TEST REPORT

Report No.:	BCTC2504135595-2E
Applicant:	Shanghai TUGE Data Technologies Co., Ltd.
Product Name:	Smart IoT 4G Router
Test Model:	TR40
Tested Date:	2025-04-03 to 2025-05-16
Issued Date:	2025-05-27

Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2AU4T-TR40

Product Name:	Smart IoT 4G Router
Trademark:	N/A
Model/Type reference:	TR40
Prepared For:	Shanghai TUGE Data Technologies Co., Ltd.
Address:	Floor 1-2, Building 4, No.1628, Lingang New Area, China (Shanghai) Pilot Free Trade Zone
Manufacturer:	Shanghai TUGE Data Technologies Co., Ltd.
Address:	Floor 1-2, Building 4, No.1628, Lingang New Area, China (Shanghai) Pilot Free Trade Zone
Prepared By:	Shenzhen BCTC Testing Co., Ltd
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2025-04-03
Sample Tested Date:	2025-04-03 to 2025-05-16
Report No.:	BCTC2504135595-2E
Test Standards:	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part22 Subpart H FCC CFR Title 47 Part24 Subpart E ANSI/ TIA/ EIA-603-D-2010 FCC KDB 971168 D01 Power Meas. License Digital Systems v02v02
Test Results:	PASS
Remark:	This is WCDMAradio test report.

Tested by:

Brave Zeng/ Project Handler

Approved by:

Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

Table Of Content

(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2504135595-2E	2025-05-27	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No.	Results
1	RF Exposure	§1.1307,§2.1093	PASS
2	RF Output Power	§22.913 (a), §24.232 (c),	PASS
3	Peak-to-average Ratio(PAR) of Transmitter	§24.232(d),§22.913,	PASS
4	Emission Bandwidth	§22.917 (b), §24.238(b),	PASS
5	Spurious Emissions at Antenna Terminal	§22.917 (a), §24.238 (a),	PASS
6	Spurious Radiation Emissions	§22.917 (a), §24.238 (a),	PASS
7	Out of Band Emissions	§22.917 (a), §24.238 (a),	PASS
8	Frequency Stability	§22.355, §24.235,	PASS

3. 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	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(9KHz-30MHz)	U=3.7dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission (150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59℃

4. Product Information And Test Setup

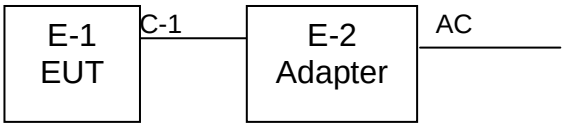
4.1 Product Information

Model/Type reference:	TR40
Model differences:	N/A
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	WCDMA Band II: TX: 1852.40~1907.60MHz; Rx: 1932.60~1987.40MHz; WCDMA Band IV: TX: 1712.40~1752.60MHz; Rx: 2112.60~2152.40MHz; WCDMA Band V: TX: 826.40~846.60MHz; RX: 871.40~ 891.60MHz;
Max RF Output Power:	WCDMA Band II: 22.03dBm WCDMA Band IV: 22.16dBm WCDMA Band V: 22.05dBm
Type of Modulation:	WCDMA Mode with BPSK Modulation
Type of Emission:	WCDMA Band II: 4M73F9W WCDMA Band IV: 4M16F9W WCDMA Band V: 4M15F9W
Antenna installation:	Internal antenna
Antenna Gain:	WCDMA Band II: 2.25dBi WCDMA Band IV: 1.15dBi WCDMA Band V: 0.65dBi
Remark:	The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.
Ratings:	Input: DC 12V,2A Output: DC 12V,2A, Total: 24.0W (Max)

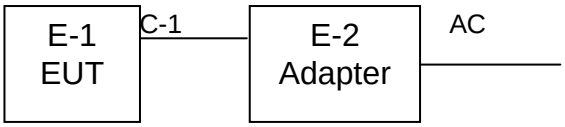
4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.

Conducted Emission:



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	Smart IoT 4G Router	N/A	TR40	N/A	EUT
E-2	Adapter	N/A	N/A	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	N/A	N/A

Notes:
1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.5 Test Mode

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
WCDMA Band II	WCDMA/HSDPA/HSUPA	1852.4 MHz	9262
		1880.0 MHz	9400
		1907.6 MHz	9538
WCDMA Band IV	WCDMA/HSDPA/HSUPA	1712.4MHz	1312
		1732.4MHz	1412
		1752.6MHz	1513
WCDMA Band V	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.4 MHz	4182
		846.6 MHz	4233
Note 1: the transmitter has been tested on the communications mode of WCDMA, HSDPA, HSUPA compliance test and record the worst case.			

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Adapter	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address:1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.
FCC Test Firm Registration Number: 712850
A2LA certificate registration number is: CN1212
ISED Registered No.: 23583
ISED CAB identifier: CN0017

5.2 Test Instrument Used

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power meter	Keysight	E4419	\	May 16, 2024	May 15, 2025
Power Sensor (AV)	Keysight	E9300A	\	May 16, 2024	May 15, 2025
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 16, 2024	May 15, 2025
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 16, 2024	May 15, 2025

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power meter	Keysight	E4419	\	May 14, 2025	May 13, 2026
Power Sensor (AV)	Keysight	E9300A	\	May 14, 2025	May 13, 2026
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 14, 2025	May 13, 2026
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 14, 2025	May 13, 2026

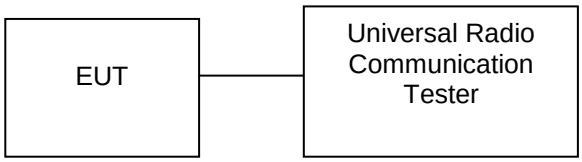
Radiated Emissions Test (966 Chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	May 16, 2024	May 15, 2025
Receiver	R&S	ESR3	102075	May 16, 2024	May 15, 2025
Receiver	R&S	ESRP	101154	May 16, 2024	May 15, 2025
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 16, 2024	May 15, 2025
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 21, 2024	May 20, 2025
Loop Antenna(9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	May 21, 2024	May 20, 2025
Amplifier	SKET	LAPA_01G18G-45dB	SK2021040901	May 16, 2024	May 15, 2025
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 21, 2024	May 20, 2025
Amplifier(18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 16, 2024	May 15, 2025
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 21, 2024	May 20, 2025
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 16, 2024	May 15, 2025
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Radiated Emissions Test (966 Chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	May 15, 2023	May 14, 2026
Receiver	R&S	ESR3	102075	May 08, 2025	May 07, 2026
Receiver	R&S	ESRP	101154	May 14, 2025	May 13, 2026
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 14, 2025	May 13, 2026
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 21, 2024	May 20, 2025
Loop Antenna(9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	May 21, 2024	May 20, 2025
Amplifier	SKET	LAPA_01G18G-45dB	SK2021040901	May 14, 2025	May 13, 2026
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 14, 2025	May 13, 2026
Amplifier(18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 14, 2025	May 13, 2026
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 21, 2024	May 20, 2025
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 14, 2025	May 13, 2026
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

6. RF Output Power

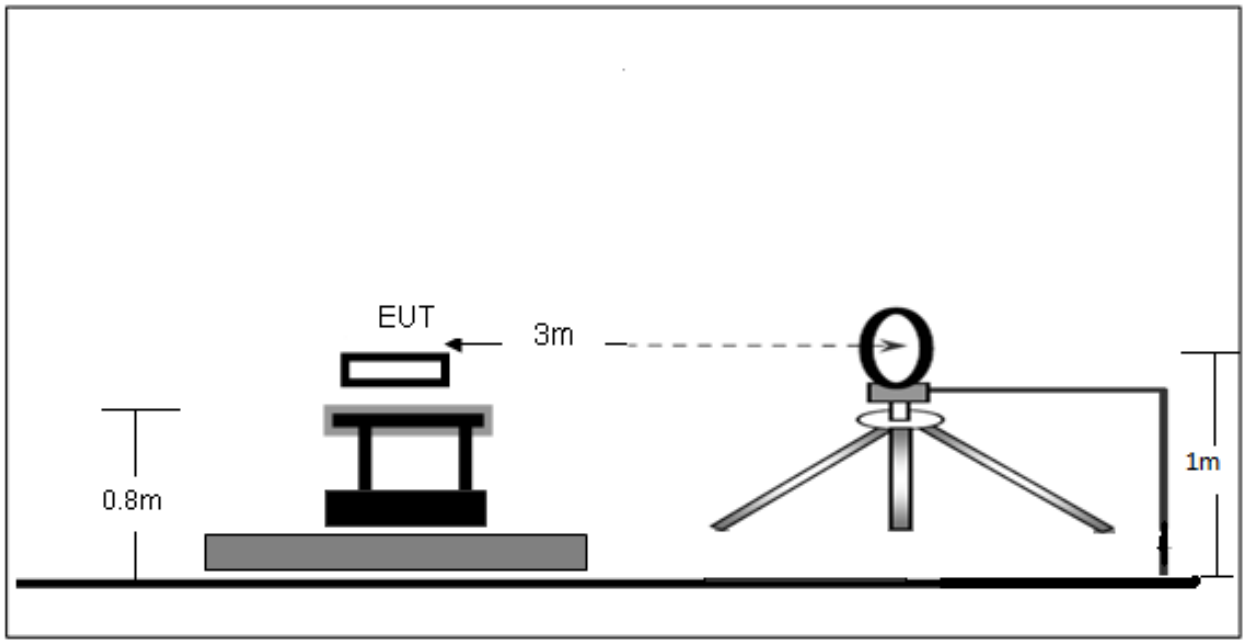
6.1 Block Diagram Of Test Setup

Conducted output power test method:

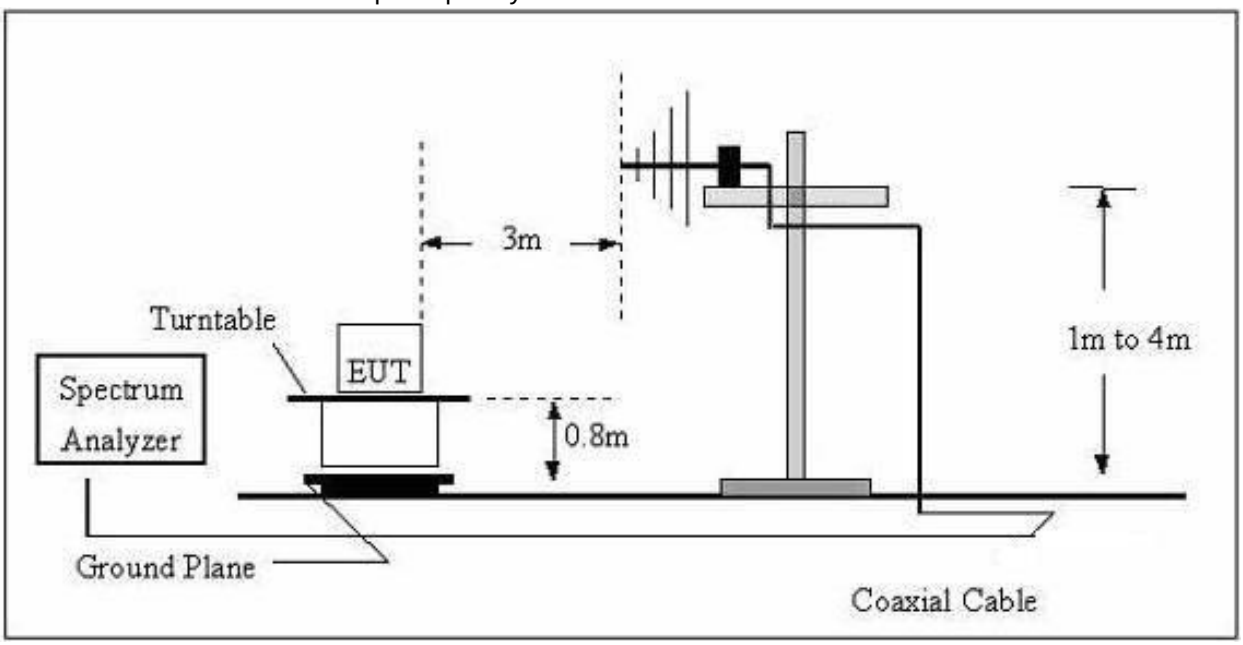


Radiated power test method:

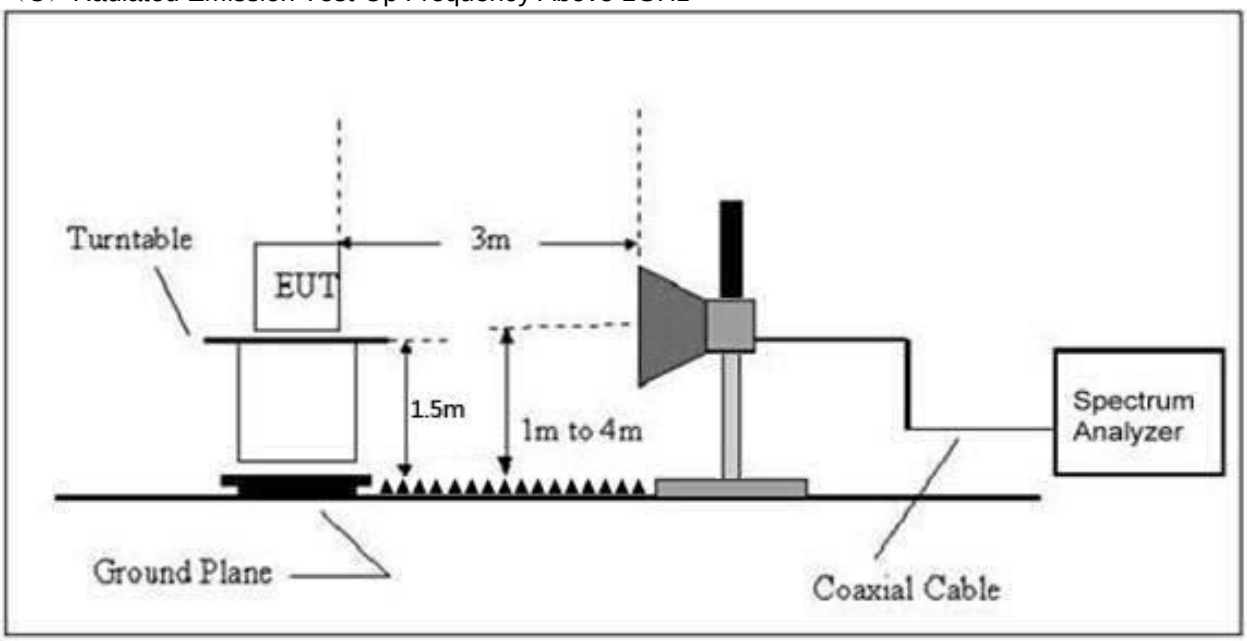
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



6.2 Limit

According to §22.913(a)(2),The ERP of mobileand portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §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.

6.3 Test procedure

Radiated power test method:

1.The setup of EUT is according with per ANSI/TIA Standard 603 D and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

6.4 Test Result

EIRP For WCDMA Mode Band II

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 24E Limits (dBm)	Result
Low Channel								
1852.4	H	1.5	0	40.33	-22.25	18.08	33.00	PASS
1852.4	V	1.5	0	40.36	-22.25	18.11	33.00	PASS
Middle Channel								
1880	H	1.5	0	41.23	-22.16	19.07	33.00	PASS
1880	V	1.5	0	39.96	-22.16	17.80	33.00	PASS
High Channel								
1907.6	H	1.5	0	40.89	-22.06	18.83	33.00	PASS
1907.6	V	1.5	0	40.27	-22.06	18.21	33.00	PASS

EIRP For HSDPA Mode Band II

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 24E Limits (dBm)	Result
Low Channel								
1852.4	H	1.5	0	41.61	-22.25	19.36	33.00	PASS
1852.4	V	1.5	0	40.57	-22.25	18.32	33.00	PASS
Middle Channel								
1880	H	1.5	0	41.82	-22.16	19.66	33.00	PASS
1880	V	1.5	0	40.67	-22.16	18.51	33.00	PASS
High Channel								
1907.6	H	1.5	0	41.11	-22.06	19.05	33.00	PASS
1907.6	V	1.5	0	40.43	-22.06	18.37	33.00	PASS

EIRP For HSUPA Mode Band II

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 24E Limits (dBm)	Result
Low Channel								
1852.4	H	1.5	0	39.50	-22.25	17.25	33.00	PASS
1852.4	V	1.5	0	40.13	-22.25	17.88	33.00	PASS
Middle Channel								
1880	H	1.5	0	41.40	-22.16	19.24	33.00	PASS
1880	V	1.5	0	39.63	-22.16	17.47	33.00	PASS
High Channel								
1907.6	H	1.5	0	41.13	-22.06	19.07	33.00	PASS
1907.6	V	1.5	0	40.43	-22.06	18.37	33.00	PASS

EIRP For WCDMA Mode Band IV

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 24E Limits (dBm)	Result
Low Channel								
1712.4	H	1.5	0	40.91	-22.71	18.20	33.00	PASS
1712.4	V	1.5	0	40.99	-22.71	18.28	33.00	PASS
Middle Channel								
1732.4	H	1.5	0	40.88	-22.67	18.21	33.00	PASS
1732.4	V	1.5	0	41.08	-22.67	18.41	33.00	PASS
High Channel								
1752.6	H	1.5	0	40.42	-22.60	17.82	33.00	PASS
1752.6	V	1.5	0	40.58	-22.60	17.98	33.00	PASS

EIRP For HSDPA Mode Band IV

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 24E Limits (dBm)	Result
Low Channel								
1712.4	H	1.5	0	40.57	-22.71	17.86	33.00	PASS
1712.4	V	1.5	0	39.78	-22.71	17.07	33.00	PASS
Middle Channel								
1732.4	H	1.5	0	39.80	-22.67	17.13	33.00	PASS
1732.4	V	1.5	0	40.39	-22.67	17.72	33.00	PASS
High Channel								
1752.6	H	1.5	0	40.58	-22.60	17.98	33.00	PASS
1752.6	V	1.5	0	40.09	-22.60	17.49	33.00	PASS

