



Certificate #4312.01

# FCC TEST REPORT

**Product Name:** Smartphone

**Trade Mark:** inventus

**Model No.:** CT1

**Report Number:** 2312288686RFM-1

**Test Standards:** FCC 47 CFR Part 22 Subpart H  
FCC 47 CFR Part 24 Subpart E  
FCC 47 CFR Part 27 Subpart L

**FCC ID:** 2BDXXBDCT1

**Test Result:** PASS

**Date of Issue:** April 23, 2024

Prepared for:

**INVENTUS GROUP LTD**

**C/O FLB ACCOUNTANTS LLP 1010 ESKDALE ROAD, WINNERSH  
TRIANGLE, WOKINGHAM, UNITED KINGDOM, RG41 5TS**

Prepared by:


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Date: April 23, 2024

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**Version**

Version No.	Date	Description
V1.0	April 23, 2024	Original

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## 1. GENERAL INFORMATION

### 1.1 CLIENT INFORMATION

<b>Applicant:</b>	INVENTUS GROUP LTD
<b>Address of Applicant:</b>	C/O FLB ACCOUNTANTS LLP 1010 ESKDALE ROAD, WINNERSH TRIANGLE, WOKINGHAM, UNITED KINGDOM, RG41 5TS
<b>Manufacturer:</b>	INVENTUS GROUP LTD
<b>Address of Manufacturer:</b>	C/O FLB ACCOUNTANTS LLP 1010 ESKDALE ROAD, WINNERSH TRIANGLE, WOKINGHAM, UNITED KINGDOM, RG41 5TS

### 1.2 EUT INFORMATION

#### 1.2.1 General Description of EUT

<b>Product Name:</b>	Smartphone			
<b>Model No.:</b>	CT1			
<b>Trade Mark:</b>	<b>inventus</b>			
<b>DUT Stage:</b>	Identical Prototype			
<b>EUT Supports Function:</b> (Provided by the customer)	<b>GSM Bands:</b>	GSM850/E-GSM900/DCS 1800/PCS 1900		
	<b>UTRA Bands:</b>	WCDMA Band I/II/IV/V/VIII/XI/XIX		
	<b>E-UTRA Bands:</b>	FDD Band 1/2/3/4/5/7/8/11/12/13/17/18/19/20/21/25/26/28/30/66/71 TDD Band 38/39/40/41		
	<b>2.4 GHz ISM Band:</b>	IEEE 802.11b/g/n Bluetooth V5.2		
	<b>5 GHz U-NII Bands:</b>	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac	
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac	
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac	
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac	
	<b>RNSS Band:</b>	1559 MHz to 1610 MHz	GPS/ BDS/ GLONASS	
	<b>BSR:</b>	VHF Band II	FM	
<b>NFC:</b>	13.553 MHz to 13.567 MHz			
<b>Software Version:</b>	SW1_V7.0_SCT1INVS_ROW_A13_140324(Provided by the customer)			
<b>Hardware Version:</b>	HW1 (Provided by the customer)			
<b>Sample Received Date:</b>	December 28, 2023			
<b>Sample Tested Date:</b>	January 16, 2024 to March 26, 2024			
<b>Remark:</b>	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**

Adapter	
<b>Model No.:</b>	TPD-203A120167UF01
<b>Input:</b>	100-240V~50/60Hz 0.6A
<b>Output:</b>	5.0V===3.0A or 9.0V===2.22A or 12.0V===1.67A

Battery	
<b>Model No.:</b>	INV012
<b>Battery Type:</b>	Lithium-ion Rechargeable Battery
<b>Rated Voltage:</b>	3.85Vdc
<b>Limited Charge Voltage:</b>	4.4Vdc
<b>Rated Capacity:</b>	4850mAh

Cable	
<b>Connector:</b>	USB Type-C Plug Cable
<b>Cable Type:</b>	Shielded without ferrite
<b>Length:</b>	1.15Meter

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### 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

<b>Support Networks:</b>	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA	
<b>Type of Modulation:</b>	GSM/GPRS:	GMSK
	EDGE:	GMSK, 8PSK
	WCDMA	BPSK
	HSDPA:	QPSK
	HSUPA:	QPSK
<b>Frequency Range:</b>	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 IV:	1712.4-1752.6 MHz
	WCDMA Band V:	826.4-846.6 MHz
<b>Max RF Output Power:</b>	GSM/GPRS 850:	32.70 dBm
	EDGE 850:	27.31 dBm
	GSM/GPRS 1900:	29.20 dBm
	EDGE 1900:	25.70 dBm
	WCDMA Band II:	23.09 dBm
	WCDMA Band IV:	23.24 dBm
	WCDMA Band V:	23.71 dBm
<b>Emission Designator:</b>	GSM/GPRS 850:	246KGXW
	EDGE 850:	250KG7W
	GSM/GPRS 1900:	247KGXW
	EDGE 1900:	250KG7W
	WCDMA Band II:	4M17F9W
	WCDMA Band IV:	4M18F9W
	WCDMA Band V:	4M17F9W
<b>Antenna Type:</b> (Provided by the customer)	Antenna 0: LDS Antenna Antenna 1&2: FPCB Antenna	
<b>Antenna Gain:</b> (Provided by the customer)	GSM 850:	-1.29 dBi
	PCS 1900:	-0.9 dBi
	WCDMA Band II:	-0.9 dBi
	WCDMA Band IV:	-0.68 dBi
	WCDMA Band V:	-1.29 dBi
<b>GPRS/EDGE Class:</b>	Class 12	
<b>Sample No.:</b>	Radiated: S202312282554-ZJB06/06	
	Conducted: S202312282554-ZJA02/2, S202312282554-ZJB05/06	
<b>Normal Test Voltage:</b>	3.8 Vdc	
<b>Extreme Test Voltage:</b>	3.6 to 4.35Vdc	
<b>Extreme Test Temperature:</b>	-30 °C to +50 °C	

### 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	Manufacturer

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.**

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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.

### 1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

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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 <sup>-8</sup>
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

FCC 47 CFR Part 27 Subpart L 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 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	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
<input checked="" type="checkbox"/>	3m SAC	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	27-Oct-2023	26-Oct-2024
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	30-Oct-2023	29-Oct-2024
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	30-Oct-2023	29-Oct-2024
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	31-Oct-2023	30-Oct-2024
<input checked="" type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	16-Apr-2022	15-Apr-2024
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-LINDGREN	00118385	00201874	31-Oct-2023	30-Oct-2024
<input checked="" type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	30-Oct-2023	29-Oct-2024
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-LINDGREN	00118384	00202652	30-Oct-2023	29-Oct-2024
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	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
<input checked="" type="checkbox"/>	EXA Signal Analyzer	KEYSIGHT	N9010B	MY62060155	19-Apr-2023	18-Apr-2024
<input checked="" type="checkbox"/>	DC Source	KIKUSUI	PWR400L	LK003024	N/A	N/A
<input checked="" type="checkbox"/>	Digital multimeter	FLUKE	15B+	30701460WS15	31-Oct-2023	30-Oct-2024
<input checked="" type="checkbox"/>	Temp & Humidity chamber	Votisch	VT4002	58566133290020	14-Apr-2023	13-Apr-2024
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	119583	14-Apr-2023	13-Apr-2024
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	120932	14-Apr-2023	13-Apr-2024

