

**ELECTROMAGNETIC EMISSIONS
COMPLIANCE REPORT**

FCC Applicant: ALPS ALPINE CO., LTD.
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Japan

FCC Manufacturer: ALPS ALPINE CO., LTD.
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ISED Applicant: Alps Alpine Co., Ltd.
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Japan

ISED Manufacturer: Alps Alpine Co., Ltd.
6-3-36, Furukawanakazato, Osaki-city Miyagi-pref, 989-6181,
Japan

Product Name: 5G Communication Module

Brand Name: ALPS ALPINE CO., LTD.

Model No./ISED HVIN: UMNZ1A2

Report Number: TERF2405001537E2

FCC ID CWTUMNZ1A2

IC: 1788F-UMNZ1A2

Date of EUT Received: May 30, 2024

Date of Test: Jun. 05, 2024 ~ Sep. 12, 2024

Issue Date: Oct. 04, 2024

Approved By _____**Vito Pei****We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26-2015 and the energy emitted by the sample EUT comply with FCC rule part 2, 22H & 24E & 27 C and ISED RSS-Gen, 132, 133, 139.

The results of this report relate only to the sample identified in this report.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2405001537E2	00	Original.	Aug. 07, 2024	Yami Kuo	
TERF2405001537E2	01	Revise chapter 4	Sep. 26, 2024	Yami Kuo	*
TERF2405001537E2	02	Revise chapter 1.3	Oct. 04, 2024	Yami Kuo	*

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.
- 2、Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.
And are assessed as electrically identical in RF characteristics, therefore, no further assessment required for the variant(s).

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1 GENERAL PRODUCT INFORMATION

1.1 Product Description

Product Name:	5G Communication Module
Brand Name:	ALPS ALPINE CO., LTD.
Model No./ISED HVIN:	UMNZ1A2
Hardware Version:	1.0
Firmware Version:	HI3.1
EUT Series No.:	440283005924
Power Supply:	3.7Vdc
Test Software (Name/Version)	default(Link Call Box)

1.2 Operation Frequency Range

Operating Frequency (MHz)		Operating Frequency (MHz)	
GSM/GPRS/EDGE 850	824.2 - 848.8	WCDMA / HSPA+ Band II	1852.4 - 1907.6
GSM/GPRS/EDGE 1900	1850.2 - 1909.8	WCDMA / HSPA+ Band IV	1712.4 - 1752.6
		WCDMA / HSPA+ Band V	826.4 - 846.6

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1.3 Antenna Designation

Antenna Type	Antenna Model No.
PCB monopole	Ant1
	Ant2
	Ant3
	Ant4
	Ant5
	Ant6
Note: Transmission in frequencies in this test report are only available by the above antenna(s).	

SIM 1

Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)			
		Ant1	Ant2	Ant3	Ant4
GSM/GPRS/EDGE 850	824.2 - 848.8	1.27	2.68	3.15	3.06
GSM/GPRS/EDGE 1900	1850.2 - 1909.8	3.04	3.09	3.3	2.68
WCDMA / HSPA+ Band II	1852.4 - 1907.6	3.04	3.09	3.3	2.68
WCDMA / HSPA+ Band IV	1712.4 - 1752.6	3.17	2.91	3.32	2.51
WCDMA / HSPA+ Band V	826.4 - 846.6	1.27	2.68	3.15	3.06

SIM 2

Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)	
		Ant5	Ant6
GSM/GPRS/EDGE 850	824.2 - 848.8	3.22	1.05
GSM/GPRS/EDGE 1900	1850.2 - 1909.8	2.64	2.98

Note: Antenna information is provided by the applicant.

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1.4 Type of Emission & Max ERP/EIRP Power Measurement Result:

SIM 1

Mode	ERP / EIRP (dBm)		W	99%	Type of Emission
GSM 850	33.90	ERP	2.455	0.2446	245KGXW
GPRS 850	33.73	ERP	2.360	0.2457	246KGXW
EDGE 850	27.86	ERP	0.611	0.2474	247KG7W
GSM 1900	32.88	EIRP	1.941	0.2470	247KGXW
GPRS 1900	32.87	EIRP	1.936	0.2470	247KGXW
EDGE 1900	29.09	EIRP	0.811	0.2442	244KG7W
Mode	ERP / EIRP (dBm)		W	99%	Type of Emission
WCDMA Band II	27.97	EIRP	0.627	4.1464	4M15F9W
HSDPA Band II	26.91	EIRP	0.491	4.1434	4M14F9W
HSUPA Band II	26.95	EIRP	0.495	4.1380	4M14F9W
WCDMA Band IV	27.91	EIRP	0.618	4.1506	4M15F9W
HSDPA Band IV	26.87	EIRP	0.486	4.1397	4M14F9W
HSUPA Band IV	26.84	EIRP	0.483	4.1495	4M15F9W
WCDMA Band V	25.56	ERP	0.360	4.1470	4M15F9W
HSDPA Band V	24.61	ERP	0.289	4.1403	4M14F9W
HSUPA Band V	24.53	ERP	0.284	4.1386	4M14F9W

SIM 2

Mode	ERP / EIRP (dBm)		W	99%	Type of Emission
GSM 850	32.22	ERP	1.667	0.2466	247KGXW
GPRS 850	32.05	ERP	1.603	0.2495	249KGXW
EDGE 850	25.98	ERP	0.396	0.2467	247KG7W
GSM 1900	32.63	EIRP	1.832	0.2465	247KGXW
GPRS 1900	32.56	EIRP	1.803	0.2459	246KGXW
EDGE 1900	28.59	EIRP	0.723	0.2458	246KG7W

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1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22H, 24E, 27C

ISED RSS-GEN Issue 5 Amendment 2 Feb. 2021

ISED RSS-132 Issue 4 January 2023

ISED RSS-133 Issue 6, Amendment 1 Jan. 18, 2018

ISED RSS-139 Issue 4 Amendment Oct. 2022

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

KDB941225 D01 SAR test for 3G devices v03r01 (SAR Measurement Procedures for 3G Devices, WCDMA / HSPA) was used for EUT and Base station setting.

KDB412172 D01 Determining ERP and EIRP v01r01

TS 151 010-1 is used to set, and measure the output power.

1.6 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
Conducted G				
Note: Test site name is remarked on the equipment list in each section of this report as an indica- tion where measurements occurred in specific test site and address.				

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1.7 Special Accessories

No special accessories were used during testing.

1.8 Equipment Modifications

There was no modifications incorporated into the EUT.

1.9 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Measurement at Antenna Port

The EUT is placed on a table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions (ERP/EIRP)

The EUT is placed on a turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

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2.5 Final Amplifier Voltage and Current Information:

SIM 1

Test mode	DC voltage (V)	DC current (mA)
GSM 850	3.7	390
GSM 850	3.7	380
EDGE 850	3.7	370
GSM 1900	3.7	270
EDGE 1900	3.7	260
WCDMA B2	3.7	750
HSUPA B2	3.7	600
HSDPA B2	3.7	660
WCDMA B4	3.7	730
HSUPA B4	3.7	550
HSDPA B4	3.7	690
WCDMA B5	3.7	580
HSUPA B5	3.7	460
HSDPA B5	3.7	550

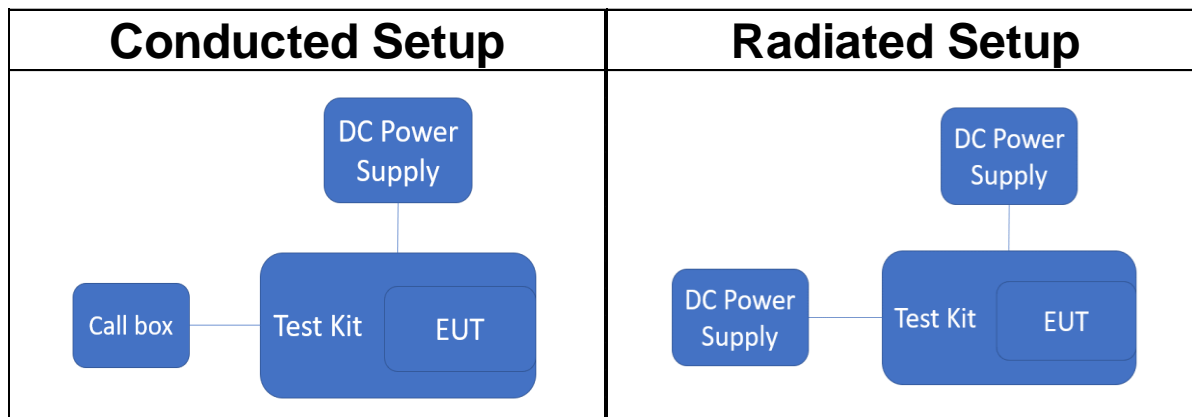
SIM 2

Test mode	DC voltage (V)	DC current (mA)
GSM 850	3.7	390
GPRS 850	3.7	370
EDGE 850	3.7	350
GSM 1900	3.7	270
GPRS 1900	3.7	250
EDGE 1900	3.7	240

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3 TEST CONFIGURATION



Note: Radio Communication Analyzer is placed in remote side for radiated test.

3.1 Control Unit(s)

Setup units & cable					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Provided by Applicant	Provided by Lab
EV B2	ALPSALPINE	FY0212Z11-2	N/A	V	
Setup units & cable					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Provided by Applicant	Provided by Lab
EV B2	ALPSALPINE	FY0212Z11-2	N/A	V	

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4 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§2.1046(a)	RSS-GEN §6.12	RF Power Output	Compliant
§22.913(a)(5) §24.232(c) §27.50(d)(4)	RSS-132 §5.4 RSS-133 §6.4 RSS-139 §5.5	ERP/ EIRP measurement	Compliant
§2.1049(h)	RSS-GEN §6.7	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §22.917(a) §24.238(a) §27.53(h)	RSS-GEN §6.13 RSS-132 §5.5 RSS-133 §6.5 RSS-139 §5.6	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §22.917(a) §24.238(a) §27.53(h)	RSS-GEN §6.13 RSS-132 §5.5 RSS-133 §6.5 RSS-139 §5.6	Field Strength of Spurious Radiation	Compliant
§22.913(d) §24.232(d) §27.50(d)(5)	RSS-132 §5.4 RSS-133 §6.4 RSS-139 §5.5	Peak to Average Ratio	Compliant
§2.1055(a)(1) §22.355 §24.235 §27.54	RSS-132 §5.3 RSS-133 §6.3 RSS-139 §5.4	Frequency Stability	Compliant

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5 DESCRIPTION OF TEST MODES

5.1 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

5.2 Measurement Configuration

SIM 1

RADIATED EMISSION	GSM Bands	Test Channel		
		L	M	H
ERP	850	v	v	v
EIRP	1900	v	v	v
FREQUENCY STABILITY	850	-	v	-
	1900	-	v	-
OCCUPIED BANDWIDTH	850	v	v	v
	1900	v	v	v
PEAK TO AVERAGE RATIO	850	v	v	v
	1900	v	v	v
BAND EDGE	850	v	-	v
	1900	v	-	v
CONDCUDED EMISSION	850	v	v	v
	1900	v	v	v

SIM 2

RADIATED EMISSION	GSM Bands	Test Channel		
		L	M	H
ERP	850	v	v	v
EIRP	1900	v	v	v
FREQUENCY STABILITY	850	-	v	-
	1900	-	v	-
OCCUPIED BANDWIDTH	850	v	v	v
	1900	v	v	v
PEAK TO AVERAGE RATIO	850	v	v	v
	1900	v	v	v
BAND EDGE	850	v	-	v
	1900	v	-	v
CONDCUDED EMISSION	850	v	v	v
	1900	v	v	v

Test Items	WCDMA / HSPA Bands	Test Channel		
		L	M	H
ERP	Band V	v	v	v
EIRP	Band II	v	v	v
	Band IV	v	v	v
FREQUENCY STABILITY	Band II	-	v	-
	Band IV	-	v	-
	Band V	-	v	-
OCCUPIED BANDWIDTH	Band II	v	v	v
	Band IV	v	v	v
	Band V	v	v	v
PEAK TO AVERAGE RATIO	Band II	v	v	v
	Band IV	v	v	v
	Band V	v	v	v
BAND EDGE	Band II	v	-	v
	Band IV	v	-	v
	Band V	v	-	v
CONDCUDED EMISSION	Band II	v	v	v
	Band IV	v	v	v
	Band V	v	v	v

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6 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
Power Density	+/- 0.61 dB
RF Power Output	+/- 0.97 dB
ERP/ EIRP measurement	+/- 2.15 dB
	+/- 2.15 dB
Emission Bandwidth	+/- 1.38 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 0.77 dB
Peak to Average Ratio	+/- 0.97 dB
Frequency Stability vs. Temperature	+/- 1.48 Hz
Frequency Stability vs. Voltage	+/- 1.48 Hz
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	1.89 dB	9kHz~30MHz
	+/-	4.15 dB	30MHz - 1000MHz
	+/-	3.43 dB	1GHz - 18GHz
	+/-	3.86 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89 dB	9kHz~30MHz
	+/-	4.02 dB	30MHz - 1000MHz
	+/-	3.43 dB	1GHz - 18GHz
	+/-	3.86 dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2 dB	33GHz-50GHz
	+/-	1.59 dB	50GHz-60GHz
	+/-	1.7 dB	60GHz-90GHz
	+/-	1.64 dB	90GHz-140GHz
	+/-	3.83 dB	140GHz-220GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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7 MEASUREMENT EQUIPMENT USED

7.1 Conducted Measurement

Conducted Emission Test Site: Conducted E					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Attenuator	Marvelous	MVE2213-10	RF06	11/15/2023	11/14/2024
Coaxial Cables	Woken	00100A1F1A185C	RF72	11/15/2023	11/14/2024
DC Block	PASTERNAK	PE8210	RF157	11/15/2023	11/14/2024
DC Power Supply	Gwinstek	SPD-3606	GEV923152	05/17/2024	05/16/2025
Radio Communication Analyser	Anritsu	MT8820C	6201107337	07/14/2023	07/13/2024
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/10/2024	04/09/2025
Splitter	Woken	DOM35LW1A2	RF255	11/15/2023	11/14/2024
Temperature Chamber	Haich	HC-TOPH-30-CHP	QHC20230320-100-2	08/24/2023	08/23/2024
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R

7.2 Radiated Measurement

Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
3m Site NSA	SGS	966 chamber C	N/A	03/02/2024	03/01/2025
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-300	11/02/2023	11/01/2024
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	12/14/2023	12/13/2024
Coaxial Cable	Huber+Suhner	EMC106-SM-SM-9100	150704	11/15/2023	11/14/2024
Coaxial Cable	Huber+Suhner	RG 214/U	W22.03	11/15/2023	11/14/2024
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	MY17388/4	11/15/2023	11/14/2024
DC Power Supply	DHA	DPS-3003	9411005787	08/21/2023	08/20/2024
DC Power Supply	Gwinstek	SPS-3610	GEW902165	01/17/2024	01/16/2025
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/24/2024	01/23/2025
Horn Antenna	Schwarzbeck	BBHA9120D	1341	05/30/2024	05/29/2025
Horn Antenna	Schwarzbeck	BBHA9170	184	12/28/2023	12/27/2024
Horn Antenna	Schwarzbeck	BBHA9170	185	08/21/2023	08/20/2024
Pre-Amplifier	EMC Instruments	EMC118A45SE	980789	11/15/2023	11/14/2024
Pre-Amplifier	EMC Instruments	EMC18405SEE	980881	11/15/2023	11/14/2024
Pre-Amplifier	EMC Instruments	EMC330	980096	11/15/2023	11/14/2024
Radio Communication Analyser	Anritsu	MT8820C	6201465316	07/10/2023	07/09/2024
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/10/2024	04/09/2025
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

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8 MAXIMUM OUTPUT POWER

8.1 Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

According to FCC §2.1046

FCC 22.913(a)

(5) mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

FCC 24.232(c)

Mobile and portable stations are limited to 2 W EIRP.

