr-2024	31-Mar-2025
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	28-Oct-2024	27-Oct-2025
☒	Pre-amplifier	ETS-LINDGREN	00118384	00202652	28-Oct-2024	27-Oct-2025
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

RF Conducted Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	25-Oct-2024	24-Oct-2025
☒	DC Source	KIKUSUI	PWR400L	LK003024	19-Jul-2024	18-Jul-2025
☒	Digital multimeter	FLUKE	15B+	30701460WS15	29-Oct-2024	28-Oct-2025
☒	Temp & Humidity chamber	Votisch	VT4002	58566133290020	29-Mar-2024	28-Mar-2025
☒	Wideband Radio Communication Tester	R&S	CMW500	119583	29-Mar-2024	28-Mar-2025
☐	Wideband Radio Communication Tester	R&S	CMW500	120932	29-Mar-2024	28-Mar-2025

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4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

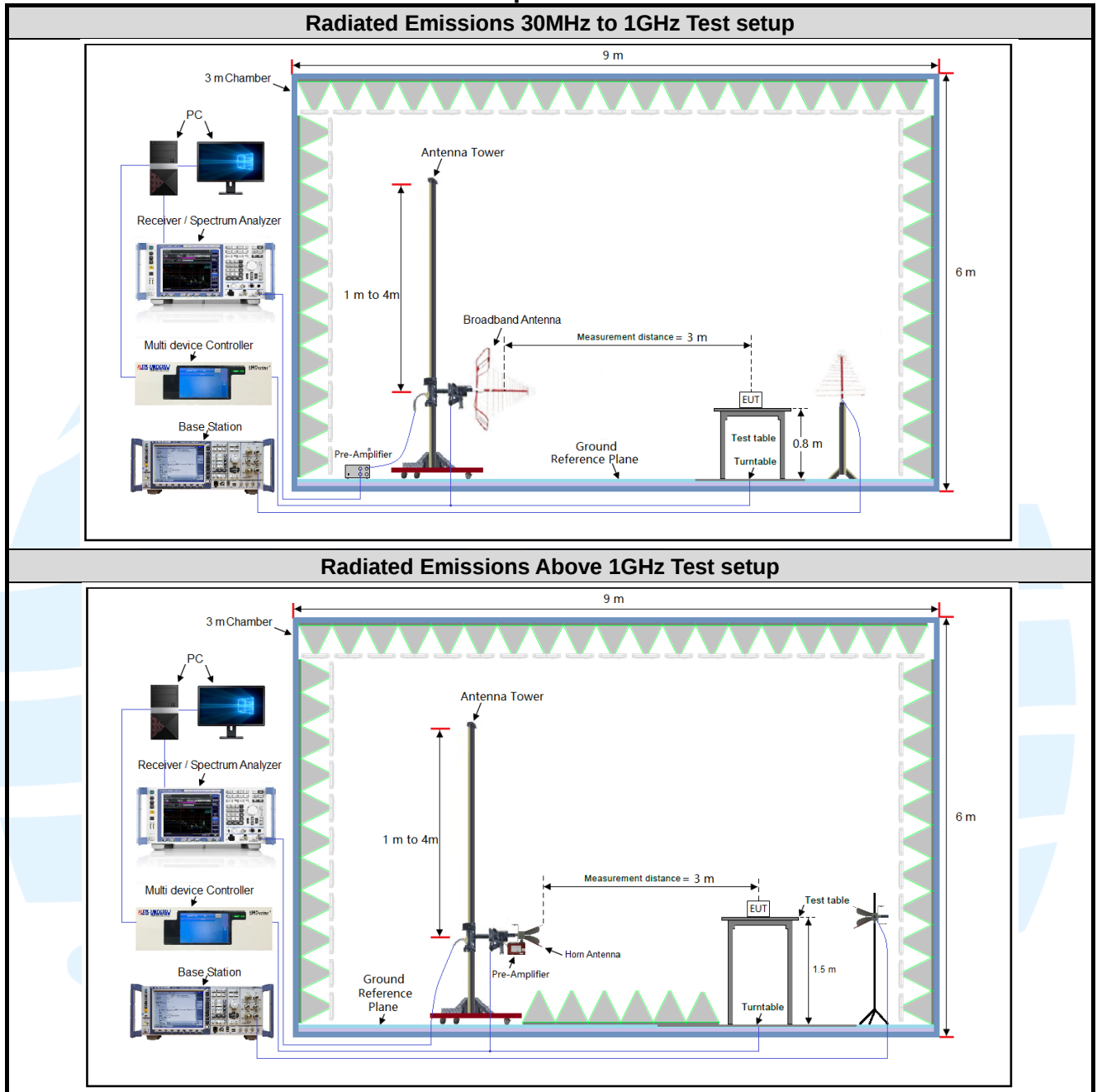
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.5	20 to 75
TH/VL	+50	3.5	20 to 75
TL/VH	-30	4.3	20 to 75
TH/VH	+50	4.3	20 to 75