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#### 4. TEST CONFIGURATION

##### 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

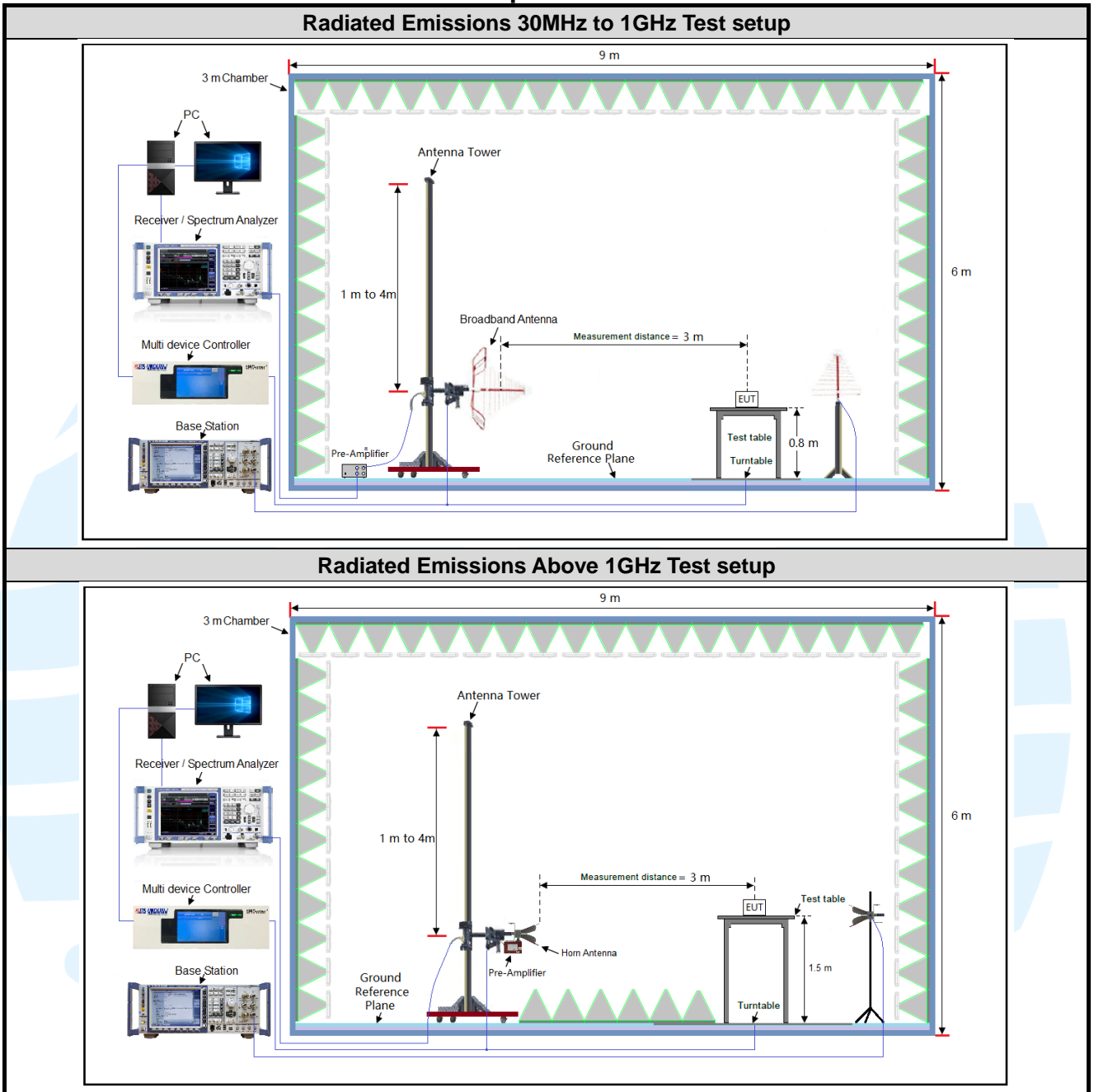
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.6	20 to 75
TH/VL	+50	3.6	20 to 75
TL/VH	-30	4.35	20 to 75
TH/VH	+50	4.35	20 to 75

**Remark:**

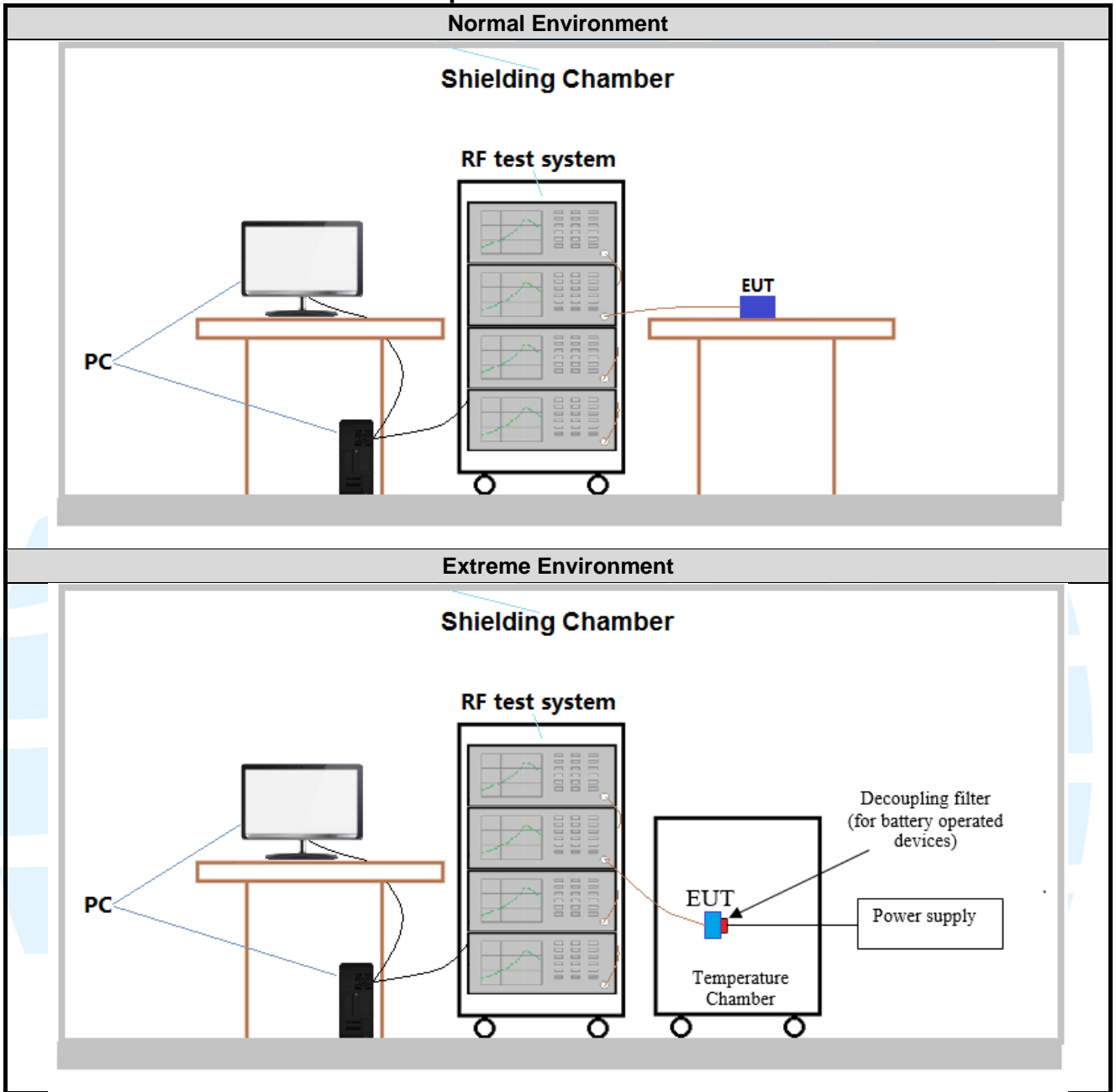
- 1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.6 V to 4.35 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.6 V to 4.35 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;  
 TL: Low Extreme Test Temperature; 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