FCC 27.50(d)

(4) Mobile, and portable (hand-held) stations operating in the 1710-1755 MHz, 1695-1710 MHz and 1755-1780 MHz bands are limited to 1W EIRP.

RSS-132 §5.4

The transmitter output power shall be measured in terms of average power. The equivalent radiated power (e.r.p.) shall not exceed 7 watts for mobile equipment and 3 watts for portable equipment.

The effective isotropic radiated power (e.i.r.p.) shall not exceed the limits specified in SRSP-503 for base station equipment.

RSS-133 §6.4

The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510.

According to section 5.1.2 of SRSP-510, Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

RSS-139 §5.5

The maximum output power of the equipment shall comply with the limits specified below. In the tables, maximum power refers to the equivalent isotropically radiated power (e.i.r.p.) or total radiated power (TRP), measured in terms of average values.

The limits in this RSS are specified for the purpose of certification and may not apply to all deployment scenarios. Consult SRSP-513 and SRSP-519 for more details on the bands 2110-2180 MHz and 2180-2200 MHz respectively

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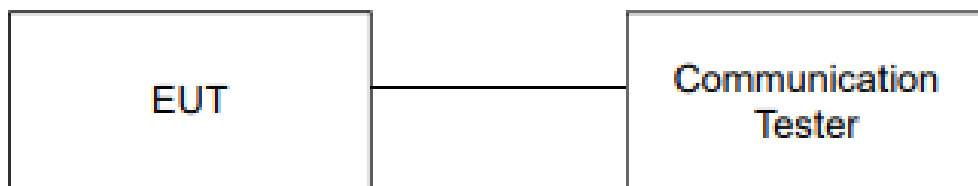
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8.2 Test Set-up



Note: Measurement setup for testing on Antenna connector

8.3 Output Power Measurement Applicable Guidance

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a communication tester.

Transmitter output was read off the communication tester in dBm.

The power output at the transmitter antenna port was determined by adding the value of the attenuator to the communication tester reading.

TS 151 010-1 is reference to conduct the test measurement of output power.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCDMA/HSPA) was used for EUT and RMC 12.2kps is used for Base station setting.

KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results.

Conducted average power is obtained from the simulator telecommunication test set.

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8.4 Determining ERP and/or EIRP from conducted RF output power measurements

According to KDB 412172 D01 Power Approach,

$$EIRP = P_T + G_T - L_C,$$

$$ERP = EIRP - 2.15,$$

Where:

- ERP or EIRP = effective radiated power or equivalent isotropically radiated power (expressed in the same units as P_T , typically dBW, dBm, or power spectral density (PSD)²), relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP);
- P_T = transmitter output power, expressed in dBW, dBm, or PSD;
- G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
- L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

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8.5 Measurement Results

8.5.1 GSM

SIM 1

GSM/GPRS/EDGE (GMSK; 8-PSK) Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
GSM 850	824.2	128	32.90	3.15	33.90	36.05	38.50	-2.45
	836.6	190	32.31	3.15	33.31	35.46	38.50	-3.04
	848.8	251	32.11	3.15	33.11	35.26	38.50	-3.24
GSM 1900	1850.2	512	29.58	3.30	30.73	32.88	33.00	-0.12
	1880.0	661	29.53	3.30	30.68	32.83	33.00	-0.17
	1909.8	810	29.51	3.30	30.66	32.81	33.00	-0.19
GPRS 850	824.2	128	32.73	3.15	33.73	35.88	38.50	-2.62
	836.6	190	32.23	3.15	33.23	35.38	38.50	-3.12
	848.8	251	32.06	3.15	33.06	35.21	38.50	-3.29
GPRS 1900	1850.2	512	29.57	3.30	30.72	32.87	33.00	-0.13
	1880.0	661	29.47	3.30	30.62	32.77	33.00	-0.23
	1909.8	810	29.39	3.30	30.54	32.69	33.00	-0.31
EDGE 850	824.2	128	26.86	3.15	27.86	30.01	38.50	-8.49
	836.6	190	26.15	3.15	27.15	29.30	38.50	-9.20
	848.8	251	26.16	3.15	27.16	29.31	38.50	-9.19
EDGE 1900	1850.2	512	25.64	3.30	26.79	28.94	33.00	-4.06
	1880.0	661	25.79	3.30	26.94	29.09	33.00	-3.91
	1909.8	810	25.42	3.30	26.57	28.72	33.00	-4.28

EUT Mode	Frequency (MHz)	CH	Average Burst Power (1DN 1UP) Class 8 (dBm)	Average Burst Power (1DN 2UP) Class 10 (dBm)	Average Burst Power (1DN 3UP) Class 12 (dBm)	Average Burst Power (1DN 4UP) Class 12 (dBm)
GPRS 850	824.2	128	32.73	32.71	32.64	32.57
	836.6	190	32.23	32.15	32.09	32.00
	848.8	251	32.06	32.01	31.98	31.86
GPRS 1900	1850.2	512	29.57	29.55	29.51	29.50
	1880.0	661	29.47	29.43	29.41	29.38
	1909.8	810	29.39	29.38	29.36	29.35
EDGE 850	824.2	128	26.86	26.81	26.71	26.55
	836.6	190	26.15	26.03	25.90	25.75
	848.8	251	26.16	26.12	25.94	25.80
EDGE 1900	1850.2	512	25.64	25.62	25.59	25.57
	1880.0	661	25.79	25.77	25.74	25.72
	1909.8	810	25.42	25.39	25.37	25.35

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SIM 2

GSM/GPRS/EDGE (GMSK; 8-PSK) Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
GSM 850	824.2	128	33.32	1.05	32.22	34.37	38.50	-4.13
	836.6	190	33.11	1.05	32.01	34.16	38.50	-4.34
	848.8	251	32.65	1.05	31.55	33.70	38.50	-4.80
GSM 1900	1850.2	512	29.55	2.98	30.38	32.53	33.00	-0.47
	1880.0	661	29.65	2.98	30.48	32.63	33.00	-0.37
	1909.8	810	29.21	2.98	30.04	32.19	33.00	-0.81
GPRS 850	824.2	128	33.15	1.05	32.05	34.20	38.50	-4.30
	836.6	190	32.94	1.05	31.84	33.99	38.50	-4.51
	848.8	251	32.46	1.05	31.36	33.51	38.50	-4.99
GPRS 1900	1850.2	512	29.47	2.98	30.30	32.45	33.00	-0.55
	1880.0	661	29.58	2.98	30.41	32.56	33.00	-0.44
	1909.8	810	29.10	2.98	29.93	32.08	33.00	-0.92
EDGE 850	824.2	128	27.08	1.05	25.98	28.13	38.50	-10.37
	836.6	190	26.91	1.05	25.81	27.96	38.50	-10.54
	848.8	251	26.06	1.05	24.96	27.11	38.50	-11.39
EDGE 1900	1850.2	512	25.51	2.98	26.34	28.49	33.00	-4.51
	1880.0	661	25.61	2.98	26.44	28.59	33.00	-4.41
	1909.8	810	25.11	2.98	25.94	28.09	33.00	-4.91

EUT Mode	Frequency (MHz)	CH	Average Burst Power (1DN 1UP) Class 8 (dBm)	Average Burst Power (1DN 2UP) Class 10 (dBm)	Average Burst Power (1DN 3UP) Class 12 (dBm)	Average Burst Power (1DN 4UP) Class 12 (dBm)
GPRS 850	824.2	128	33.15	33.10	33.05	32.96
	836.6	190	32.94	32.84	32.70	32.51
	848.8	251	32.46	32.34	32.30	32.25
GPRS 1900	1850.2	512	29.47	29.45	29.43	29.40
	1880.0	661	29.58	29.57	29.55	29.54
	1909.8	810	29.10	29.08	29.05	29.04
EDGE 850	824.2	128	27.08	26.99	26.91	26.79
	836.6	190	26.91	26.83	26.72	26.62
	848.8	251	26.06	25.95	25.82	25.76
EDGE 1900	1850.2	512	25.51	25.50	25.48	25.47
	1880.0	661	25.61	25.59	25.58	25.56
	1909.8	810	25.11	25.09	25.05	25.03

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8.5.2 WCDMA & HSPA Measurement Results:

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm. RMC 12.2kps is used for this testing.

SIM 1

WCDMA/HSUPA/HSDPA Band II Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
WCDMA	1852.4	9262	24.67	3.30	25.82	27.97	33.00	-5.03
	1880.0	9400	24.58	3.30	25.73	27.88	33.00	-5.12
	1907.6	9538	24.47	3.30	25.62	27.77	33.00	-5.23
HSDPA	1852.4	9262	23.61	3.30	24.76	26.91	33.00	-6.09
	1880.0	9400	23.55	3.30	24.70	26.85	33.00	-6.15
	1907.6	9538	23.51	3.30	24.66	26.81	33.00	-6.19
HSUPA	1852.4	9262	23.65	3.30	24.80	26.95	33.00	-6.05
	1880.0	9400	23.49	3.30	24.64	26.79	33.00	-6.21
	1907.6	9538	23.55	3.30	24.70	26.85	33.00	-6.15

WCDMA/HSUPA/HSDPA Band IV Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
WCDMA	1712.4	1312	24.51	3.32	25.68	27.83	30.00	-2.17
	1732.6	1413	24.47	3.32	25.64	27.79	30.00	-2.21
	1752.6	1513	24.59	3.32	25.76	27.91	30.00	-2.09
HSDPA	1712.4	1312	23.49	3.32	24.66	26.81	30.00	-3.19
	1732.6	1413	23.44	3.32	24.61	26.76	30.00	-3.24
	1752.6	1513	23.55	3.32	24.72	26.87	30.00	-3.13
HSUPA	1712.4	1312	23.52	3.32	24.69	26.84	30.00	-3.16
	1732.6	1413	23.40	3.32	24.57	26.72	30.00	-3.28
	1752.6	1513	23.49	3.32	24.66	26.81	30.00	-3.19

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WCDMA/HSUPA/HSDPA Band V Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
WCDMA	826.4	4132	24.56	3.15	25.56	27.71	38.50	-10.79
	836.6	4183	24.22	3.15	25.22	27.37	38.50	-11.13
	846.6	4233	24.28	3.15	25.28	27.43	38.50	-11.07
HSDPA	826.4	4132	23.61	3.15	24.61	26.76	38.50	-11.74
	836.6	4183	23.30	3.15	24.30	26.45	38.50	-12.05
	846.6	4233	23.21	3.15	24.21	26.36	38.50	-12.14
HSUPA	826.4	4132	23.53	3.15	24.53	26.68	38.50	-11.82
	836.6	4183	23.23	3.15	24.23	26.38	38.50	-12.12
	846.6	4233	23.44	3.15	24.44	26.59	38.50	-11.91

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8.5.3 HSPA (HSDPA & HSUPA) Release 6:

The following 4 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C10.1.4 & C11.1.3 in the 3GPP TS34.121-1. RMC 12.2kps is used for this testing.

8.5.4 HSDPA SUB-TEST Setting

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH(FOR HSDPA)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)	RMC (Kbps)
1	2/15	15/15	64	2/15	4/15	0.0	0.0	12.2
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0	12.2
3	15/15	8/15	64	15/8	30/15	1.5	0.5	12.2
4	15/15	4/15	64	15/4	30/15	1.5	0.5	12.2

Note: The recommended HSDPA MPRs are implemented as per following sub-tests.

SIM 1

Mode	Sub test	Avg. Power (dBm) Channel		
		9262	9400	9538
HSDPA II	1	23.61	23.55	23.51
	2	23.52	23.54	23.37
	3	23.25	23.02	22.95
	4	23.21	22.92	22.91

Mode	Sub test	Avg. Power (dBm) Channel		
		1312	1413	1513
HSDPA IV	1	23.49	23.44	23.55
	2	23.46	23.31	23.50
	3	22.96	22.97	23.07
	4	22.91	22.87	23.04

Mode	Sub test	Avg. Power (dBm) Channel		
		4132	4183	4233
HSDPA V	1	23.61	23.30	23.21
	2	23.60	23.29	23.19
	3	23.11	22.78	22.84
	4	23.01	22.68	22.67

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8.5.5 HSPA SUB-TEST Setting

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH(FOR HSUPA)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (Code s)	CM (dB)	MPR (dB)	AG Index	E-TFCl	RMC (Kbps)
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75	12.2
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67	12.2
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4 4	2	2.0	1.0	15	92	12.2
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71	12.2
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81	12.2

Note: The recommended HSUPA MPRs are implemented as per following sub-tests.