Remark:

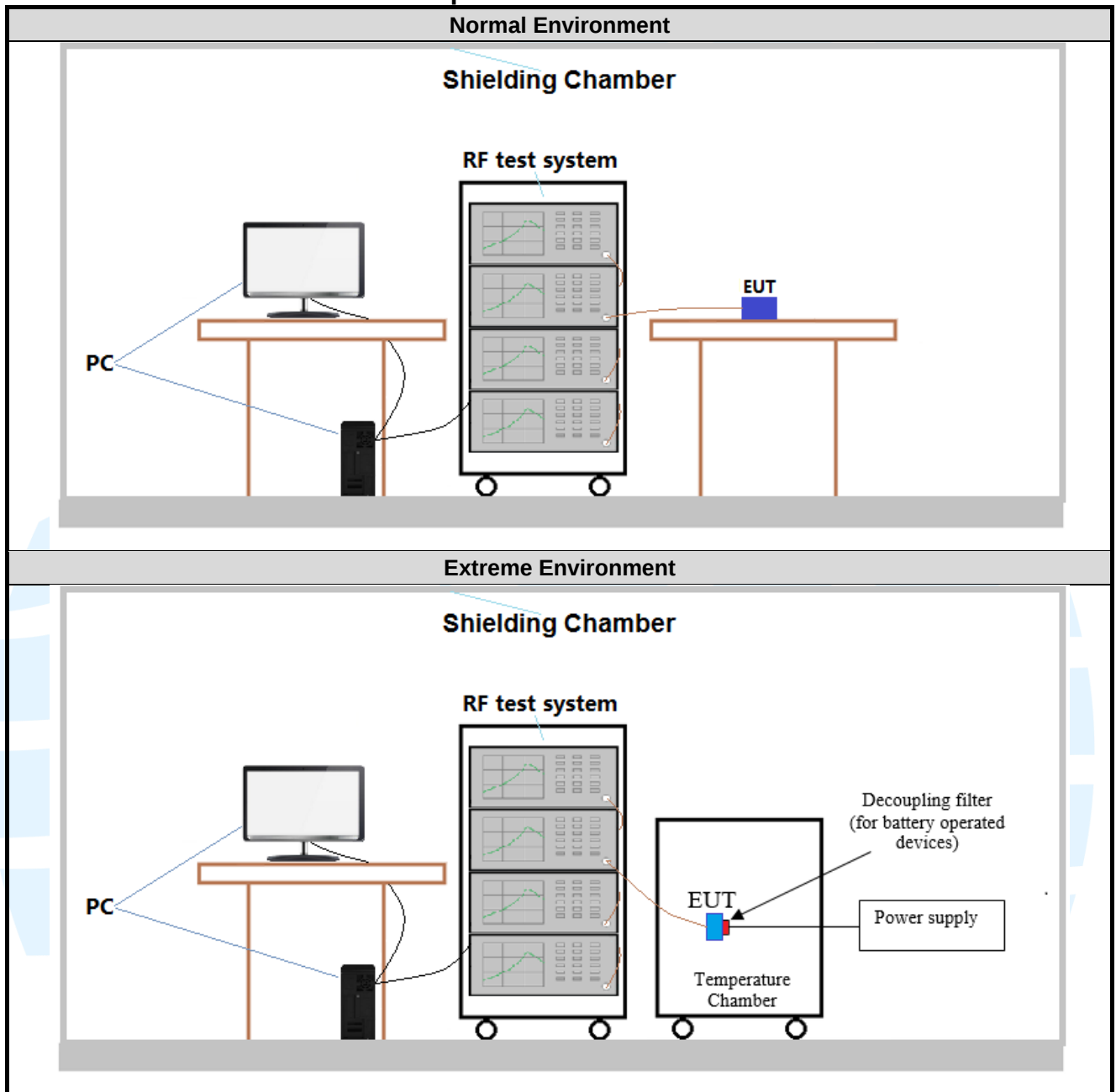
- 1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.5 V to 4.3 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.5 V to 4.3 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup