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

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
WCDMA Band IV	Tx (1710 MHz-1755 MHz)	Channel 1312	Channel 1412	Channel 1513
		1712.4 MHz	1732.4 MHz	1752.6 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)	32.70	32.65	32.65
GPRS (GMSK, 1Tx-slot)	32.70	32.65	32.64
GPRS (GMSK, 2Tx-slot)	31.84	31.79	31.77
GPRS (GMSK, 3Tx-slot)	30.06	30.00	29.98
GPRS (GMSK, 4Tx-slot)	29.09	29.04	28.99
EDGE (8PSK, 1Tx-slot)	27.31	27.20	27.15
EDGE (8PSK, 2Tx-slot)	26.09	26.13	26.01
EDGE (8PSK, 3Tx-slot)	24.03	24.06	24.10
EDGE (8PSK, 4Tx-slot)	23.01	23.02	23.05

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)	29.20	28.87	28.60
GPRS (GMSK, 1Tx-slot)	29.00	28.71	28.40
GPRS (GMSK, 2Tx-slot)	28.31	28.06	27.81
GPRS (GMSK, 3Tx-slot)	26.70	26.50	26.24
GPRS (GMSK, 4Tx-slot)	25.63	25.41	25.18
EDGE (8PSK, 1Tx-slot)	25.70	25.60	25.30
EDGE (8PSK, 2Tx-slot)	24.86	24.70	24.30
EDGE (8PSK, 3Tx-slot)	23.00	22.84	22.50
EDGE (8PSK, 4Tx-slot)	22.00	21.75	21.33

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	23.09	22.90	22.98
HSDPA Subtest-1	22.00	21.93	21.95
HSDPA Subtest-2	21.60	21.45	21.42
HSDPA Subtest-3	21.47	21.40	21.45
HSDPA Subtest-4	21.48	21.39	21.42
HSUPA Subtest-1	20.28	20.29	20.30
HSUPA Subtest-2	22.00	21.91	21.89
HSUPA Subtest-3	21.49	21.38	21.42
HSUPA Subtest-4	21.95	21.89	21.90
HSUPA Subtest-5	22.03	21.93	21.96



WCDMA Band IV Maximum Average Power (dBm)			
Channel	1312	1412	1513
Frequency (MHz)	1712.4 MHz	1732.4 MHz	1752.6 MHz
RMC 12.2K	23.10	23.21	<b>23.24</b>
HSDPA Subtest-1	22.23	22.24	22.23
HSDPA Subtest-2	21.73	21.72	21.75
HSDPA Subtest-3	21.68	21.66	21.66
HSDPA Subtest-4	21.67	21.65	21.67
HSUPA Subtest-1	20.50	20.66	20.34
HSUPA Subtest-2	22.23	22.22	22.23
HSUPA Subtest-3	21.69	21.70	21.64
HSUPA Subtest-4	22.14	22.13	22.22
HSUPA Subtest-5	22.20	22.25	22.24

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	23.61	<b>23.71</b>	23.60
HSDPA Subtest-1	22.71	22.72	22.71
HSDPA Subtest-2	22.21	2.23	22.28
HSDPA Subtest-3	22.14	22.15	22.15
HSDPA Subtest-4	22.13	22.14	22.13
HSUPA Subtest-1	21.27	21.22	21.30
HSUPA Subtest-2	22.70	22.74	22.72
HSUPA Subtest-3	22.12	22.20	22.19
HSUPA Subtest-4	22.37	22.41	22.40
HSUPA Subtest-5	22.45	22.48	22.44

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/IVV	RMC 12.2kbps Link	RMC 12.2kbps Link

## 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 27	Miscellaneous Wireless Communications Services
4	FCC 47 CFR Part 24	Personal Communications Services
5	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
6	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01
7	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),  
 FCC 47 CFR Part 27.50(d)(4)

**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.

**FCC 47 CFR Part 27.50(d)(4)**

Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

**Test Procedure:**

According to KDB 412172 D01 Power Approach,

- **ERP or EIRP = P<sub>T</sub> + G<sub>T</sub> - L<sub>c</sub>**
- **ERP = EIRP - 2.15**

where

- **P<sub>T</sub>** = transmitter output power, expressed in dBW, dBm, or PSD;
- **G<sub>T</sub>** = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
- **L<sub>c</sub>** = 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	-0.9	28.30	27.97	27.70	33.01	0.6761	0.6266	0.5888	2	Pass
	GPRS		28.10	27.81	27.50	33.01	0.6457	0.6039	0.5623	2	Pass
	EGPRS		24.80	24.70	24.40	33.01	0.3020	0.2951	0.2754	2	Pass
GSM 850	GSM	-1.29	29.26	29.21	29.21	38.45	0.8433	0.8337	0.8337	7	Pass
	GPRS		29.26	29.21	29.20	38.45	0.8433	0.8337	0.8318	7	Pass
	EGPRS		23.87	23.76	23.71	38.45	0.2438	0.2377	0.2350	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	-0.9	22.19	22.00	22.08	33.01	0.1656	0.1585	0.1614	2	Pass
	HSDPA		21.10	21.03	21.05	33.01	0.1288	0.1268	0.1274	2	Pass
	HSUPA		21.13	21.03	21.06	33.01	0.1297	0.1268	0.1276	2	Pass
WCDMA Band IV	RMC 12.2K	-0.68	22.42	22.53	22.56	30	0.1746	0.1791	0.1803	1	Pass
	HSDPA		21.55	21.56	21.55	30	0.1429	0.1432	0.1429	1	Pass
	HSUPA		21.55	21.57	21.56	30	0.1429	0.1435	0.1432	1	Pass
WCDMA Band V	RMC 12.2K	-1.29	20.17	20.27	20.16	38.45	0.1040	0.1064	0.1038	7	Pass
	HSDPA		19.27	19.28	19.27	38.45	0.0845	0.0847	0.0845	7	Pass
	HSUPA		19.26	19.30	19.28	38.45	0.0843	0.0851	0.0847	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),  
FCC 47 CFR Part 27.50(d)(4)

**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.

**FCC 47 CFR Part 27.50(d)(4)**

Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt 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),  
FCC 47 CFR Part 27.50(d)(5)

**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.

- a) Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth
- b) Set the number of counts to a value that stabilizes the measured CCDF curve
- c) 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:** Pass