SIM 1

Mode	Sub test	Avg. Power (dBm)		
		Channel		
		9262	9400	9538
HSUPA II	1	23.65	23.49	23.55
	2	23.14	23.00	22.96
	3	23.57	23.54	23.45
	4	23.66	23.57	23.45
	5	23.63	23.56	23.40

Mode	Sub test	Avg. Power (dBm)		
		Channel		
		1312	1413	1513
HSUPA IV	1	23.52	23.40	23.49
	2	23.11	22.96	23.07
	3	23.43	23.46	23.48
	4	23.48	23.42	23.63
	5	23.44	23.43	23.55

Mode	Sub test	Avg. Power (dBm)		
		Channel		
		4132	4183	4233
HSUPA V	1	23.53	23.23	23.44
	2	23.08	22.71	22.69
	3	23.48	23.15	23.41
	4	23.59	23.21	23.23
	5	23.56	23.25	23.25

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8.5.6 WCDMA/HSDPA/HSUPA band II, IV, V

The EUT output power was controlled by simulator and enter max rated power 24dBm. The EUT is going to be set to max output power to 24dBm then record the read. The min. power was measures by a function key "minimum power" then record the read. It is -52.3dBm. The power variation can be 0.1dB step by setting.

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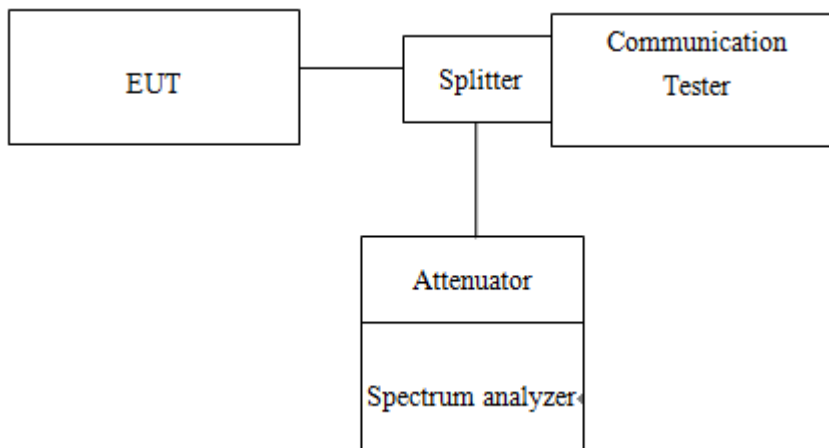
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9 OCCUPIED BANDWIDTH MEASUREMENT

9.1 Standard Applicable

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power.

9.2 Test Set-up



9.3 Measurement Procedure

99% & 26dB Bandwidth with detector peak

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 * RBW, with span > 2 * Signal BW, set % Power = 99%.

99% Bandwidth with detector sample

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% ~ 5% of emission BW, VBW= 3 times RBW.

Set RBW= 1% ~ 5%, VBW= 3 * RBW, with span > 2 * Signal BW, set % Power = 99%.

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9.4 Measurement Result

SIM 1

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		GSM 850	GPRS 850	EDGE 850	GSM 850	GPRS 850	EDGE 850
824.2	128	0.24327	0.24529	0.24730	0.3186	0.3209	0.3148
836.6	190	0.24409	0.24154	0.24736	0.3284	0.3112	0.3242
848.8	251	0.24455	0.24566	0.24180	0.3149	0.3220	0.3173

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		GSM 1900	GPRS 1900	EDGE 1900	GSM 1900	GPRS 1900	EDGE 1900
1850.2	512	0.24412	0.24698	0.24416	0.3137	0.3150	0.3203
1880.0	661	0.24701	0.24651	0.24347	0.3163	0.3151	0.3168
1909.8	810	0.24356	0.24448	0.23943	0.3159	0.3135	0.3191

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		WCDMA II	HSDPA II	HSUPA II	WCDMA II	HSDPA II	HSUPA II
1852.40	9262	4.13820	4.13220	4.13020	4.703	4.676	4.671
1880.00	9400	4.14260	4.13120	4.13800	4.696	4.698	4.682
1907.60	9538	4.14640	4.14340	4.13720	4.698	4.673	4.695

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		WCDMA IV	HSDPA IV	HSUPA IV	WCDMA IV	HSDPA IV	HSUPA IV
1712.40	1312	4.15060	4.13710	4.14950	4.705	4.693	4.682
1732.60	1413	4.14080	4.13550	4.13740	4.690	4.682	4.672
1752.60	1513	4.14630	4.13970	4.14870	4.692	4.699	4.697

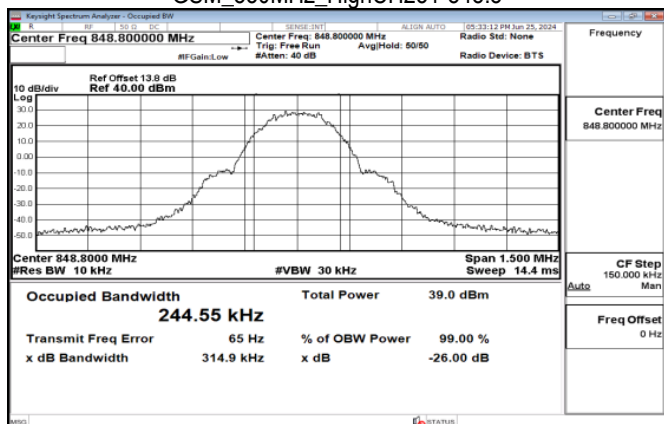
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		WCDMA V	HSDPA V	HSUPA V	WCDMA V	HSDPA V	HSUPA V
826.40	4132	4.14700	4.13870	4.13860	4.695	4.682	4.696
836.60	4183	4.13170	4.13180	4.13750	4.695	4.683	4.691
846.60	4233	4.14310	4.14030	4.13120	4.695	4.681	4.664

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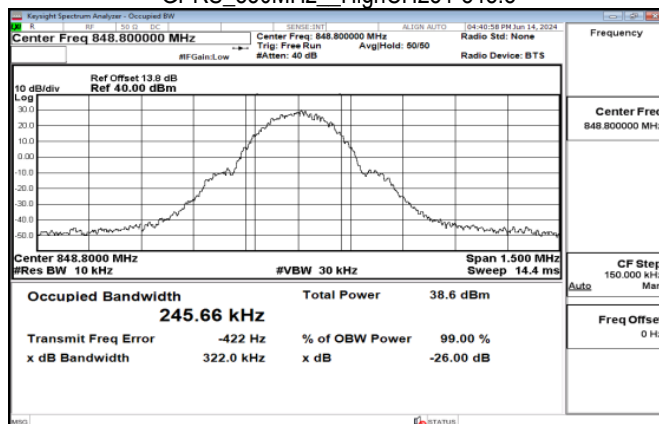
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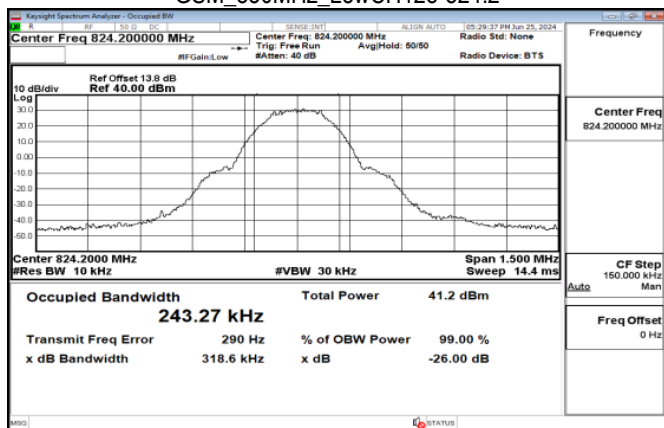
GSM_850MHz_HighCH251-848.8



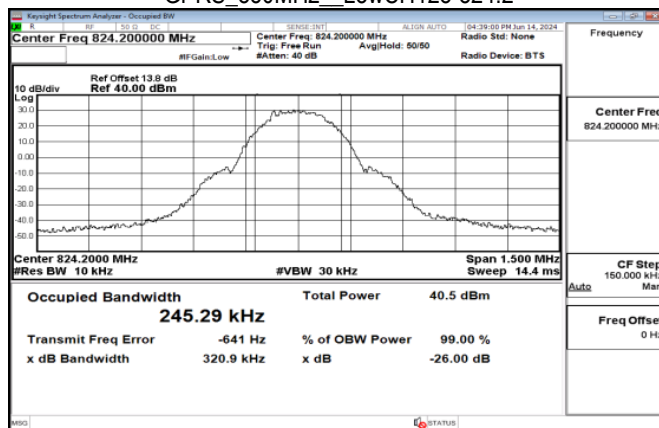
GPRS_850MHz_HighCH251-848.8



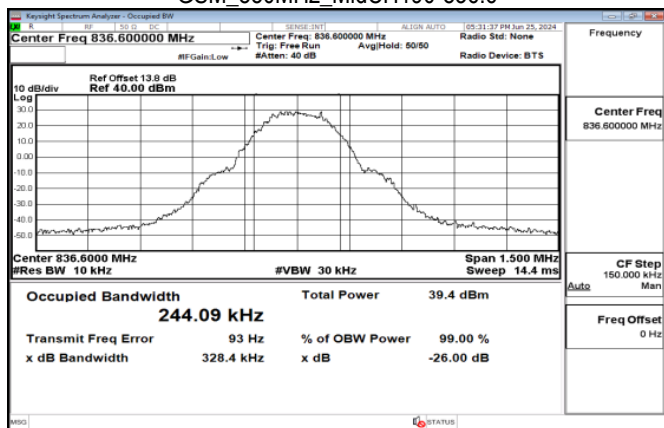
GSM_850MHz_LowCH128-824.2



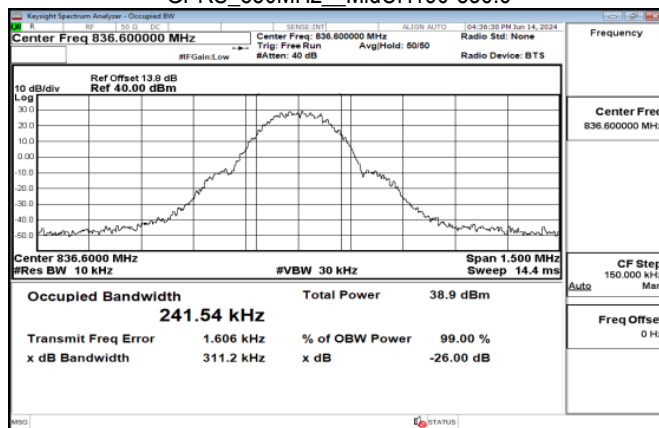
GPRS_850MHz_LowCH128-824.2



GSM_850MHz_MidCH190-836.6



GPRS_850MHz_MidCH190-836.6

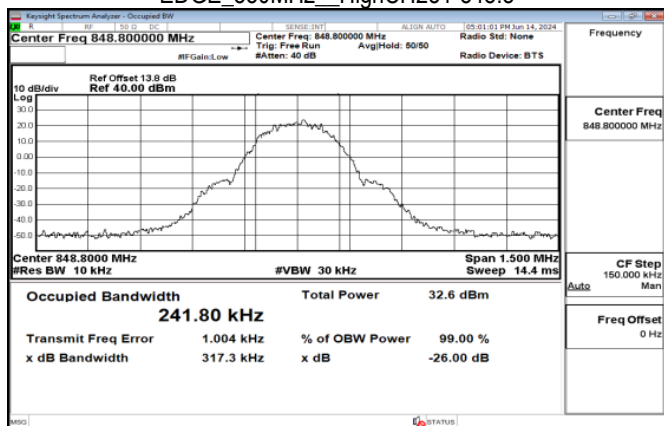


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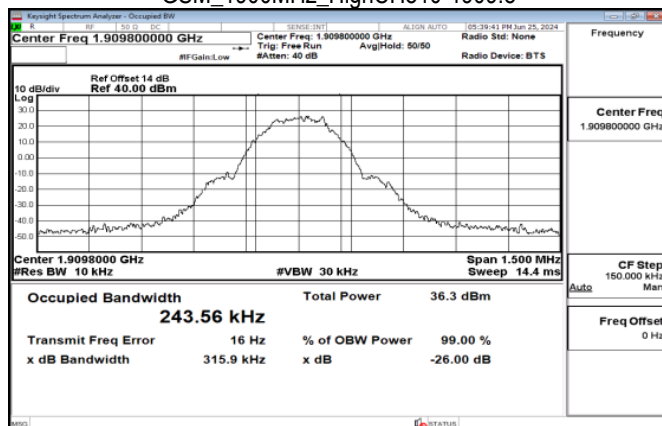
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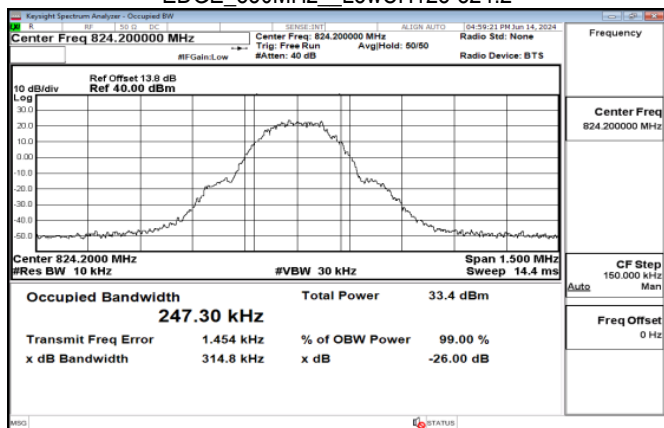
EDGE_850MHz_HighCH251-848.8