4.2.2 For Conducted RF test setup



4.3 TEST CHANNELS

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/EDGE850	Tx (824 MHz ~ 849 MHz)	Channel 128	Channel 190	Channel 251
		824.2 MHz	836.6 MHz	848.8 MHz
WCDMA band V	Tx (824 MHz ~ 849 MHz)	Channel 4132	Channel 4182	Channel 4233
		826.4 MHz	836.4 MHz	846.6 MHz
CDMA BC0	Tx (824 MHz ~ 849 MHz)	Channel 1013	Channel 384	Channel 777
		824.7 MHz	836.52 MHz	848.31 MHz

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/EDGE1900	Tx (1850 MHz-1910 MHz)	Channel 512	Channel 661	Channel 810
		1850.2 MHz	1880.0 MHz	1909.8 MHz
WCDMA Band II	Tx (1850 MHz-1910 MHz)	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz

4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 3.8Vdc battery. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below:
SIM 1 Card Conducted transmitter power measurement result.

GSM 850 Maximum Average Power (dBm)			
Channel	128	190	251
Frequency(MHz)	824.2 MHz	836.6 MHz	848.8 MHz
GSM (GMSK, 1Tx-slot)	33.36	33.38	33.30
GPRS (GMSK, 1Tx-slot)	33.38	33.31	33.22
GPRS (GMSK, 2Tx-slot)	32.47	32.43	32.34
GPRS (GMSK, 3Tx-slot)	30.53	30.47	30.42
GPRS (GMSK, 4Tx-slot)	29.29	29.28	29.19
EDGE (8PSK, 1Tx-slot)	28.41	28.4	28.44
EDGE (8PSK, 2Tx-slot)	27.19	27.18	27.19
EDGE (8PSK, 3Tx-slot)	24.85	24.9	24.89
EDGE (8PSK, 4Tx-slot)	23.62	23.58	23.66

PCS 1900 Maximum Average Power (dBm)			
Channel	512	661	810
Frequency(MHz)	1850.2 MHz	1880.0 MHz	1909.8 MHz
GSM (GMSK, 1Tx-slot)	30.66	30.96	30.78
GPRS (GMSK, 1Tx-slot)	30.60	30.76	30.63
GPRS (GMSK, 2Tx-slot)	29.73	30	29.85
GPRS (GMSK, 3Tx-slot)	27.87	28.15	28.02
GPRS (GMSK, 4Tx-slot)	26.63	26.92	26.79
EDGE (8PSK, 1Tx-slot)	27.38	27.41	27.45
EDGE (8PSK, 2Tx-slot)	26.21	26.23	26.3
EDGE (8PSK, 3Tx-slot)	24.14	24.17	24.23
EDGE (8PSK, 4Tx-slot)	22.91	22.93	22.98

CDMA BC0 Maximum Average Power (dBm)			
Channel	1013	384	777
Frequency(MHz)	824.7 MHz	836.52 MHz	848.31 MHz
1xRTT RC1 S055	25.15	25.01	25.21
1xRTT RC3 S055	25.21	25.04	25.24
1xRTT RC3 S032 (+F-SCH)	24.91	25.06	25.22
1xRTT RC3 S032 (SCH)	24.95	25.11	25.23

WCDMA Band II Maximum Average Power (dBm)			
Channel	9262	9400	9538
Frequency (MHz)	1852.4 MHz	1880.0 MHz	1907.6 MHz
RMC 12.2K	24.73	24.75	25.04
HSDPA Subtest-1	23.71	23.83	23.97
HSDPA Subtest-2	23.2	23.22	23.43
HSDPA Subtest-3	23.21	23.25	23.54
HSDPA Subtest-4	23.13	23.16	23.50
HSUPA Subtest-1	22.08	22.13	22.01
HSUPA Subtest-2	21.70	21.81	22.01
HSUPA Subtest-3	22.69	22.79	22.98
HSUPA Subtest-4	21.23	21.34	21.52
HSUPA Subtest-5	22.48	22.74	23.30