EIRP For HSUPA Mode Band IV

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 24E Limits (dBm)	Result
Low Channel								
1712.4	H	1.5	0	41.25	-22.71	18.54	33.00	PASS
1712.4	V	1.5	0	40.19	-22.71	17.48	33.00	PASS
Middle Channel								
1732.4	H	1.5	0	41.45	-22.67	18.78	33.00	PASS
1732.4	V	1.5	0	39.75	-22.67	17.08	33.00	PASS
High Channel								
1752.6	H	1.5	0	41.24	-22.60	18.64	33.00	PASS
1752.6	V	1.5	0	39.84	-22.60	17.24	33.00	PASS

ERP For WCDMA Mode Band V

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 22H Limits (dBm)	Result
Low Channel								
826.4	H	1.5	0	19.40	-1.33	18.07	38.45	PASS
826.4	V	1.5	0	18.22	-1.33	16.89	38.45	PASS
Middle Channel								
836.6	H	1.5	0	18.40	-1.10	17.30	38.45	PASS
836.6	V	1.5	0	19.15	-1.10	18.05	38.45	PASS
High Channel								
846.6	H	1.5	0	19.82	-0.87	18.95	38.45	PASS
846.6	V	1.5	0	18.98	-0.87	18.11	38.45	PASS

ERP For HSDPA Mode Band V

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 22H Limits (dBm)	Result
Low Channel								
826.4	H	1.5	0	19.03	-1.33	17.70	38.45	PASS
826.4	V	1.5	0	18.33	-1.33	17.00	38.45	PASS
Middle Channel								
836.6	H	1.5	0	18.17	-1.10	17.07	38.45	PASS
836.6	V	1.5	0	18.11	-1.10	17.01	38.45	PASS
High Channel								
846.6	H	1.5	0	19.84	-0.87	18.97	38.45	PASS
846.6	V	1.5	0	18.66	-0.87	17.79	38.45	PASS

ERP For HSUPA Mode Band V

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	Measure-ment (dBm)	FCC Part 22H Limits (dBm)	Result
Low Channel								
826.4	H	1.5	0	18.41	-1.33	17.08	38.45	PASS
826.4	V	1.5	0	17.96	-1.33	16.63	38.45	PASS
Middle Channel								
836.6	H	1.5	0	19.63	-1.10	18.53	38.45	PASS
836.6	V	1.5	0	18.37	-1.10	17.27	38.45	PASS
High Channel								
846.6	H	1.5	0	19.18	-0.87	18.31	38.45	PASS
846.6	V	1.5	0	18.16	-0.87	17.29	38.45	PASS

Correction Factor= S.G. Power - Cable loss + Antenna Gain- SPA. Reading

Max. Conducted Output Power

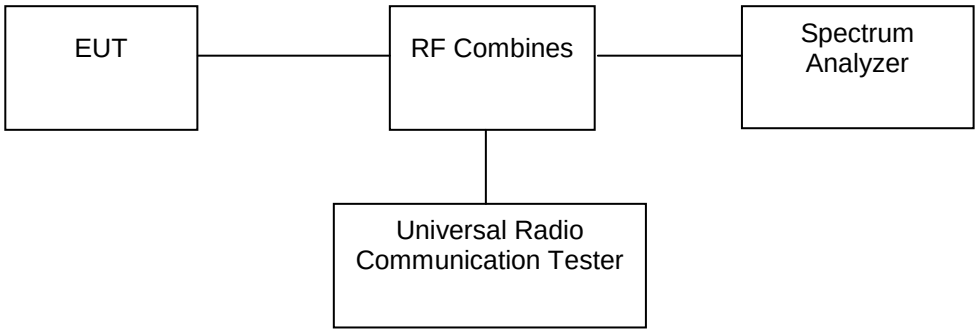
Band	WCDMA Band II		
Channel	**9262**	**9400**	**9538**
Frequency(MHz)	**1852.4**	**1880.0**	**1907.6**
WCDMA RMC 12.2K	21.90	22.01	22.03
HSDPA Subtest-1	20.63	19.36	20.02
HSDPA Subtest-2	20.17	18.98	19.65
HSDPA Subtest-3	19.97	18.97	19.55
HSDPA Subtest-4	19.59	18.44	19.16
HSUPA Subtest-1	20.48	19.16	19.90
HSUPA Subtest-2	20.42	19.30	20.00
HSUPA Subtest-3	19.84	18.96	19.70
HSUPA Subtest-4	20.33	19.23	19.97
HSUPA Subtest-5	20.23	19.12	19.96

Band	WCDMA Band V		
Channel	**1312**	**1450**	**1513**
Frequency(MHz)	**1712.4**	**1740**	**1752.6**
WCDMA RMC 12.2K	22.07	22.13	22.16
HSDPA Subtest-1	20.68	20.14	20.37
HSDPA Subtest-2	20.30	19.88	20.15
HSDPA Subtest-3	19.96	19.70	19.92
HSDPA Subtest-4	19.77	19.55	19.61
HSUPA Subtest-1	20.63	19.95	20.40
HSUPA Subtest-2	20.55	20.11	20.32
HSUPA Subtest-3	20.26	19.88	20.10
HSUPA Subtest-4	20.49	20.07	20.34
HSUPA Subtest-5	20.33	20.04	20.21

Band	WCDMA Band V		
Channel	**4132**	**4182**	**4233**
Frequency(MHz)	**826.4**	**836.4**	**846.6**
WCDMA RMC 12.2K	22.05	21.95	21.94
HSDPA Subtest-1	21.59	21.61	21.12
HSDPA Subtest-2	21.23	21.31	20.91
HSDPA Subtest-3	21.02	21.08	20.60
HSDPA Subtest-4	20.83	20.76	20.56
HSUPA Subtest-1	21.48	21.59	21.04
HSUPA Subtest-2	21.44	21.59	21.08
HSUPA Subtest-3	21.33	21.17	21.02
HSUPA Subtest-4	21.40	21.56	21.08
HSUPA Subtest-5	21.28	21.46	20.97

7. Peak-to-average Ratio(PAR) of Transmitter

7.1 Block Diagram Of Test Setup



7.2 Limit

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. 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.

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

7.3 Test procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded.Record the maximum PAPR level associated with a probability of 0.1%.

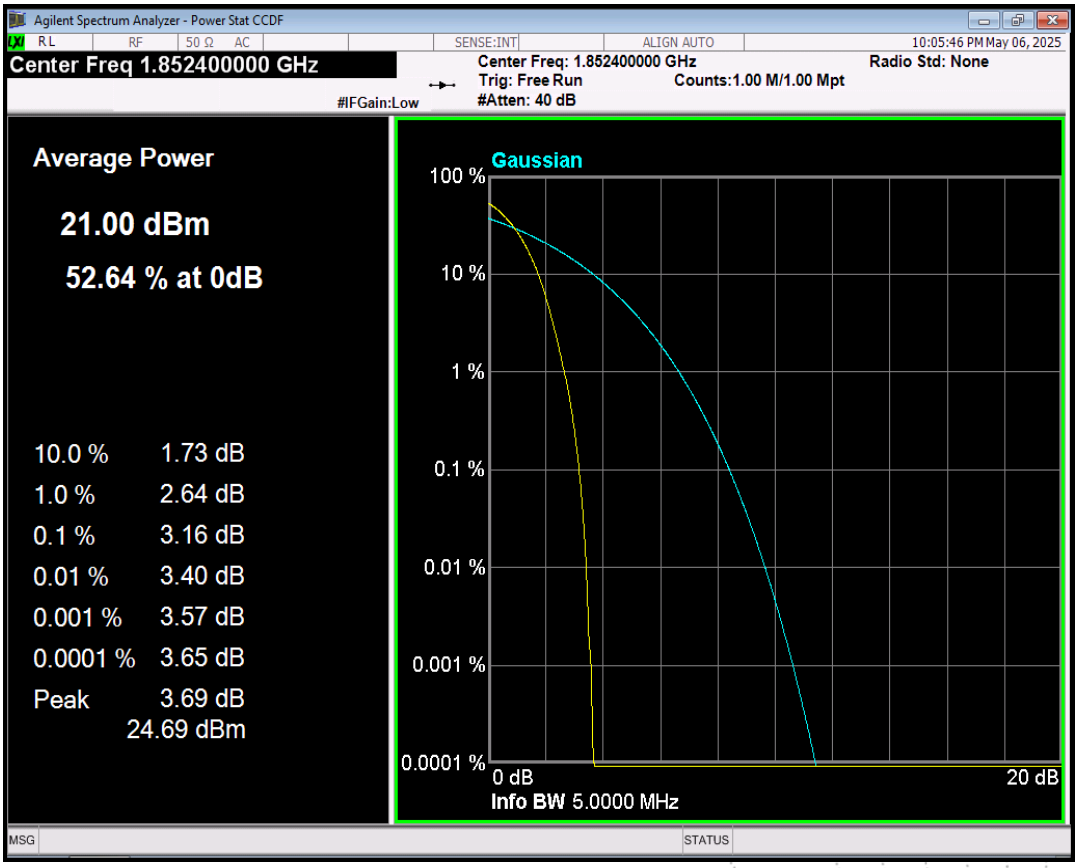
7.4 Test Result

Band	Channel	Frequency (MHz)	Result (dB)	high Limit (dB)	Verdict
WCDMA Band2	9262	1852.4	3.16	13	PASS
WCDMA Band2	9400	1880	3.16	13	PASS
WCDMA Band2	9538	1907.6	3.15	13	PASS
WCDMA Band4	1312	1712.4	3.19	13	PASS
WCDMA Band4	1450	1740	3.20	13	PASS
WCDMA Band4	1513	1752.6	3.20	13	PASS

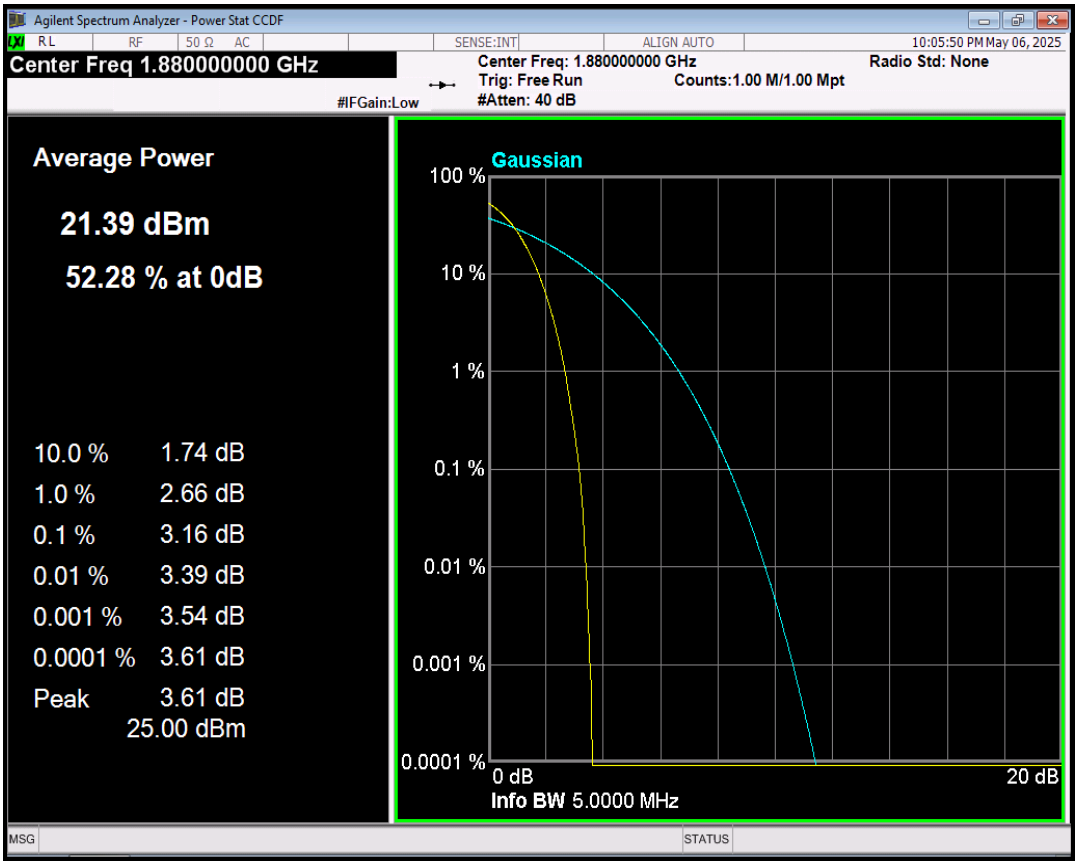
WCDMA Band5	4132	826.4	3.07	13	PASS
WCDMA Band5	4182	836.4	3.10	13	PASS
WCDMA Band5	4233	846.6	3.16	13	PASS

Note:In WCDMA, RMC, HSDPA and HSUPA all three tests only reflect the worst mode RMC.

