

TEST REPORT

Report Number: 15175342-E17V2

Applicant : APPLE, INC
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A3212

Brand : APPLE

FCC ID : BCG-E8725A

IC : 579C-E8725A

EUT Description : SMARTPHONE

Test Standard(s) : FCC 47 CFR PART 2, PART 25
ISED RSS-170 ISSUE 4, RSS-GEN ISSUE 5

Date Of Issue:
2024-11-25

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-11-13	Initial Review	--
V2	2024-11-25	Addressed TCB questions, updated section 2, 6, &10	Binod Sitaula

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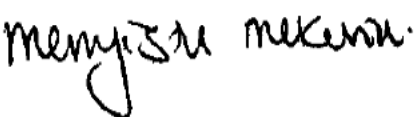
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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.	
Model	A3212	
Brand	APPLE	
FCC ID	BCG-E8725A	
IC	579C-E8725A	
EUT Description	SMARTPHONE	
Serial Number	RADIATED: LD23Q31PQ4, L52G6VJWHY CONDUCTED: C07H9K000JE0000J57, C07H9K000HZ0000J57, C07H9K000JQ0000J57	
Sample Receipt Date	2024-05-06	
Date Tested	2024-05-06 to 2024-10-17	
Applicable Standards	FCC 47 CFR Part 2, Part 25 ISED RSS-GEN ISSUE 5, RSS-170 Issue 4	
Test Results	COMPLIES	
UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.		
Approved & Released By:	Reviewed By:	Prepared By:
		
Mengistu Mekuria Staff Engineer UL Verification Services Inc	Binod Sitaula Laboratory Engineer Associate UL Verification Services Inc	Tewodros Woldemichael Laboratory Engineer UL Verification Services Inc

2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for correctly integrating customer-provided data with measurements performed by UL Verification Services Inc.

Below is a list of the data provided by the customer:

1. Antenna gain (see section 6.4.)

Requirement Description	Band	Requirement Clause Number (FCC)	Requirement Clause Number (ISED)	Result	Remarks
RF Conducted Output Power	53	25.149 (c)(4)(iii)	RSS-170 5.4; SMSE-009-20 Annex A 9.d	Complies	
Equivalent Isotropic Radiated Power	53	25.149 (c)(4)(iii)	RSS-170 5.4; SMSE-009-20 Annex A 9.e	Complies	
Maximum Power Spectral Density	53	25.149 (c)(4)(iv)	SMSE-009-20 Annex A 9.f	Complies	
Duty Cycle	53	Reporting purpose	Reporting purpose	Complies	
Occupied Bandwidth		2.1049	Reporting purpose	Complies	
6 dB Bandwidth	53	25.149 (c)(4) (ii)	SMSE-009-20 Annex A 9.c	Complies	
Band Edge and Emission Mask	53	2.1051, 25.149 (c) (4) (v), (vi)	RSS-170 5.7.3; SMSE-009-20 Annex A 9.g and h	Complies	
Out of Band Emissions	53	2.1051, 25.149 (c) (4) (v), (vi)	RSS-170 5.7.3; SMSE-009-20 Annex A 9.g, h, and i	Complies	
Frequency Stability	53	25.202 (d)	RSS-170 5.3	Complies	
Field Strength of Spurious Radiation	53	2.1053, 25.149 (c) (4) (v), (vi)	RSS-170 5.7.3; SMSE-009-20 Annex A 9.g, h, and i	Complies	
Carrier-Off-State Emissions Radiation	53	25.216 (i)	RSS-170 5.10	Complies	

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- FCC 47 CFR Part 2, Part 25
- [FCC KDB 971168 D01](#): Power Meas License Digital Systems
- [FCC KDB 971168 D02](#): Misc Rev Approv License Devices
- [FCC KDB 412172 D01](#): Determining ERP and EIRP
- ISED RSS-GEN ISSUE 5, RSS-170 ISSUE 4 as amended by SMSE-009-20

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☐	Building 3: 843 Auburn Court, Fremont, CA 94538, USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			
☒	Building 5: 47670 Kato Rd, Fremont, CA 94538, USA			

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U _{Lab}
Conducted Antenna Port Emission Measurement	1.940
Power Spectral Density	2.466
Time Domain Measurements Using SA	3.39
RF Power Measurement Direct Method Using Power Meter	0.450 Peak; 1.300 Ave.
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 db
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 db
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 db
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 db
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 db
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 db
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 db

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with cellular GSM, GPRS, EGPRS, WCDMA, LTE, 5G NR1, IEEE 802.11a/b/g/n/ac/ax, Bluetooth (BT), Global Positioning System (GPS), Near-Field Communication (NFC) and Mobile Satellite Service (MSS) technologies. The rechargeable battery is not user accessible. This device is not user-serviceable and requires special tools to disassemble.

6.2. MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

$$\text{ERP/EIRP} = \text{PMeas} + \text{GT} - \text{LC}$$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and ERP/EIRP output powers as follows:

LTE BAND 53

FCC: §25.149 (c)(4) (iii): The maximum transmit power is no more than 1 W with a peak EIRP of no more than 6 dBW (36dBm or 3.98W).

ISED: SMSE-009-20 Annex A 9.e: The maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 6 dBW (36dBm or 3.98W).

FCC Part 25/ RSS-170								
Peak EIRP Limit (W)				3.98				
Conducted Average Limit (W)				1.00				
Antenna Gain (dBi) Ant(1)				-2.40				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	2484.2	2494.3	20.70	18.30	0.068	1095	1M10G7W
	16QAM			20.70	18.30	0.068	1097	1M10D7W
3.0	QPSK	2485.0	2493.5	20.70	18.30	0.068	2697	2M70G7W
	16QAM			20.70	18.30	0.068	2703	2M70D7W
5.0	QPSK	2486.0	2492.5	20.70	18.30	0.068	4505	4M51G7W
	16QAM			20.70	18.30	0.068	4483	4M48D7W
10.0	QPSK	2488.5	2490.0	20.70	18.30	0.068	8975	8M98G7W
	16QAM			20.70	18.30	0.068	8984	8M98D7W

5G NR n53

FCC Part 25 / RSS-170								
Peak EIRP Limit (W)				3.98				
Conducted Average Limit (W)				1.00				
Antenna Gain (dBi) Ant(1)				-2.40				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
10.0	BPSK	2488.5	2490.0	20.70	18.30	0.068	8625	8M63G7W
	QPSK			20.70	18.30	0.068	8580	8M58G7W
	16QAM			20.70	18.30	0.068	8605	8M61D7W

6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version: 1.0.23

6.4. MAXIMUM ANTENNA GAIN

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

LTE Bands	Frequency Range (MHz)	ANT 1 Antenna Gain (dBi)	ANT 2 Antenna Gain (dBi)
LTE BAND 53, 5G NR n5	2483.5 – 2495 MHz	-2.4	-3.1

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports the following LTE and 5G NR Bands:
Band 53, and 5G NR n53

BPSK modulation applied only for 5G NR frequencies and has the same tune up power as QPSK modulations.

The DFT-s-OFDM and CP-OFDM waveforms were investigated, and DFT-s-OFDM was found to be the worst case.

The worst-case scenario for all measurements is based on an engineering evaluation made on different modulations. All modulations had the same target power for the worst-case antenna, so QPSK and BPSK were used to represent the worst mode for LTE bands and 5G NR bands respectively and were set for all conducted and radiated tests. Output power measurements were measured on BPSK, QPSK, 16QAM, 64QAM, and 256QAM modulations. For testing purposes emissions on sections 8 and 9 were measured while QPSK/BPSK was set at or above target power for all bands. Conducted tests were performed on the worst-case antenna because it has the highest conducted power. The worst-case antenna is shown in the table below.

LTE and 5G NR Bands	Worst case Antenna Port For Conducted Power
LTE BAND 53, and 5G NR n53	Ant 1

The EUT was investigated in three orthogonal orientations X/Y/Z on both ANT 1 and ANT2 antennas to determine the worst-case orientation. The full tests of the EUT have made upon the orientations that shown in the table below.

Frequency Bands	ANT1	ANT2
2300 – 2700 MHz	Y	X

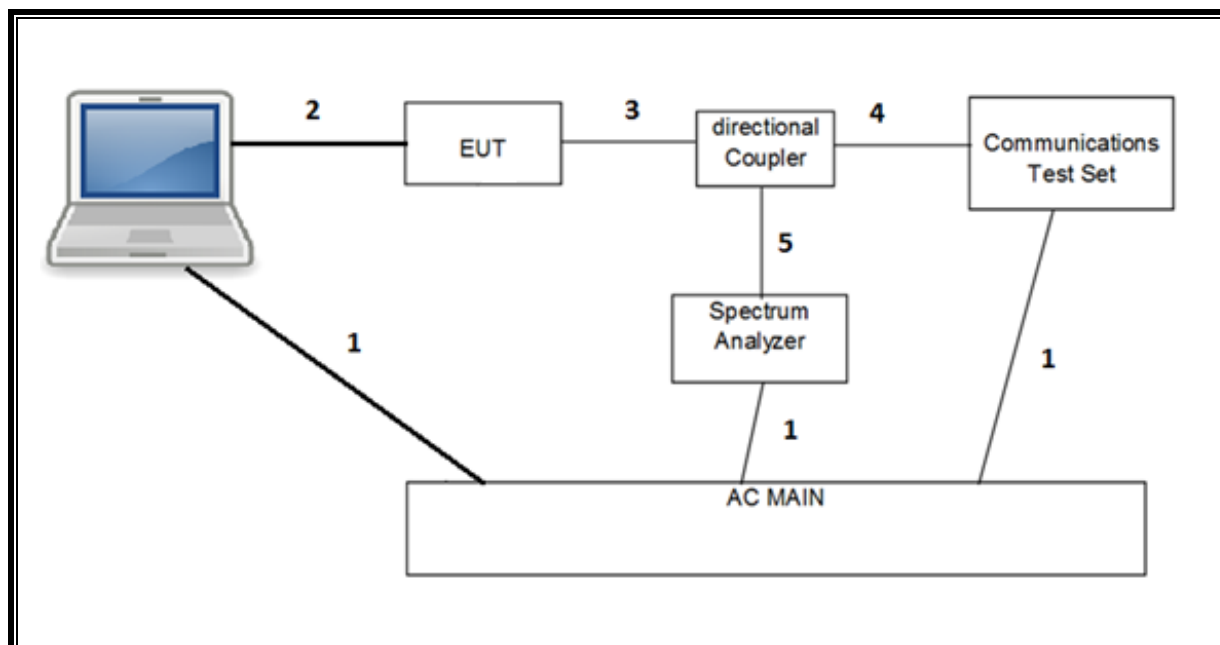
Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 9kHz to 1GHz.