WCDMA Band V Maximum Average Power (dBm)			
Channel	4132	4182	4233
Frequency (MHz)	826.4 MHz	836.4 MHz	846.6 MHz
RMC 12.2K	24.77	24.85	24.81
HSDPA Subtest-1	23.69	23.77	23.76
HSDPA Subtest-2	23.21	23.29	23.21
HSDPA Subtest-3	23.15	23.30	23.25
HSDPA Subtest-4	23.22	23.29	23.19
HSUPA Subtest-1	22.11	22.16	22.13
HSUPA Subtest-2	21.74	21.82	21.77
HSUPA Subtest-3	22.72	22.80	22.76
HSUPA Subtest-4	21.23	21.31	21.26
HSUPA Subtest-5	22.70	22.81	22.79

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the worse mode applicability and tested channel detail as below:

Band	Radiated	Conducted
GSM/GPRS/EDGE 850/1900	1) GSM (GMSK, 1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link	1) GSM (GMSK,1Tx-slot) Link 2) GPRS (GMSK, 1Tx-slot) Link 3) EDGE (8PSK, 1Tx-slot) Link
WCDMA Band II/IV/V	RMC 12.2kbps Link	RMC 12.2kbps Link
CDMA BC0	1xRTT RC3 S055	1xRTT RC3 S055

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 22	Public Mobile Services
3	FCC 47 CFR Part 24	Personal Communications Services
4	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
5	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01
6	KDB 412172 D01 Determining ERP and EIRP v01r01	Guidelines for determining the effective radiated power (ERP) and isotropically radiated power (EIRP) of an RF transmitting system

5.2 MAXIMUM ERP/EIRP

Test Requirement: FCC 47 CFR Part 2.1046(a),
FCC 47 CFR Part 22.913(a),
FCC 47 CFR Part 24.232(c),

Test Method: KDB 971168 D01v03r01 Section 5.6 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 22.913(a)

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC 47 CFR Part 24.232(c)

Mobile and portable stations are limited to 2 watts EIRP.

Test Procedure:

According to KDB 412172 D01 Power Approach,

- $ERP \text{ or } EIRP = P_T + G_T - L_c$
- $ERP = EIRP - 2.15$

where

- P_T = transmitter output power, expressed in dBW, dBm, or PSD;
- G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
- L_c = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Band		Ant. Gain (dBi)	Maximum ERP/EIRP (dBm)				Maximum ERP/EIRP (W)				Result
			Low	Mid	High	Limit (dBm)	Low	Mid	High	Limit (W)	
PCS 1900	GSM	-1.29	29.37	29.67	29.49	38.45	0.8650	0.9268	0.8892	2	Pass
	GPRS		29.31	29.47	29.34	38.45	0.8531	0.8851	0.8590	2	Pass
	EGPRS		26.09	26.12	26.16	38.45	0.4064	0.4093	0.4130	2	Pass
GSM 850	GSM	-6.06	25.15	25.17	25.09	33.01	0.3273	0.3289	0.3228	7	Pass
	GPRS		25.17	25.10	25.01	33.01	0.3289	0.3236	0.3170	7	Pass
	EGPRS		20.20	20.19	20.23	33.01	0.1047	0.1045	0.1054	7	Pass
CDMA BC0	1xRTT RC3 S055	-6.06	17.00	16.83	17.03	38.45	0.0501	0.0482	0.0505	7	Pass

Band		Ant. Gain (dBi)	Maximum ERP/EIRP (dBm)				Maximum ERP/EIRP (W)				Result
			Low	Mid	High	Limit (dBm)	Low	Mid	High	Limit (W)	
WCDMA Band II	RMC 12.2K	-1.29	23.44	23.46	23.75	33.01	0.2208	0.2218	0.2371	2	Pass
	HSDPA		22.42	22.54	22.68	33.01	0.1746	0.1795	0.1854	2	Pass
	HSUPA		21.19	21.45	22.01	33.01	0.1315	0.1396	0.1589	2	Pass
WCDMA Band V	RMC 12.2K	-6.06	16.56	16.64	16.60	38.45	0.0453	0.0461	0.0457	7	Pass
	HSDPA		15.48	15.56	15.55	38.45	0.0353	0.0360	0.0359	7	Pass
	HSUPA		14.49	14.60	14.58	38.45	0.0281	0.0288	0.0287	7	Pass

Note: The maximum ERP/EIRP is calculated from max output power and antenna gain, the antenna gain provided by the customer, and the customer takes all the responsibilities for the accuracy of antenna gain.