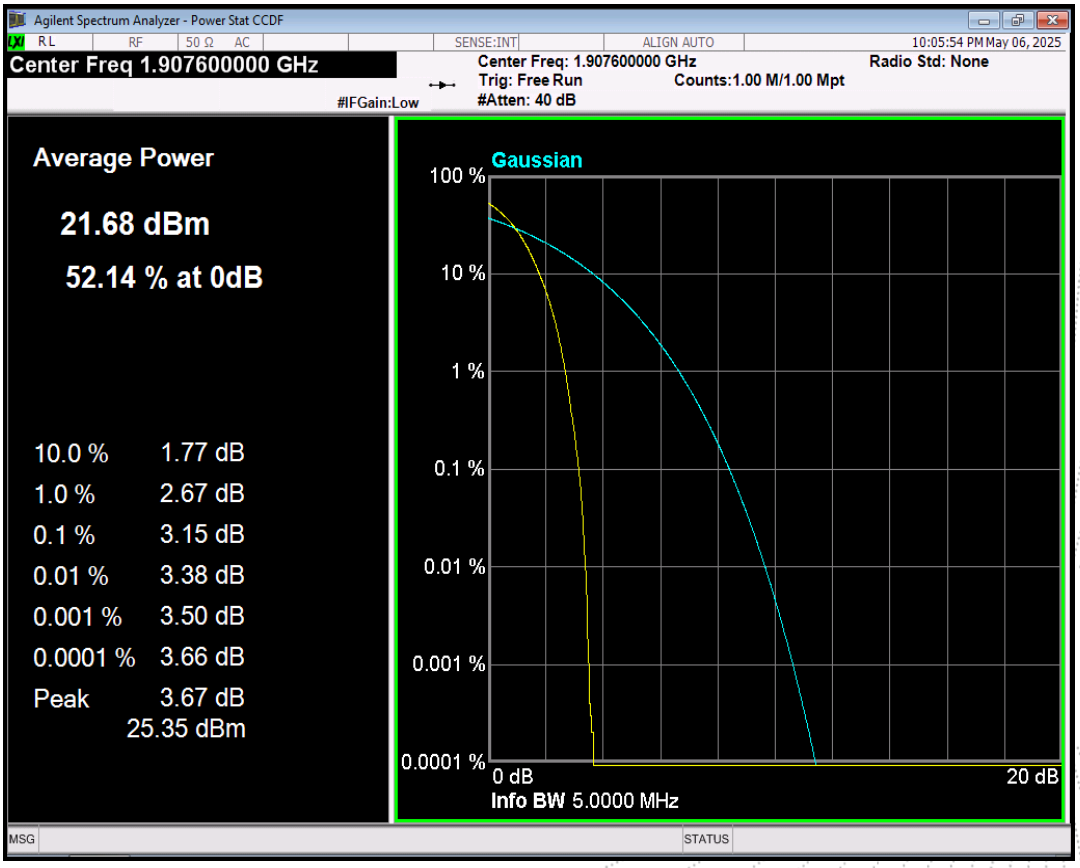
WCDMA Band2 Channel=9262



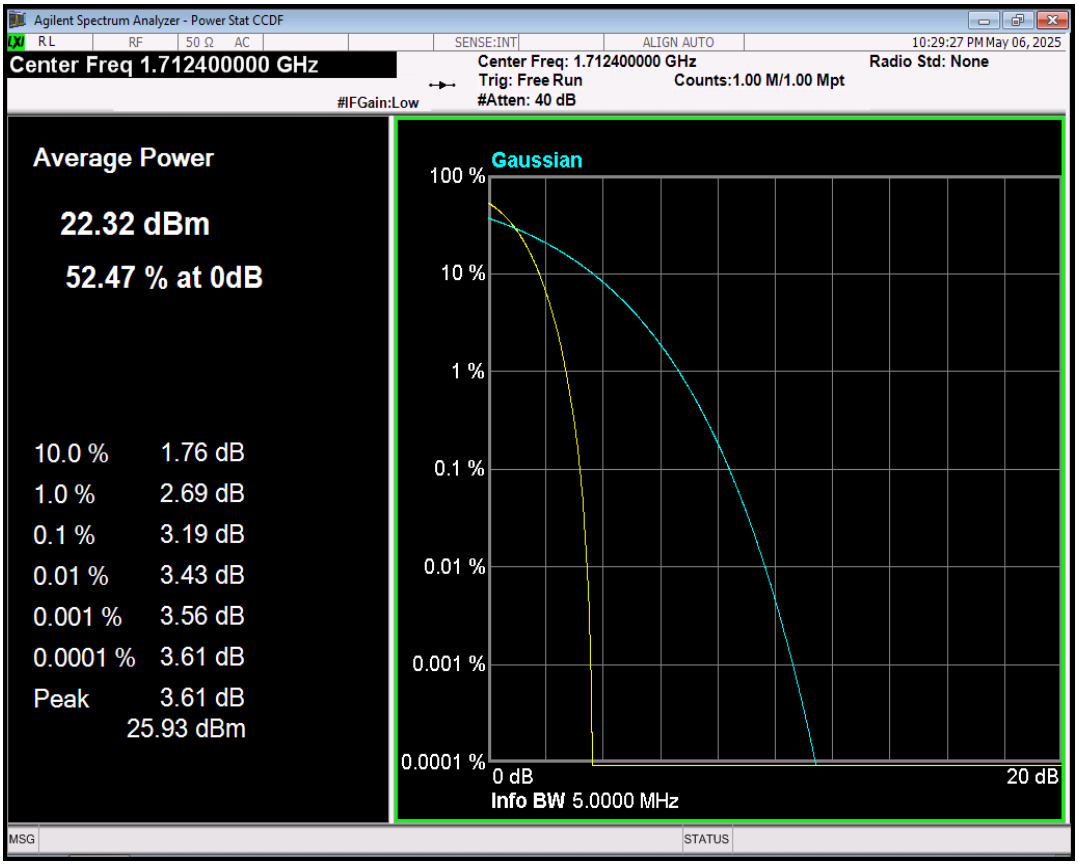
WCDMA Band2 Channel=9400



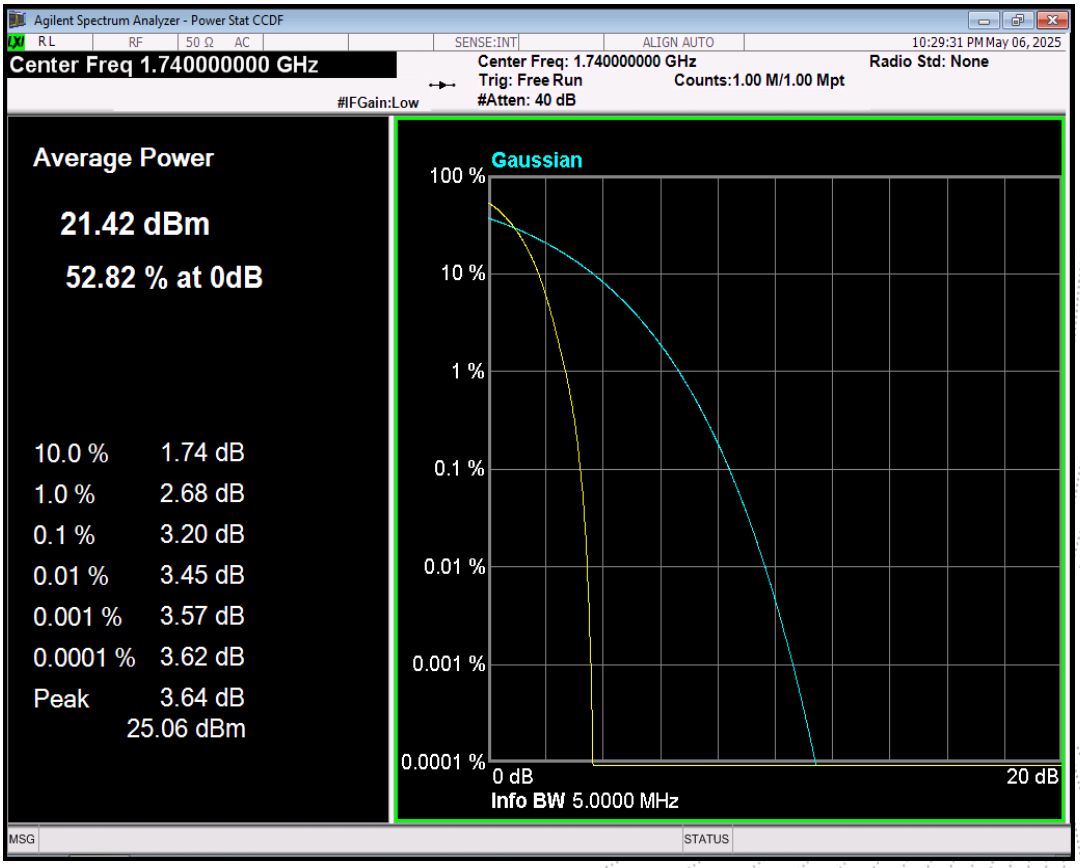
WCDMA Band2 Channel=9538



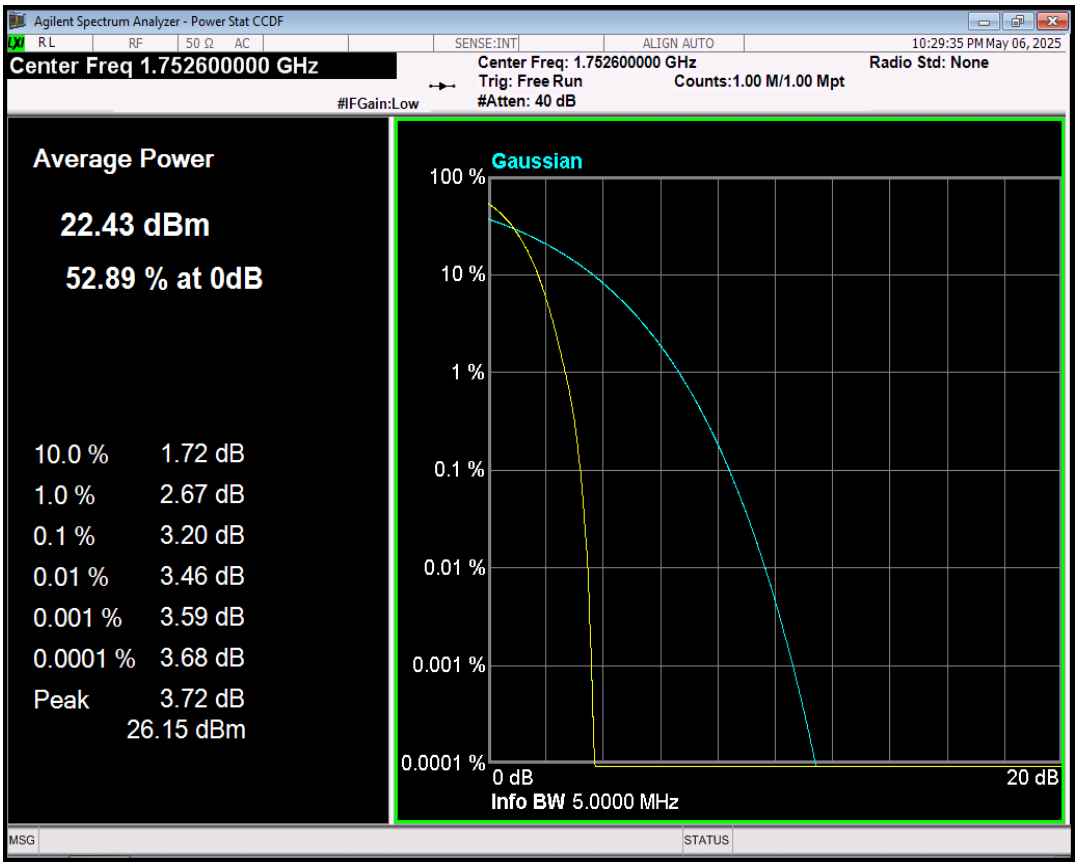
WCDMA Band4 Channel=1312



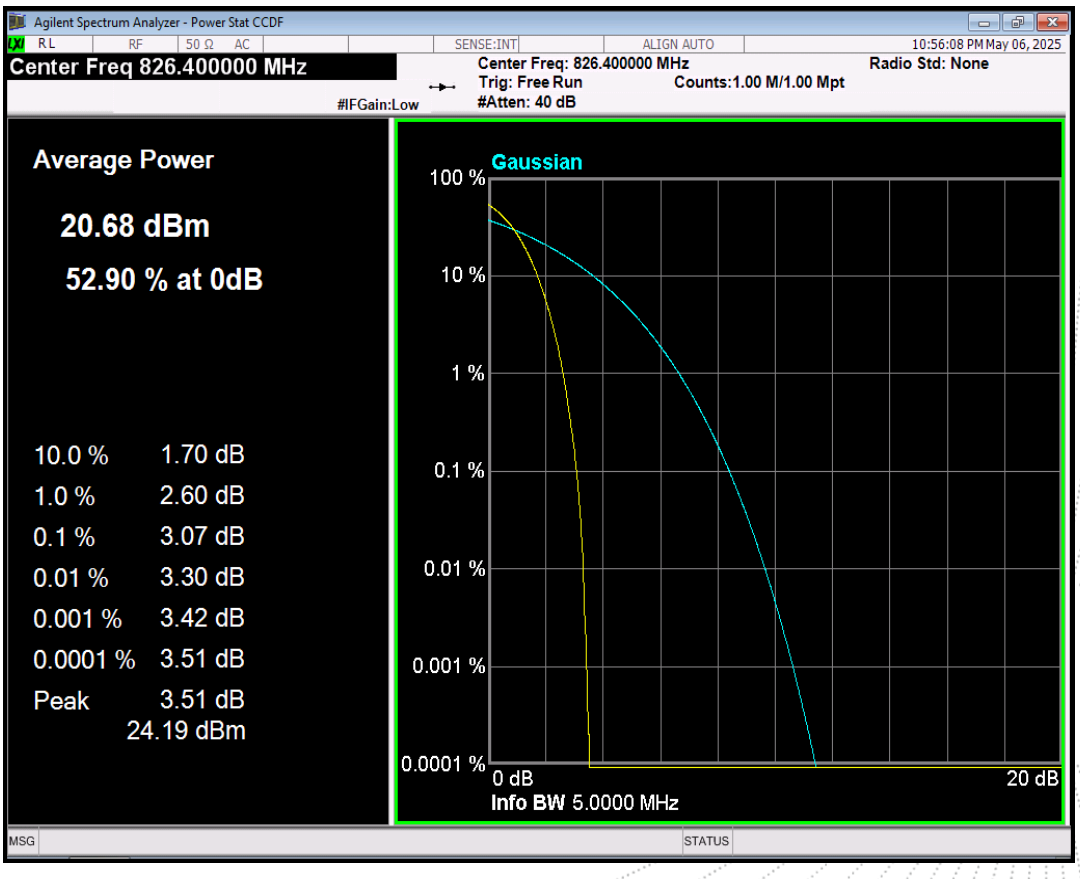
WCDMA Band4 Channel=1450



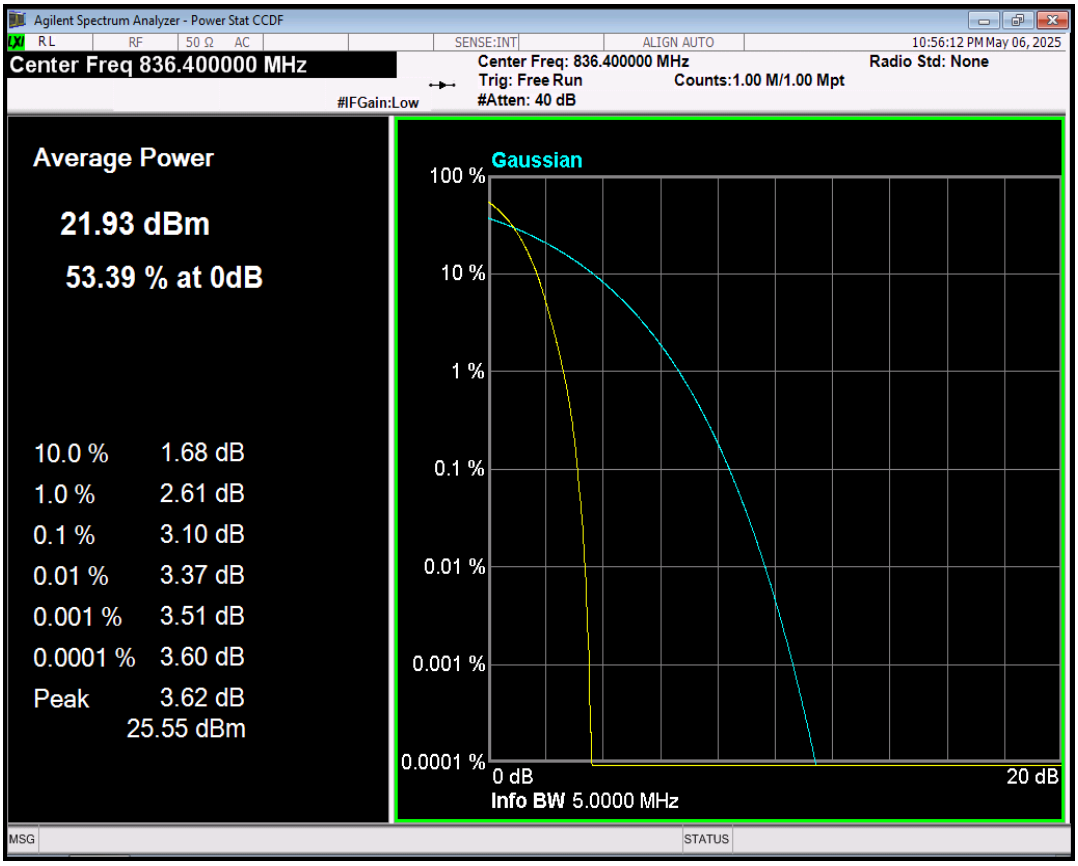
WCDMA Band4 Channel=1513



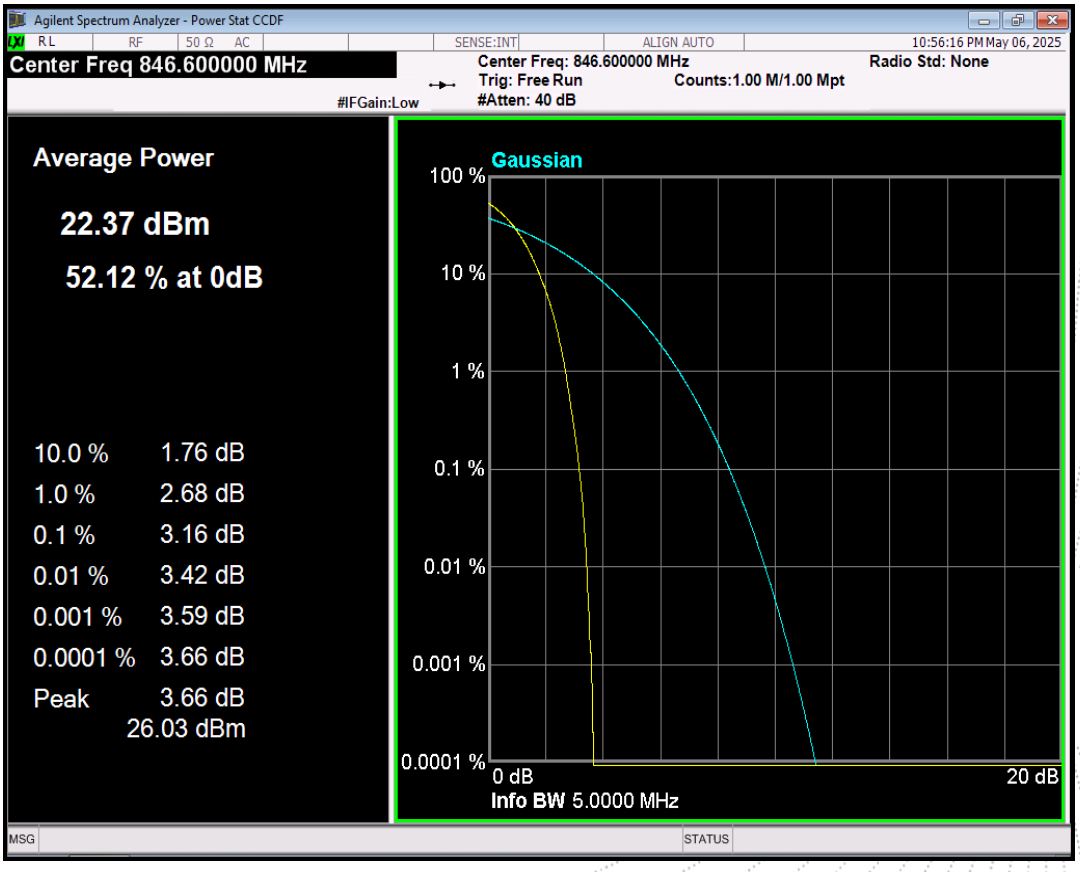
WCDMA Band5 Channel=4132



WCDMA Band5 Channel=4182

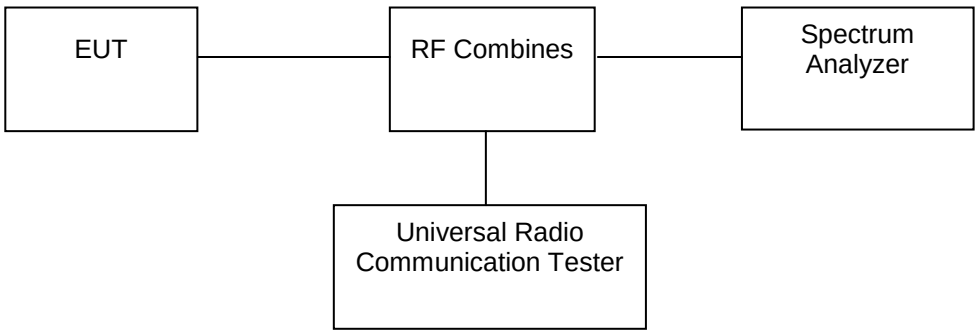


WCDMA Band5 Channel=4233



8. Emission Bandwidth

8.1 Block Diagram Of Test Setup



8.2 Limit

According to §22.917(b),The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.3 Test procedure