For simultaneous transmission of multiple channels in the 2.4GHz/5GHz WLAN, UWB, and Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

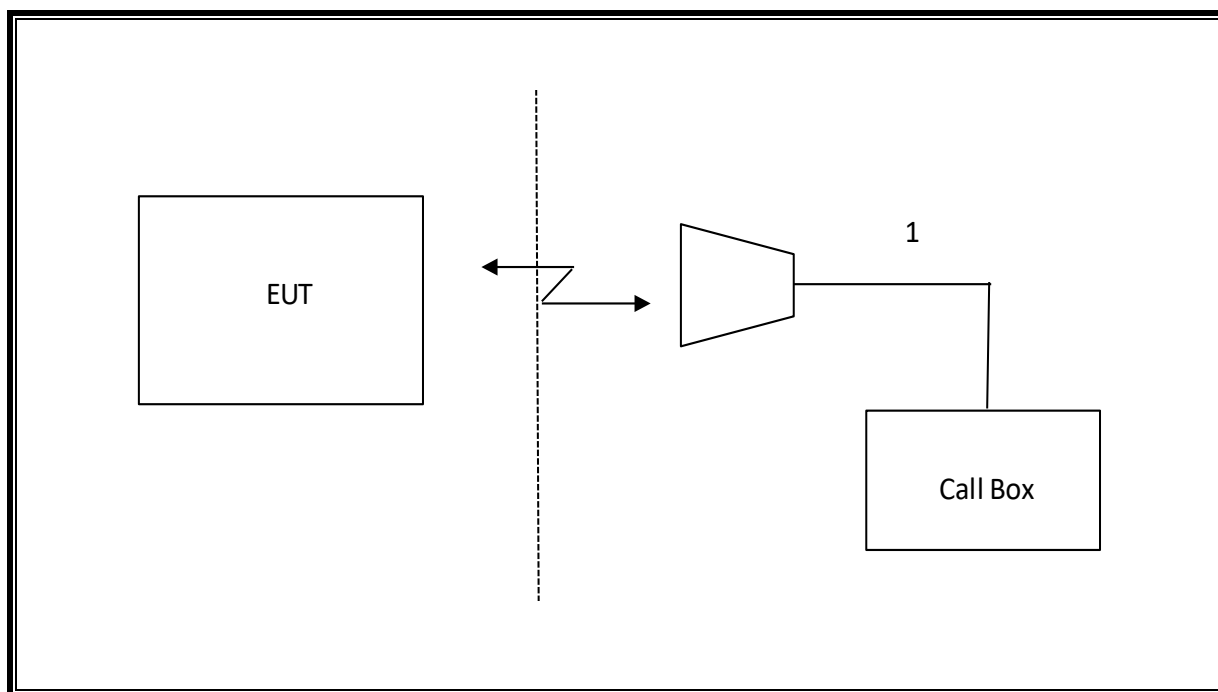
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number		FCC ID/ DoC
Laptop		Apple	MacBook Pro	HRP082673		BCGA1708
AC/DC adapter		Apple	A1718	C4H64450HH3GN8RA6		--
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	3	US 115V	Un-shielded	2.0	N/A
2	USB	1	DC	Un-shielded	1.0	N/A
3	RF In/Out	1	EUT	Un-shielded	0.6	N/A
4	RF In/Out	1	Communication Test Set	Un-shielded	1.2	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A
I/O CABLES (RF RADIATED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF In/Out	1	Antenna	Un-shielded	5.0	N/A

CONDUCTED SETUP



RADIATED SETUP



7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	80430	2026-09-30
Antenna, Horn 1-18GHz	ETS Lindgren	3117	79834	2026-07-31
Antenna, Broadband Hybrid, 30MHz to 3000MHz	SUNAR	JB3	222009	2026-06-30
*Antenna, Passive Loop 30Hz - 1MHz	ELECTRO-METRICS	EM-6871	170014	2024-08-31
*Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170016	2024-08-31
*RF Filter Box, 1-18GHz	UL-FR1	NA	217255	2024-10-31
RF Filter Box, 1-18GHz	UL-FR1	RATS 2	226781	2025-03-30
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	430250	2025-10-31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169936	2025-02-28
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169935	2025-02-28
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	85943	2025-02-28
Directional Coupler	KRYTAR	152610	198816	2024-10-31
Directional Coupler	KRYTAR	152610	231664	2025-01-22
Power Meter, P-series single channel	Keysight	N1912A	90719	2025-01-31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	81319	2025-01-31
Filter, HPF 1.2GHz	Wainwright Instruments GmbH	WHKX6-948-1.2/15G-40ST	99	2024-10-31
Spectrum Analyzer, PXA, 2Hz to 44GHz	Keysight	N9030B	231739	2025-01-31
Spectrum Analyzer, PXA, 2Hz to 44GHz	Keysight	N9030B	245120	2025-02-28
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	85212	2025-02-28
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	222793	2025-02-28
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	222797	2025-02-28
Chamber, Environmental	Thermotron Corp.	SM-16C Mini-Max	179936	2025-07-30
Transmitting Antenna, Horn Antenna	TEKBOX Digital Solutions	TBMA4	226709	C.N.R.
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	199659	2024-12-31
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	2025-05-31
DC Power Supply	GWINSTEK	GPS18500	N/A	C.N.R.
UL AUTOMATION SOFTWARE				
CLT Software	UL	UL RF	V2023.11.21.0	
Power Measurement Software	UL	UL RF	V2023.08.14.0	
Radiated test software	UL	UL RF	Ver 9.5 2023-05-01	

NOTES:

- * Testing is completed before equipment expiration date.

8. RF OUTPUT POWER MEASUREMENTS

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All LTE bands conducted average power is obtained from the CMW500 telecommunication test set.

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS 36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 38.521-1 specification.

The allowed MPR for SRS, PUCCH formats 0, 1, 3 and 4, and PRACH shall be as specified for QPSK modulated DFTs-OFDM of equivalent RB allocation. The allowed MPR for PUCCH format 2 shall be as specified for QPSK modulated CP-OFDM of equivalent RB allocation.

Table 6.2.2.3-1: Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5 ¹	≤ 1.2 ¹	≤ 0.2 ¹
	Pi/2 BPSK w Pi/2 BPSK DMRS	≤ 0.5 ²	≤ 0.5 ²	0 ²
	QPSK	≤ 1		0
	16 QAM	≤ 2		≤ 1
	64 QAM		≤ 2.5	
	256 QAM		≤ 4.5	
CP-OFDM	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM		≤ 3.5	
	256 QAM		≤ 6.5	
NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability <i>powerBoosting-pi2BPSK</i> and if the IE <i>powerBoostPi2BPSK</i> is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0dB MPR is 26dBm.				
NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE <i>powerBoostPi2BPSK</i> is set to 0 and if more than 40% of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.				

Table 6.2.2.3-2: Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5	≤ 2.5	
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS 36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
NS_04	6.6.2.2.2, 6.6.3.3.19	41	20	>10	≤ 1
			5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	

The allowed A-MPR values specified below in Table 6.2.3.3.1-1 of 3GPP TS 38.521-1 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.3.3.1-1: Additional maximum power reduction (A-MPR)

Network signalling label	Requirements (subclause)	NR Band	Channel bandwidth (MHz)	Resources blocks (N_{RB})	A-MPR (dB)
NS_01		Table 5.2-1	5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	Table 5.3.2-1	N/A
NS_03	6.5.2.3.3.3	n2, n25, n66, n70, n86			Clause 6.2.3.3.7
NS_03U	6.5.2.3.3.3, 6.5.2.4.2.3	n2, n25, n66, n86			Clause 6.2.3.3.7
NS_04	6.5.2.3.3.2, 6.5.3.3.3.1	n41	10, 15, 20, 40, 50, 60, 80, 90, 100		Clause 6.2.3.3.2

AVERAGE OUTPUT POWER TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with directional coupler connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

PEAK OUTPUT POWER TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with directional coupler connected to a power meter via wideband peak power sensor. Peak output power was read directly from power meter.

RESULTS

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average and peak conducted output powers as follows:

8.1. LTE BAND 53

RULE PART(S) AND LIMITS

FCC: §25.149 (c)(4) (iii): The maximum transmit power is no more than 1 W (30dBm) with a peak EIRP of no more than 6 dBW.

ISED: SMSE-009-20 Annex A 9.d: Transmitter output power shall not exceed 0 dBW (30dBm).

Test Engineer ID:	32061	Test Date:	2024-07-24
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OUTPUT POWER FOR LTE BAND 53 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1			Ant 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				60147	60195	60248	60147	60195	60248
1.4	QPSK	1	0	20.46	20.48	20.53	20.50	20.47	20.47
		1	2	20.64	20.69	20.70	20.70	20.65	20.67
		1	5	20.41	20.52	20.58	20.44	20.48	20.42
		3	0	20.43	20.51	20.51	20.53	20.51	20.48
		3	1	20.52	20.68	20.61	20.61	20.58	20.56
		3	2	20.51	20.66	20.66	20.55	20.57	20.49
	16QAM	6	0	19.44	19.61	19.60	19.56	19.51	19.46
		1	0	20.51	20.52	20.43	20.52	20.50	20.48
		1	2	20.67	20.70	20.63	20.70	20.63	20.65
		1	5	20.53	20.57	20.52	20.44	20.53	20.42
		3	0	20.49	20.49	20.50	20.51	20.51	20.50
		3	1	20.50	20.65	20.56	20.58	20.55	20.56
	64QAM	3	2	20.51	20.63	20.66	20.51	20.55	20.51
		6	0	19.35	19.49	19.45	19.43	19.38	19.28
		1	0	19.93	19.81	20.48	19.53	20.22	20.31
		1	2	20.38	20.70	19.80	20.52	20.52	20.49
		1	5	20.35	20.23	19.60	20.54	20.12	20.70
		3	0	20.12	20.06	20.00	20.05	20.33	19.73
	256QAM	3	1	20.21	20.39	20.11	20.28	20.23	20.14
		3	2	20.06	20.14	20.09	19.98	20.24	20.43
		6	0	18.97	19.12	18.88	19.24	19.25	19.14
		1	0	20.15	20.07	20.20	16.46	17.05	16.90
		1	2	19.89	19.85	20.00	16.73	17.70	17.18
		1	5	19.83	19.54	19.62	16.45	16.54	16.93
		3	0	20.43	20.28	20.29	18.12	17.71	17.74
		3	1	20.43	20.42	20.36	18.20	17.91	17.97
		3	2	20.38	20.37	20.31	18.03	17.92	17.84
		6	0	20.17	20.42	20.51	17.60	17.92	17.75