**Test Data:** Please refer to Appendix A

## 5.599%&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),  
FCC 47 CFR Part 27.53(h)

**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:** Pass

**Test Data:** Please refer to Appendix A

## 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),  
FCC 47 CFR Part 27.53(h)(1)

**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 A

## 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),  
FCC 47 CFR Part 27.53(h)(1)

**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 A



### 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),  
 FCC 47 CFR Part 27.53(h)(1)

**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	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
<b>Lowest Channel</b>							
1	713.692	-88.98	40.86	-48.12	-13.00	-35.12	Horizontal
2	798.620	-88.48	41.73	-46.75	-13.00	-33.75	Horizontal
3	912.695	-86.80	43.52	-43.28	-13.00	-30.28	Horizontal
4	1648.400	-59.06	0.04	-59.02	-13.00	-46.02	Horizontal
5	2472.600	-57.08	4.02	-53.06	-13.00	-40.06	Horizontal
6	674.677	-86.42	39.82	-46.60	-13.00	-33.60	Vertical
7	881.184	-87.23	43.15	-44.08	-13.00	-31.08	Vertical
8	965.474	-86.64	43.86	-42.78	-13.00	-29.78	Vertical
9	1648.400	-56.42	0.04	-56.38	-13.00	-43.38	Vertical
10	2472.600	-55.03	4.02	-51.01	-13.00	-38.01	Vertical
<b>Middle Channel</b>							
1	804.252	-89.07	41.94	-47.13	-13.00	-34.13	Horizontal
2	919.132	-88.12	43.55	-44.57	-13.00	-31.57	Horizontal
3	986.044	-88.56	44.36	-44.20	-13.00	-31.20	Horizontal
4	1673.200	-55.66	0.15	-55.51	-13.00	-42.51	Horizontal
5	2509.800	-59.07	4.20	-54.87	-13.00	-41.87	Horizontal
6	809.924	-88.17	42.08	-46.09	-13.00	-33.09	Vertical
7	881.184	-88.25	43.15	-45.10	-13.00	-32.10	Vertical
8	938.714	-86.29	43.51	-42.78	-13.00	-29.78	Vertical
9	1673.200	-58.48	0.15	-58.33	-13.00	-45.33	Vertical
10	2509.800	-57.35	4.20	-53.15	-13.00	-40.15	Vertical
<b>Highest Channel</b>							
1	734.037	-88.34	41.01	-47.33	-13.00	-34.33	Horizontal
2	827.179	-88.23	42.32	-45.91	-13.00	-32.91	Horizontal
3	938.714	-85.54	43.51	-42.03	-13.00	-29.03	Horizontal
4	1697.600	-58.23	0.27	-57.96	-13.00	-44.96	Horizontal
5	2546.400	-58.96	4.26	-54.70	-13.00	-41.70	Horizontal
6	781.961	-88.08	41.30	-46.78	-13.00	-33.78	Vertical
7	821.387	-88.19	42.37	-45.82	-13.00	-32.82	Vertical
8	932.141	-87.30	43.41	-43.89	-13.00	-30.89	Vertical
9	1697.600	-57.72	0.27	-57.45	-13.00	-44.45	Vertical
10	2546.400	-59.84	4.26	-55.58	-13.00	-42.58	Vertical

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PCS 1900							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
<b>Lowest Channel</b>							
1	607.181	-79.92	10.09	-69.83	-13.00	-56.83	Horizontal
2	698.804	-80.84	12.02	-68.82	-13.00	-55.82	Horizontal
3	938.714	-81.47	14.71	-66.76	-13.00	-53.76	Horizontal
4	3700.400	-70.12	8.62	-61.50	-13.00	-48.50	Horizontal
5	5550.600	-70.59	12.12	-58.47	-13.00	-45.47	Horizontal
6	607.181	-78.70	10.09	-68.61	-13.00	-55.61	Vertical
7	868.886	-80.32	13.69	-66.63	-13.00	-53.63	Vertical
8	979.139	-81.51	14.85	-66.66	-13.00	-53.66	Vertical
9	3700.400	-69.15	8.62	-60.53	-13.00	-47.53	Vertical
10	5550.600	-69.85	12.12	-57.73	-13.00	-44.73	Vertical
<b>Middle Channel</b>							
1	771.047	-80.71	12.54	-68.17	-13.00	-55.17	Horizontal
2	875.013	-81.49	14.01	-67.48	-13.00	-54.48	Horizontal
3	972.283	-80.79	14.58	-66.21	-13.00	-53.21	Horizontal
4	3760.000	-66.09	8.78	-57.31	-13.00	-44.31	Horizontal
5	5640.000	-71.79	12.00	-59.79	-13.00	-46.79	Horizontal
6	611.462	-79.48	10.09	-69.39	-13.00	-56.39	Vertical
7	728.897	-79.66	11.53	-68.13	-13.00	-55.13	Vertical
8	787.475	-80.60	12.94	-67.66	-13.00	-54.66	Vertical
9	3760.000	-65.21	8.78	-56.43	-13.00	-43.43	Vertical
10	5640.000	-65.91	12.00	-53.91	-13.00	-40.91	Vertical
<b>Highest Channel</b>							
1	754.963	-79.95	12.07	-67.88	-13.00	-54.88	Horizontal
2	833.013	-80.65	13.10	-67.55	-13.00	-54.55	Horizontal
3	965.474	-81.45	14.45	-67.00	-13.00	-54.00	Horizontal
4	3819.600	-66.88	8.95	-57.93	-13.00	-44.93	Horizontal
5	5729.400	-72.58	11.89	-60.69	-13.00	-47.69	Horizontal
6	734.037	-80.39	11.60	-68.79	-13.00	-55.79	Vertical
7	781.961	-80.55	12.77	-67.78	-13.00	-54.78	Vertical
8	925.613	-81.51	14.71	-66.80	-13.00	-53.80	Vertical
9	3819.600	-62.85	8.95	-53.90	-13.00	-40.90	Vertical
10	5729.400	-71.15	11.89	-59.26	-13.00	-46.26	Vertical

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WCDMA Band II							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
<b>RMC 12.2kbps _ Lowest Channel</b>							
1	693.910	-80.23	11.86	-68.37	-13.00	-55.37	Horizontal
2	793.028	-80.52	13.00	-67.52	-13.00	-54.52	Horizontal
3	965.474	-80.55	14.45	-66.10	-13.00	-53.10	Horizontal
4	3704.800	-70.05	8.62	-61.43	-13.00	-48.43	Horizontal
5	5557.200	-70.47	12.11	-58.36	-13.00	-45.36	Horizontal
6	793.028	-80.73	13.00	-67.73	-13.00	-54.73	Vertical
7	925.613	-81.64	14.71	-66.93	-13.00	-53.93	Vertical
8	972.283	-80.63	14.58	-66.05	-13.00	-53.05	Vertical
9	1693.200	-61.11	0.25	-60.86	-13.00	-47.86	Vertical
10	2539.800	-64.44	4.25	-60.19	-13.00	-47.19	Vertical
<b>RMC 12.2kbps _ Middle Channel</b>							
1	899.958	-80.83	14.32	-66.51	-13.00	-53.51	Horizontal
2	945.334	-81.08	14.42	-66.66	-13.00	-53.66	Horizontal
3	972.283	-81.33	14.58	-66.75	-13.00	-53.75	Horizontal
4	3704.800	-70.35	8.62	-61.73	-13.00	-48.73	Horizontal
5	5557.200	-70.63	12.11	-58.52	-13.00	-45.52	Horizontal
6	875.013	-81.54	14.01	-67.53	-13.00	-54.53	Vertical
7	925.613	-81.47	14.71	-66.76	-13.00	-53.76	Vertical
8	965.474	-80.29	14.45	-65.84	-13.00	-52.84	Vertical
9	3760.000	-65.68	8.78	-56.90	-13.00	-43.90	Vertical
10	5640.000	-69.66	12.00	-57.66	-13.00	-44.66	Vertical
<b>RMC 12.2kbps _ Highest Channel</b>							
1	679.435	-79.72	11.30	-68.42	-13.00	-55.42	Horizontal
2	739.214	-80.04	11.80	-68.24	-13.00	-55.24	Horizontal
3	965.474	-81.51	14.45	-67.06	-13.00	-54.06	Horizontal
4	3815.200	-67.49	8.94	-58.55	-13.00	-45.55	Horizontal
5	5722.800	-71.71	11.90	-59.81	-13.00	-46.81	Horizontal
6	703.731	-80.63	11.90	-68.73	-13.00	-55.73	Vertical
7	906.304	-81.85	14.40	-67.45	-13.00	-54.45	Vertical
8	958.714	-81.54	14.46	-67.08	-13.00	-54.08	Vertical
9	3760.000	-65.63	8.78	-56.85	-13.00	-43.85	Vertical
10	5640.000	-70.99	12.00	-58.99	-13.00	-45.99	Vertical