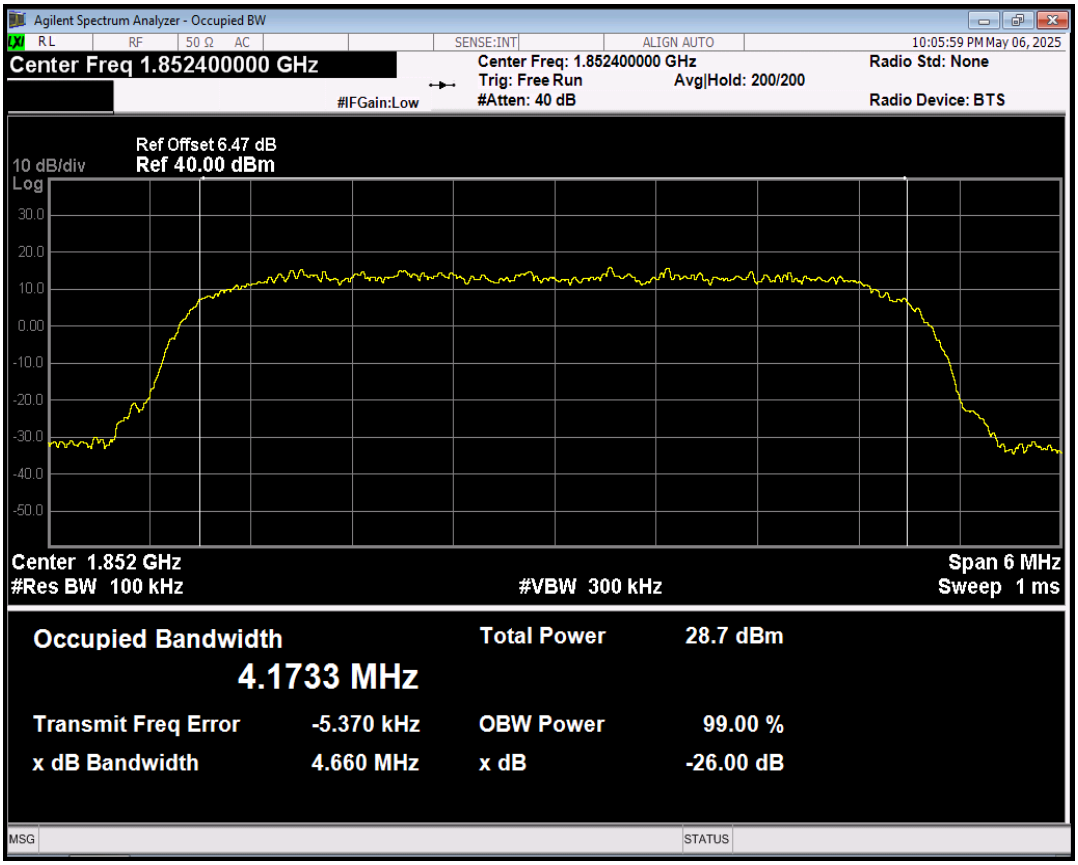
The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

8.4 Test Result

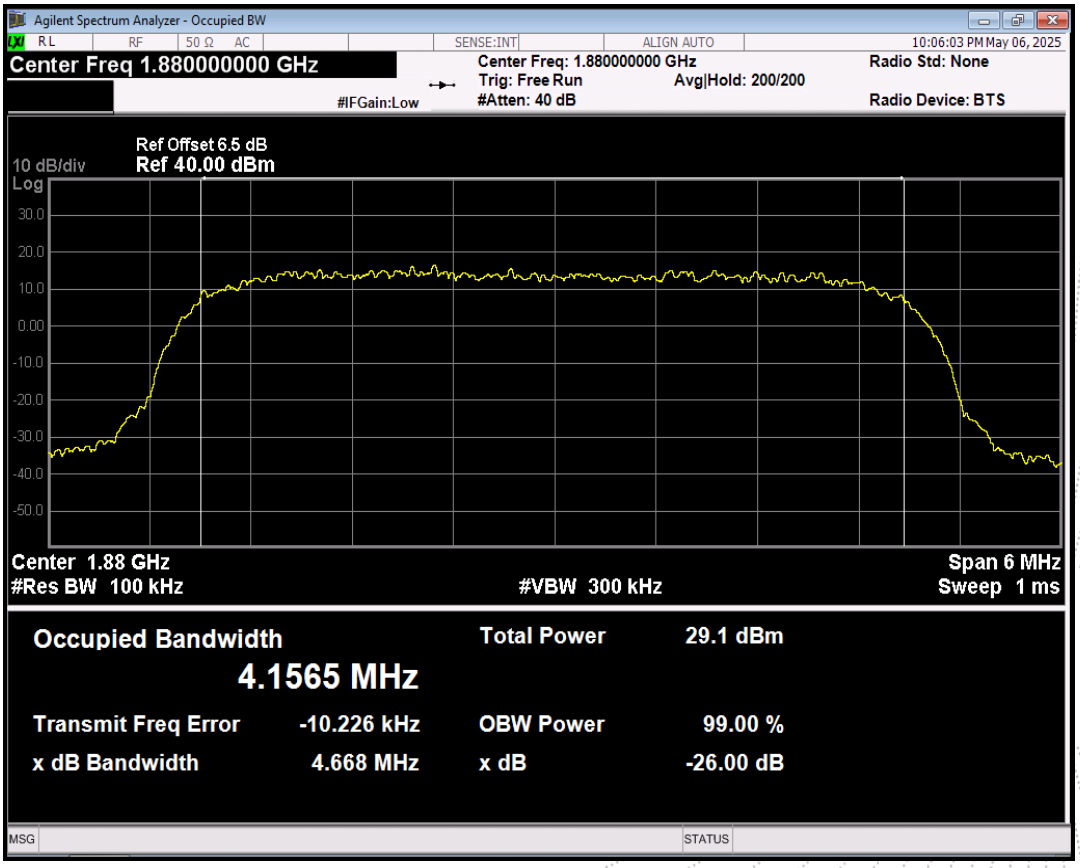
Band	Channel	Frequency (MHz)	99% OBW (kHz)	-26dB EBW (kHz)	Verdict
WCDMA Band2	9262	1852.4	4173.276	4660.124	PASS
WCDMA Band2	9400	1880	4156.532	4667.517	PASS
WCDMA Band2	9538	1907.6	4160.618	4673.298	PASS
WCDMA Band4	1312	1312	4151.110	4652.867	PASS
WCDMA Band4	1412	1450	4169.626	4658.435	PASS
WCDMA Band4	1513	1513	4140.949	4654.266	PASS
WCDMA Band5	4132	826.4	4142.634	4669.171	PASS
WCDMA Band5	4182	836.4	4152.477	4682.361	PASS
WCDMA Band5	4233	846.6	4151.290	4685.282	PASS

Note：In WCDMA, RMC, HSDPA and HSUPA all three tests only reflect the worst mode RMC.