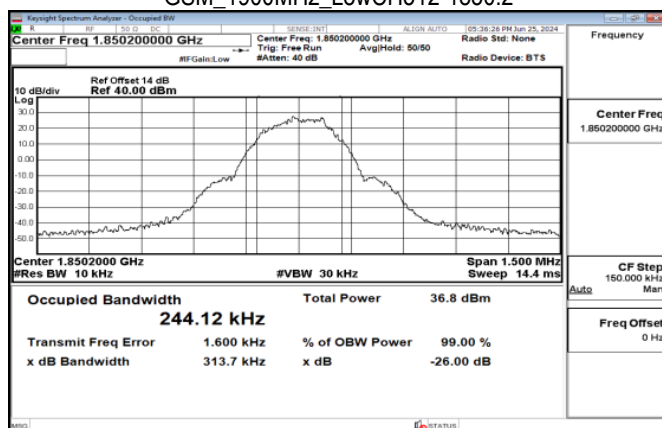
GSM_1900MHz_HighCH810-1909.8



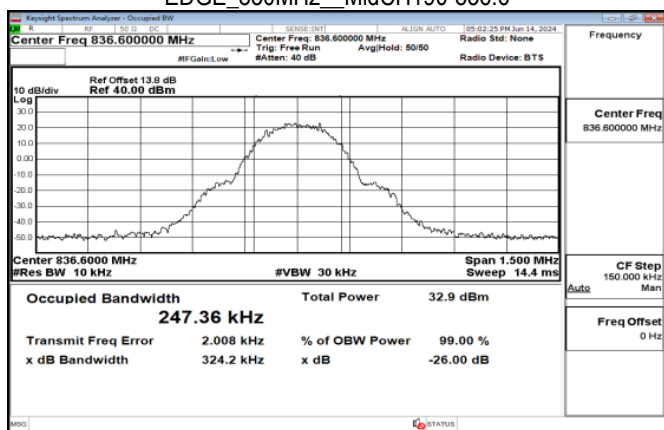
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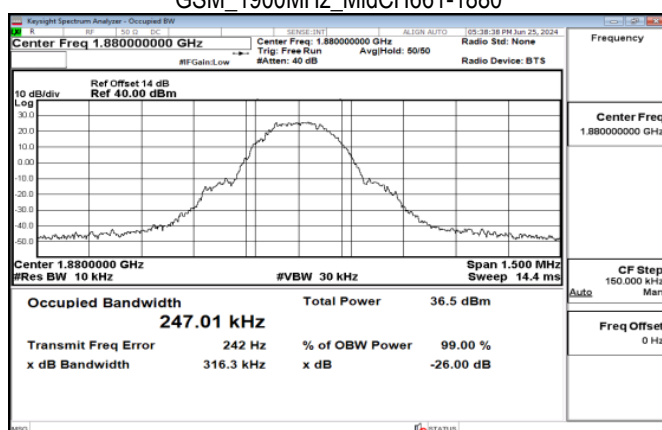
GSM_1900MHz_LowCH512-1850.2



EDGE_850MHz_MidCH190-836.6



GSM_1900MHz_MidCH661-1880

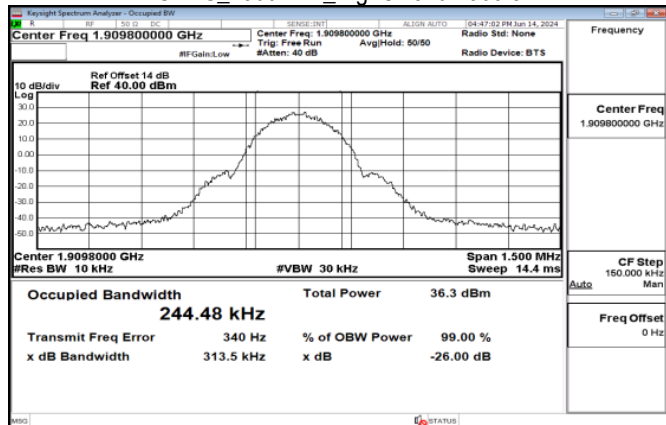


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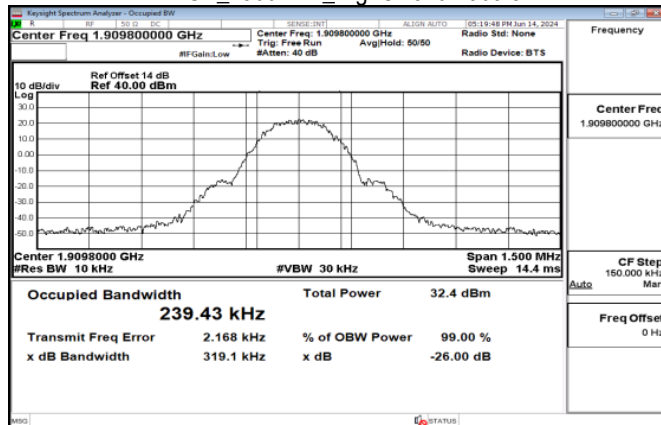
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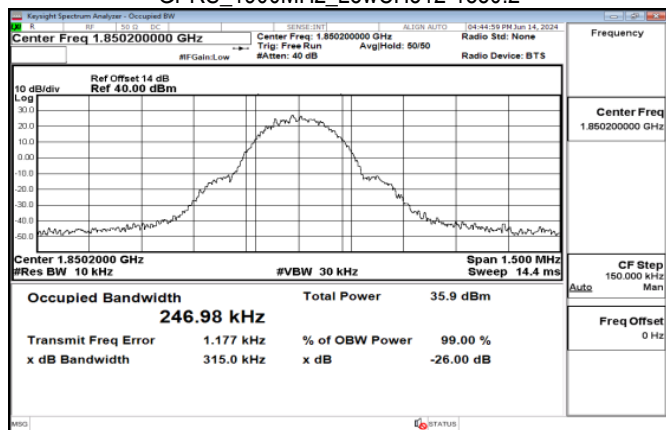
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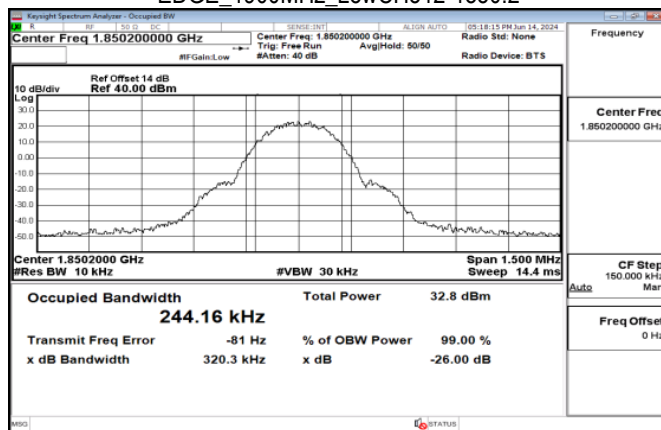
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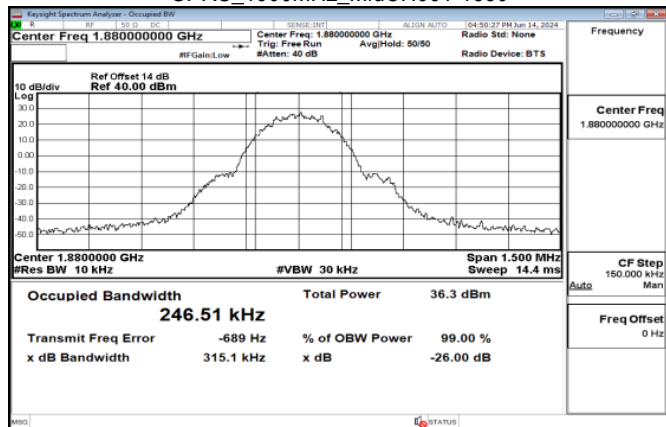
GPRS_1900MHz_LowCH512-1850.2



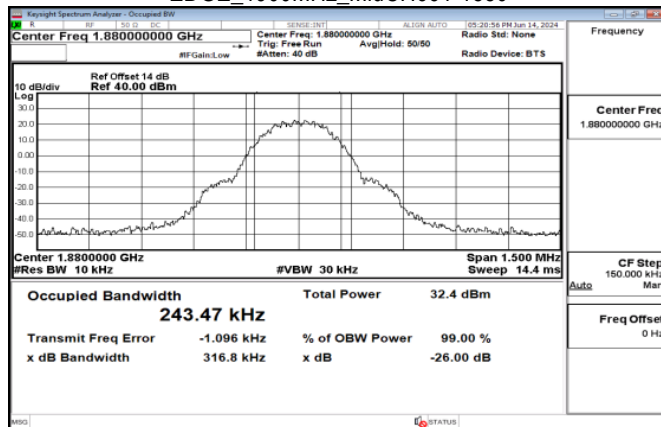
EDGE_1900MHz_LowCH512-1850.2



GPRS_1900MHz_MidCH661-1880



EDGE_1900MHz_MidCH661-1880

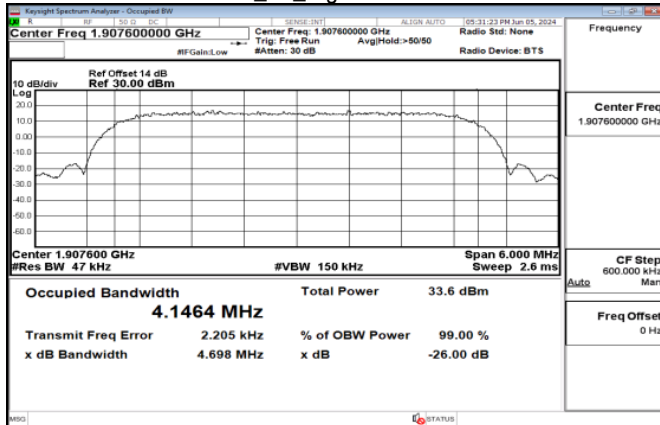


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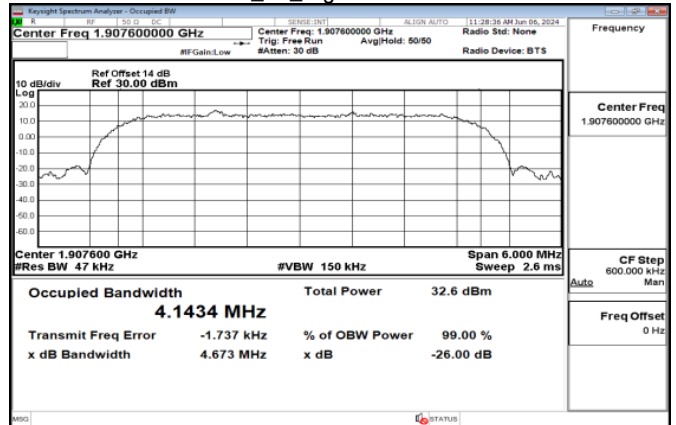
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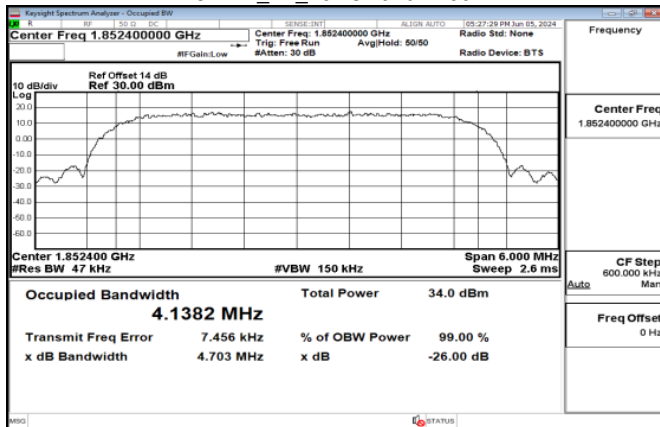
WCDMA_B2_HighCH9538-1907.6



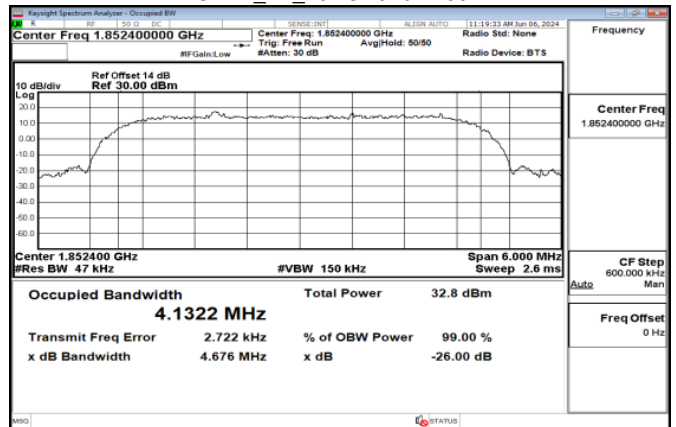
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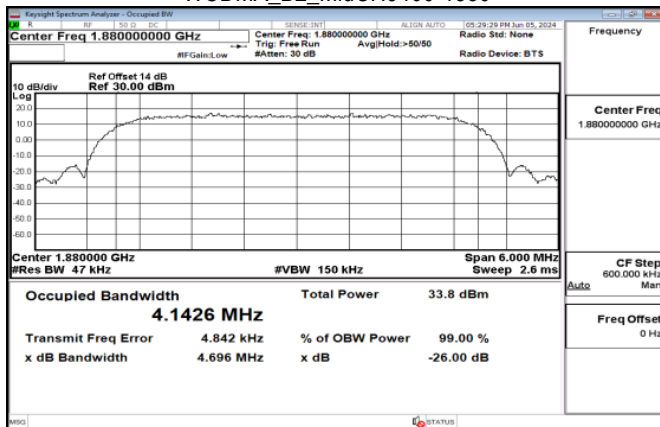
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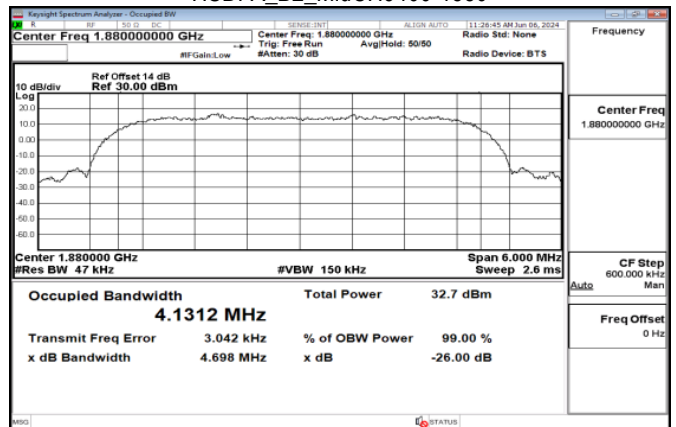
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WCDMA_B2_MidCH9400-1880