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WCDMA Band IV							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
<b>RMC 12.2kbps_ Lowest Channel</b>							
1	833.013	-79.37	13.10	-66.27	-13.00	-53.27	Horizontal
2	919.132	-80.77	14.52	-66.25	-13.00	-53.25	Horizontal
3	938.714	-80.59	14.71	-65.88	-13.00	-52.88	Horizontal
4	3815.200	-66.41	8.94	-57.47	-13.00	-44.47	Horizontal
5	5722.800	-72.02	11.90	-60.12	-13.00	-47.12	Horizontal
6	798.620	-80.99	12.97	-68.02	-13.00	-55.02	Vertical
7	833.013	-80.87	13.10	-67.77	-13.00	-54.77	Vertical
8	906.304	-80.82	14.40	-66.42	-13.00	-53.42	Vertical
9	3424.800	-65.11	7.50	-57.61	-13.00	-44.61	Vertical
10	5137.200	-65.84	10.76	-55.08	-13.00	-42.08	Vertical
<b>RMC 12.2kbps_ Middle Channel</b>							
1	771.047	-80.43	12.54	-67.89	-13.00	-54.89	Horizontal
2	868.886	-81.14	13.69	-67.45	-13.00	-54.45	Horizontal
3	952.000	-80.72	14.50	-66.22	-13.00	-53.22	Horizontal
4	3464.800	-66.37	7.74	-58.63	-13.00	-45.63	Horizontal
5	5197.200	-67.49	10.90	-56.59	-13.00	-43.59	Horizontal
6	793.028	-80.95	13.00	-67.95	-13.00	-54.95	Vertical
7	887.398	-80.99	13.86	-67.13	-13.00	-54.13	Vertical
8	938.714	-80.82	14.71	-66.11	-13.00	-53.11	Vertical
9	3424.800	-65.41	7.50	-57.91	-13.00	-44.91	Vertical
10	5137.200	-66.17	10.76	-55.41	-13.00	-42.41	Vertical
<b>RMC 12.2kbps_ Highest Channel</b>							
1	744.427	-79.55	11.94	-67.61	-13.00	-54.61	Horizontal
2	899.958	-81.48	14.32	-67.16	-13.00	-54.16	Horizontal
3	932.141	-81.68	14.85	-66.83	-13.00	-53.83	Horizontal
4	3505.200	-64.50	7.97	-56.53	-13.00	-43.53	Horizontal
5	5257.800	-68.83	11.15	-57.68	-13.00	-44.68	Horizontal
6	827.179	-80.53	12.79	-67.74	-13.00	-54.74	Vertical
7	893.656	-80.71	14.14	-66.57	-13.00	-53.57	Vertical
8	938.714	-80.60	14.71	-65.89	-13.00	-52.89	Vertical
9	3505.200	-64.36	7.97	-56.39	-13.00	-43.39	Vertical
10	5257.800	-68.25	11.15	-57.10	-13.00	-44.10	Vertical

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WCDMA Band V							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
<b>RMC 12.2kbps _ Lowest Channel</b>							
1	36.268	-80.03	31.69	-48.34	-13.00	-35.34	Horizontal
2	906.304	-87.70	43.57	-44.13	-13.00	-31.13	Horizontal
3	986.044	-87.67	44.36	-43.31	-13.00	-30.31	Horizontal
4	1652.800	-60.37	0.06	-60.31	-13.00	-47.31	Horizontal
5	2479.200	-65.01	4.06	-60.95	-13.00	-47.95	Horizontal
6	35.762	-79.45	31.76	-47.69	-13.00	-34.69	Vertical
7	881.184	-87.44	43.15	-44.29	-13.00	-31.29	Vertical
8	952.000	-86.86	43.79	-43.07	-13.00	-30.07	Vertical
9	1652.800	-58.45	0.06	-58.39	-13.00	-45.39	Vertical
10	2479.200	-61.96	4.06	-57.90	-13.00	-44.90	Vertical
<b>RMC 12.2kbps _ Middle Channel</b>							
1	35.762	-79.14	31.76	-47.38	-13.00	-34.38	Horizontal
2	749.676	-88.00	40.95	-47.05	-13.00	-34.05	Horizontal
3	958.714	-87.78	43.89	-43.89	-13.00	-30.89	Horizontal
4	1672.800	-62.65	0.15	-62.50	-13.00	-49.50	Horizontal
5	2509.200	-64.43	4.20	-60.23	-13.00	-47.23	Horizontal
6	679.435	-87.84	39.93	-47.91	-13.00	-34.91	Vertical
7	815.635	-87.84	42.22	-45.62	-13.00	-32.62	Vertical
8	952.000	-85.87	43.79	-42.08	-13.00	-29.08	Vertical
9	1652.800	-61.47	0.06	-61.41	-13.00	-48.41	Vertical
10	2479.200	-66.75	4.06	-62.69	-13.00	-49.69	Vertical
<b>RMC 12.2kbps _ Highest Channel</b>							
1	881.184	-87.64	43.15	-44.49	-13.00	-31.49	Horizontal
2	906.304	-87.60	43.57	-44.03	-13.00	-31.03	Horizontal
3	992.997	-88.07	44.47	-43.60	-13.00	-30.60	Horizontal
4	1672.800	-62.72	0.15	-62.57	-13.00	-49.57	Horizontal
5	2509.200	-65.22	4.20	-61.02	-13.00	-48.02	Horizontal
6	912.695	-88.48	43.52	-44.96	-13.00	-31.96	Vertical
7	952.000	-88.00	43.79	-44.21	-13.00	-31.21	Vertical
8	979.139	-87.17	44.18	-42.99	-13.00	-29.99	Vertical
9	1693.200	-61.31	0.25	-61.06	-13.00	-48.06	Vertical
10	2539.800	-64.54	4.25	-60.29	-13.00	-47.29	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 &  
 FCC 47 CFR Part 27.54

**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  $\pm 2.5$  ppm for mobile stations.

**FCC 47 CFR Part 24.235, FCC 47 CFR Part 27.54**

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. =  $-30^{\circ}$  to  $+ 50^{\circ}\text{C}$
  - b) Voltage =low voltage, 3.6 Vdc, Normal, 3.8 Vdc and High voltage, 4.35 Vdc.