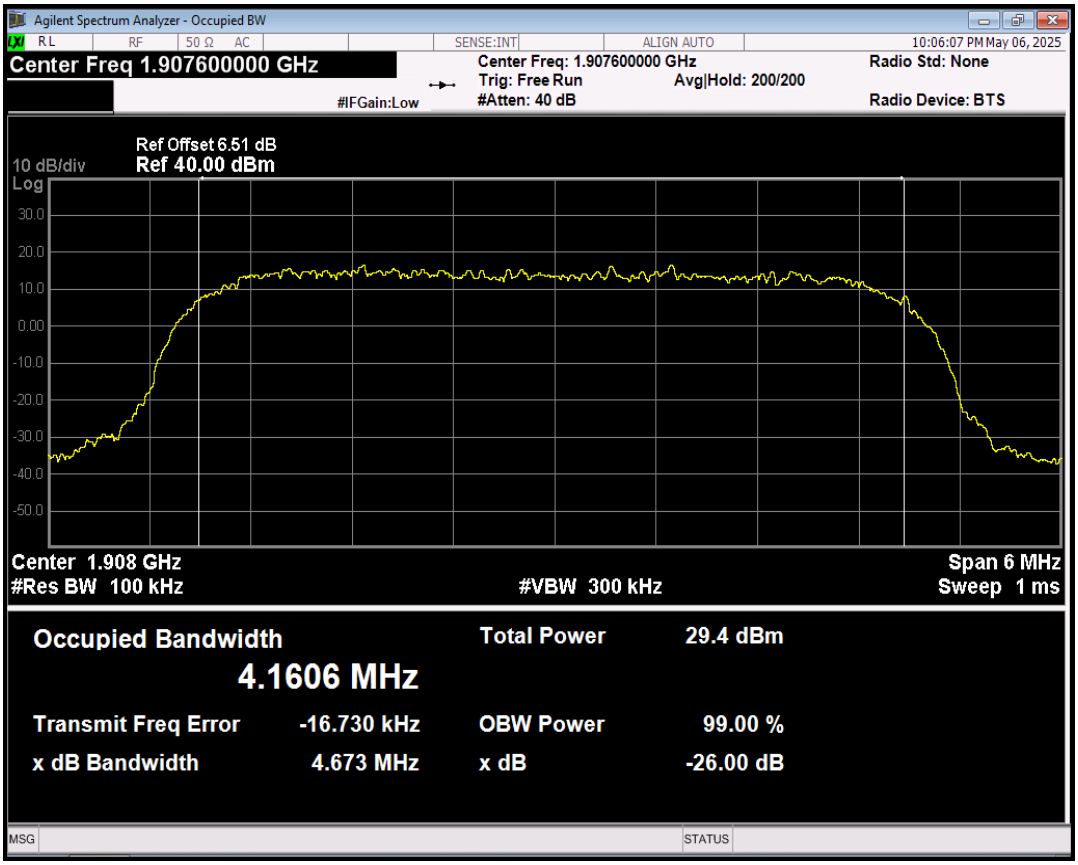
WCDMA Band2 Channel=9262



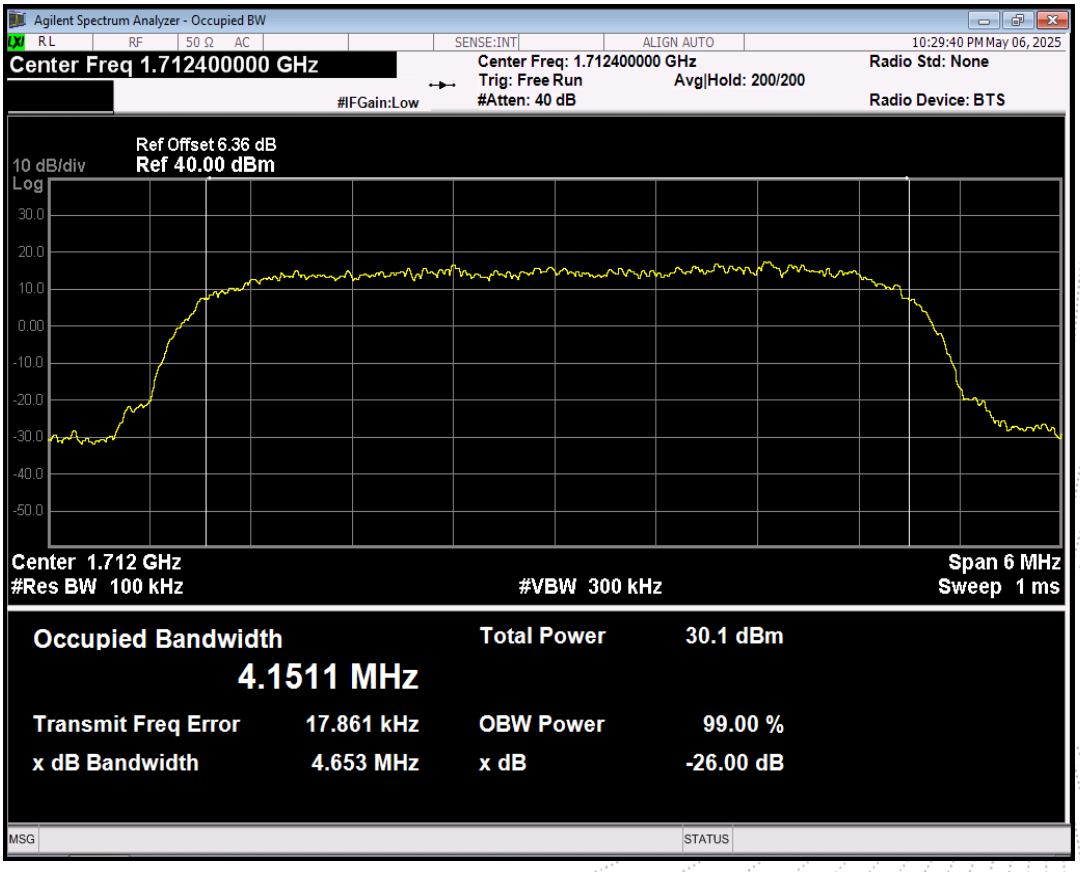
WCDMA Band2 Channel=9400



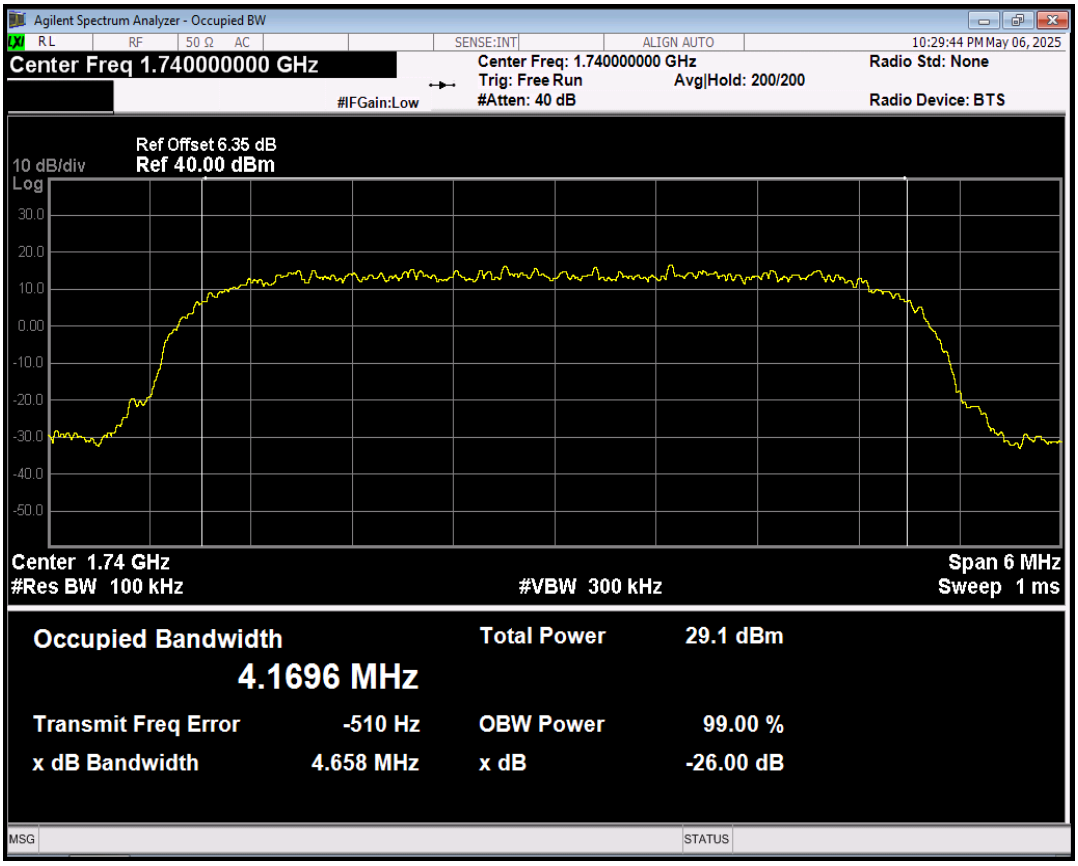
WCDMA Band2 Channel=9538



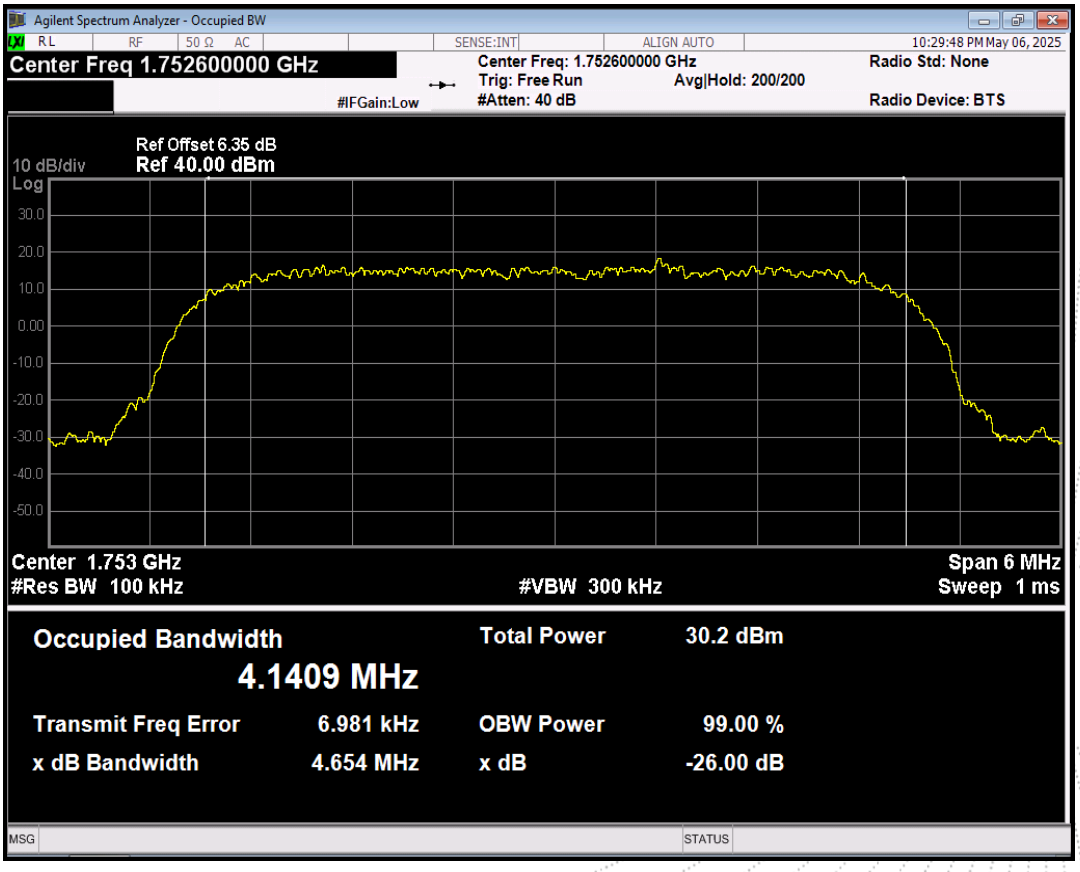
WCDMA Band4 Channel=1312



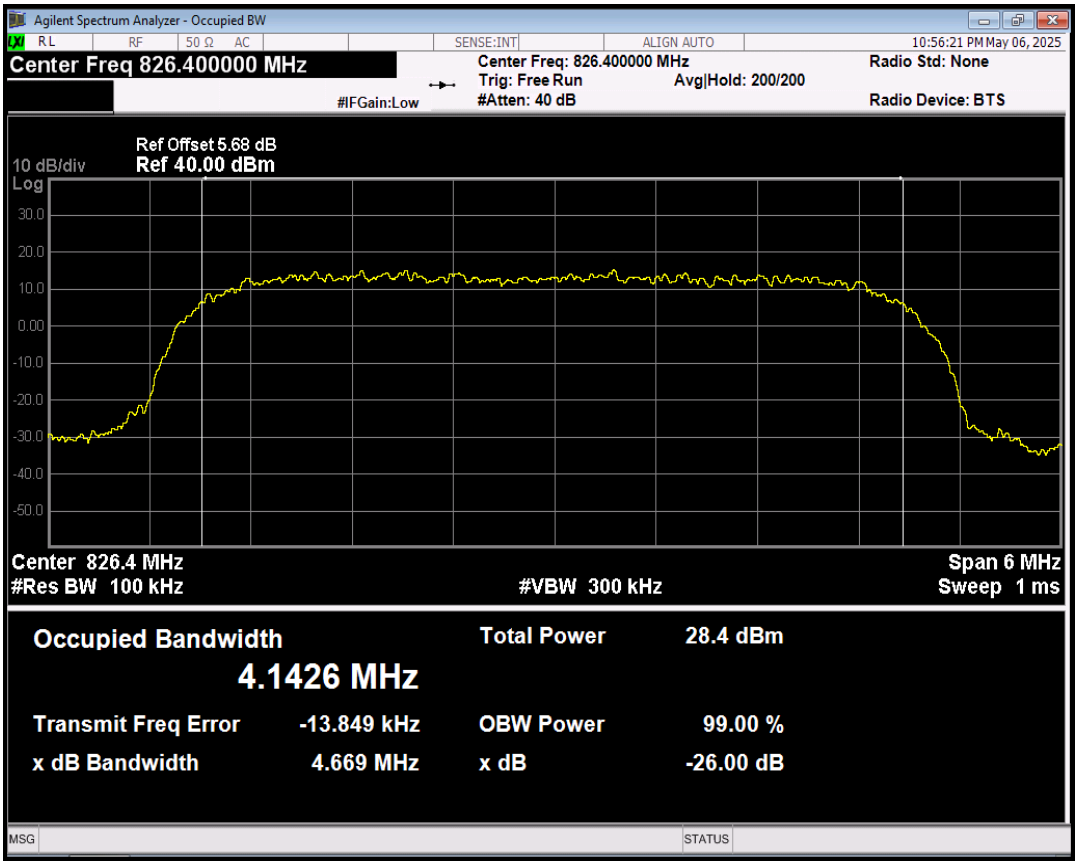
WCDMA Band4 Channel=1450



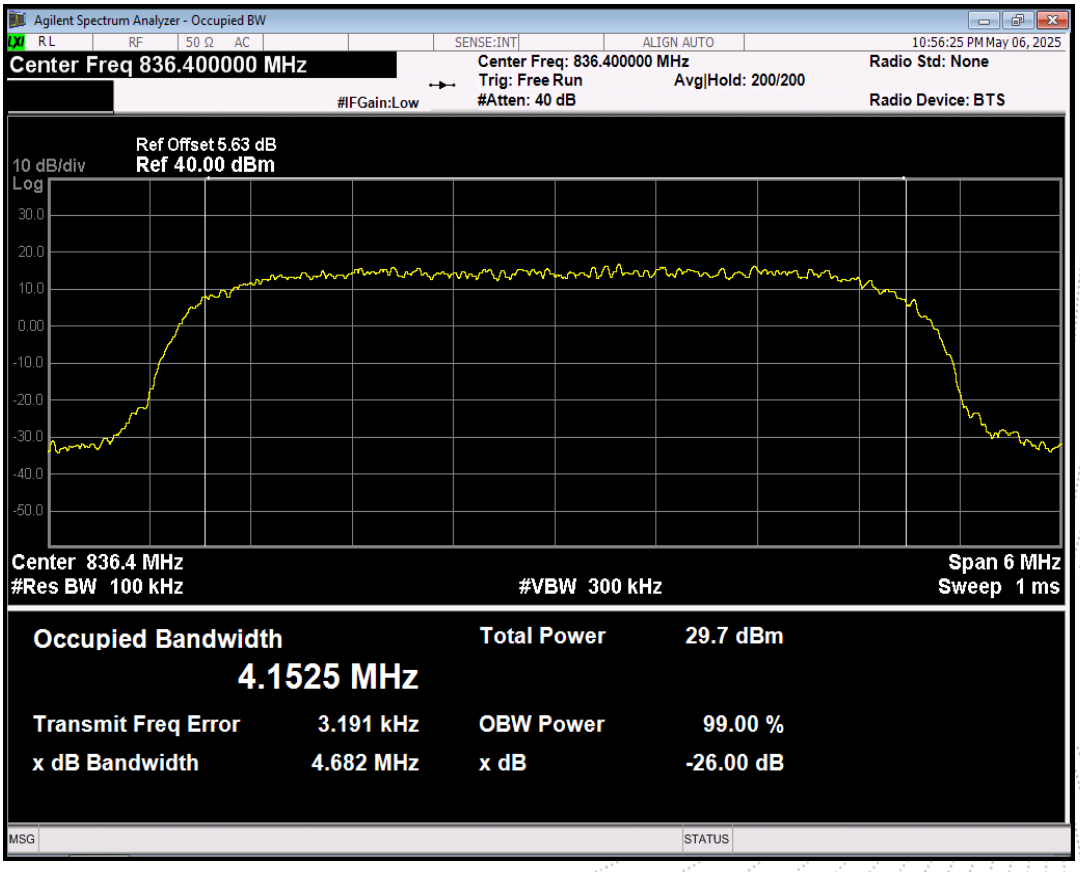
WCDMA Band4 Channel=1513



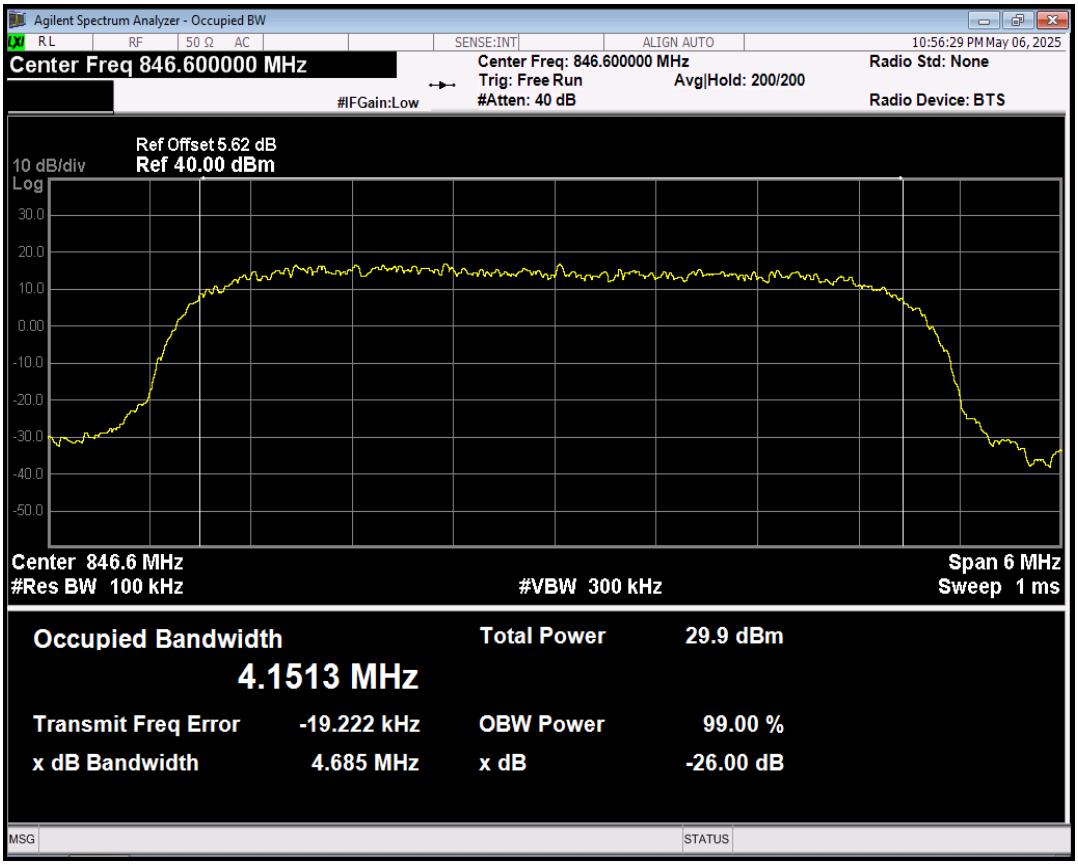
WCDMA Band5 Channel=4132



WCDMA Band5 Channel=4182

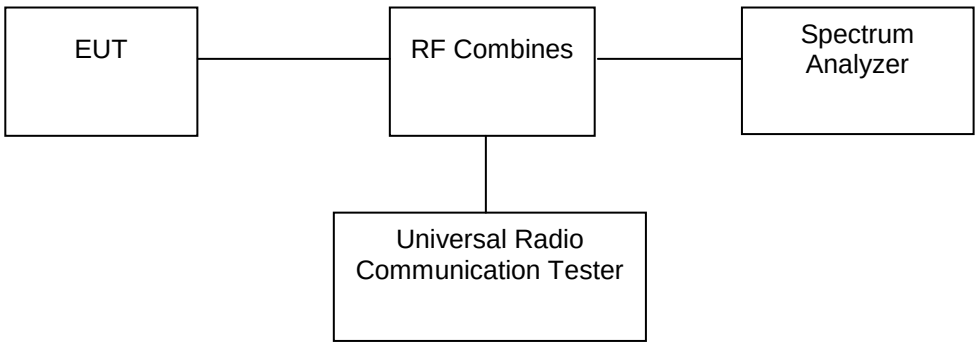


WCDMA Band5 Channel=4233



9. Out of Band Emissions at Antenna Terminal

9.1 Block Diagram Of Test Setup



9.2 Limit

According to §22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

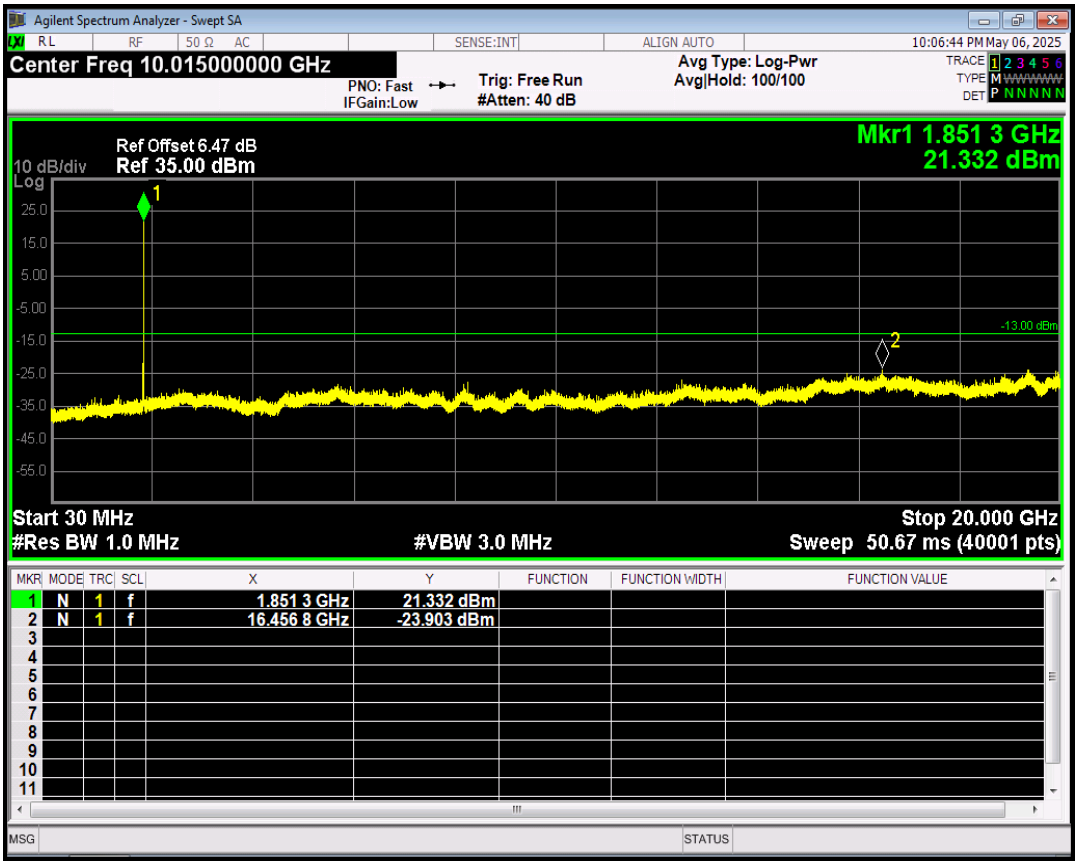
According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

9.3 Test procedure

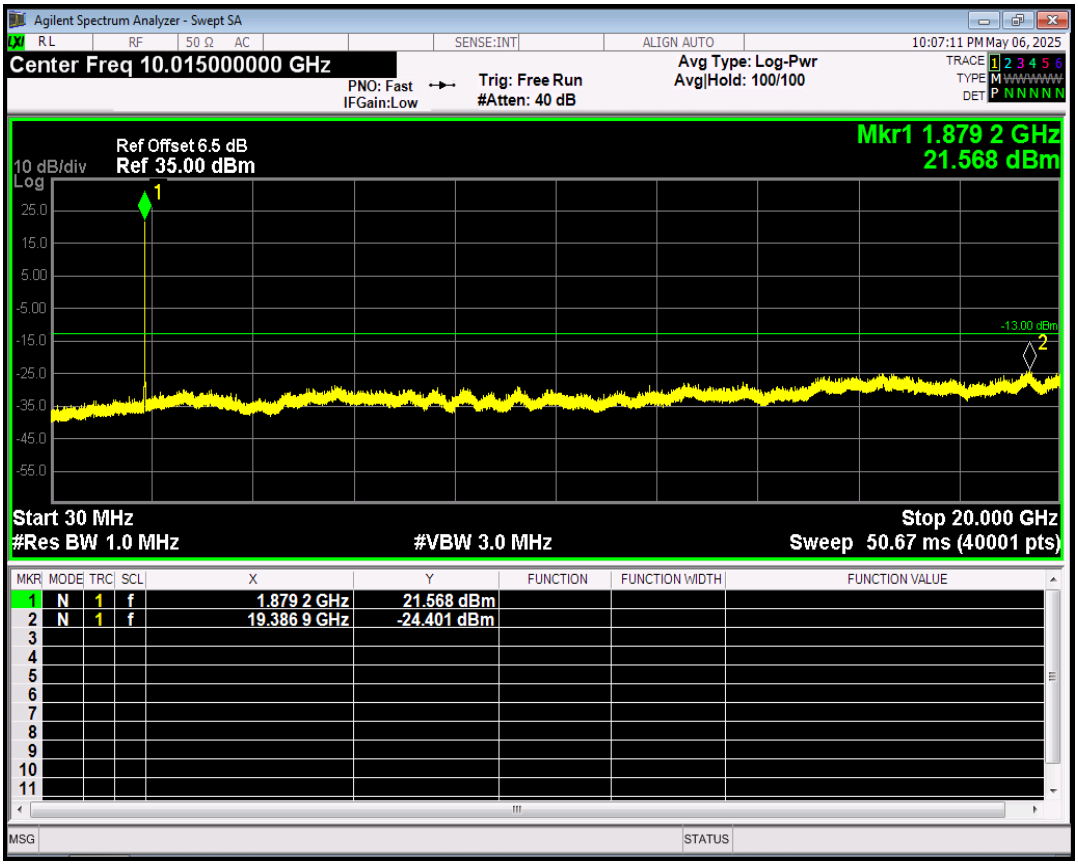
The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic

9.4 Test Result

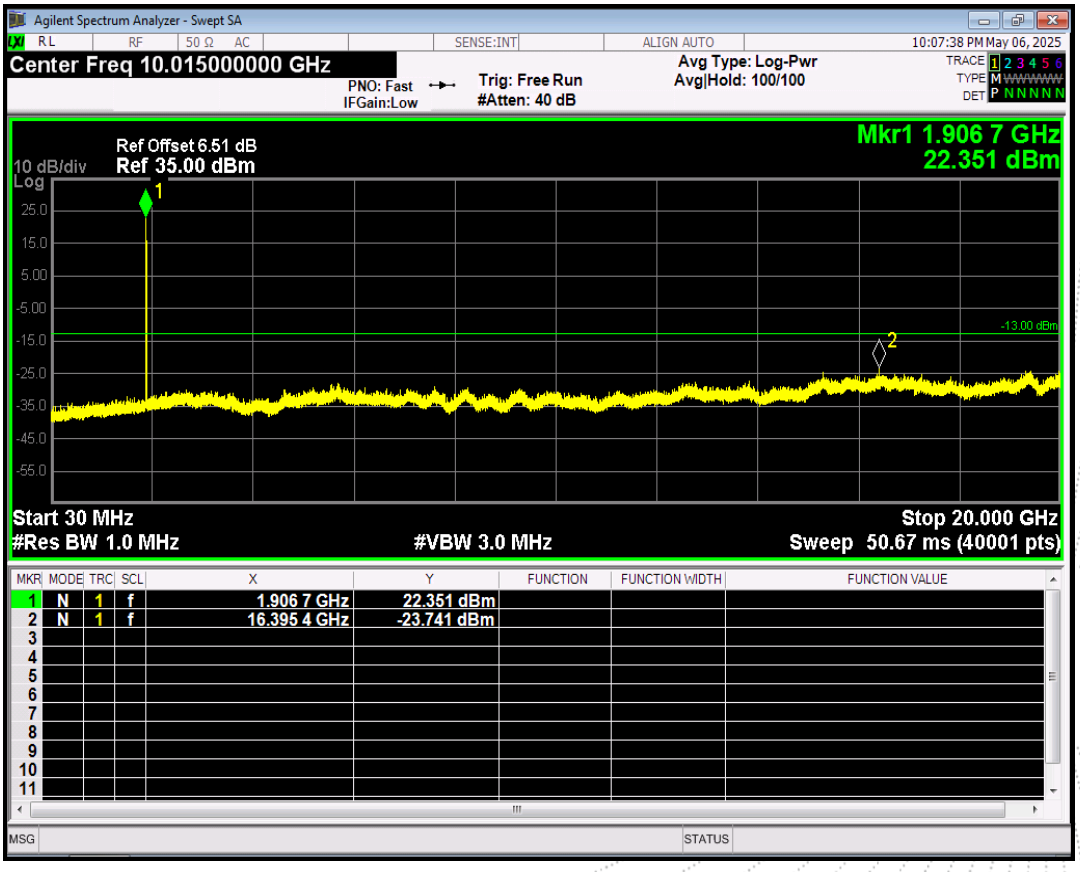
WCDMA Band2 Channel=9262



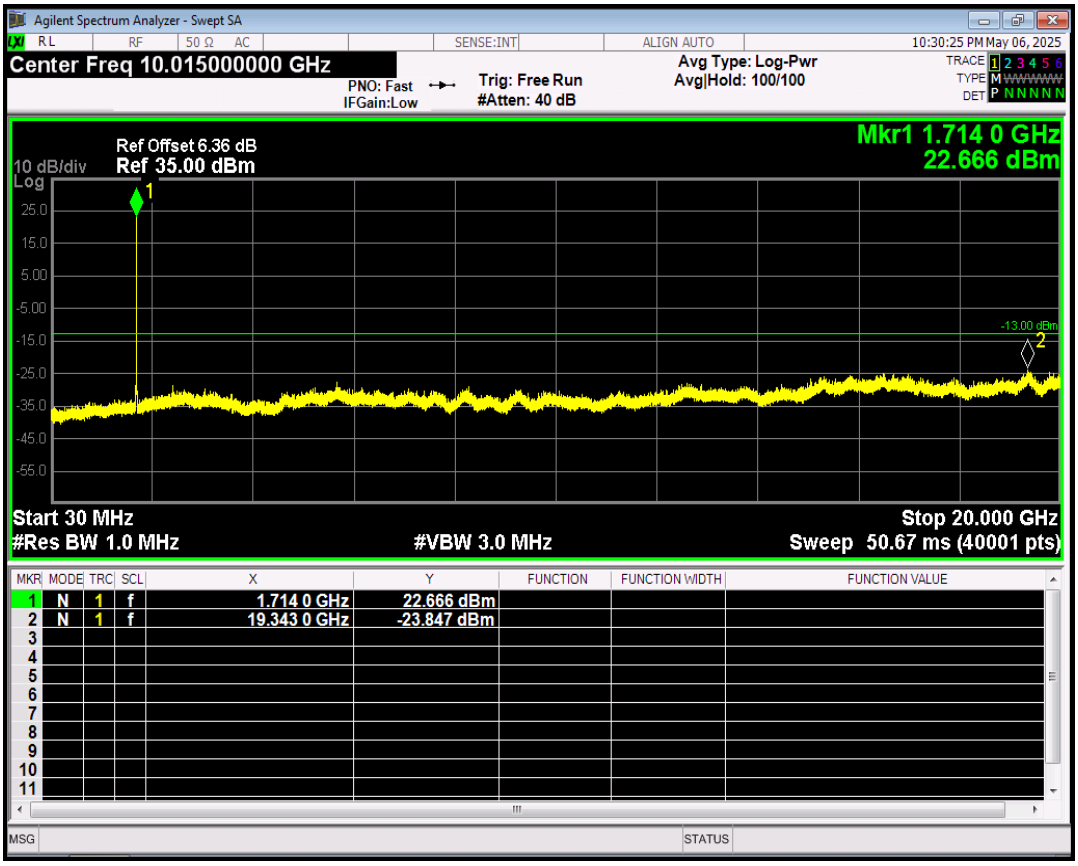
WCDMA Band2 Channel=9400



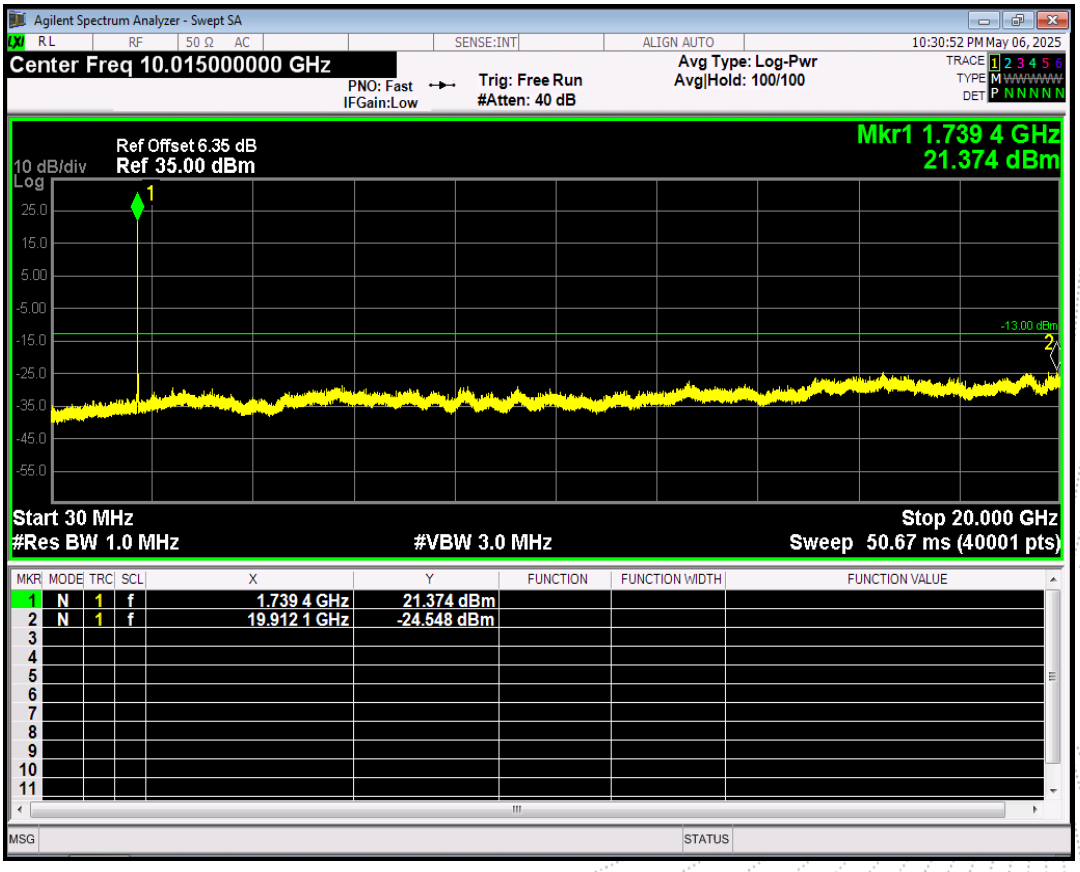
WCDMA Band2 Channel=9538



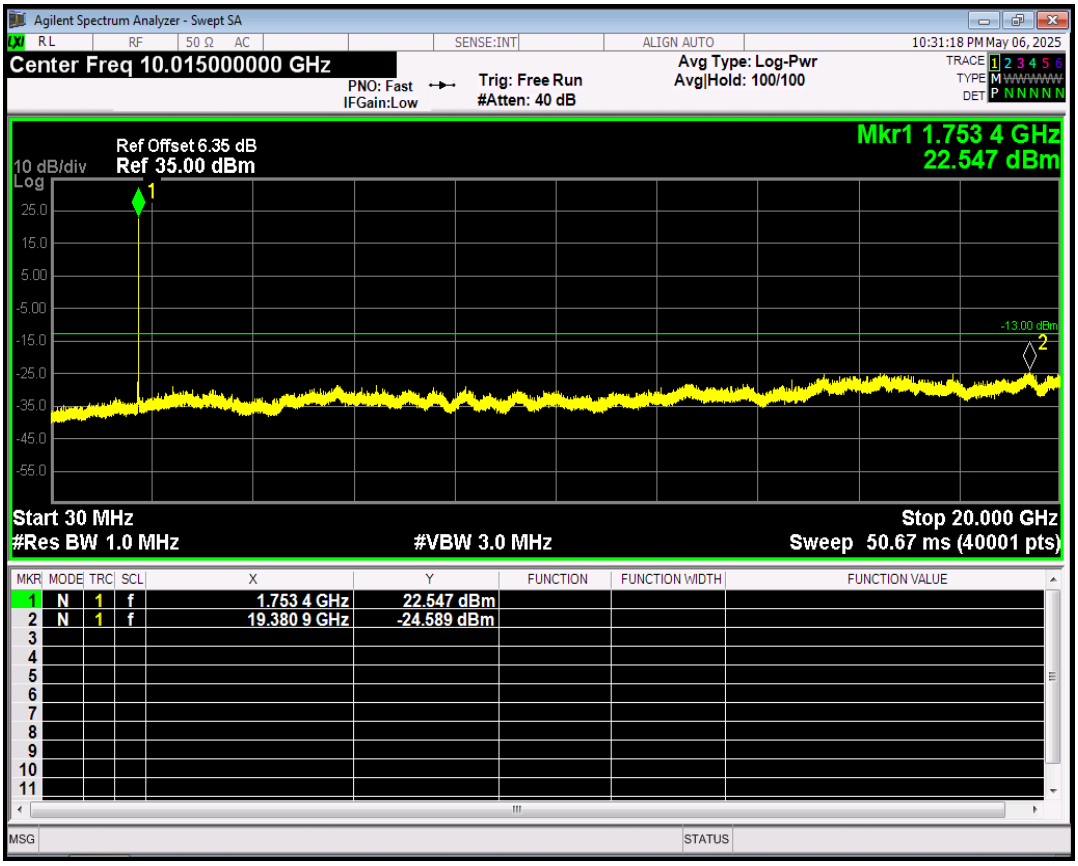
WCDMA Band4 Channel=1312



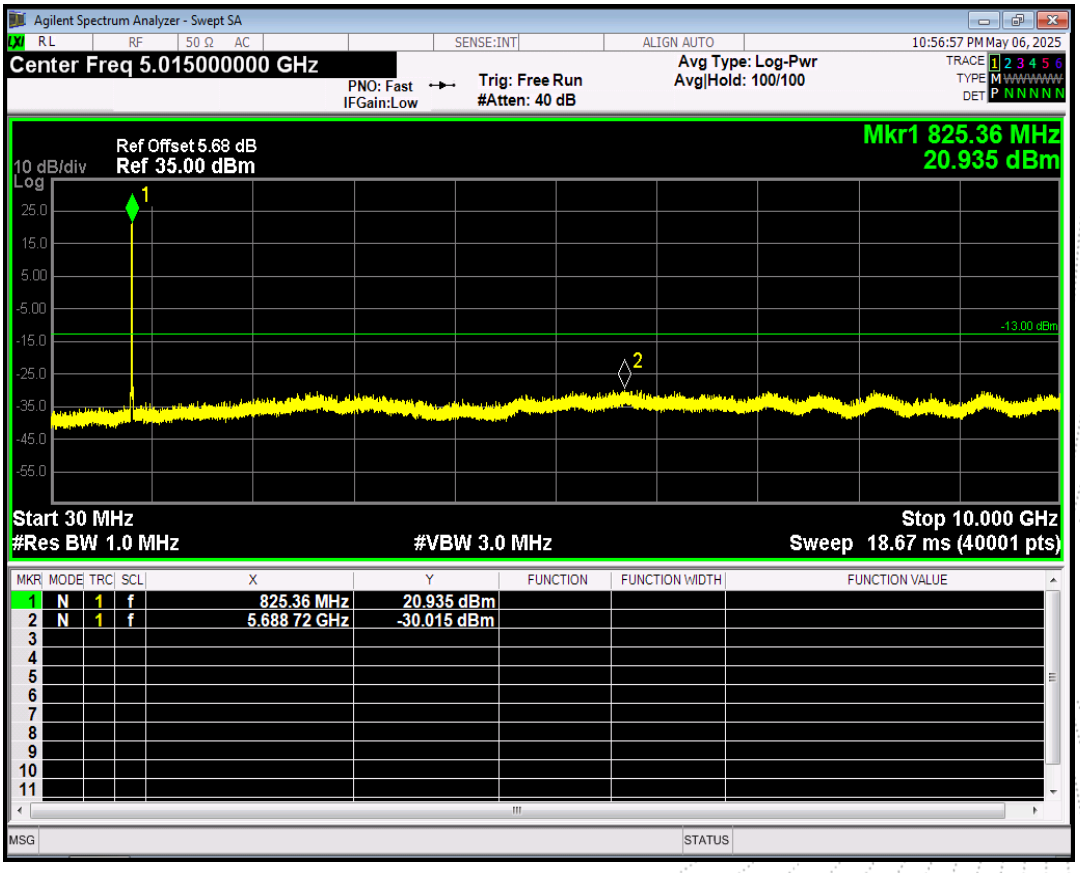
WCDMA Band4 Channel=1450



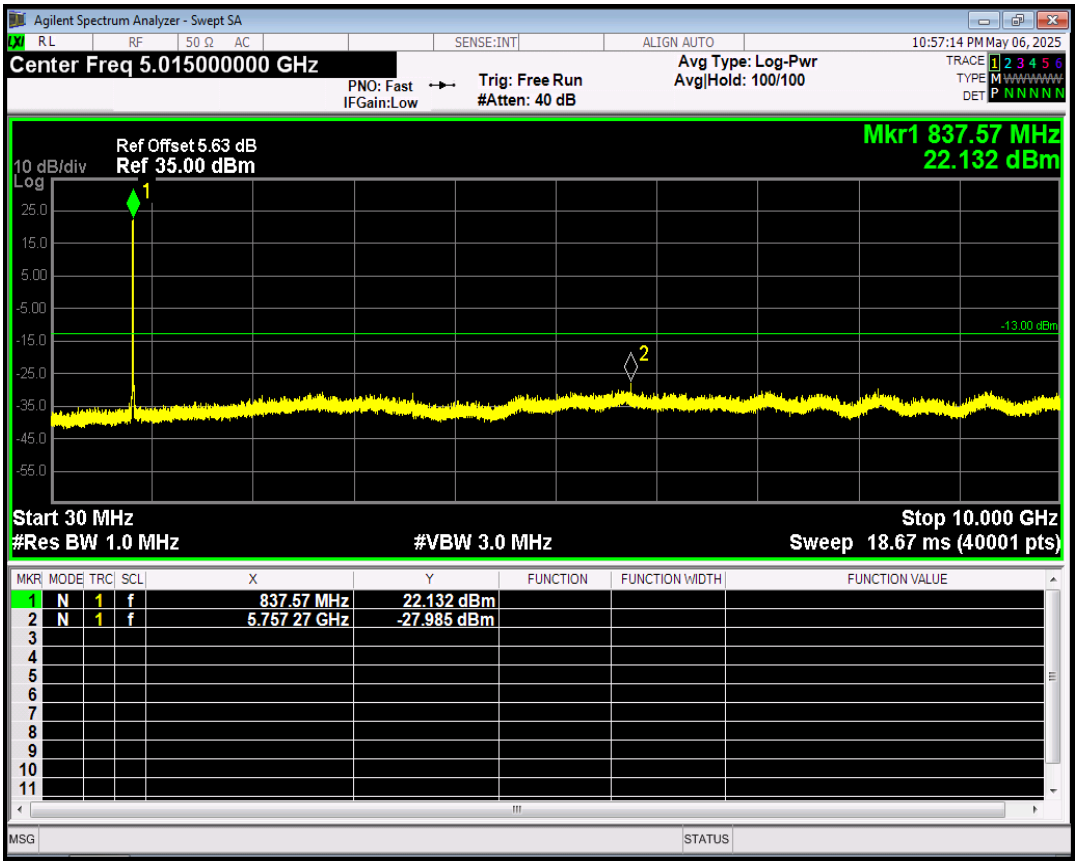
WCDMA Band4 Channel=1513



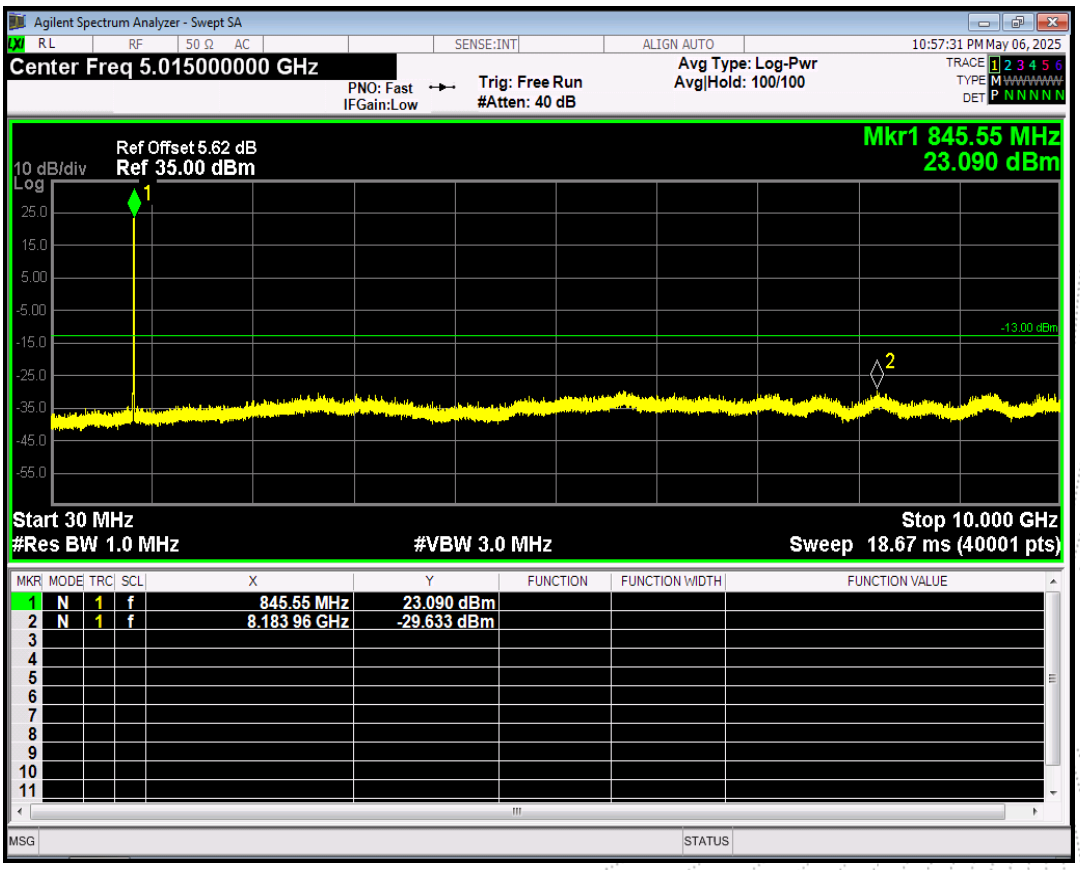
WCDMA Band5 Channel=4132



WCDMA Band5 Channel=4182

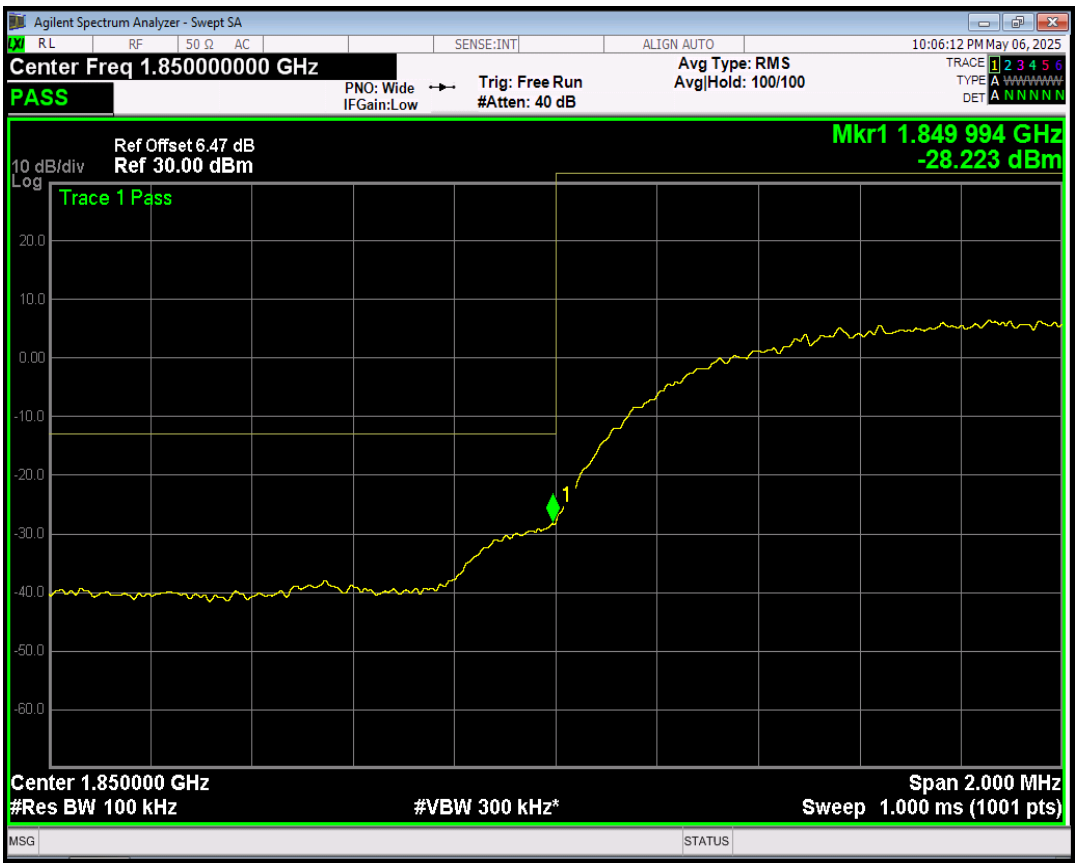


WCDMA Band5 Channel=4233



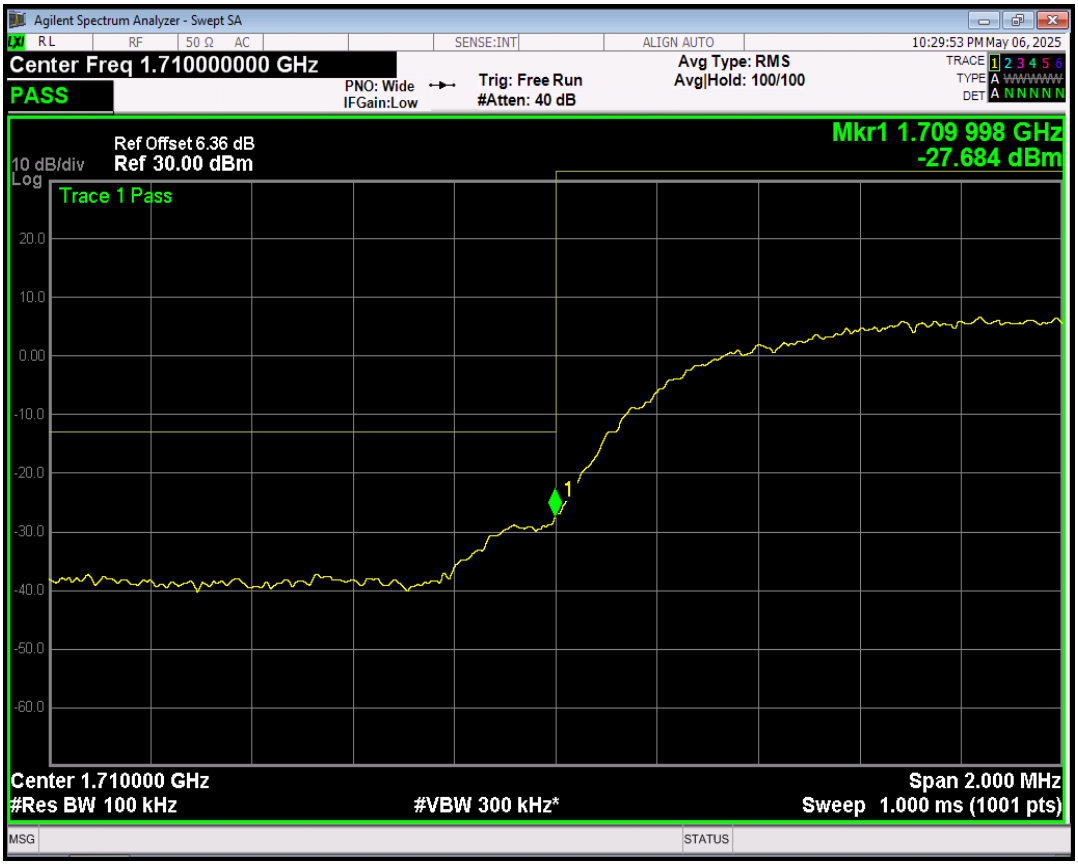
Band edge

WCDMA Band2 Channel=9262



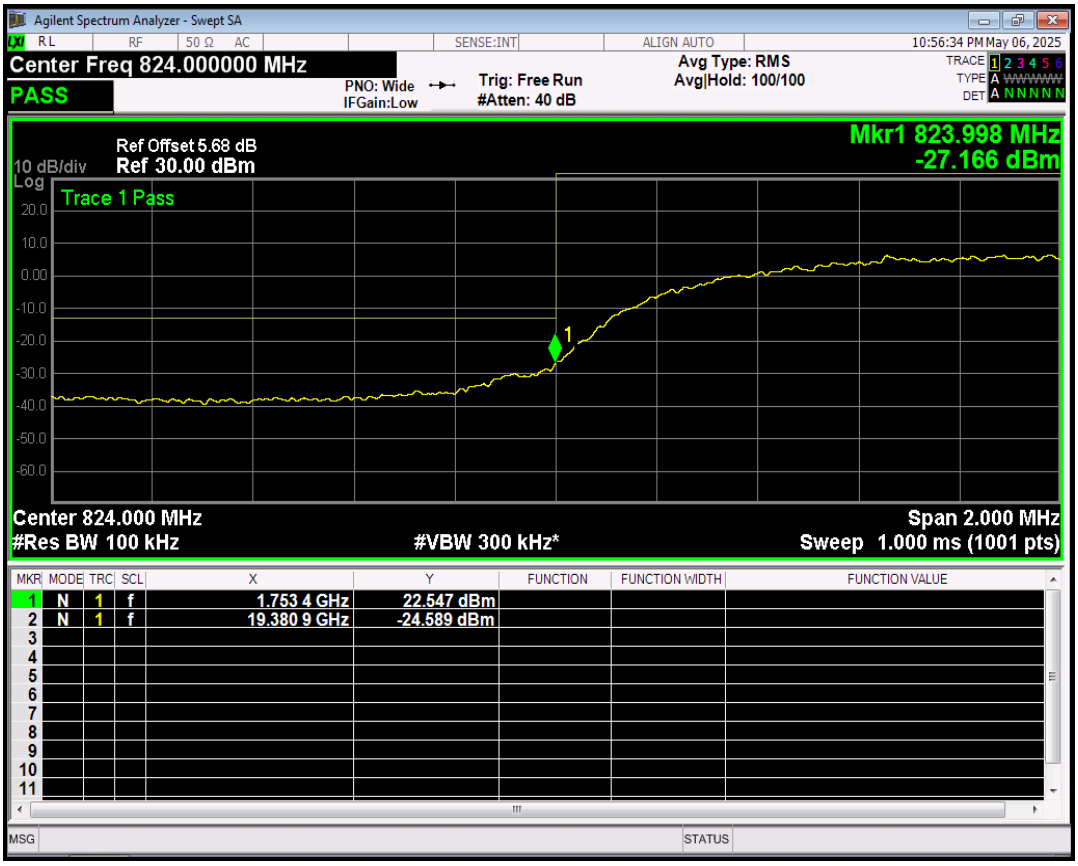
WCDMA Band2 Channel=9538

WCDMA Band4 Channel=1312

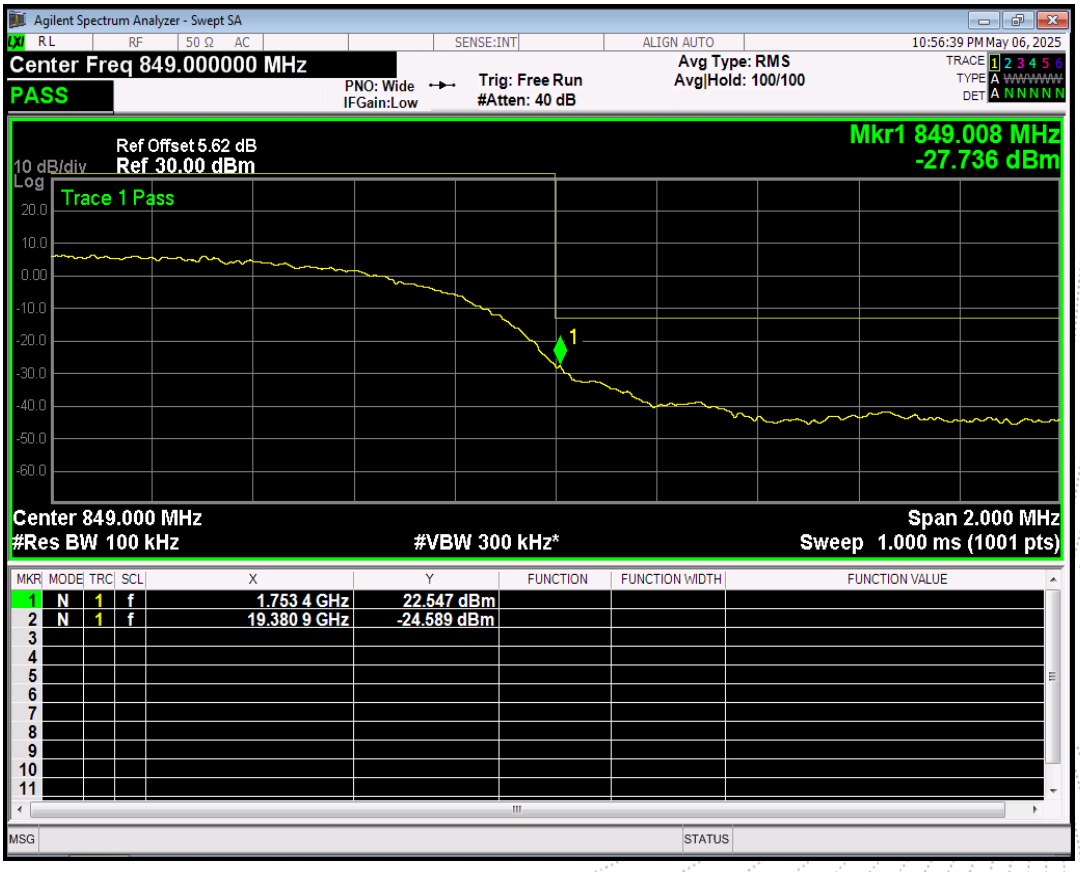


WCDMA Band4 Channel=1513

WCDMA Band5 Channel=4132



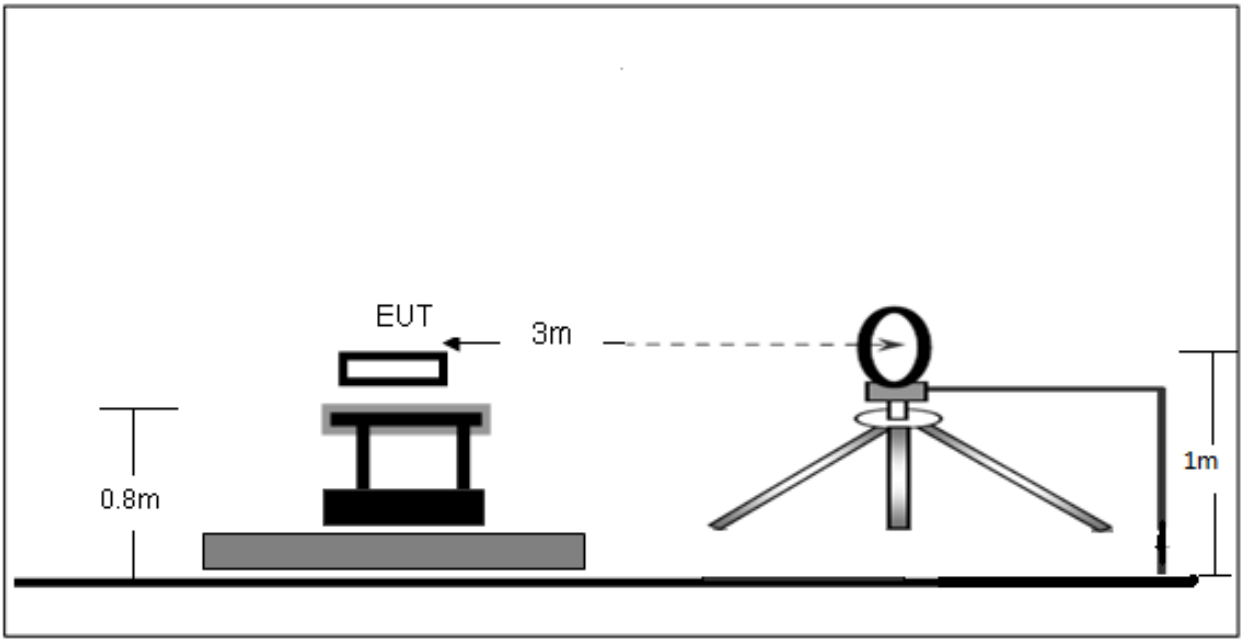
WCDMA Band5 Channel=4233



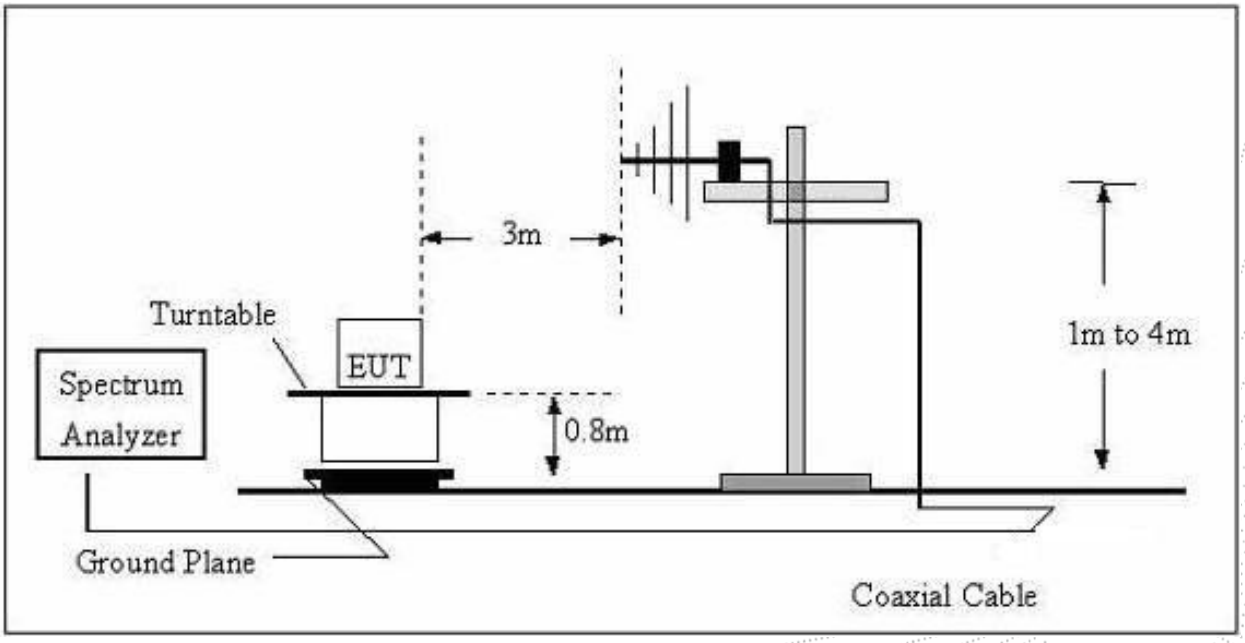
10. Spurious Radiated Emissions

10.1 Block Diagram Of Test Setup

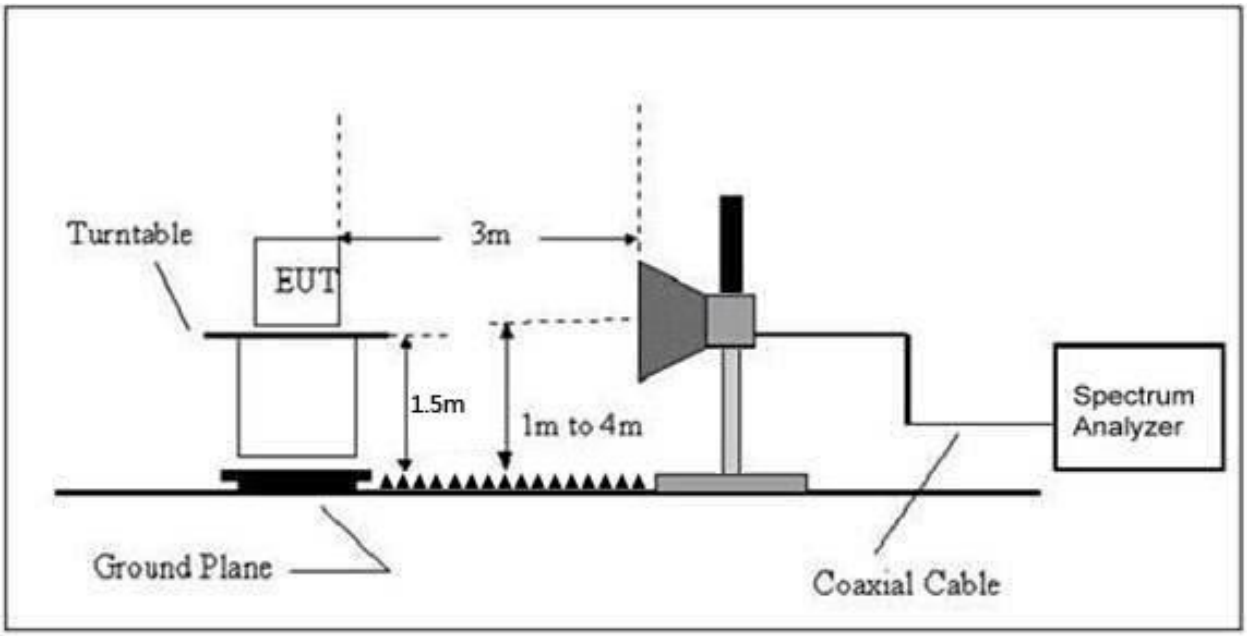
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



10.2 Limit

According to §22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

10.3 Test procedure

1. The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts)

10.4 Test Result

For Band WCDMA Band II Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1852.4MHz)						
61.83	-43.84	-15.60	-59.44	-13.00	-46.44	H
3704.8	-25.98	-17.43	-43.41	-13.00	-30.41	H
5557.2	-29.99	-11.73	-41.72	-13.00	-28.72	H
61.83	-43.76	-15.60	-59.35	-13.00	-46.35	V
3704.8	-26.87	-17.43	-44.30	-13.00	-31.30	V
5557.2	-29.83	-11.73	-41.56	-13.00	-28.56	V
Middle Channel (1880MHz)						
61.83	-42.09	-15.60	-57.68	-13.00	-44.68	H
3760	-27.02	-16.98	-44.00	-13.00	-31.00	H
5640	-31.16	-11.33	-42.49	-13.00	-29.49	H
61.83	-44.90	-15.60	-60.50	-13.00	-47.50	V
3760	-27.25	-16.98	-44.23	-13.00	-31.23	V
5640	-29.60	-11.33	-40.93	-13.00	-27.93	V
High Channel (1907.6MHz)						
61.83	-44.63	-15.60	-60.22	-13.00	-47.22	H
3815.2	-27.43	-16.52	-43.95	-13.00	-30.95	H
5722.8	-32.51	-10.93	-43.44	-13.00	-30.44	H
61.83	-42.74	-15.60	-58.34	-13.00	-45.34	V
3815.2	-29.95	-16.52	-46.47	-13.00	-33.47	V
5722.8	-29.24	-10.93	-40.17	-13.00	-27.17	V

Note: Result=Reading+ Correct, Margin= Result- Limit

For Band WCDMA Band IV Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1852.4MHz)						