HSDPA_B2_MidCH9400-1880

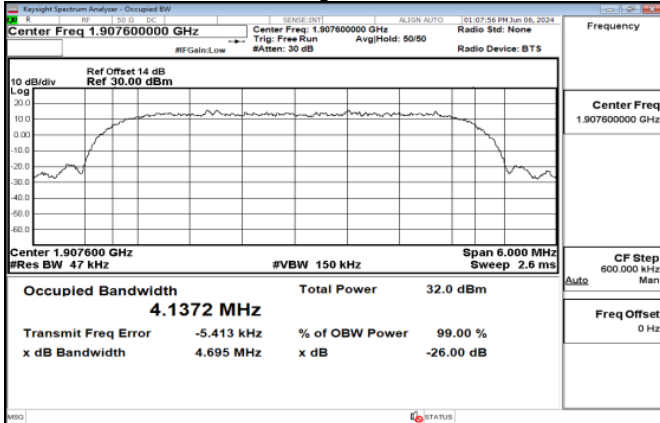


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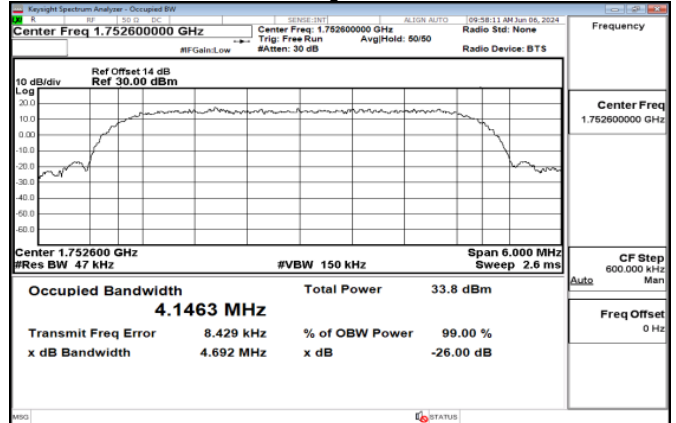
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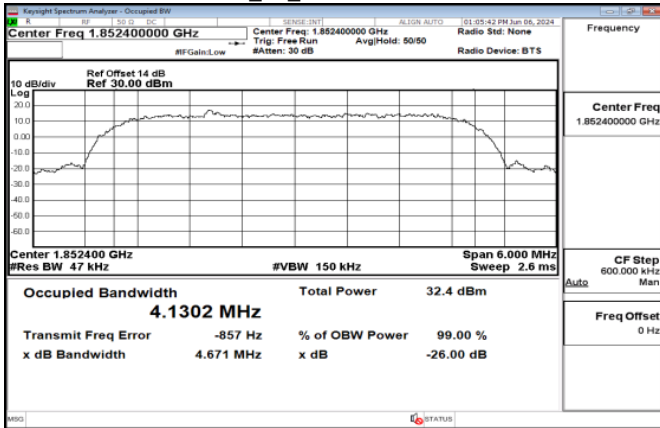
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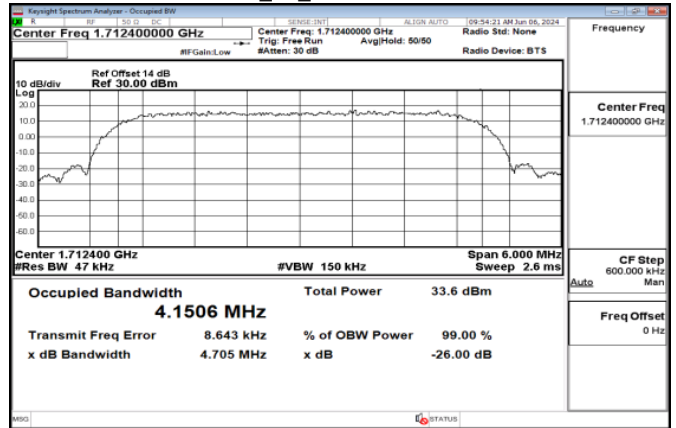
WCDMA_B4_HighCH1513-1752.6



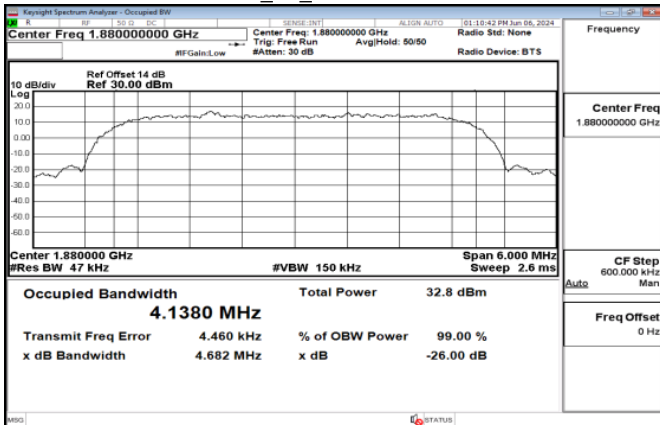
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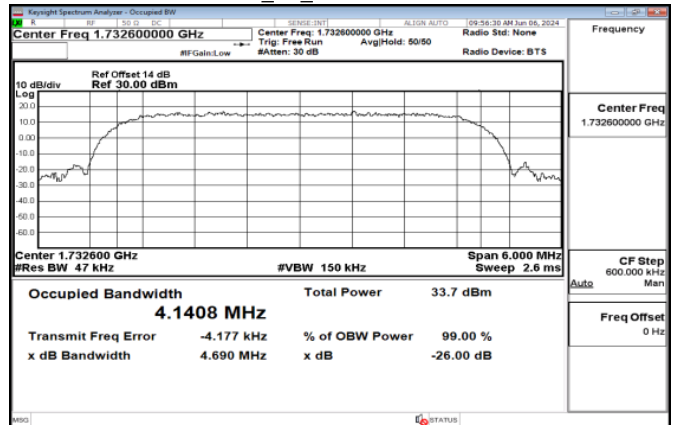
WCDMA_B4_LowCH1312-1712.4



HSUPA_B2_MidCH9400-1880



WCDMA_B4_MidCH1413-1732.6

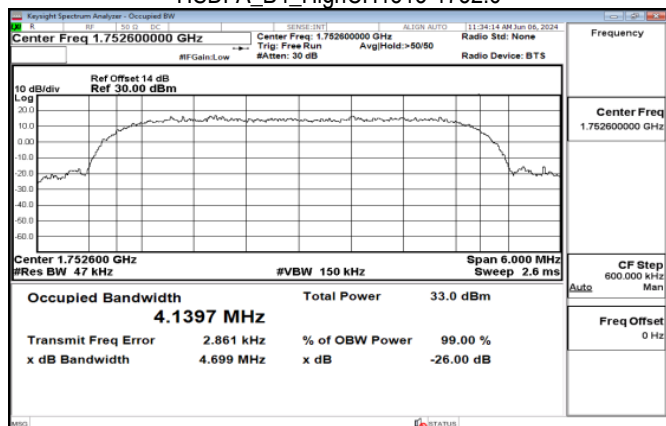


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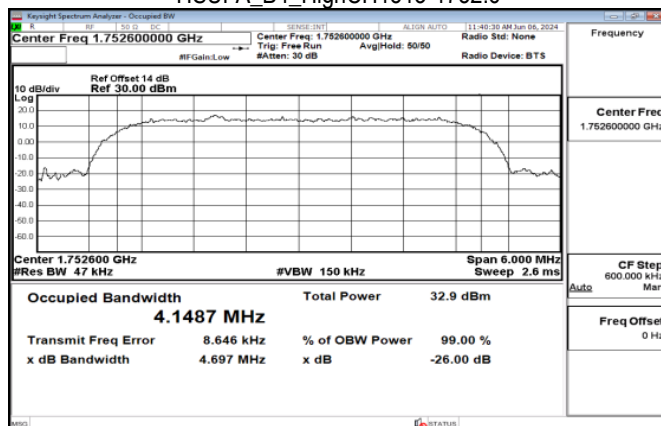
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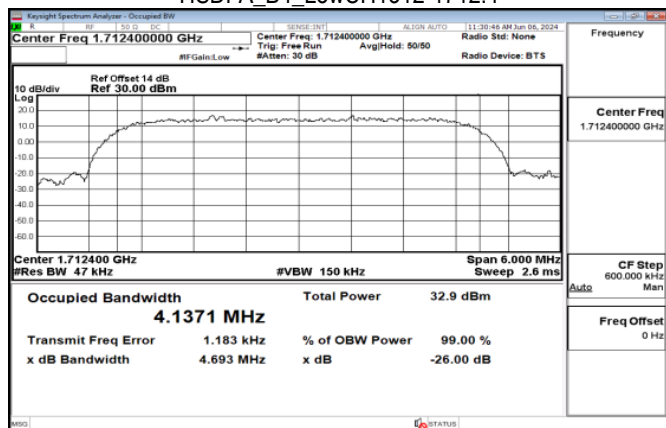
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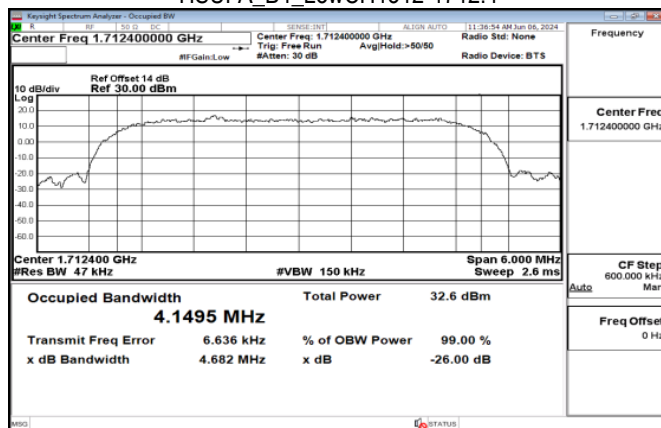
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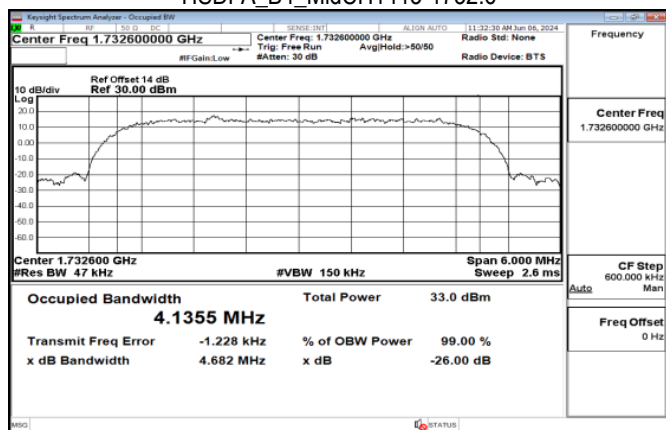
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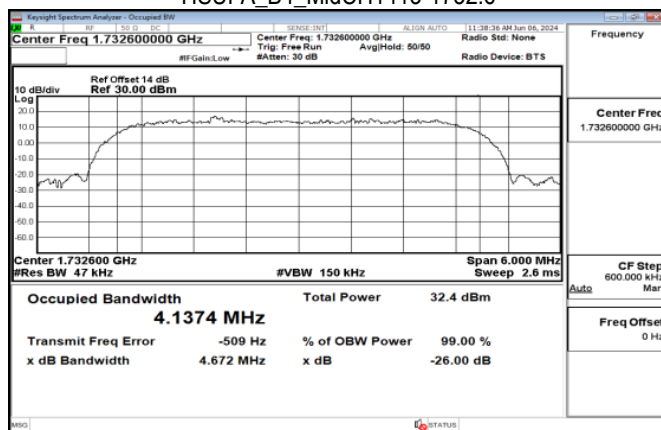
HSUPA_B4_LowCH1312-1712.4