OUTPUT POWER FOR LTE BAND 53 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1			Ant 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				60155	60195	60240	60155	60195	60240
3.0	QPSK	1	0	20.40	20.54	20.43	20.60	20.52	20.49
		1	7	20.58	20.70	20.56	20.68	20.70	20.68
		1	14	20.41	20.50	20.51	20.53	20.54	20.42
		8	0	19.52	19.49	19.47	19.60	19.59	19.56
		8	4	19.54	19.59	19.50	19.63	19.63	19.58
		8	7	19.52	19.57	19.46	19.60	19.61	19.54
	16QAM	15	0	19.47	19.50	19.43	19.57	19.56	19.50
		1	0	20.58	20.51	20.45	20.59	20.53	20.48
		1	7	20.70	20.61	20.64	20.68	20.70	20.59
		1	14	20.40	20.52	20.59	20.51	20.49	20.33
		8	0	19.39	19.31	19.35	19.40	19.37	19.30
		8	4	19.41	19.40	19.39	19.41	19.41	19.34
	64QAM	8	7	19.37	19.39	19.36	19.41	19.38	19.32
		15	0	19.31	19.38	19.31	19.37	19.33	19.25
		1	0	20.31	20.41	20.30	20.18	20.70	20.64
		1	7	20.53	20.70	20.22	19.91	20.47	20.20
		1	14	20.33	20.15	20.13	20.15	20.05	20.06
		8	0	19.29	19.45	19.22	19.27	18.92	19.13
	256QAM	8	4	19.39	19.63	19.60	19.24	19.07	19.19
		8	7	19.53	19.48	19.75	19.28	19.27	19.28
		15	0	19.30	19.52	19.17	19.10	18.90	19.21
		1	0	19.71	19.73	19.59	16.93	17.70	16.94
		1	7	19.90	19.88	19.49	17.43	17.17	17.59
		1	14	19.48	20.20	19.70	17.48	16.83	17.58
		8	0	20.20	20.32	20.24	17.93	18.09	17.80
		8	4	20.09	20.23	20.10	17.95	18.07	17.95
		8	7	20.23	20.42	20.03	17.92	18.20	17.79
		15	0	19.95	20.13	20.12	17.82	17.82	17.80

OUTPUT POWER FOR LTE BAND 53 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	ANT 1			ANT 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				60165	60195	60230	60165	60195	60230
				2486.0 MHz	2489.0 MHz	2492.5 MHz	2486.0 MHz	2489.0 MHz	2492.5 MHz
5.0	QPSK	1	0	20.67	20.65	20.66	20.70	20.65	20.58
		1	12	20.63	20.66	20.60	20.59	20.57	20.53
		1	24	20.65	20.70	20.67	20.62	20.60	20.46
		12	0	19.56	19.67	19.62	19.55	19.55	19.48
		12	6	19.55	19.65	19.54	19.56	19.53	19.47
		12	11	19.53	19.63	19.52	19.53	19.51	19.45
		25	0	19.54	19.66	19.52	19.54	19.54	19.45
	16QAM	1	0	20.48	20.51	20.54	20.70	20.64	20.53
		1	12	20.43	20.67	20.44	20.62	20.47	20.51
		1	24	20.46	20.70	20.49	20.68	20.57	20.42
		12	0	19.18	19.29	19.22	19.30	19.29	19.22
		12	6	19.17	19.26	19.19	19.30	19.28	19.21
		12	11	19.18	19.27	19.20	19.29	19.27	19.21
		25	0	19.19	19.24	19.18	19.29	19.25	19.22
	64QAM	1	0	20.37	20.18	20.02	20.50	20.68	20.40
		1	12	19.88	19.97	20.54	20.70	20.46	20.45
		1	24	20.70	20.09	20.41	20.54	20.29	20.70
		12	0	18.92	18.91	18.87	19.29	19.51	19.37
		12	6	18.74	19.00	18.70	19.45	19.50	19.33
		12	11	18.99	19.07	18.90	19.41	19.25	19.36
		25	0	18.94	18.95	18.88	19.50	19.43	19.28
	256QAM	1	0	19.48	19.31	19.56	17.30	16.96	17.42
		1	12	19.84	19.60	19.82	17.05	17.44	16.89
		1	24	20.20	19.48	19.75	17.70	17.27	17.34
		12	0	19.94	19.99	19.96	18.00	17.79	18.10
		12	6	19.96	20.07	19.83	18.01	17.84	17.98
		12	11	19.92	20.07	19.73	18.20	17.80	17.95
		25	0	19.96	19.93	19.81	17.95	17.97	18.03

OUTPUT POWER FOR LTE BAND 53 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1			Ant 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				60190	60195	60205	60190	60195	60205
				2488.5 MHz	2489.0 MHz	2490.0 MHz	2488.5 MHz	2489.0 MHz	2490.0 MHz
10.0	QPSK	1	0	20.64	20.63	20.61	20.68	20.70	20.66
		1	24	20.69	20.70	20.70	20.67	20.70	20.68
		1	49	20.62	20.67	20.68	20.58	20.62	20.53
		25	0	19.62	19.62	19.68	19.64	19.63	19.64
		25	12	19.61	19.69	19.70	19.62	19.62	19.62
		25	24	19.67	19.69	19.62	19.60	19.60	19.60
		50	0	19.63	19.73	19.74	19.66	19.64	19.66
	16QAM	1	0	20.47	20.63	20.52	20.68	20.64	20.70
		1	24	20.57	20.70	20.61	20.63	20.64	20.68
		1	49	20.55	20.56	20.59	20.60	20.58	20.51
		25	0	19.33	19.32	19.41	19.43	19.43	19.44
		25	12	19.30	19.39	19.38	19.40	19.42	19.43
		25	24	19.37	19.39	19.30	19.38	19.40	19.41
		50	0	19.34	19.41	19.42	19.44	19.44	19.46
	64QAM	1	0	20.14	19.85	20.05	19.95	20.41	20.47
		1	24	20.20	19.91	19.94	20.70	19.99	19.23
		1	49	20.70	19.64	20.34	20.65	20.20	20.24
		25	0	18.71	18.89	18.93	18.79	18.82	18.82
		25	12	18.78	18.86	18.81	18.89	18.68	18.72
		25	24	18.83	18.75	18.77	18.88	18.85	18.72
		50	0	18.90	18.82	18.95	18.82	18.71	18.77
	256QAM	1	0	19.80	19.67	19.73	17.00	16.99	17.28
		1	24	20.19	19.90	19.70	17.70	17.55	16.94
		1	49	20.20	20.14	20.03	16.88	16.81	17.05
		25	0	20.12	20.12	20.24	17.99	18.00	18.18
		25	12	20.13	20.04	20.17	18.10	18.11	18.07
		25	24	20.11	19.93	20.05	18.20	18.11	18.09
		50	0	20.27	20.09	20.17	18.18	18.04	18.20

8.2. 5G NR n53

RULE PART(S) AND LIMITS

FCC: §25.149 (c)(4) (iii): The maximum transmit power is no more than 1 W (30dBm) with a peak EIRP of no more than 6 dBW.

ISED: SMSE-009-20 Annex A 9.d: Transmitter output power shall not exceed 0 dBW (30dBm).

Test Engineer ID:	32061	Test Date:	2024-08-03
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OUTPUT POWER FOR 5G NR n53 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1			Ant 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				497700	497800	498000	497700	497800	498000
10.0	BPSK	1	0	2488.5 MHz	2489.0 MHz	2490.0 MHz	2488.5 MHz	2489.0 MHz	2490.0 MHz
				20.70	20.54	20.48	20.57	20.52	19.92
		1	1		20.64	20.45	20.58	20.40	19.86
		1	22		20.50	20.41	20.52	20.51	19.77
		1	23		20.53	20.44	20.53	20.54	19.84
		12	6		20.45	20.47	20.46	20.52	19.79
		24	0		20.67	20.58	20.64	20.70	20.00
		1	0		20.59	20.54	20.63	20.63	20.56
	QPSK	1	1		20.54	20.59	20.54	20.57	20.49
		1	22		20.58	20.49	20.58	20.53	20.58
		1	23		20.55	20.48	20.56	20.58	19.92
		12	6		20.54	20.60	20.51	20.63	19.97
		24	0		20.70	20.65	20.62	20.70	20.01
		1	0		20.43	20.34	20.35	20.21	19.72
		1	1		20.46	20.34	20.26	20.43	19.84
		1	22		20.36	20.36	20.33	20.52	19.95
	16QAM	1	23		20.49	20.29	20.31	20.24	19.72
		12	6		20.70	20.58	20.63	20.70	20.08
		24	0		20.66	20.54	20.64	20.51	19.83
		1	0		20.39	20.38	20.70	19.99	19.52
		1	1		20.50	20.42	20.49	20.16	19.45
		1	22		20.52	20.41	20.48	20.12	19.46
		1	23		20.60	20.55	20.44	20.20	19.60
		12	6		20.43	20.51	20.45	20.16	19.50
	64QAM	24	0		20.61	20.57	20.53	20.29	19.54
		1	0		20.56	20.52	20.65	18.14	17.70
		1	1		20.60	20.54	20.63	18.19	17.44
		1	22		20.64	20.59	20.61	18.15	17.78
		1	23		20.70	20.62	20.55	18.20	17.61
		12	6		20.51	20.58	20.62	18.17	17.53
		24	0		20.57	20.64	20.58	18.27	17.60
		1	0		20.56	20.52	20.65	18.14	17.70
	256QAM	1	1		20.60	20.54	20.63	18.19	17.44
		1	22		20.64	20.59	20.61	18.15	17.78
		1	23		20.70	20.62	20.55	18.20	17.61
		12	6		20.51	20.58	20.62	18.17	17.53
		24	0		20.57	20.64	20.58	18.27	17.60
		1	0		20.56	20.52	20.65	18.14	17.70
		1	1		20.60	20.54	20.63	18.19	17.44
		1	22		20.64	20.59	20.61	18.15	17.78

9. CONDUCTED TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

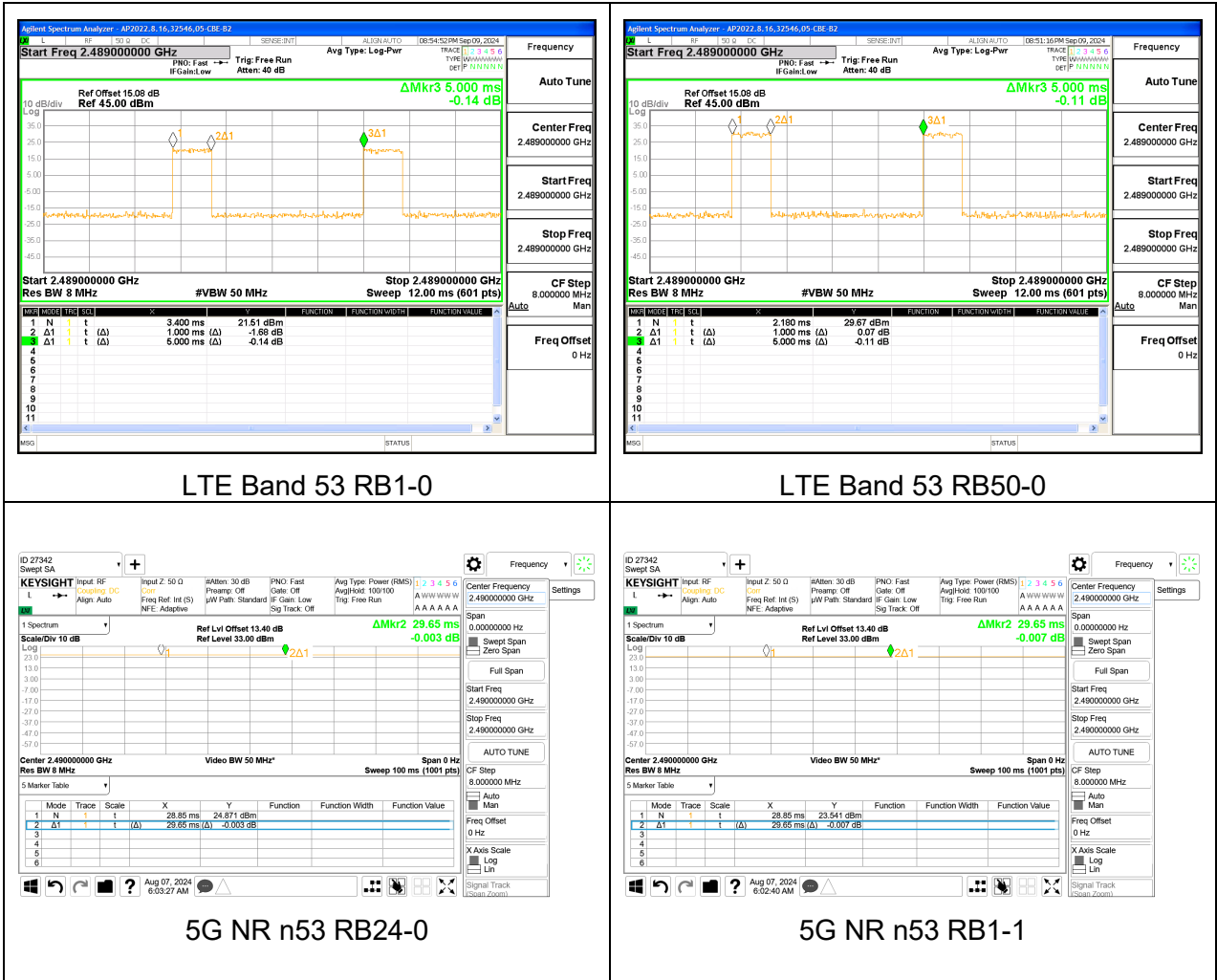
None; for reporting purposes only.