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a),
FCC 47 CFR Part 22.913(a),
FCC 47 CFR Part 24.232(c),
Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 22.913(a)

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC 47 CFR Part 24.232(c)

Mobile and portable stations are limited to 2 watts EIRP.

Test Procedure:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA2000, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: PASS

Test Data: The full result refer to section 4.5 for details.

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement: FCC 47 CFR Part 22.913(a),
FCC 47 CFR Part 24.232(c),
Test Method: KDB 971168 D01v03r01 Section 5.7

Limit: In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

- Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth
- Set the number of counts to a value that stabilizes the measured CCDF curve
- Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Please refer to Appendix A2&B2

5.5 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h),
FCC 47 CFR Part 22.917(b),
FCC 47 CFR Part 24.238(b),

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 4

Limit: No Limit, for reporting purposes only.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Please refer to Appendix A3&B3

5.6 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051,
FCC 47 CFR Part 22.917(a),
FCC 47 CFR Part 24.238(a),
Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

For each band edge measurement:

- 1) Set the spectrum analyzer span to include the block edge frequency.
- 2) Set a marker to point the corresponding band edge frequency in each test case.
- 3) Set display line at -13 dBm
- 4) Set resolution bandwidth to at least 1% of emission bandwidth.
- 5) Set spectrum analyzer with RMS detector.
- 6) Record the max trace plot into the test report

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Please refer to Appendix A4&B4

5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 2.1051,
FCC 47 CFR Part 22.917(a)(b),
FCC 47 CFR Part 24.238(a)(b),
Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

Test Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Please refer to Appendix A5&B5

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: FCC 47 CFR Part 2.1053,
FCC 47 CFR Part 22.917(a)(b),
FCC 47 CFR Part 24.238(a)(b),

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 7

Limits:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The worst measurement data as follows:

GSM 850							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
Lowest Channel							
1	550.290	-76.67	7.94	-68.73	-13.00	-55.73	Horizontal
2	906.304	-80.22	14.53	-65.69	-13.00	-52.69	Horizontal
3	979.139	-80.64	15.25	-65.39	-13.00	-52.39	Horizontal
4	1645.658	-55.98	-0.32	-56.30	-13.00	-43.30	Horizontal
5	2472.600	-59.65	3.46	-56.19	-13.00	-43.19	Horizontal
6	689.051	-79.34	11.04	-68.30	-13.00	-55.30	Vertical
7	912.695	-80.11	14.49	-65.62	-13.00	-52.62	Vertical
8	992.997	-80.26	15.56	-64.70	-13.00	-51.70	Vertical
9	1645.658	-55.64	-0.32	-55.96	-13.00	-42.96	Vertical
10	2472.600	-59.72	3.46	-56.26	-13.00	-43.26	Vertical
Middle Channel							
1	734.037	-79.52	11.71	-67.81	-13.00	-54.81	Horizontal
2	906.304	-80.46	14.53	-65.93	-13.00	-52.93	Horizontal
3	945.334	-80.41	14.69	-65.72	-13.00	-52.72	Horizontal
4	1664.833	-58.63	-0.17	-58.80	-13.00	-45.80	Horizontal
5	2509.800	-61.71	3.58	-58.13	-13.00	-45.13	Horizontal
6	698.804	-79.84	11.44	-68.40	-13.00	-55.40	Vertical
7	787.475	-80.86	12.31	-68.55	-13.00	-55.55	Vertical
8	925.613	-79.97	14.46	-65.51	-13.00	-52.51	Vertical
9	1664.833	-56.65	-0.17	-56.82	-13.00	-43.82	Vertical
10	2509.800	-60.04	3.58	-56.46	-13.00	-43.46	Vertical
Highest Channel							
1	815.635	-80.14	13.04	-67.10	-13.00	-54.10	Horizontal
2	887.398	-80.30	14.17	-66.13	-13.00	-53.13	Horizontal
3	986.044	-80.97	15.44	-65.53	-13.00	-52.53	Horizontal
4	1694.016	-57.53	0.03	-57.50	-13.00	-44.50	Horizontal
5	2546.400	-60.40	3.73	-56.67	-13.00	-43.67	Horizontal
6	821.387	-80.31	13.20	-67.11	-13.00	-54.11	Vertical
7	906.304	-80.78	14.53	-66.25	-13.00	-53.25	Vertical
8	986.044	-80.74	15.44	-65.30	-13.00	-52.30	Vertical
9	1694.016	-55.19	0.03	-55.16	-13.00	-42.16	Vertical
10	2546.400	-60.58	3.73	-56.85	-13.00	-43.85	Vertical