HSDPA_B4_MidCH1413-1732.6



HSUPA_B4_MidCH1413-1732.6

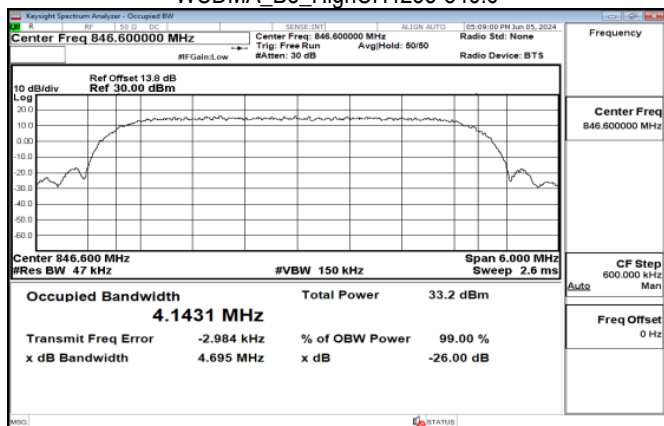


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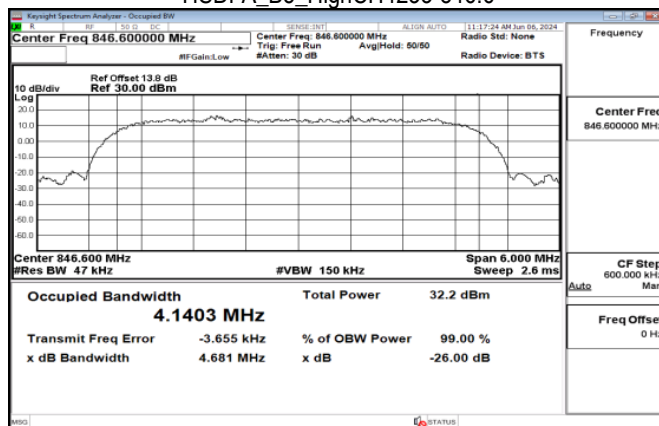
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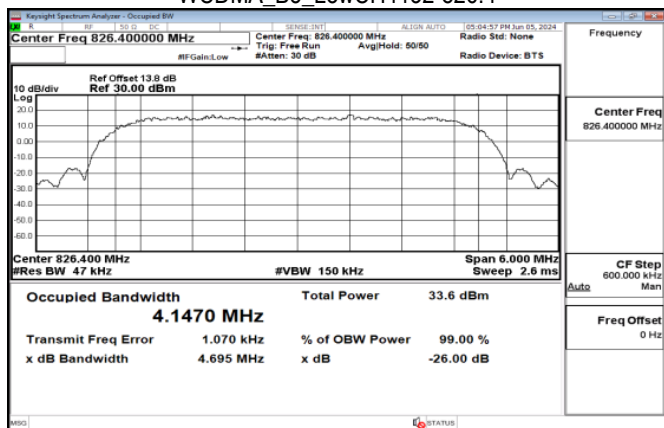
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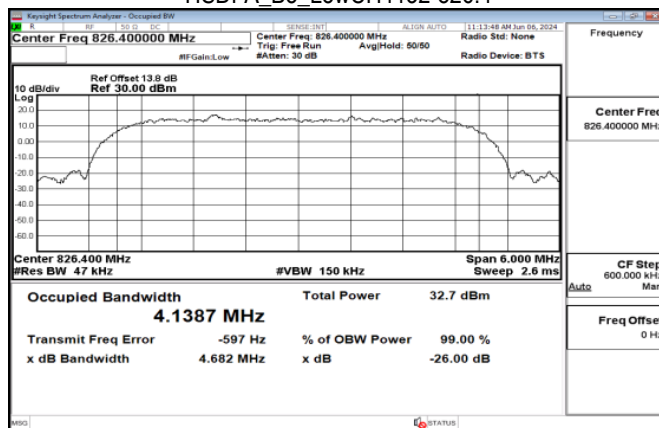
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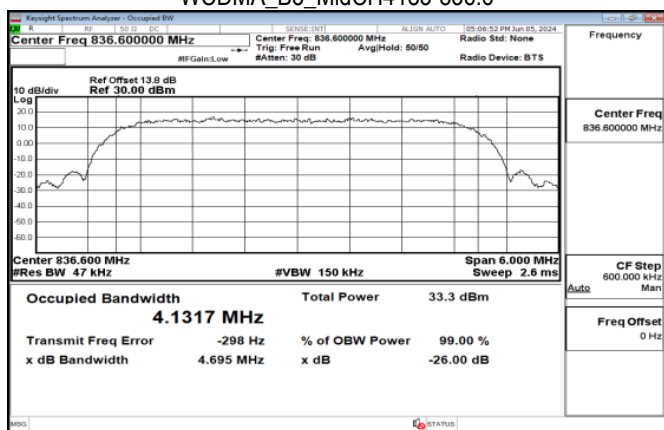
WCDMA_B5_LowCH4132-826.4



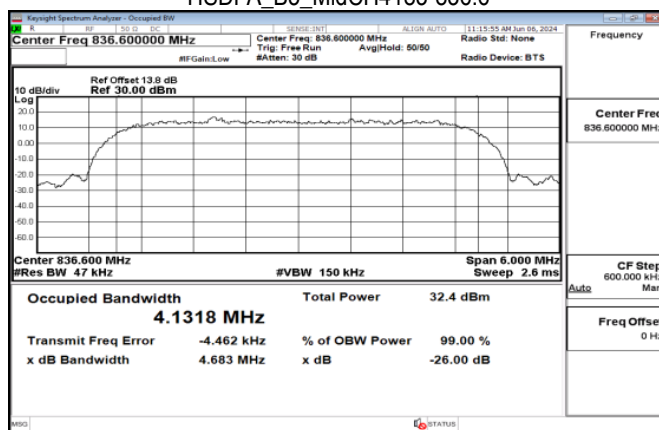
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WCDMA_B5_MidCH4183-836.6



HSDPA_B5_MidCH4183-836.6

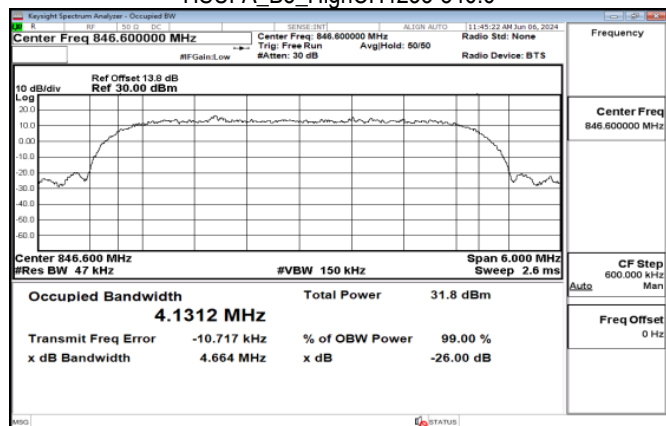


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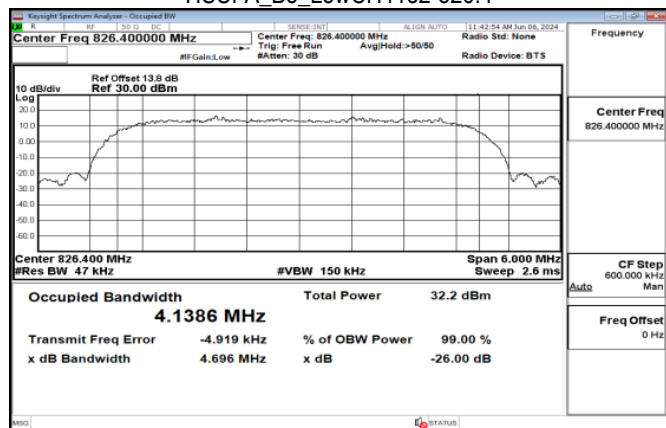
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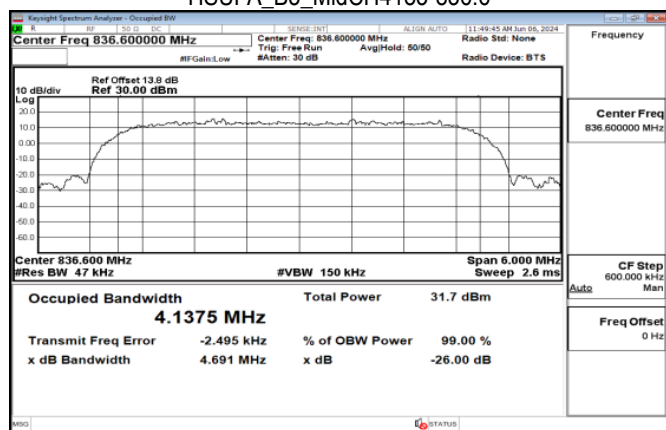
HSUPA_B5_HighCH4233-846.6



HSUPA_B5_LowCH4132-826.4



HSUPA_B5_MidCH4183-836.6



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SIM 2

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		GSM 850	GPRS 850	EDGE 850	GSM 850	GPRS 850	EDGE 850
824.2	128	0.24526	0.24723	0.24605	0.3164	0.3159	0.3162
836.6	190	0.24552	0.24525	0.24669	0.3213	0.3145	0.3177
848.8	251	0.24658	0.24949	0.24540	0.3120	0.3232	0.3230

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		GSM 1900	GPRS 1900	EDGE 1900	GSM 1900	GPRS 1900	EDGE 1900
1850.2	512	0.24524	0.24307	0.24580	0.3151	0.3226	0.3150
1880.0	661	0.24645	0.24097	0.24231	0.3150	0.3149	0.3205
1909.8	810	0.24586	0.24593	0.24241	0.3106	0.3184	0.3167

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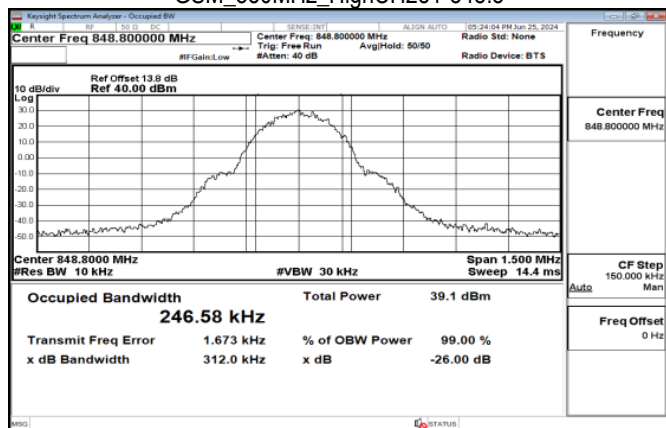
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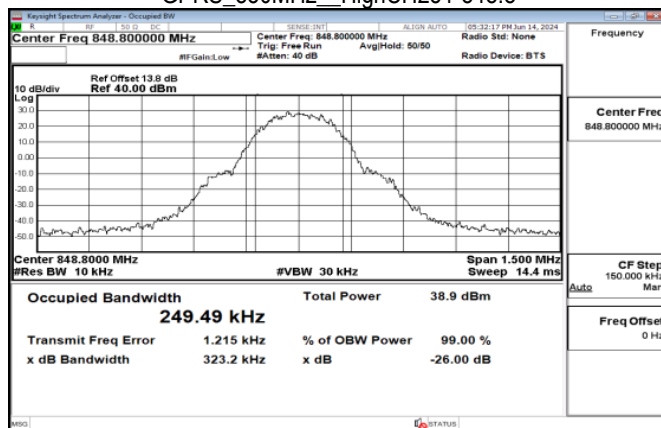
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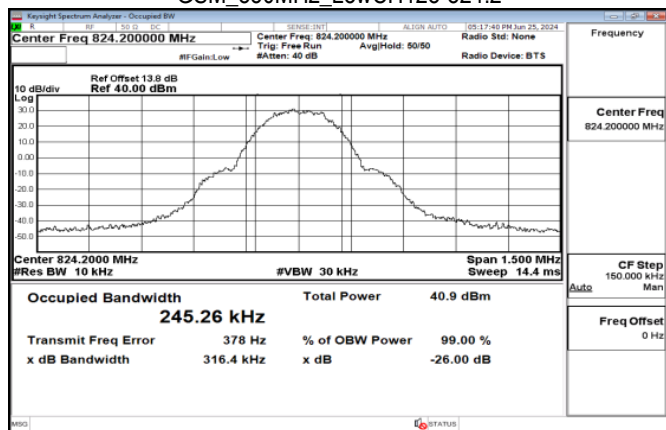
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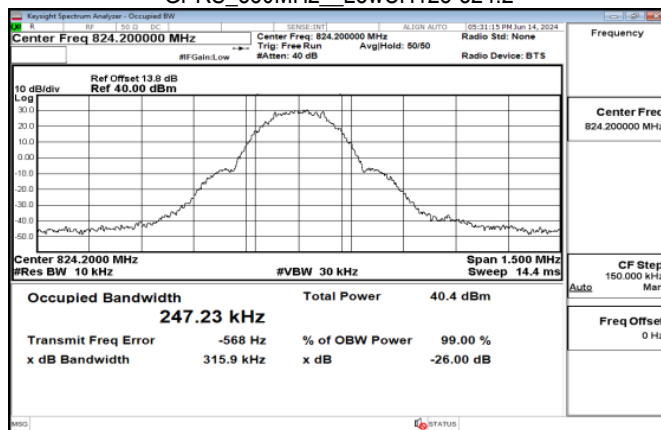
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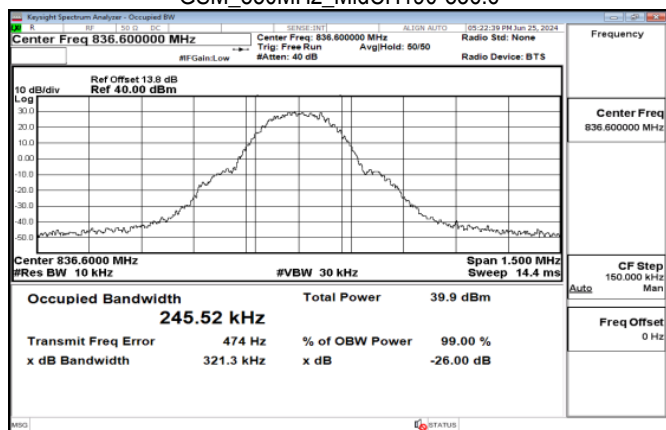
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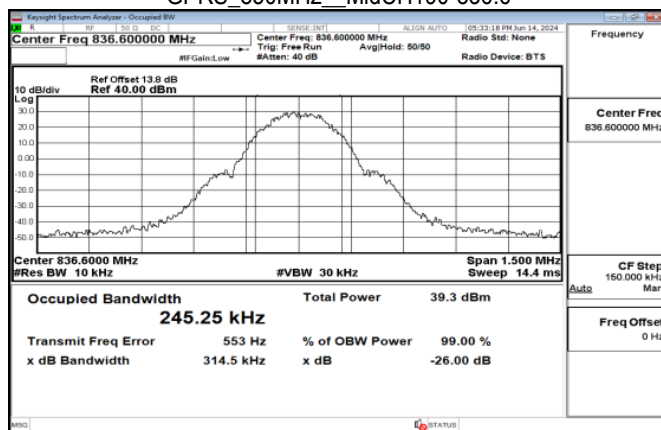
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GSM_850MHz_MidCH190-836.6