PROCEDURE

Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Band	RB Allocation / Offset	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
LTE Band 53	1 / 0	1.000	5.000	0.20	20.00	6.99
LTE Band 53	50 / 0	1.000	5.000	0.20	20.00	6.99
5G NR n53	1 / 1	29.65	29.65	1.00	100.00	0.00
5G NR n53	24 / 0	29.65	29.65	1.00	100.00	0.00



9.2. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only.

TEST PROCEDURE

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

RESULTS

There is no limit required and power is the same for low, middle, and high channel; therefore, only middle channel was tested. Worst-case plots (highest bandwidth) are reported only.

LTE BAND 53

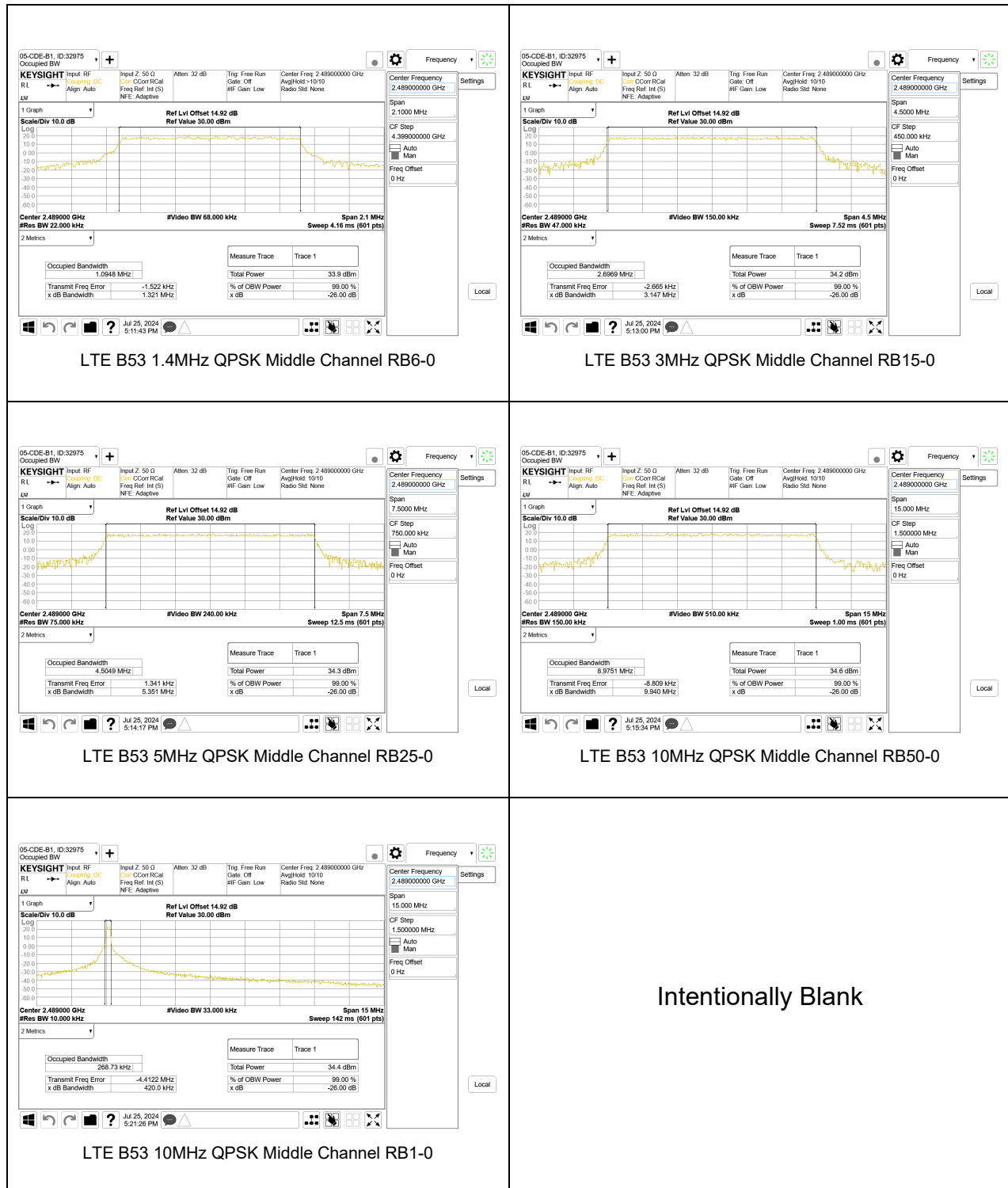
Test Engineer ID:	32061	Test Date:	2024-07-25
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Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 53	1.4MHz, QPSK	6/0	2489.0	1.095	1.32
	1.4MHz, 16QAM			1.097	1.37
	3MHz, QPSK	15/0		2.697	3.15
	3MHz, 16QAM			2.703	3.29
	5MHz, QPSK	25/0		4.505	5.35
	5MHz, 16QAM			4.483	5.30
	10MHz, QPSK	50/0		8.975	9.94
	10MHz, 16QAM			8.984	9.77
	10MHz, QPSK	1/0		0.269	0.42

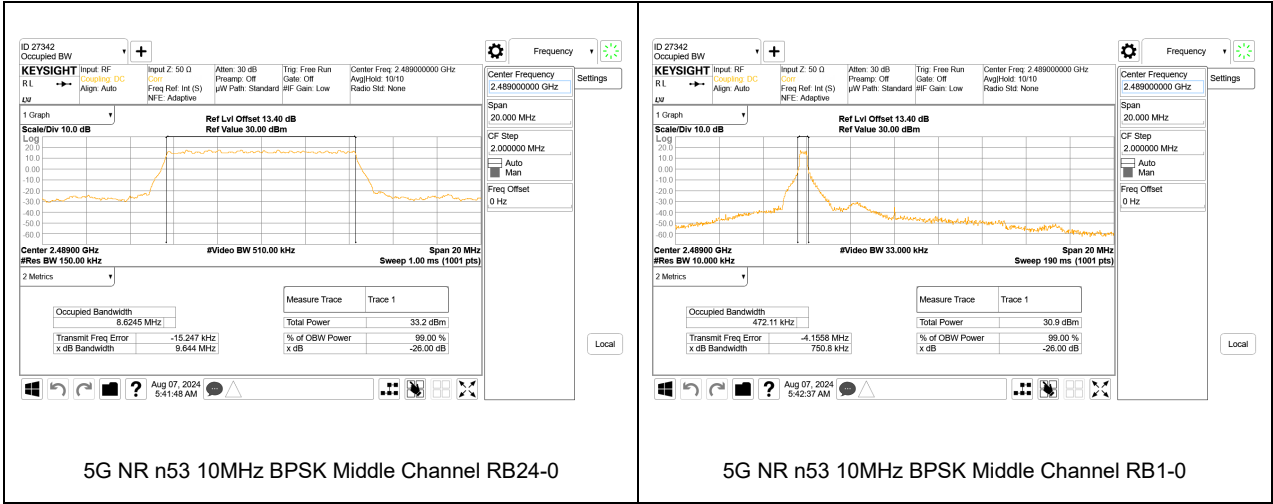
5G NR n53

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
5G NR n53	10MHz, BPSK	24/0	2489.0	8.625	9.64
	10MHz, QPSK			8.580	9.51
	10MHz, 16QAM			8.605	9.54
	10MHz, QPSK	1/0		0.472	0.75

9.2.1. LTE BAND 53



9.2.2. 5G NR n53



9.3. MAXIMUM POWER SPECTRAL DENSITY

RULE PART(S)

FCC: §25.149 (c)(4) (iv)
ISED: SMSE-009-20 Annex A 9.f

LIMITS

FCC: The maximum power spectral density conducted to the antenna is not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission;

ISED: The equipment's maximum power spectral density conducted to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The PSD was measured with the spectrum analyzer at the low/ middle/high channel in each band where RBW=3kHz, VBW $\geq 3 * \text{RBW}$, detector= RMS (power averaging).

RESULTS

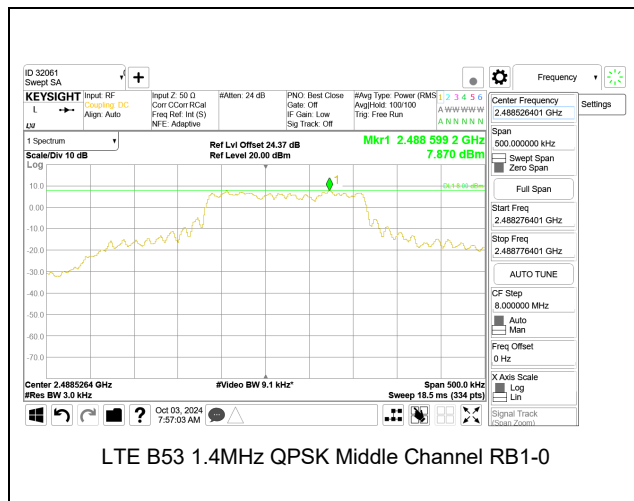
LTE BAND 53

Band	Mode	RB Allocation/RB Offset	f(MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)
LTE BAND 53	1.4MHz, QPSK	1/0	2484.2	7.758	8.0
			2489.0	7.870	
			2494.3	7.943	
	3MHz, QPSK	1/0	2485.0	7.898	
			2489.0	7.870	
			2493.5	7.927	
	5MHz, QPSK	1/0	2486.0	7.721	
			2489.0	7.636	
			2492.5	7.841	
	10MHz, QPSK	1/0	2488.5	7.720	
			2489.0	7.959	
			2490.0	7.820	
		50/0	2488.5	-6.799	
			2489.0	-5.985	
			2490.0	-6.360	