2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to  $20^{\circ}\text{C}$  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 Result:** Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result	
	(MHz)	(Vdc)	( $^{\circ}\text{C}$ )	(Hz)	(ppm)	(ppm)		
<b>GSM 850 1Tx-slot</b>								
GMSK	190 / 836.6	VL	TN	-14.74	-0.0176	$\pm 2.5$	Pass	
		VN		-9.96	-0.0119	$\pm 2.5$	Pass	
		VH		-13.12	-0.0157	$\pm 2.5$	Pass	
				50	-11.76	-0.0141	$\pm 2.5$	Pass
				40	-12.81	-0.0153	$\pm 2.5$	Pass
				30	-10.94	-0.0131	$\pm 2.5$	Pass
				20	-9.96	-0.0119	$\pm 2.5$	Pass
				10	-10.23	-0.0122	$\pm 2.5$	Pass
				0	-11.69	-0.0140	$\pm 2.5$	Pass
				-10	-6.91	-0.0083	$\pm 2.5$	Pass
				-20	-8.84	-0.0106	$\pm 2.5$	Pass
				-30	-9.28	-0.0111	$\pm 2.5$	Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>GSM 1900 1Tx-slot</b>							
GMSK	661 / 1880.0	VL	TN	-16.33	-0.0087	Note 1	Pass
		VN		-15.44	-0.0082		Pass
		VH		-18.81	-0.0100		Pass
		VN	50	-17.46	-0.0093		Pass
			40	-18.51	-0.0098		Pass
			30	-16.24	-0.0086		Pass
			20	-15.44	-0.0082		Pass
			10	-18.49	-0.0098		Pass
			0	-17.42	-0.0093		Pass
			-10	-18.34	-0.0098		Pass
			-20	-16.27	-0.0087		Pass
			-30	-15.43	-0.0082		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>EDGE 850 1Tx-slot</b>							
8PSK	190 / 836.6	VL	TN	-8.17	-0.0098	± 2.5	Pass
		VN		-6.79	-0.0081	± 2.5	Pass
		VH		-9.21	-0.0110	± 2.5	Pass
		VN	50	-9.19	-0.0110	± 2.5	Pass
			40	-10.52	-0.0126	± 2.5	Pass
			30	-11.78	-0.0141	± 2.5	Pass
			20	-6.79	-0.0081	± 2.5	Pass
			10	-9.39	-0.0112	± 2.5	Pass
			0	-7.25	-0.0087	± 2.5	Pass
			-10	-8.64	-0.0103	± 2.5	Pass
			-20	-8.53	-0.0102	± 2.5	Pass
			-30	-9.94	-0.0119	± 2.5	Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>EDGE 1900 1Tx-slot</b>							
8PSK	661 / 1880.0	VL	TN	-11.34	-0.0060	Note 1	Pass
		VN		-13.45	-0.0072		Pass
		VH		-14.52	-0.0077		Pass
		VN	50	-11.62	-0.0062		Pass
			40	-12.54	-0.0067		Pass
			30	-13.55	-0.0072		Pass
			20	-13.45	-0.0072		Pass
			10	-12.26	-0.0065		Pass
			0	-14.33	-0.0076		Pass
			-10	-11.23	-0.0060		Pass
			-20	-15.49	-0.0082		Pass
			-30	-13.28	-0.0071		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>WCDMA II RMC 12.2Kbps</b>							
BPSK	9400 / 1880.0	VL	TN	-4.58	-0.0024	Note 1	Pass
		VN		-5.14	-0.0027		Pass
		VH		-4.47	-0.0024		Pass
		VN	50	-6.22	-0.0033		Pass
			40	-5.89	-0.0031		Pass
			30	-4.43	-0.0024		Pass
			20	-5.14	-0.0027		Pass
			10	-6.26	-0.0033		Pass
			0	-7.38	-0.0039		Pass
			-10	-5.25	-0.0028		Pass
			-20	-6.39	-0.0034		Pass
			-30	-7.82	-0.0042		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>WCDMA IV RMC 12.2Kbps</b>							
BPSK	1412 / 1732.4	VL	TN	-9.73	-0.0056	Note 1	Pass
		VN		-10.12	-0.0058		Pass
		VH		-8.32	-0.0048		Pass
		VN	50	-10.39	-0.0060		Pass
			40	-8.28	-0.0048		Pass
			30	-9.36	-0.0054		Pass
			20	-10.12	-0.0058		Pass
			10	-9.83	-0.0057		Pass
			0	-10.21	-0.0059		Pass
			-10	-7.62	-0.0044		Pass
			-20	-9.45	-0.0055		Pass
			-30	-10.14	-0.0059		Pass

Modulation	Channel/ Frequency	Voltage	Temperature	Deviation	Deviation	Limit	Result
	(MHz)	(Vdc)	(°C)	(Hz)	(ppm)	(ppm)	
<b>WCDMA V RMC 12.2Kbps</b>							
BPSK	4182 / 836.4	VL	TN	-6.55	-0.0078	± 2.5	Pass
		VN		-8.22	-0.0098	± 2.5	Pass
		VH		-7.89	-0.0094	± 2.5	Pass
		VN	50	-8.47	-0.0101	± 2.5	Pass
			40	-9.18	-0.0110	± 2.5	Pass
			30	-10.35	-0.0124	± 2.5	Pass
			20	-8.22	-0.0098	± 2.5	Pass
			10	-6.57	-0.0079	± 2.5	Pass
			0	-8.91	-0.0107	± 2.5	Pass
			-10	-7.36	-0.0088	± 2.5	Pass
			-20	-9.67	-0.0116	± 2.5	Pass
			-30	-6.36	-0.0076	± 2.5	Pass

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UTTR-RF-FCC23G-V1.1



## APPENDIX A RF TEST DATA

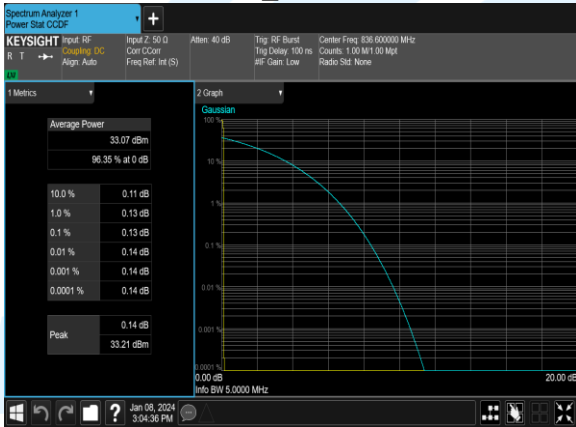
### A.1 GSM 850

#### Peak to Average Ratio

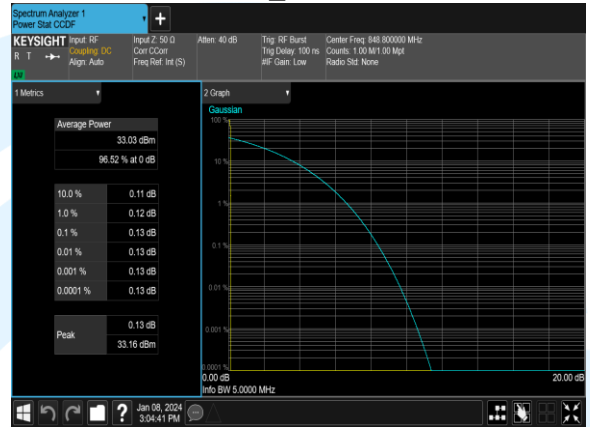
Band	Channel	Freq (MHz)	Slots	Result (dB)	Limit (dB)	Verdict
GSM 850	190	836.6	1 Tx	0.13	13	PASS
GSM 850	251	848.8	1 Tx	0.13	13	PASS
GSM 850	128	824.2	1 Tx	0.14	13	PASS
GPRS 850	190	836.6	1 Tx	0.14	13	PASS
GPRS 850	251	848.8	1 Tx	0.13	13	PASS
GPRS 850	128	824.2	1 Tx	0.14	13	PASS
EGPRS 850	190	836.6	1 Tx	5.35	13	PASS
EGPRS 850	251	848.8	1 Tx	5.20	13	PASS
EGPRS 850	128	824.2	1 Tx	5.41	13	PASS