GPRS_850MHz_MidCH190-836.6

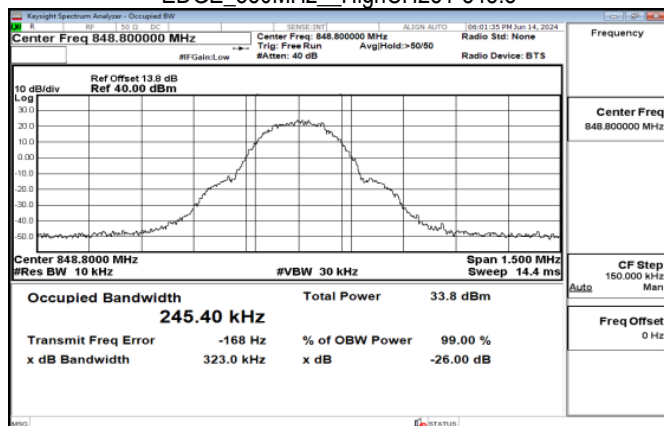


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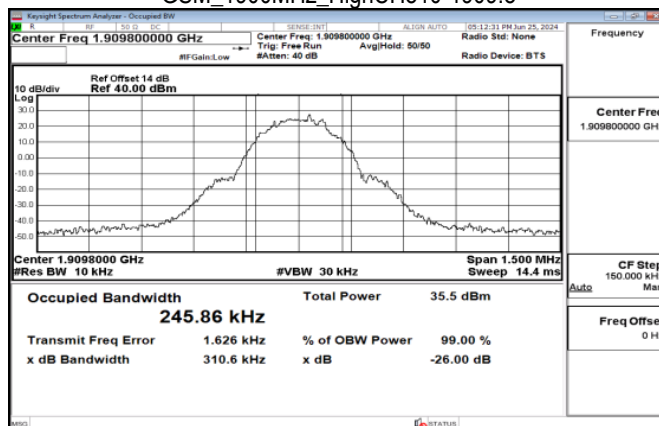
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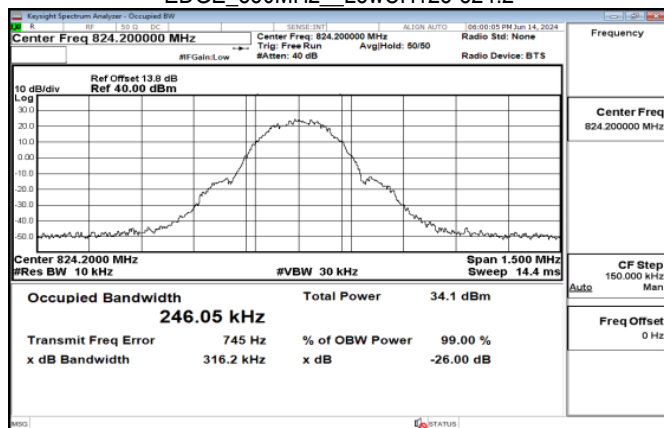
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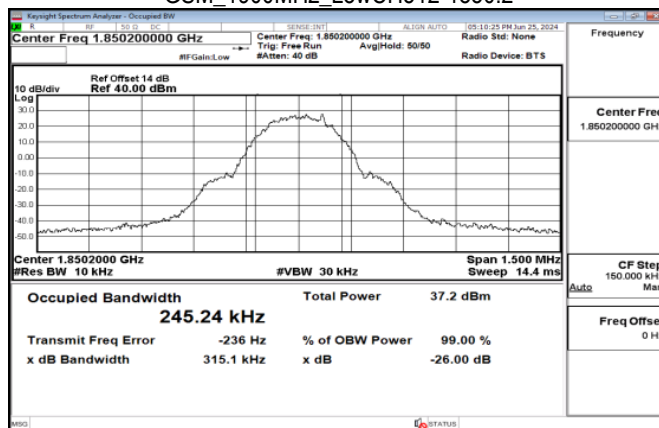
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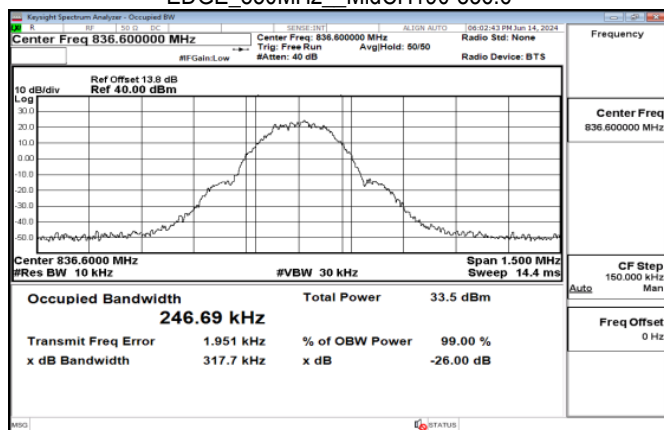
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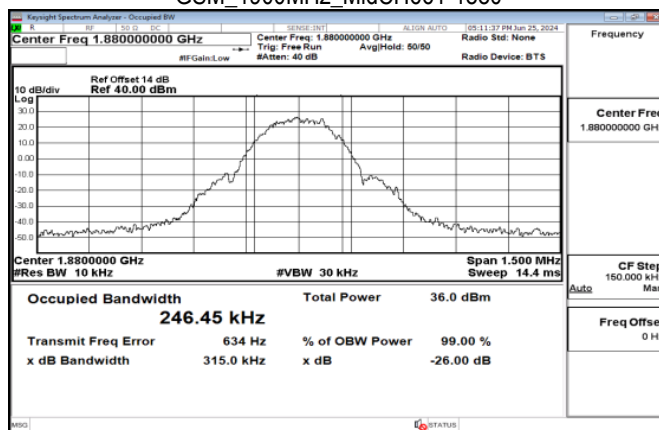
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EDGE_850MHz_MidCH190-836.6



GSM_1900MHz_MidCH661-1880

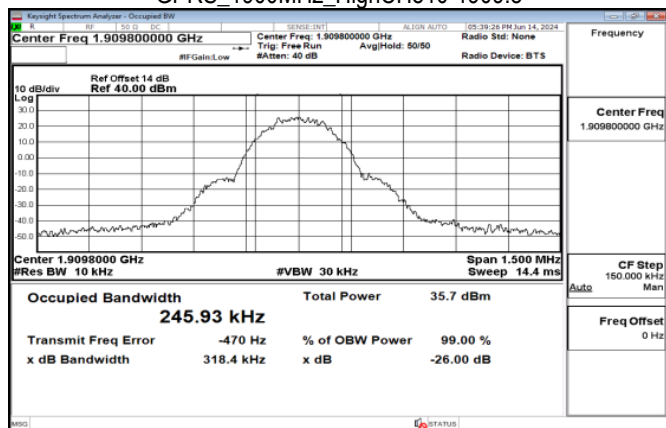


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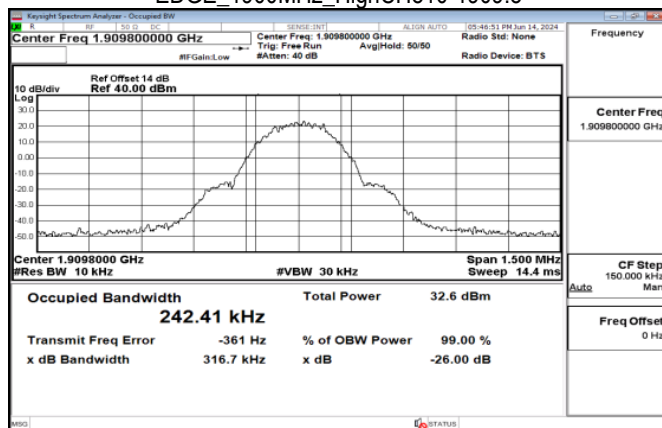
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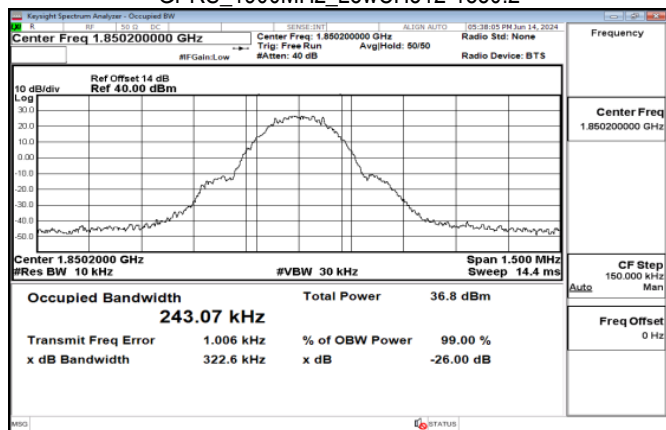
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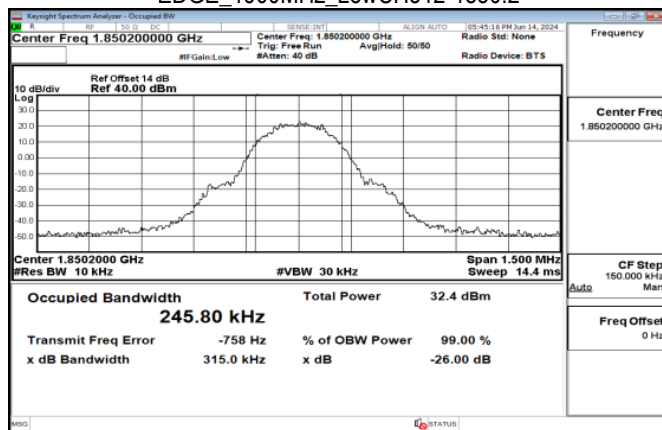
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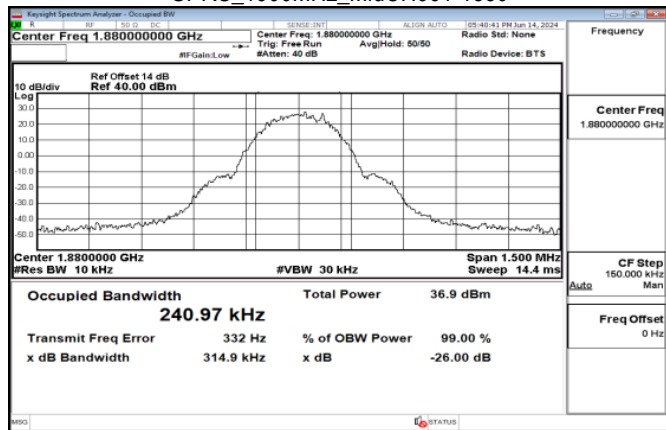
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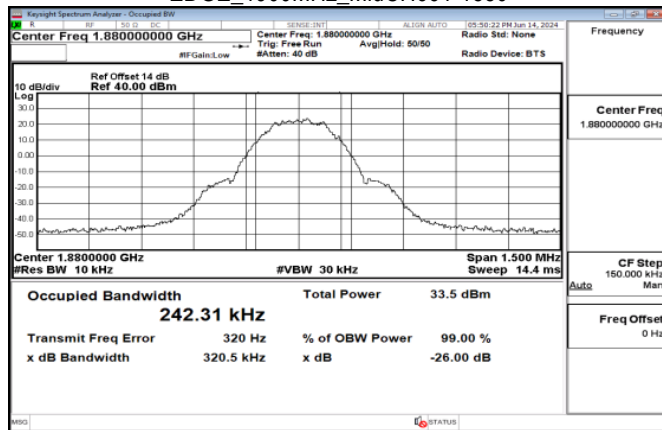
EDGE_1900MHz_LowCH512-1850.2



GPRS_1900MHz_MidCH661-1880



EDGE_1900MHz_MidCH661-1880



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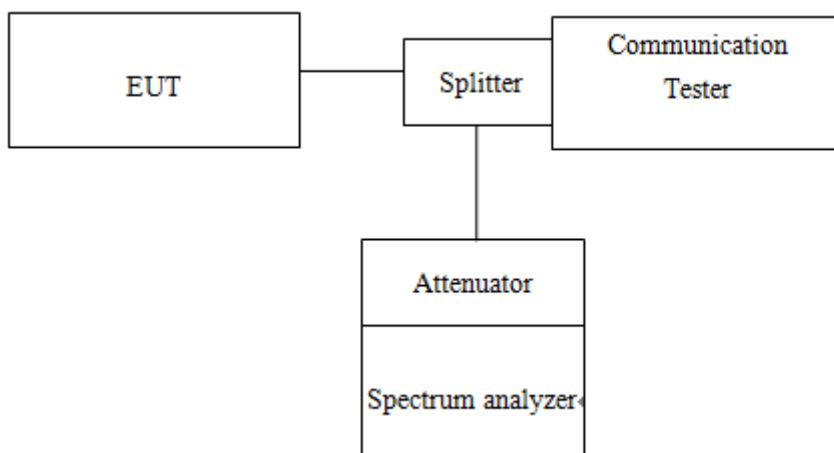
10 OUT OF BAND EMISSION AT ANTENNA TERMINALS

10.1 Standard Applicable

FCC §22.917(a), §24.238(a), §27.53(h) and RSS-132 §5.5, RSS-133 §6.5.1, RSS-139 §5.6

Out of band emissions. 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.

10.2 Test SET-UP



10.3 Measurement Procedure

10.3.1 Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

10.3.2 Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting $RBW \geq 1\% EBW$.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

10.4 Measurement Result:

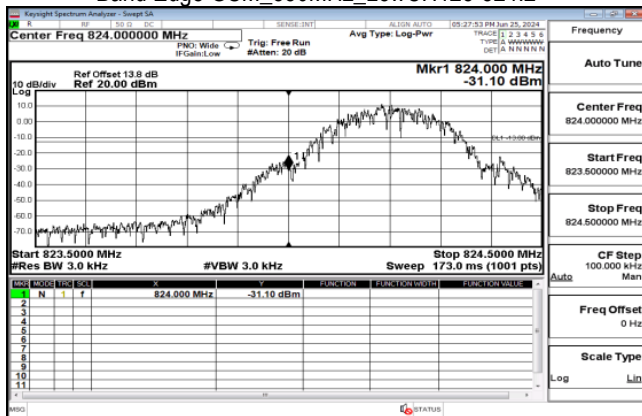
Refer to next pages.