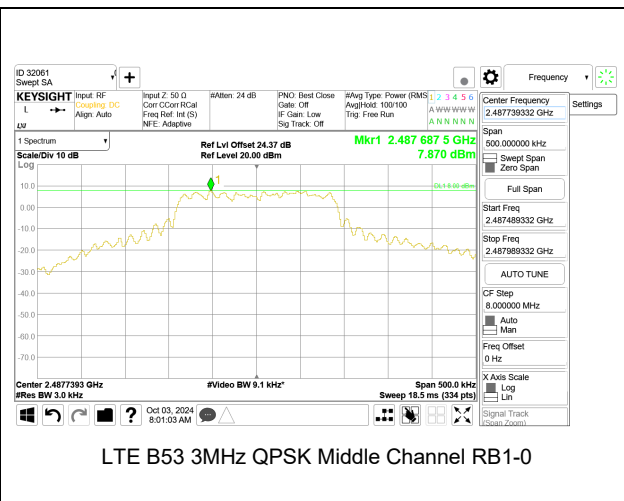
5G NR n53

Band	Mode	RB Allocation/RB Offset	f(MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)
5G NR n53	10MHz, BPSK	1/1	2488.5	6.407	8.0
			2489.0	6.873	
			2490.0	7.436	
		24/0	2488.5	-4.953	
			2489.0	-5.113	
			2490.0	-4.540	

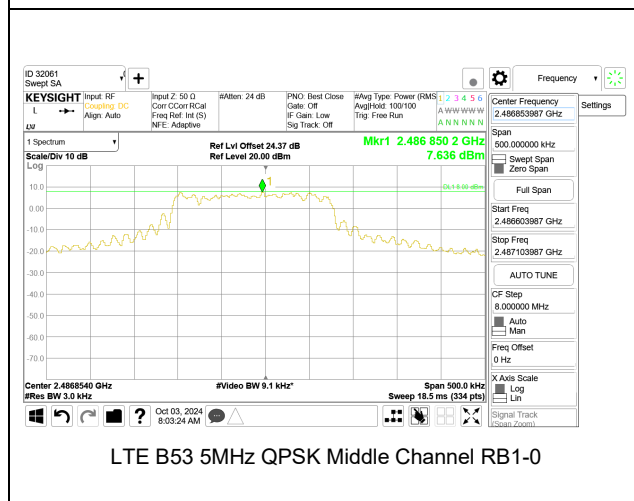
9.3.1. LTE BAND 53



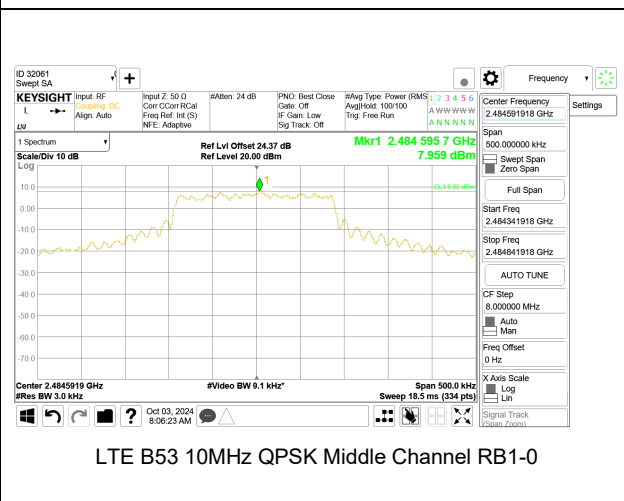
LTE B53 1.4MHz QPSK Middle Channel RB1-0



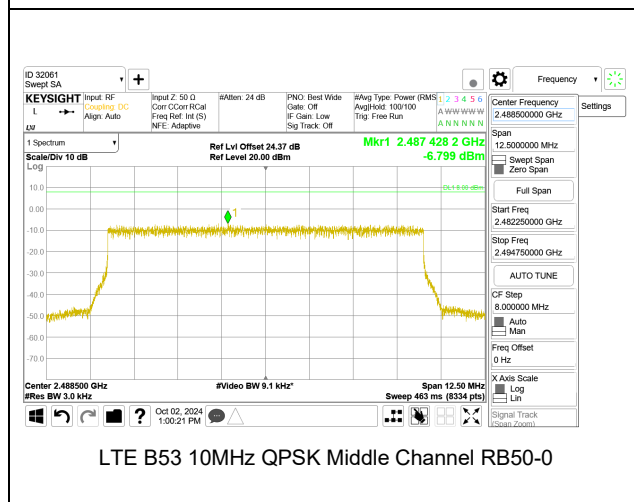
LTE B53 3MHz QPSK Middle Channel RB1-0



LTE B53 5MHz QPSK Middle Channel RB1-0



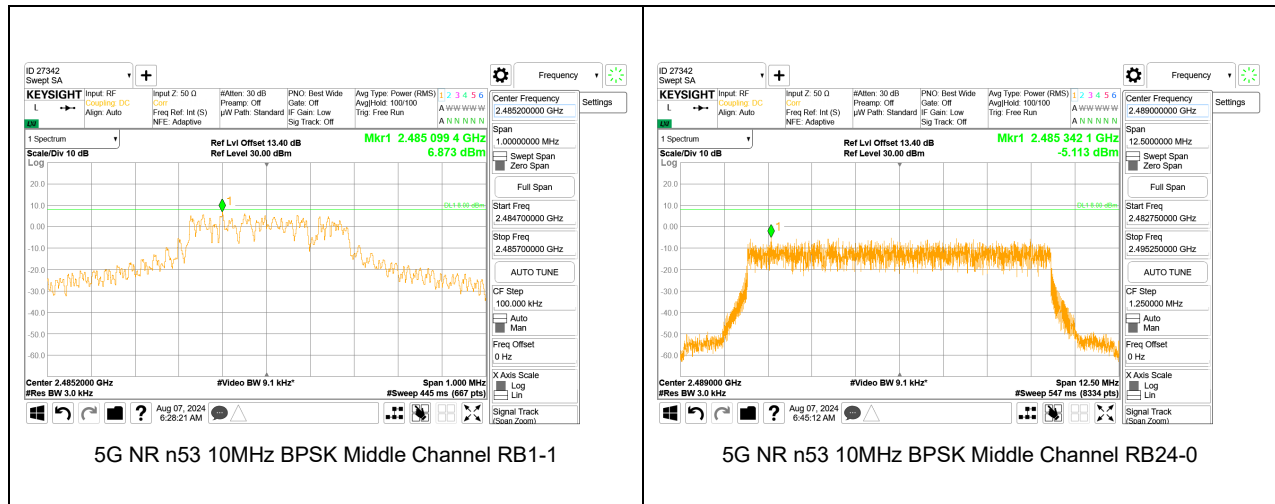
LTE B53 10MHz QPSK Middle Channel RB1-0



LTE B53 10MHz QPSK Middle Channel RB50-0

Intentionally Blank

9.3.2. 5G NR n53



9.4. 6dB BANDWIDTH

RULE PART(S)

FCC: §25.149 (c)(4) (ii)
ISED: SMSE-009-20 Annex A 9.c

LIMITS

The 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The 6dB bandwidth was measured with the spectrum analyzer at the low/ middle/high channel in each band where RBW is 1%-5% of EBW, VBW $\geq 3 * RBW$, Peak detector and max hold.

RESULTS

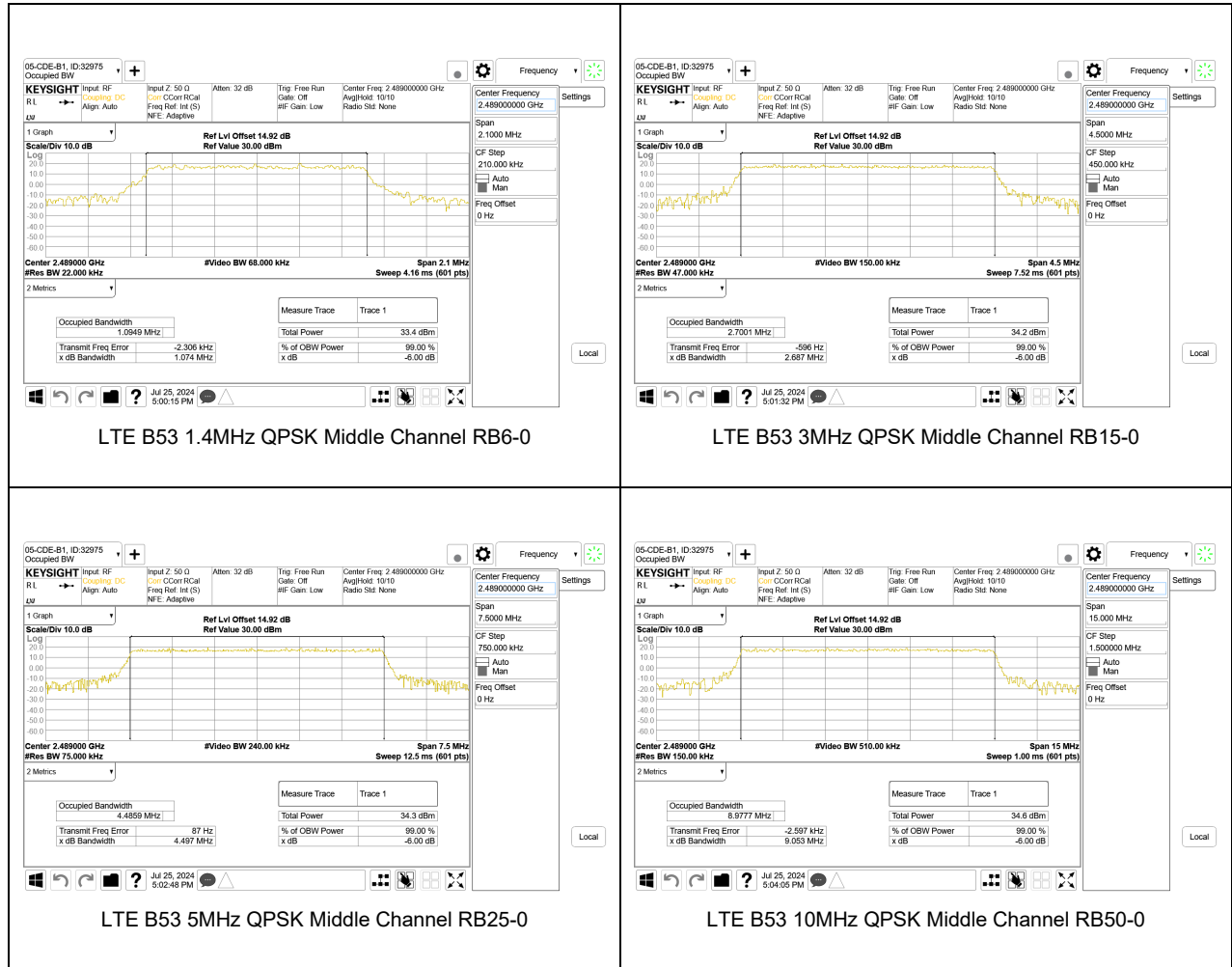
LTE BAND 53

Band	Mode	RB Allocation/RB Offset	f(MHz)	6dB BW (MHz)	6dB BW Limit (MHz)
LTE BAND 53	1.4MHz, QPSK	6/0	2489	1.074	0.5
	1.4MHz, 16QAM			1.072	
	3MHz, QPSK	15/0		2.687	
	3MHz, 16QAM			2.716	
	5MHz, QPSK	25/0		4.497	
	5MHz, 16QAM			4.498	
	10MHz, QPSK	50/0		9.053	
	10MHz, 16QAM			9.033	