#### Test Graphs

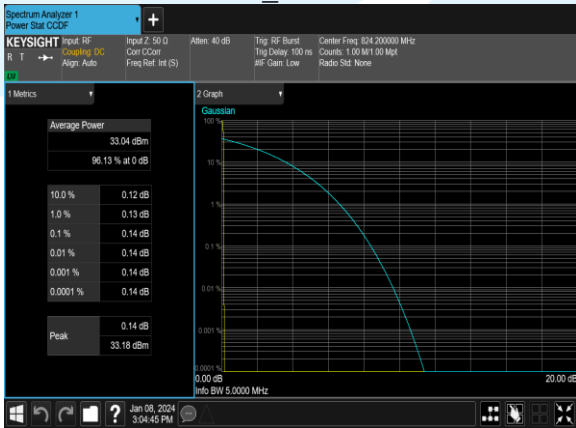
GSM850\_Channel190



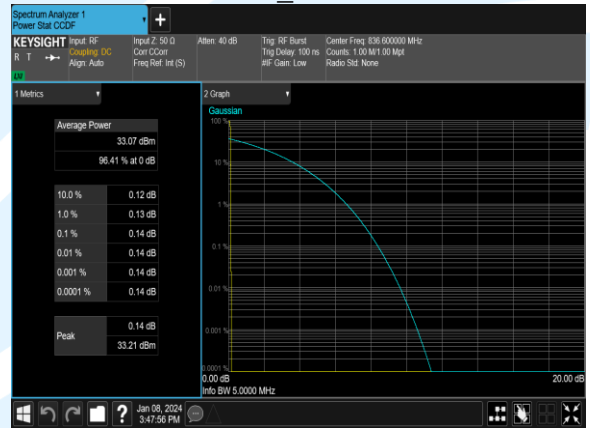
GSM850\_Channel251



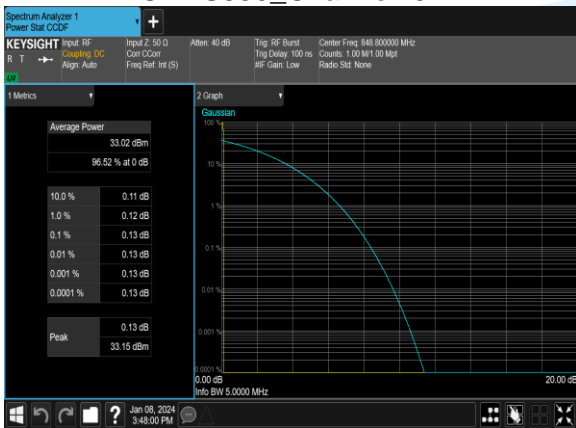
GSM850\_Channel128



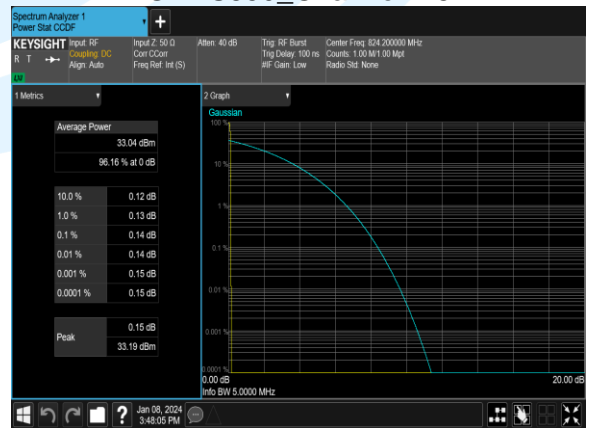
GPRS850\_Channel190



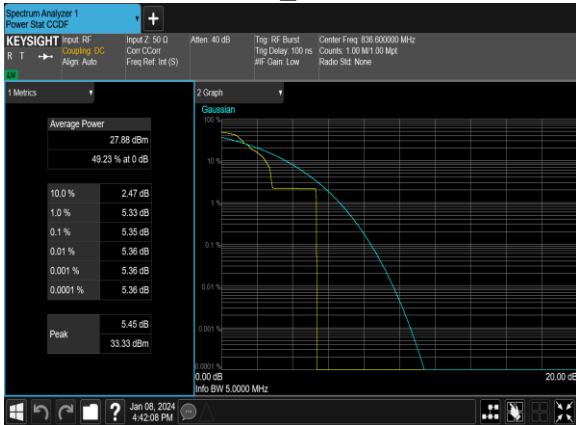
GPRS850\_Channel251



GPRS850\_Channel128



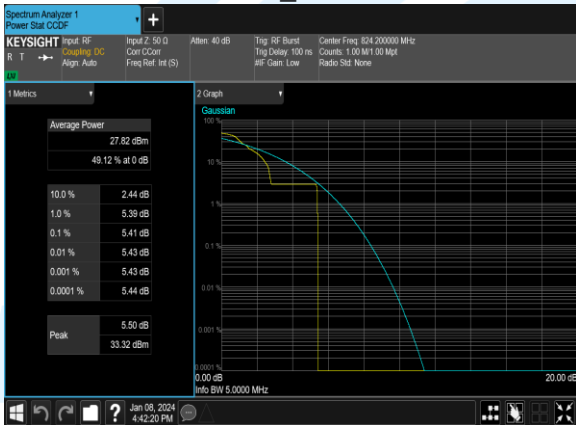
EGPRS850\_Channel190



EGPRS850\_Channel251



EGPRS850\_Channel128



## Occupied Bandwidth

Band	Channel	Freq (MHz)	Slots	OBW (MHz)	26dB BW (MHz)
GSM 850	128	824.2	1 Tx	0.24625	0.3175
GSM 850	190	836.6	1 Tx	0.24469	0.3132
GSM 850	251	848.8	1 Tx	0.24454	0.3155
GPRS 850	190	836.6	1 Tx	0.24292	0.3161
GPRS 850	251	848.8	1 Tx	0.24335	0.3161
GPRS 850	128	824.2	1 Tx	0.24462	0.3156
EGPRS 850	190	836.6	1 Tx	0.23959	0.3051
EGPRS 850	251	848.8	1 Tx	0.24981	0.3078
EGPRS 850	128	824.2	1 Tx	0.2481	0.3096