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UTTR-RF-FCC23G-V1.1

PCS 1900							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	708.694	-79.37	11.44	-67.93	-13.00	-54.93	Horizontal
2	868.886	-79.87	13.80	-66.07	-13.00	-53.07	Horizontal
3	899.958	-80.26	14.32	-65.94	-13.00	-52.94	Horizontal
4	3700.400	-59.94	7.45	-52.49	-13.00	-39.49	Horizontal
5	5550.600	-60.78	10.97	-49.81	-13.00	-36.81	Horizontal
6	809.924	-80.23	12.89	-67.34	-13.00	-54.34	Vertical
7	906.304	-81.06	14.53	-66.53	-13.00	-53.53	Vertical
8	986.044	-81.08	15.44	-65.64	-13.00	-52.64	Vertical
9	3700.400	-60.92	7.45	-53.47	-13.00	-40.47	Vertical
10	5550.600	-60.61	10.97	-49.64	-13.00	-36.64	Vertical
Middle Channel							
1	809.924	-80.51	12.89	-67.62	-13.00	-54.62	Horizontal
2	862.802	-80.49	13.74	-66.75	-13.00	-53.75	Horizontal
3	992.997	-81.11	15.56	-65.55	-13.00	-52.55	Horizontal
4	3760.000	-62.78	7.73	-55.05	-13.00	-42.05	Horizontal
5	5640.000	-60.68	11.18	-49.50	-13.00	-36.50	Horizontal
6	723.793	-80.20	11.58	-68.62	-13.00	-55.62	Vertical
7	833.013	-80.36	13.24	-67.12	-13.00	-54.12	Vertical
8	925.613	-80.23	14.46	-65.77	-13.00	-52.77	Vertical
9	3760.000	-62.03	7.73	-54.30	-13.00	-41.30	Vertical
10	5640.000	-60.47	11.18	-49.29	-13.00	-36.29	Vertical
Highest Channel							
1	893.656	-80.51	14.20	-66.31	-13.00	-53.31	Horizontal
2	932.141	-80.47	14.41	-66.06	-13.00	-53.06	Horizontal
3	979.139	-80.74	15.25	-65.49	-13.00	-52.49	Horizontal
4	3811.519	-59.37	7.98	-51.39	-13.00	-38.39	Horizontal
5	5729.400	-61.10	11.40	-49.70	-13.00	-36.70	Horizontal
6	698.804	-80.49	11.44	-69.05	-13.00	-56.05	Vertical
7	821.387	-80.33	13.20	-67.13	-13.00	-54.13	Vertical
8	965.474	-80.71	14.91	-65.80	-13.00	-52.80	Vertical
9	3819.600	-60.51	8.00	-52.51	-13.00	-39.51	Vertical
10	5729.400	-60.85	11.40	-49.45	-13.00	-36.45	Vertical