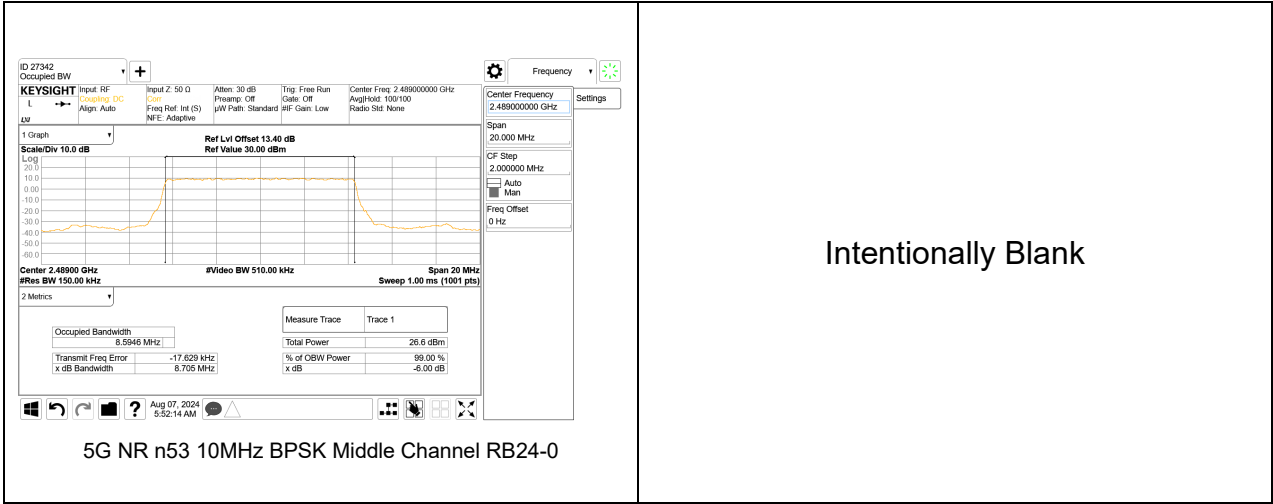
5G NR n53

Band	Mode	RB Allocation/RB Offset	f(MHz)	6dB BW (MHz)	6dB BW Limit (MHz)
5G NR n53	10MHz, BPSK	24/0	2489	8.705	0.5
	10MHz, QPSK	24/0		8.685	
	10MHz, 16QAM	24/0		8.705	

9.4.1. LTE BAND 53



9.4.2. 5G NR n53



9.5. EMISSION MASK AND BANDEDGE

RULE PART(S)

FCC: §25.149 (c)(4)

ISED: SMSE-009-20 Annex A 9

LIMITS

FCC: §25.149

(c) Equipment certification. (4) Applications for equipment authorization of terrestrial low-power system equipment that will operate in the 2483.5-2495 MHz band shall demonstrate the following:

- (v) Emissions below 2483.5 MHz are attenuated below the transmitter power (P) measured in watts by a factor of at least $40 + 10 \log(P)$ dB at the channel edge at 2483.5 MHz, $43 + 10 \log(P)$ dB at 5 MHz from the channel edge, and $55 + 10 \log(P)$ dB at X MHz from the channel edge where X is the greater of 6 MHz or the actual emission bandwidth.
- (vi) Emissions above 2495 MHz are attenuated below the transmitter power (P) measured in watts by a factor of at least $43 + 10 \log(P)$ dB on all frequencies between the channel edge at 2495 MHz and X MHz from this channel edge and $55 + 10 \log(P)$ dB on all frequencies more than X MHz from this channel edge, where X is the greater of 6 MHz or the actual emission bandwidth;

ISED: SMSE-900-20 Annex A 9:

(g) For the unwanted emission below 2483.5 MHz, the ATC system's transmitter power, P (Watt), shall be attenuated by at least:

- i. $40 + 10 \log(P)$ dB at the channel edge at 2483.5 MHz
- ii. $43 + 10 \log(P)$ dB at 5 MHz from the channel edge
- iii. $55 + 10 \log(P)$ dB at X MHz from the channel edge

where X is the greater of 6 MHz or the actual emission bandwidth.

(h) For the unwanted emission above 2495 MHz, the ATC system's transmitter power, P (Watt), shall be attenuated by at least:

- i. $43 + 10 \log(P)$ dB on all frequencies between the channel edge at 2495 MHz and X MHz from this channel edge
- ii. $55 + 10 \log(P)$ dB on all frequencies more than X MHz from this channel edge

where X is the greater of 6 MHz or the actual emission bandwidth.

Notwithstanding the above requirements, the e.i.r.p. density of the ATC system's unwanted emission shall not exceed:

- i. -44.1 dBW/30 kHz measured from the edge of the equipment channel bandwidth.
- ii. -70 dBW/MHz for broadband emissions and -80 dBW/kHz for discrete emissions in the band 1559-1610 MHz

TEST PROCEDURE FOR UNWANTED EMISSIONS

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each Emission Mask measurement:

1. Set the spectrum analyzer span to include the block edge frequency.
2. Set the Spectrum Emission Mask to cover all frequencies at their respective limits
3. Set the Spectrum Emission Mask to use the required Measurement Bandwidth
4. Set resolution bandwidth to at least 1% of emission bandwidth.

TEST PROCEDURE For EIRP DENSITY LIMIT

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each Emission Mask measurement:

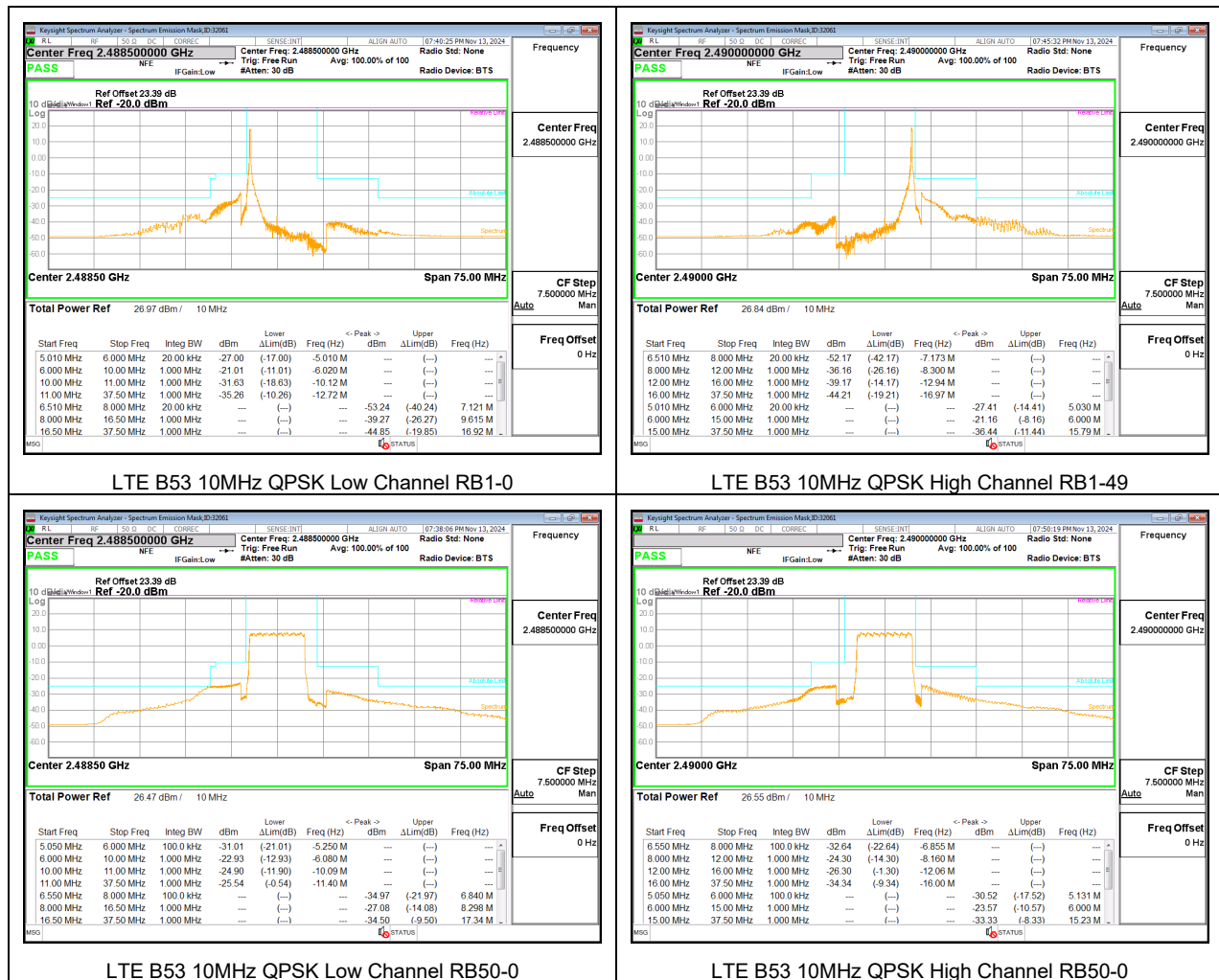
1. Set the Spectrum analyzer span to include the block edge frequency.
2. Set the Spectrum Emission Mask to cover all frequencies at their respective limits
3. Set the Spectrum Emission Mask to use the Measurement Bandwidth of 30kHz