61.83	-43.59	-15.60	-59.19	-13.00	-46.19	H
3424.80	-26.17	-19.74	-45.91	-13.00	-32.91	H
5137.20	-32.08	-13.77	-45.85	-13.00	-32.85	H
61.83	-44.09	-15.60	-59.68	-13.00	-46.68	V
3424.80	-29.74	-19.74	-49.48	-13.00	-36.48	V
5137.20	-29.36	-13.77	-43.13	-13.00	-30.13	V
Middle Channel (1880MHz)						
61.83	-44.37	-15.60	-59.97	-13.00	-46.97	H
3464.80	-27.17	-19.41	-46.58	-13.00	-33.58	H
5197.20	-30.05	-13.48	-43.53	-13.00	-30.53	H
61.83	-41.38	-15.60	-56.98	-13.00	-43.98	V
3464.80	-29.32	-19.41	-48.73	-13.00	-35.73	V
5197.20	-29.67	-13.48	-43.15	-13.00	-30.15	V
High Channel (1907.6MHz)						
61.83	-44.25	-15.60	-59.85	-13.00	-46.85	H
3505.20	-24.87	-19.08	-43.95	-13.00	-30.95	H
5257.80	-31.52	-13.19	-44.71	-13.00	-31.71	H
61.83	-42.64	-15.60	-58.23	-13.00	-45.23	V
3505.20	-26.55	-19.08	-45.63	-13.00	-32.63	V
5257.80	-28.90	-13.19	-42.09	-13.00	-29.09	V

Note: Result=Reading+ Correct, Margin= Result- Limit

For Band WCDMA Band V Mode

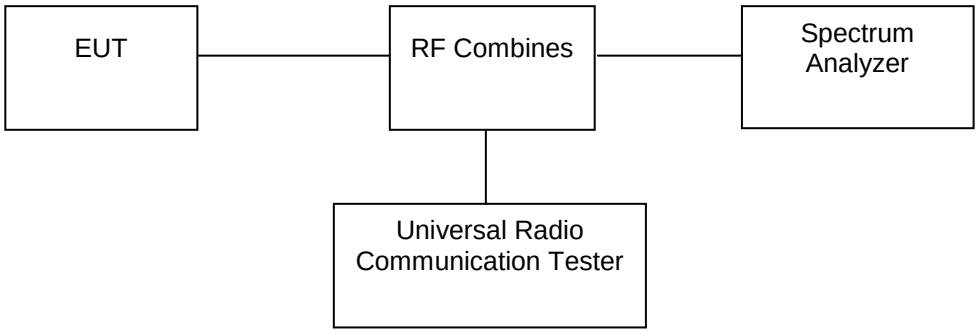
Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (826.4MHz)						
61.83	-44.77	-15.60	-60.37	-13.00	-47.37	H
1652.80	-20.15	-22.94	-43.09	-13.00	-30.09	H
2479.20	-23.84	-22.46	-46.30	-13.00	-33.30	H
61.83	-41.78	-15.60	-57.38	-13.00	-44.38	V
1652.80	-18.22	-22.94	-41.16	-13.00	-28.16	V
2479.20	-24.29	-22.46	-46.75	-13.00	-33.75	V
Middle Channel (836.4MHz)						
61.83	-43.45	-15.60	-59.05	-13.00	-46.05	H
1673.20	-19.06	-22.87	-41.93	-13.00	-28.93	H
2509.80	-26.72	-22.50	-49.22	-13.00	-36.22	H
61.83	-44.51	-15.60	-60.10	-13.00	-47.10	V
1673.20	-19.83	-22.87	-42.70	-13.00	-29.70	V
2509.80	-24.99	-22.50	-47.49	-13.00	-34.49	V
High Channel (846.6MHz)						
61.83	-43.27	-15.60	-58.86	-13.00	-45.86	H
1693.20	-18.35	-22.80	-41.15	-13.00	-28.15	H
2539.80	-23.45	-22.55	-46.00	-13.00	-33.00	H
61.83	-44.46	-15.60	-60.05	-13.00	-47.05	V
1693.20	-18.57	-22.80	-41.37	-13.00	-28.37	V
2539.80	-25.08	-22.55	-47.63	-13.00	-34.63	V

Note: Result=Reading+ Correct, Margin= Result- Limit

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listedin the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

11. Frequency Stability

11.1 Block Diagram Of Test Setup



11.2 Limit

FCC Part 22.355 : ±2.5 ppm
FCC Part 24.235 :
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

11.3 Test procedure

1. The testing follows FCC KDB 971168 D01v03r01 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 D01v03r01 Section 9.0.