## Test Graphs

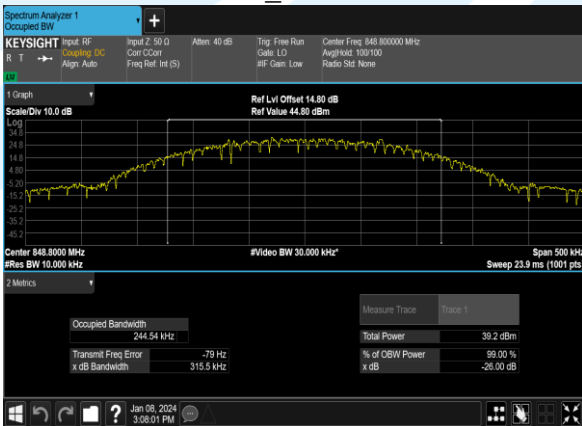
GSM850\_Channel128



GSM850\_Channel190



GSM850\_Channel251



GPRS850\_Channel190



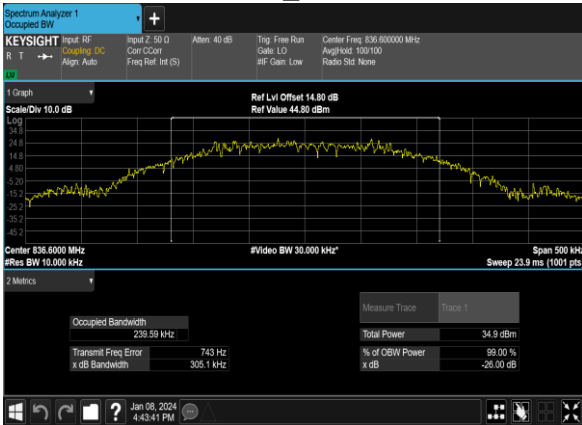
GPRS850\_Channel251



GPRS850\_Channel128



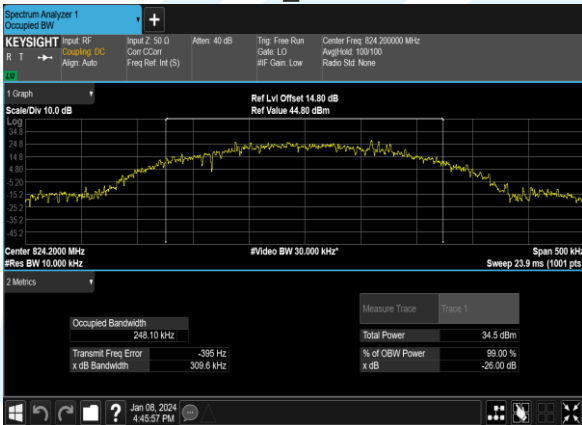
EGPRS850\_Channel190



EGPRS850\_Channel251



EGPRS850\_Channel128



**Conducted Spurious Emissions**

Band	Channel	Freq (MHz)	Slots	Result (dBm)	Limit (dBm)	Verdict
GSM 850	128	824.2	1 Tx	-30.25	-13	PASS
GSM 850	190	836.6	1 Tx	-30.11	-13	PASS
GSM 850	251	848.8	1 Tx	-29.96	-13	PASS
GPRS 850	190	836.6	1 Tx	-29.57	-13	PASS
GPRS 850	251	848.8	1 Tx	-32.67	-13	PASS
GPRS 850	128	824.2	1 Tx	-30.41	-13	PASS
EGPRS 850	251	848.8	1 Tx	-30.32	-13	PASS
EGPRS 850	128	824.2	1 Tx	-30.55	-13	PASS

**Test Graphs**

GSM850\_Channel128



GSM850\_Channel190



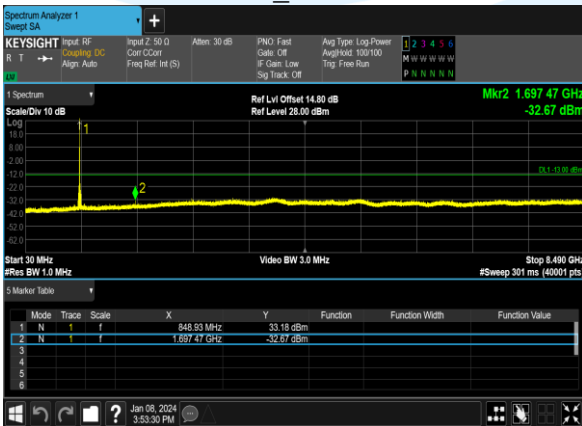
GSM850\_Channel251



GPRS850\_Channel190



GPRS850\_Channel251



GPRS850\_Channel128



EGPRS850\_Channel251



EGPRS850\_Channel128



## Conducted Band Edge

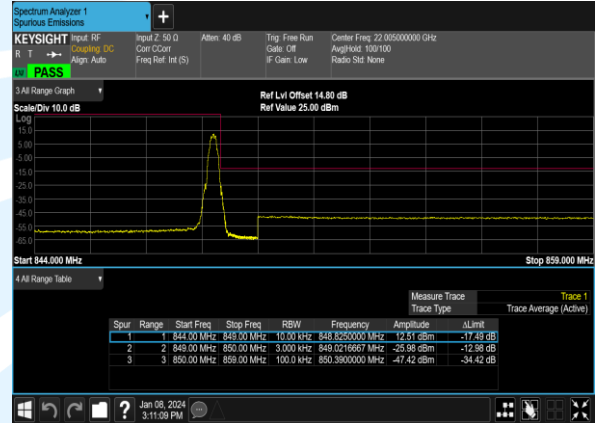
Band	Channel	Freq (MHz)	Slots	Result	Verdict
GSM 850	128	824.2	1 Tx	see graph	PASS
GSM 850	251	848.8	1 Tx	see graph	PASS
GPRS 850	251	848.8	1 Tx	see graph	PASS
GPRS 850	128	824.2	1 Tx	see graph	PASS
EGPRS 850	251	848.8	1 Tx	see graph	PASS
EGPRS 850	128	824.2	1 Tx	see graph	PASS

## Test Graphs

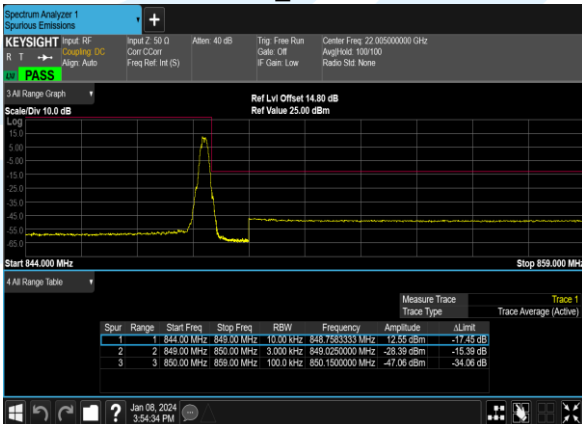
GSM850\_Channel128



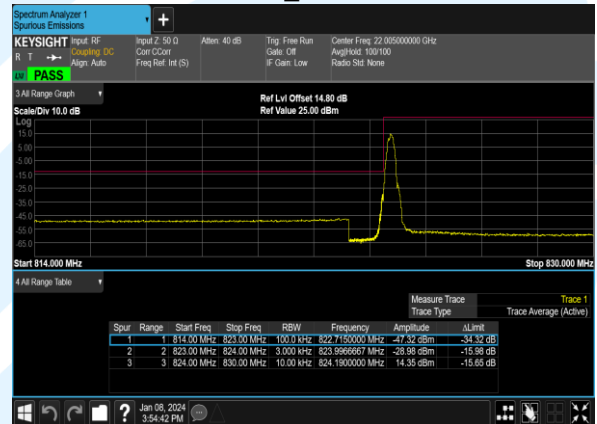
GSM850\_Channel251



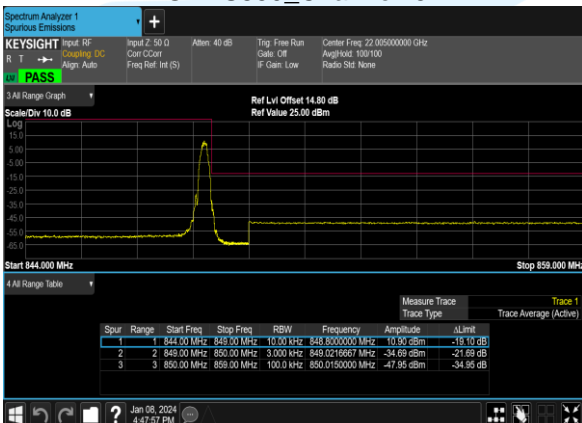
GPRS850\_Channel251



GPRS850\_Channel128



EGPRS850\_Channel251



EGPRS850\_Channel128