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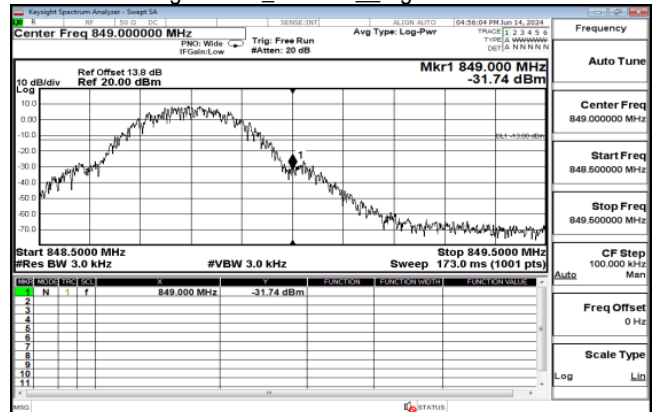
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SIM 1

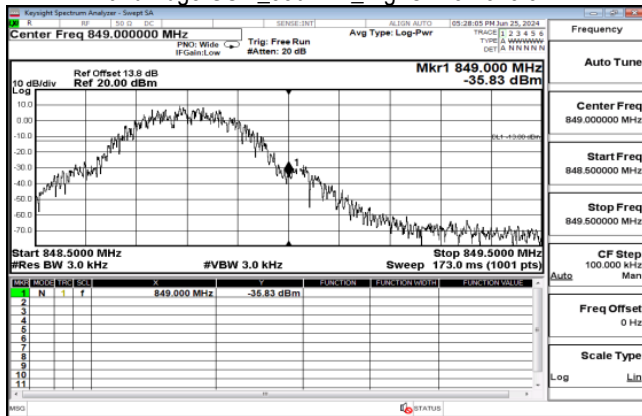
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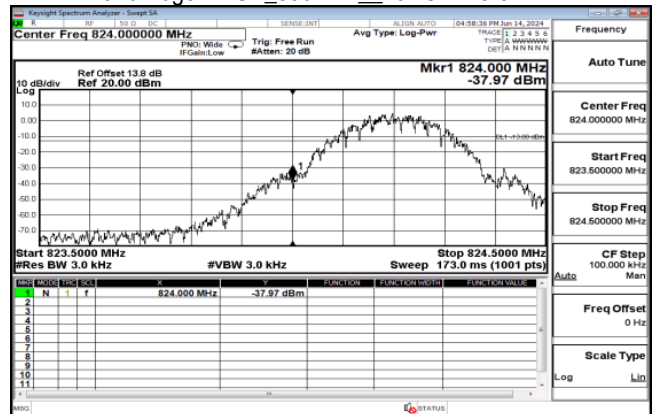
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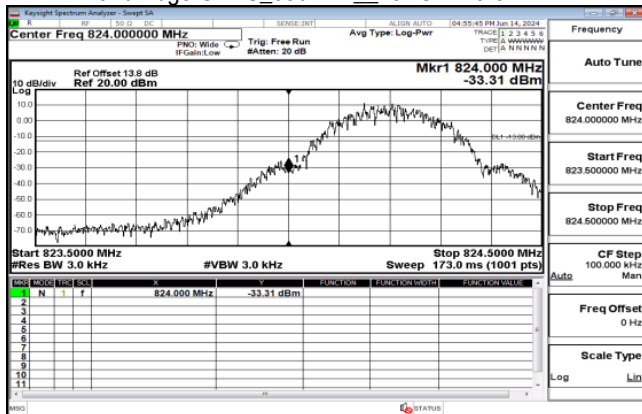
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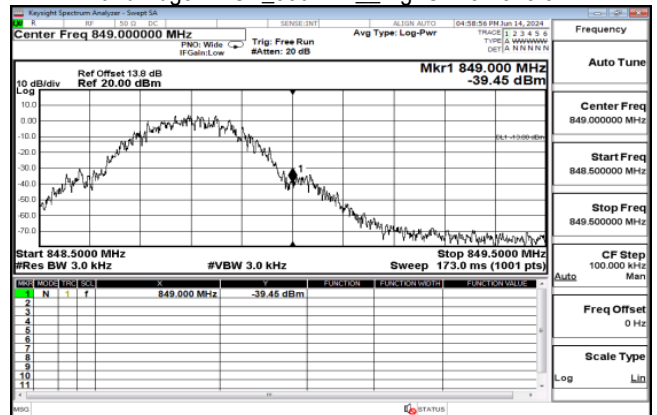
Band Edge EDGE_850MHz_LowCH128-824.2



Band Edge GPRS_850MHz_LowCH128-824.2



Band Edge EDGE_850MHz_HighCH251-848.8



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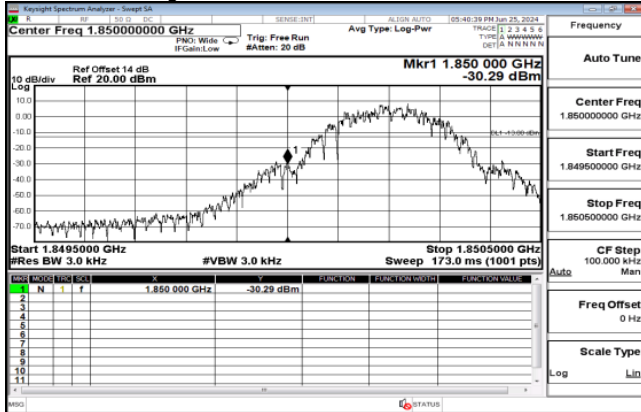
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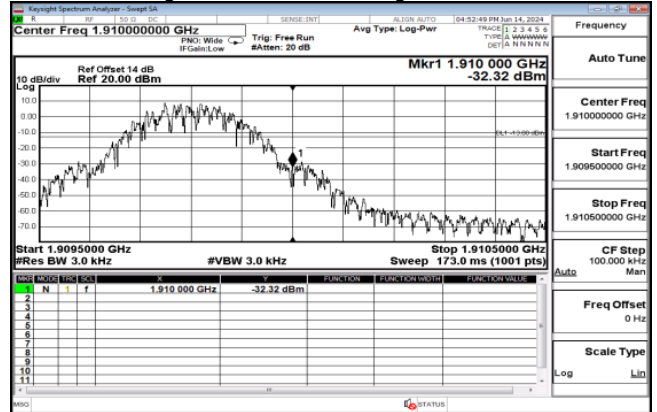
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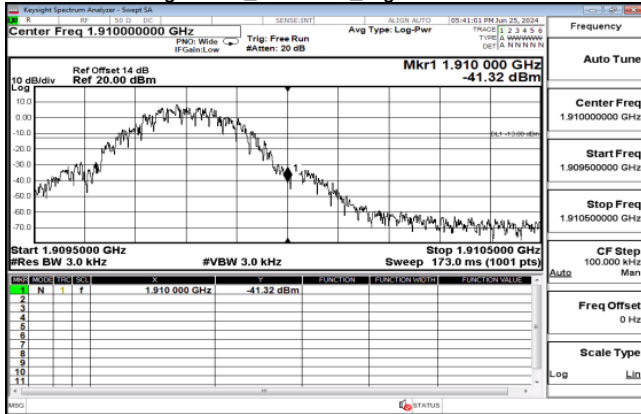
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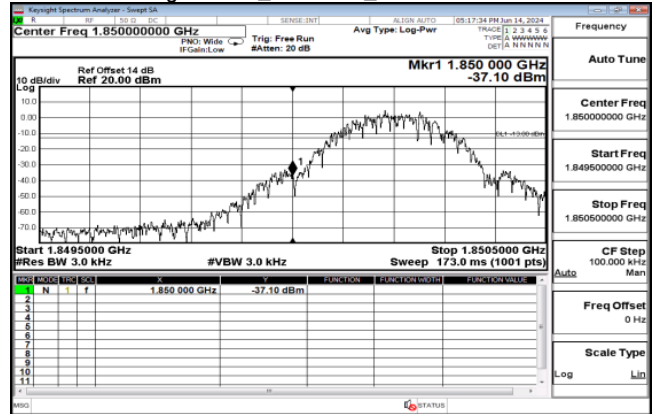
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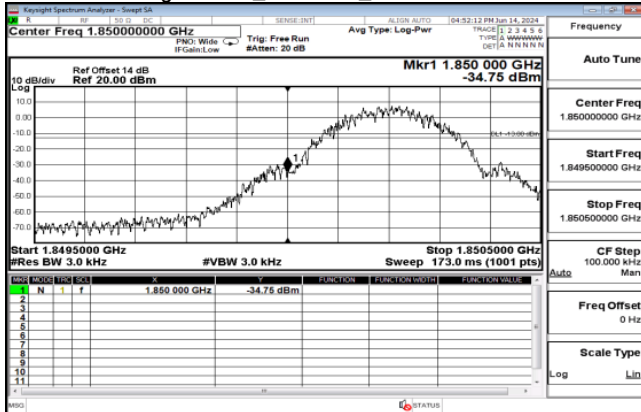
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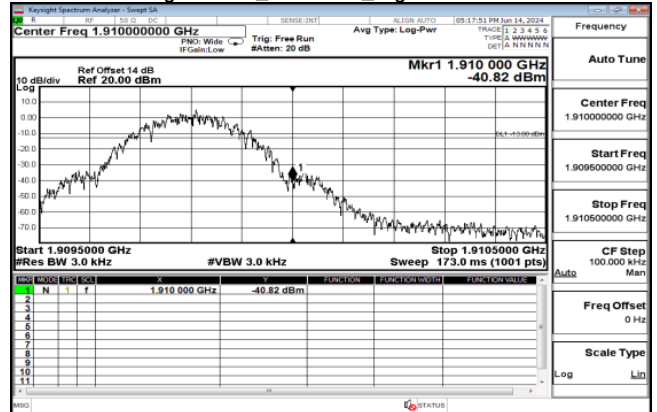
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Band Edge GPRS_1900MHz_LowCH512-1850.2



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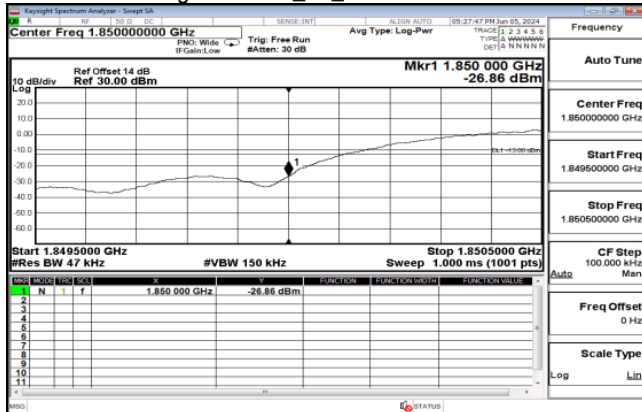


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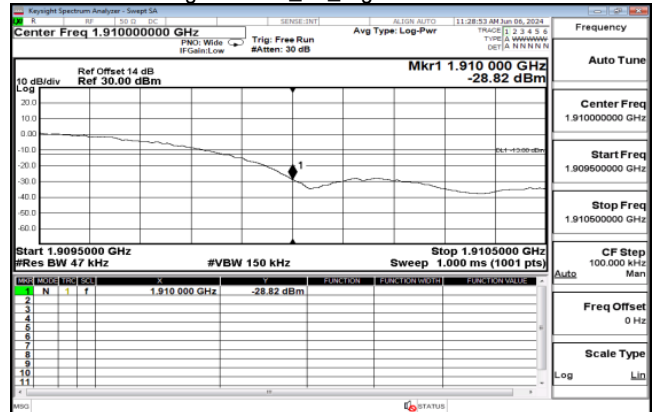
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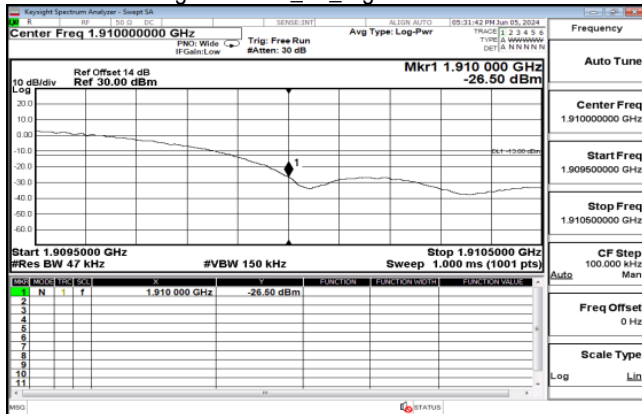
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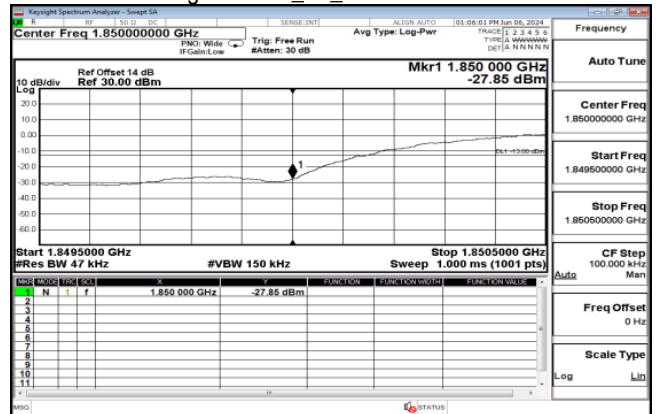
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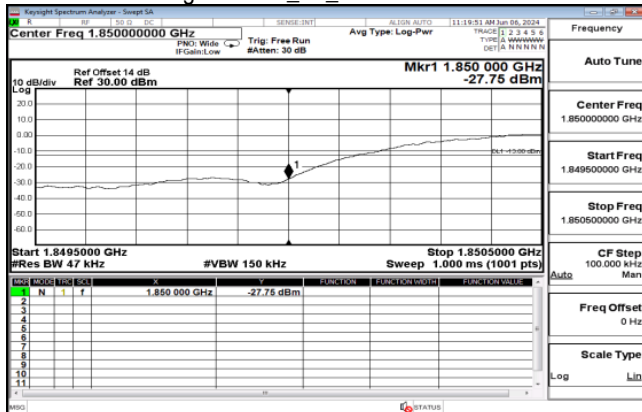
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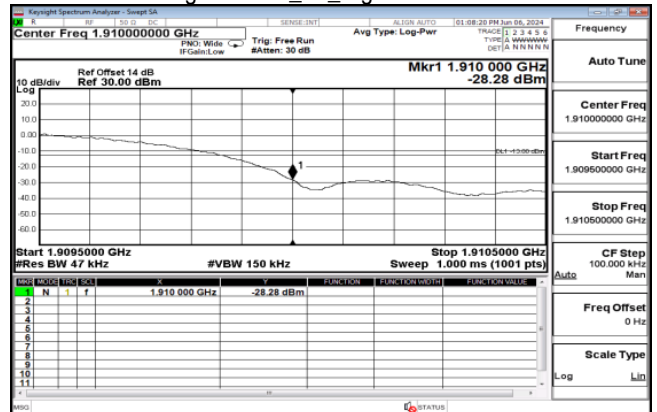
Band Edge HSUPA_B2_LowCH9262-1852.4



Band Edge HSDPA_B2_LowCH9262-1852.4



Band Edge HSUPA_B2_HighCH9538-1907.6



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