2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.

4. The variation in frequency was measured for the worst case.

11.4 Test Result

All modes have been tested, and the worst result recorded was report as below

Band V

Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (℃)				
WCDMA850	4132	12	-20	826.4	19.96	0.0242	±2.5
			-10	826.4	15.83	0.0192	±2.5
			0	826.4	19.65	0.0238	±2.5
			10	826.4	19.95	0.0241	±2.5
			20	826.4	19.61	0.0237	±2.5
			30	826.4	16.24	0.0197	±2.5
			40	826.4	18.50	0.0224	±2.5
			50	826.4	12.40	0.0150	±2.5
		VL:10.8	20	826.4	18.68	0.0226	±2.5
		VH:13.2	20	826.4	19.93	0.0241	±2.5
VERDICT				PASS			

Band IV

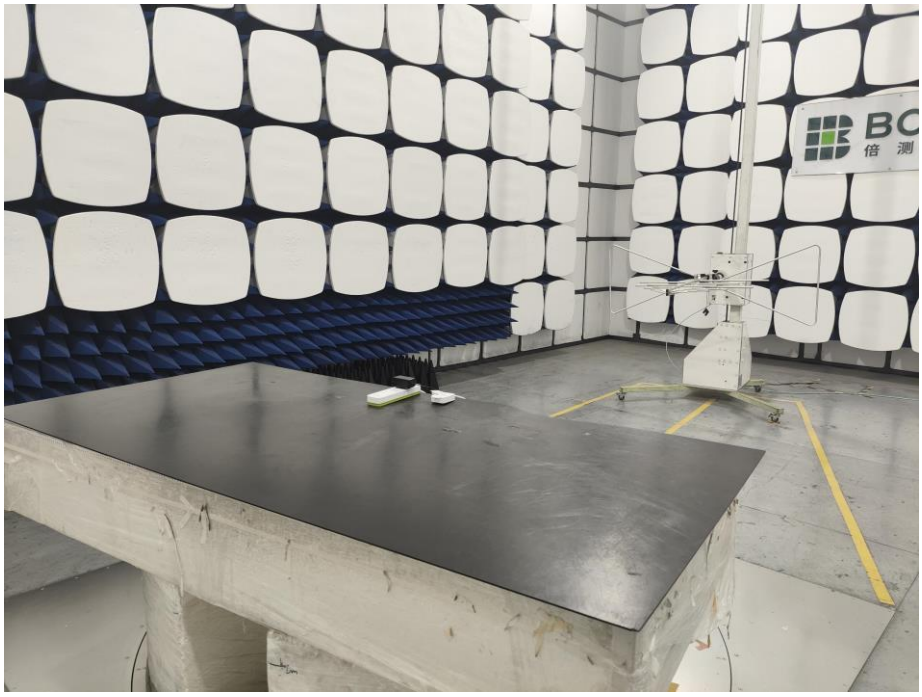
Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (℃)				
WCDMA1900	1312	12	-20	1732.4	4.32	0.0025	±2.5
			-10	1732.4	4.92	0.0028	±2.5
			0	1732.4	1.31	0.0008	±2.5
			10	1732.4	3.56	0.0021	±2.5
			20	1732.4	-0.77	-0.0004	±2.5
			30	1732.4	5.17	0.0030	±2.5
			40	1732.4	-0.71	-0.0004	±2.5
			50	1732.4	-2.83	-0.0016	±2.5
		VL:10.8	20	1732.4	1.64	0.0009	±2.5
		VH:13.2	20	1732.4	5.32	0.0031	±2.5
VERDICT				PASS			

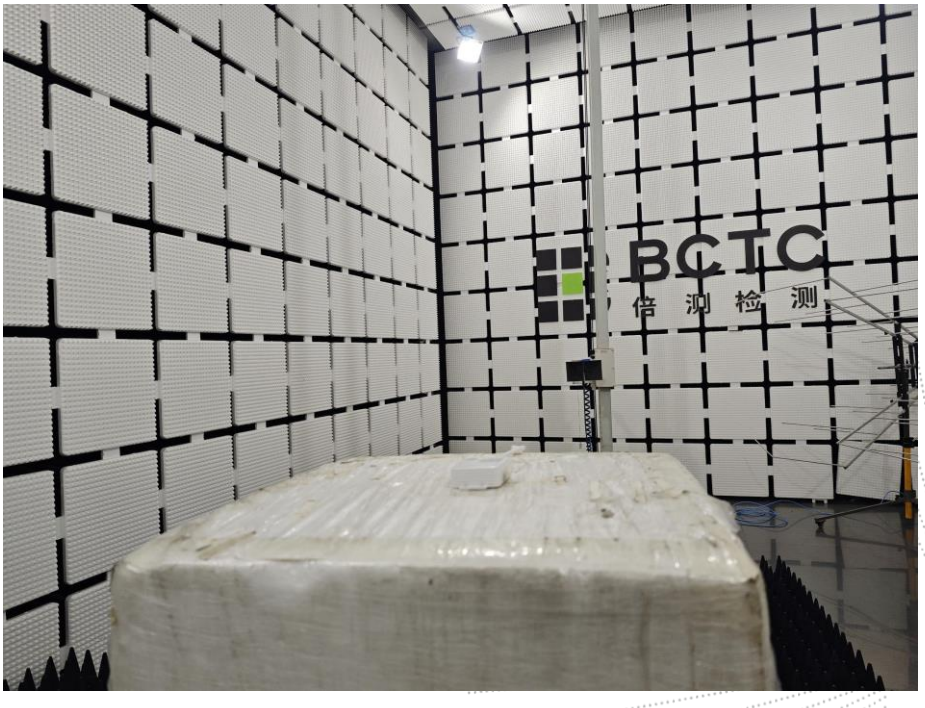
Band II

Operation Mode	Channel Number	Test Condition		Channel Frequency (MHz)	Freq.Dev. (Hz)	Deviation (ppm)	Limit (ppm)
		Voltage (V)	Temp (℃)				
WCDMA1900	9262	12	-20	1880	6.44	0.0034	±2.5
			-10	1880	-0.24	-0.0001	±2.5
			0	1880	1.38	0.0007	±2.5
			10	1880	-1.05	-0.0006	±2.5
			20	1880	-2.70	-0.0014	±2.5
			30	1880	-1.05	-0.0006	±2.5
			40	1880	-1.57	-0.0008	±2.5
			50	1880	3.05	0.0016	±2.5
		VL:10.8	20	1880	0.60	0.0003	±2.5
		VH:13.2	20	1880	4.24	0.0023	±2.5
VERDICT				PASS			

12. EUT Test Setup Photographs

Radiated Measurement Photos





STATEMENT

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without the "special seal for inspection and testing".

4. The test report is invalid without the signature of the approver.

5. The test process and test result is only related to the Unit Under Test.

6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.

7. The quality system of our laboratory is in accordance with ISO/IEC17025.

8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:
1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL：400-788-9558

P.C.: 518103

FAX：0755-33229357

Website：http://www.chnbctc.com

Consultation E-mail: bctc@bctc-lab.com.cn

Complaint/Advice E-mail: advice@bctc-lab.com.cn

※※※※※ **END** ※※※※※