RESULTS

9.5.1. LTE BAND 53

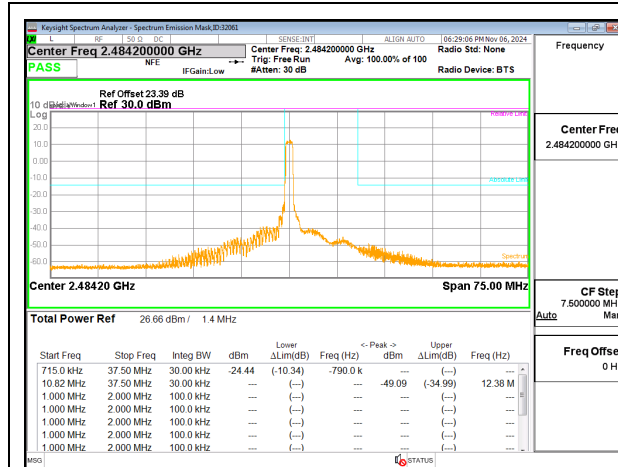
LTE BAND 53 BANDEGE



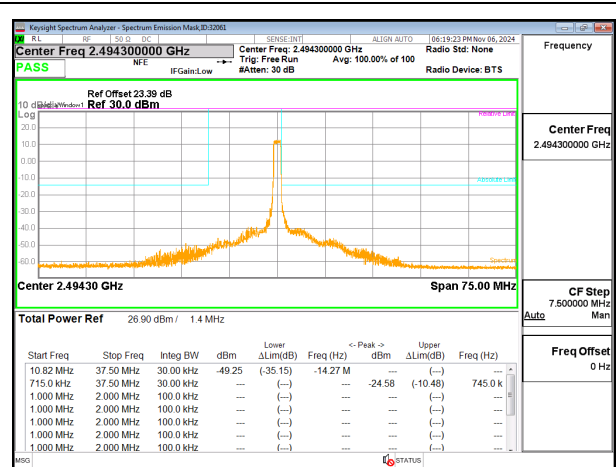


LTE BAND 53 EIRP DENSITY

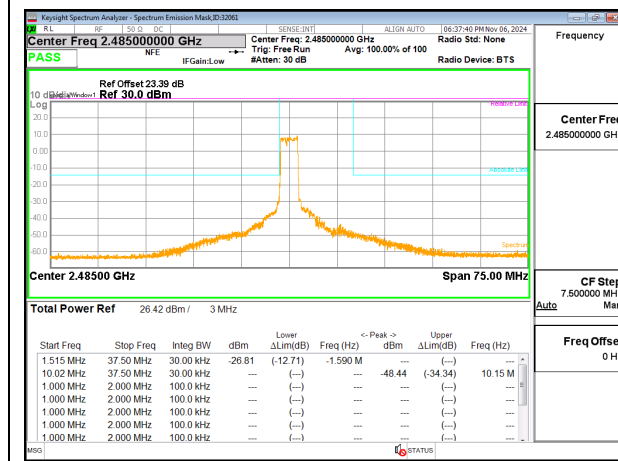
Band	Mode	RB Allocation/ RB Offset	Freq (MHz)	Highest Cond Power Density (dBm/30kHz)	Highest Antenna Gain (dBi)	Highest EIRP Density (dBm/30kHz)	EIRP Density Limit (dBm/30kHz)
LTE Band 53	1.4MHz, QPSK	1/0	2484.2	-18.89	-2.4	-21.29	-14.1
		6/0	2484.2	-24.44		-26.84	
		1/5	2494.3	-17.00		-19.4	
		6/0	2494.3	-24.58		-26.98	
	3MHz, QPSK	1/0	2485.0	-15.85		-18.25	
		15/0	2485.0	-26.81		-29.21	
		1/14	2493.5	-17.12		-19.52	
		15/0	2493.5	-26.52		-28.92	
		1/0	2486.0	-20.49		-22.89	
	5MHz, QPSK	25/0	2486.0	-30.94		-33.34	
		1/24	2492.5	-19.79		-22.19	
		25/0	2492.5	-30.68		-33.08	
		1/0	2488.5	-25.28		-27.68	
	10MHz, QPSK	50/0	2488.5	-33.74		-36.14	
		1/49	2490.0	-26.01		-28.41	
		50/0	2490.0	-35.28		-37.68	