CDMA2000 BC0							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	771.047	-80.02	11.94	-68.08	-13.00	-55.08	Horizontal
2	912.695	-80.80	14.49	-66.31	-13.00	-53.31	Horizontal
3	992.997	-81.16	15.56	-65.60	-13.00	-52.60	Horizontal
4	1652.800	-51.22	-0.26	-51.48	-13.00	-38.48	Horizontal
5	3305.600	-52.43	6.19	-46.24	-13.00	-33.24	Horizontal
6	771.047	-79.82	11.94	-67.88	-13.00	-54.88	Vertical
7	912.695	-80.46	14.49	-65.97	-13.00	-52.97	Vertical
8	952.000	-80.31	14.82	-65.49	-13.00	-52.49	Vertical
9	1655.218	-48.95	-0.25	-49.20	-13.00	-36.20	Vertical
10	3305.600	-48.78	6.19	-42.59	-13.00	-29.59	Vertical
Middle Channel							
1	734.037	-80.84	11.71	-69.13	-13.00	-56.13	Horizontal
2	912.695	-81.24	14.49	-66.75	-13.00	-53.75	Horizontal
3	945.334	-80.84	14.69	-66.15	-13.00	-53.15	Horizontal
4	1672.800	-57.34	-0.12	-57.46	-13.00	-44.46	Horizontal
5	3345.600	-57.50	6.25	-51.25	-13.00	-38.25	Horizontal
6	723.793	-80.22	11.58	-68.64	-13.00	-55.64	Vertical
7	925.613	-80.68	14.46	-66.22	-13.00	-53.22	Vertical
8	979.139	-80.75	15.25	-65.50	-13.00	-52.50	Vertical
9	1672.800	-54.88	-0.12	-55.00	-13.00	-42.00	Vertical
10	3345.600	-56.21	6.25	-49.96	-13.00	-36.96	Vertical
Highest Channel							
1	809.924	-80.64	12.89	-67.75	-13.00	-54.75	Horizontal
2	906.304	-81.47	14.53	-66.94	-13.00	-53.94	Horizontal
3	979.139	-81.29	15.25	-66.04	-13.00	-53.04	Horizontal
4	1693.200	-56.52	0.02	-56.50	-13.00	-43.50	Horizontal
5	3386.400	-55.96	6.33	-49.63	-13.00	-36.63	Horizontal
6	679.435	-79.19	10.55	-68.64	-13.00	-55.64	Vertical
7	906.304	-79.95	14.53	-65.42	-13.00	-52.42	Vertical
8	1000.000	-80.41	15.60	-64.81	-13.00	-51.81	Vertical
9	1693.200	-54.90	0.02	-54.88	-13.00	-41.88	Vertical
10	3386.400	-55.15	6.33	-48.82	-13.00	-35.82	Vertical

WCDMA Band II							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps Lowest Channel							
1	838.887	-80.01	13.30	-66.71	-13.00	-53.71	Horizontal
2	906.304	-81.10	14.53	-66.57	-13.00	-53.57	Horizontal
3	958.714	-80.72	14.93	-65.79	-13.00	-52.79	Horizontal
4	3702.714	-54.14	7.46	-46.68	-13.00	-33.68	Horizontal
5	5557.200	-59.99	10.99	-49.00	-13.00	-36.00	Horizontal
6	7419.751	-56.69	13.06	-43.63	-13.00	-30.63	Horizontal
7	787.475	-79.80	12.31	-67.49	-13.00	-54.49	Vertical
8	868.886	-80.31	13.80	-66.51	-13.00	-53.51	Vertical
9	986.044	-80.54	15.44	-65.10	-13.00	-52.10	Vertical
10	3702.714	-56.64	7.46	-49.18	-13.00	-36.18	Vertical
11	5557.200	-59.84	10.99	-48.85	-13.00	-35.85	Vertical
RMC 12.2kbps Middle Channel							
1	776.485	-79.36	11.90	-67.46	-13.00	-54.46	Horizontal
2	887.398	-79.76	14.17	-65.59	-13.00	-52.59	Horizontal
3	992.997	-81.08	15.56	-65.52	-13.00	-52.52	Horizontal
4	3745.858	-57.87	7.66	-50.21	-13.00	-37.21	Horizontal
5	5640.000	-61.16	11.18	-49.98	-13.00	-36.98	Horizontal
6	703.731	-79.77	11.46	-68.31	-13.00	-55.31	Vertical
7	771.047	-78.74	11.94	-66.80	-13.00	-53.80	Vertical
8	912.695	-80.65	14.49	-66.16	-13.00	-53.16	Vertical
9	3760.000	-62.87	7.73	-55.14	-13.00	-42.14	Vertical
10	5640.000	-60.73	11.18	-49.55	-13.00	-36.55	Vertical
RMC 12.2kbps Highest Channel							
1	771.047	-79.80	11.94	-67.86	-13.00	-54.86	Horizontal
2	827.179	-79.60	13.16	-66.44	-13.00	-53.44	Horizontal
3	979.139	-80.85	15.25	-65.60	-13.00	-52.60	Horizontal
4	3811.519	-55.58	7.98	-47.60	-13.00	-34.60	Horizontal
5	5722.800	-60.78	11.39	-49.39	-13.00	-36.39	Horizontal
6	809.924	-80.44	12.89	-67.55	-13.00	-54.55	Vertical
7	875.013	-81.26	13.93	-67.33	-13.00	-54.33	Vertical
8	919.132	-80.50	14.53	-65.97	-13.00	-52.97	Vertical
9	3811.519	-56.59	7.98	-48.61	-13.00	-35.61	Vertical
10	5722.800	-60.52	11.39	-49.13	-13.00	-36.13	Vertical

WCDMA Band V							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
RMC 12.2kbps _ Lowest Channel							
1	723.793	-80.44	11.58	-68.86	-13.00	-55.86	Horizontal
2	912.695	-80.84	14.49	-66.35	-13.00	-53.35	Horizontal
3	979.139	-81.59	15.25	-66.34	-13.00	-53.34	Horizontal
4	1645.658	-51.15	-0.32	-51.47	-13.00	-38.47	Horizontal
5	3297.681	-52.42	6.18	-46.24	-13.00	-33.24	Horizontal
6	749.676	-80.28	11.67	-68.61	-13.00	-55.61	Vertical
7	925.613	-80.37	14.46	-65.91	-13.00	-52.91	Vertical
8	965.474	-80.87	14.91	-65.96	-13.00	-52.96	Vertical
9	1645.658	-49.26	-0.32	-49.58	-13.00	-36.58	Vertical
10	3297.681	-48.77	6.18	-42.59	-13.00	-29.59	Vertical
RMC 12.2kbps _ Middle Channel							
1	703.731	-80.07	11.46	-68.61	-13.00	-55.61	Horizontal
2	906.304	-80.88	14.53	-66.35	-13.00	-53.35	Horizontal
3	958.714	-80.33	14.93	-65.40	-13.00	-52.40	Horizontal
4	1674.504	-58.35	-0.11	-58.46	-13.00	-45.46	Horizontal
5	3336.106	-57.48	6.23	-51.25	-13.00	-38.25	Horizontal
6	708.694	-79.49	11.44	-68.05	-13.00	-55.05	Vertical
7	919.132	-80.82	14.53	-66.29	-13.00	-53.29	Vertical
8	945.334	-80.41	14.69	-65.72	-13.00	-52.72	Vertical
9	1674.504	-54.89	-0.11	-55.00	-13.00	-42.00	Vertical
10	3336.106	-56.19	6.23	-49.96	-13.00	-36.96	Vertical
RMC 12.2kbps _ Highest Channel							
1	760.287	-80.20	11.63	-68.57	-13.00	-55.57	Horizontal
2	919.132	-80.88	14.53	-66.35	-13.00	-53.35	Horizontal
3	979.139	-80.90	15.25	-65.65	-13.00	-52.65	Horizontal
4	1684.232	-57.22	-0.04	-57.26	-13.00	-44.26	Horizontal
5	3374.978	-57.29	6.31	-50.98	-13.00	-37.98	Horizontal
6	804.252	-80.60	12.75	-67.85	-13.00	-54.85	Vertical
7	881.184	-79.21	14.07	-65.14	-13.00	-52.14	Vertical
8	979.139	-81.48	15.25	-66.23	-13.00	-53.23	Vertical
9	1684.232	-55.29	-0.04	-55.33	-13.00	-42.33	Vertical
10	3374.978	-55.87	6.31	-49.56	-13.00	-36.56	Vertical

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 &
FCC 47 CFR Part 22.355 &
FCC 47 CFR Part 24.235 &

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limits:

FCC 47 CFR Part 22.355,

The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

FCC 47 CFR Part 24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

1) Use CMW 500 with Frequency Error measurement capability.

a) Temp. = -30° to $+50^{\circ}\text{C}$

b) Voltage = low voltage, 3.5 Vdc, Normal, 3.8 Vdc and High voltage, 4.3 Vdc.

2) Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until $+50^{\circ}\text{C}$ is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Results: Please refer to Appendix A6&B6

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