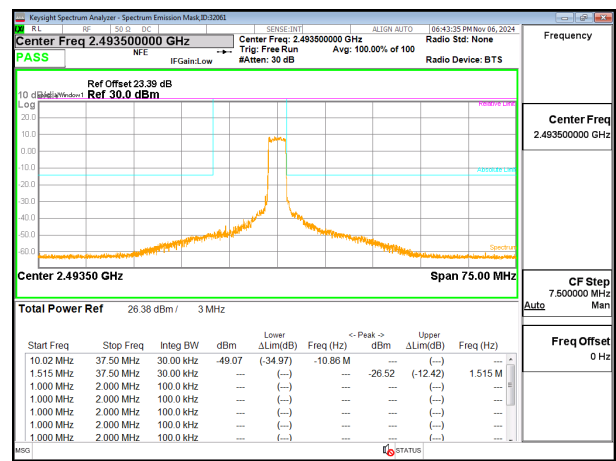
LTE B53 1.4MHz QPSK Low Channel RB6-0



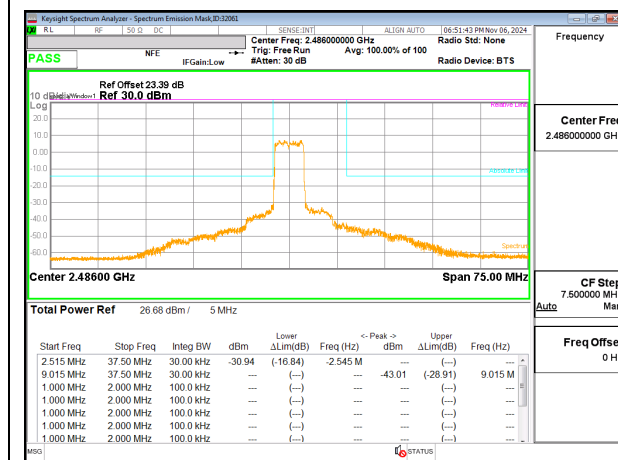
LTE B53 1.4MHz QPSK High Channel RB6-0



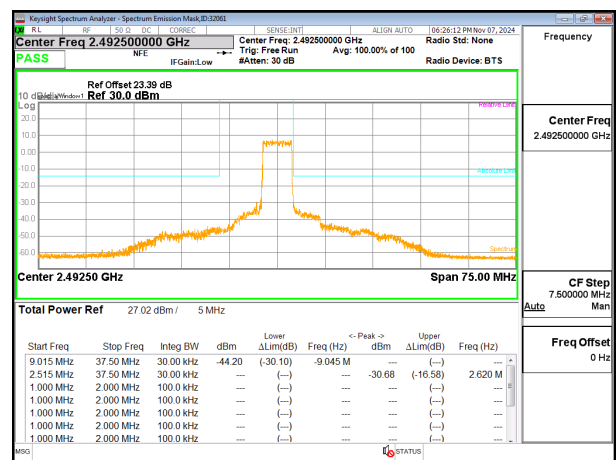
LTE B53 3MHz QPSK Low Channel RB15-0



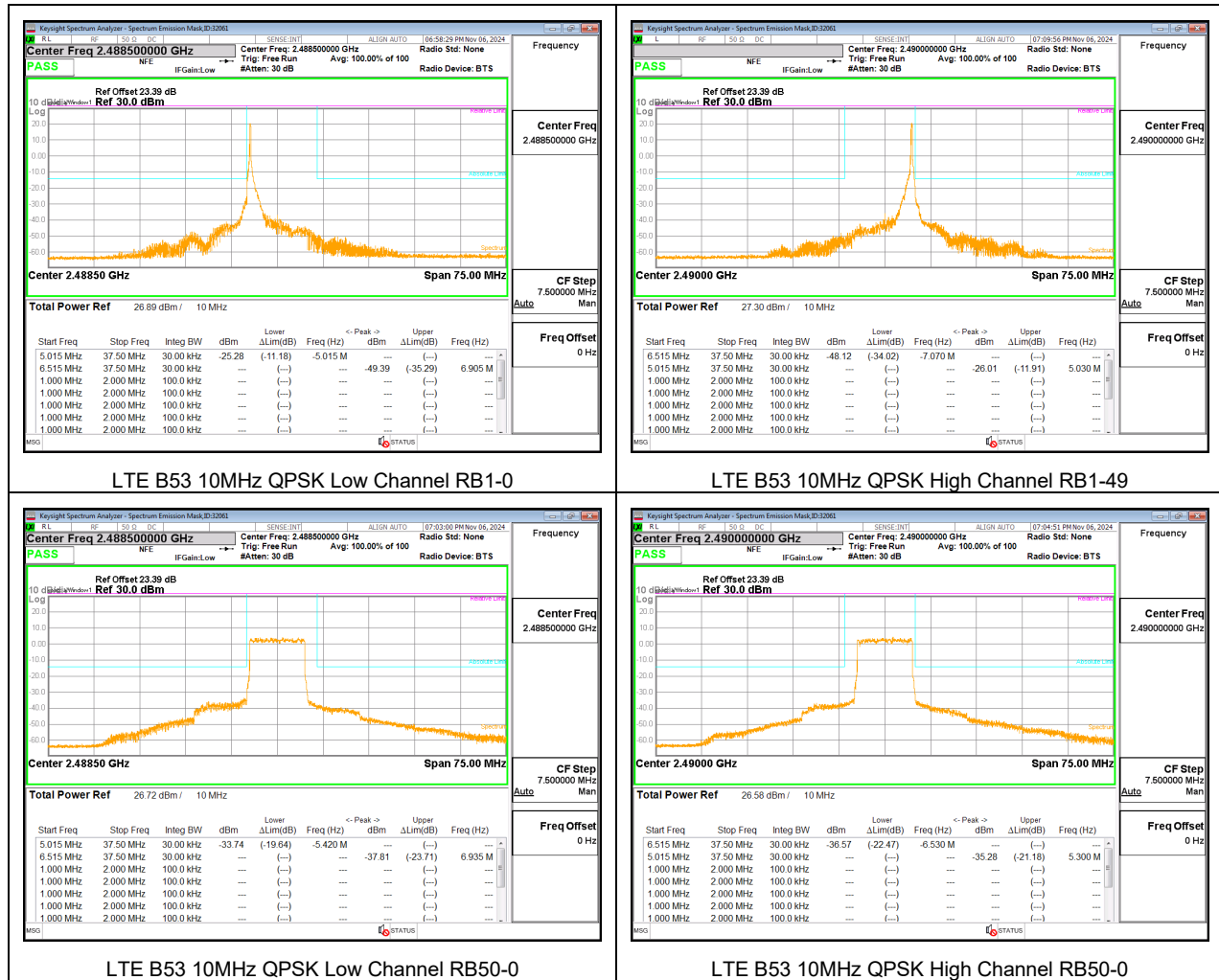
LTE B53 3MHz QPSK High Channel RB15-0



LTE B53 5MHz QPSK Low Channel RB25-0

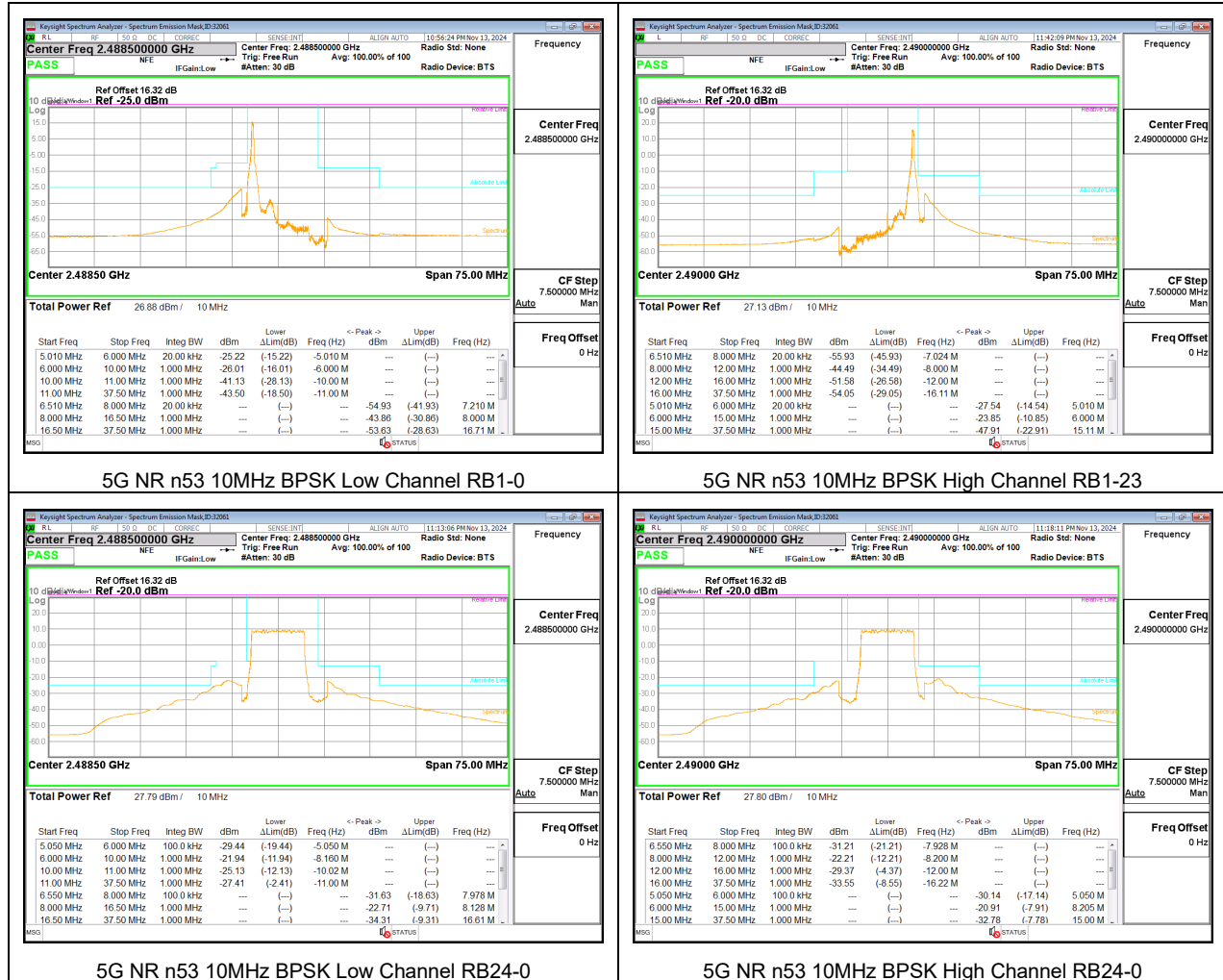


LTE B53 5MHz QPSK High Channel RB25-0



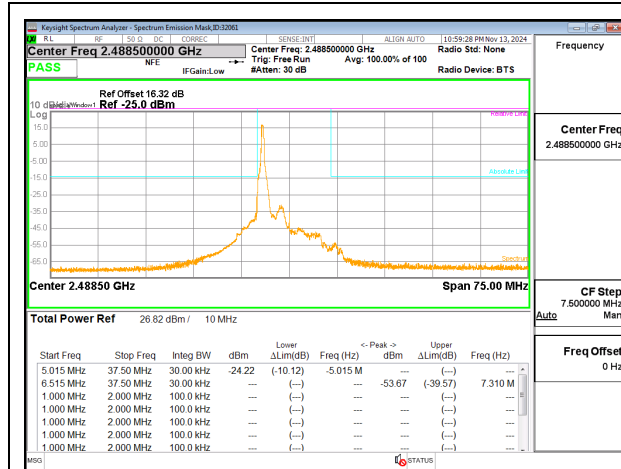
9.5.2 5G NR n53

5G NR n53 BANDEDGE

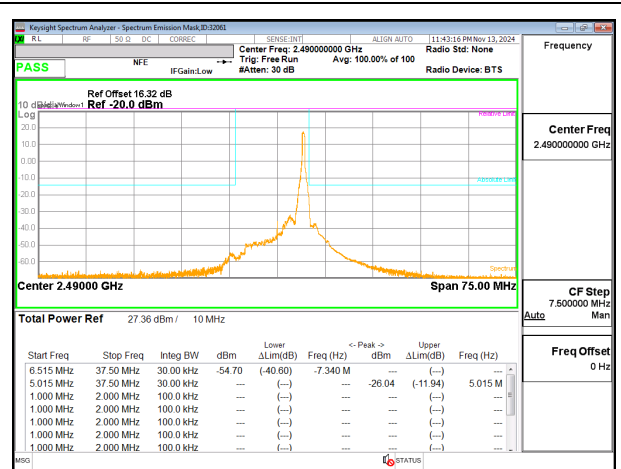


5G NR n53 EIRP DENSITY

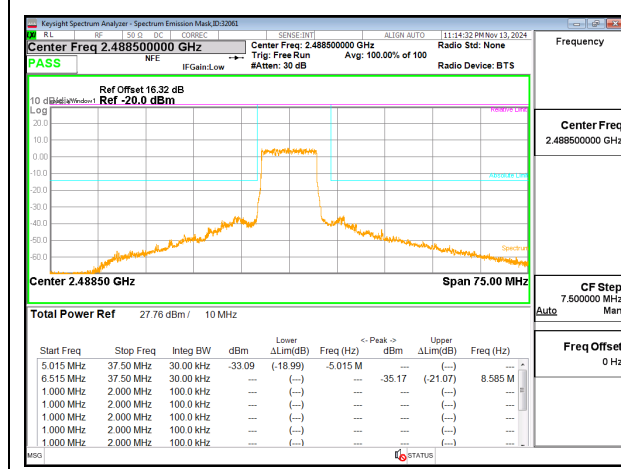
Band	Mode	RB Allocation/ RB Offset	Freq (MHz)	Highest Cond Power Density (dBm/30kHz)	Highest Antenna Gain (dBi)	Highest EIRP Density (dBm/30kHz)	EIRP Density Limit (dBm/30kHz)
5G NR n53	10MHz, BPSK	1/0	2488.5	-24.22	-2.4	-26.62	-14.1
		24/0	2488.5	-33.09		-35.49	
		1/23	2490.0	-26.04		-28.44	
		24/0	2490.0	-32.27		-34.67	



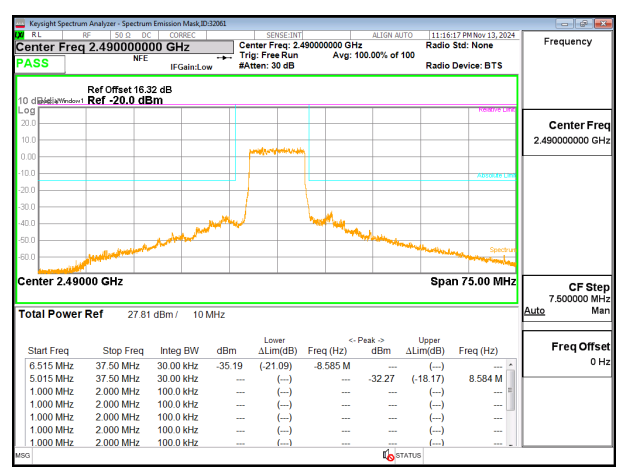
5G NR n53 10MHz BPSK Low Channel RB1-0



5G NR n53 10MHz BPSK High Channel RB1-23



5G NR n53 10MHz BPSK Low Channel RB24-0



5G NR n53 10MHz BPSK High Channel RB24-0

9.6. OUT OF BAND EMISSIONS

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -25dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.
(NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

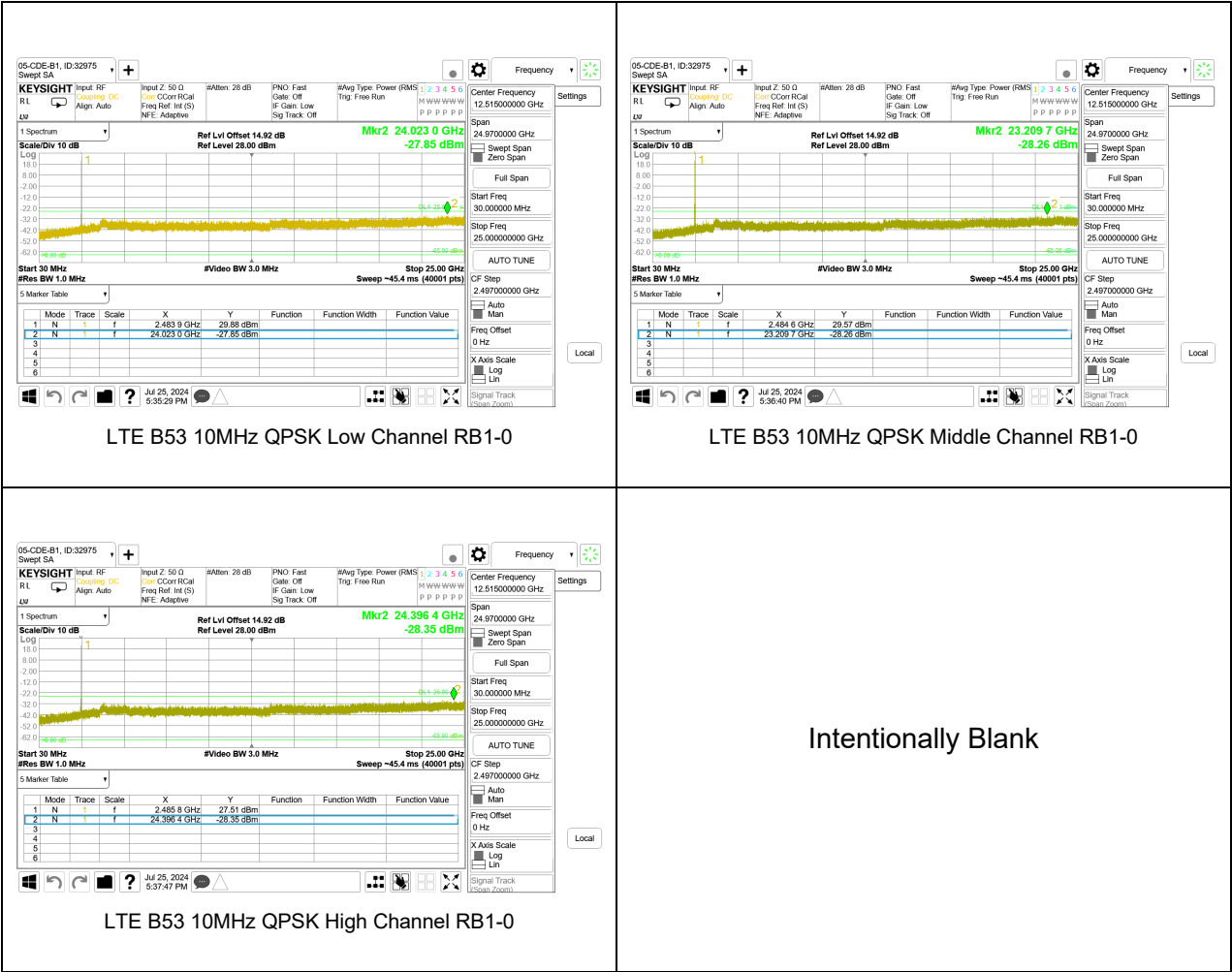
RESULTS

9.6.1. LTE BAND 53

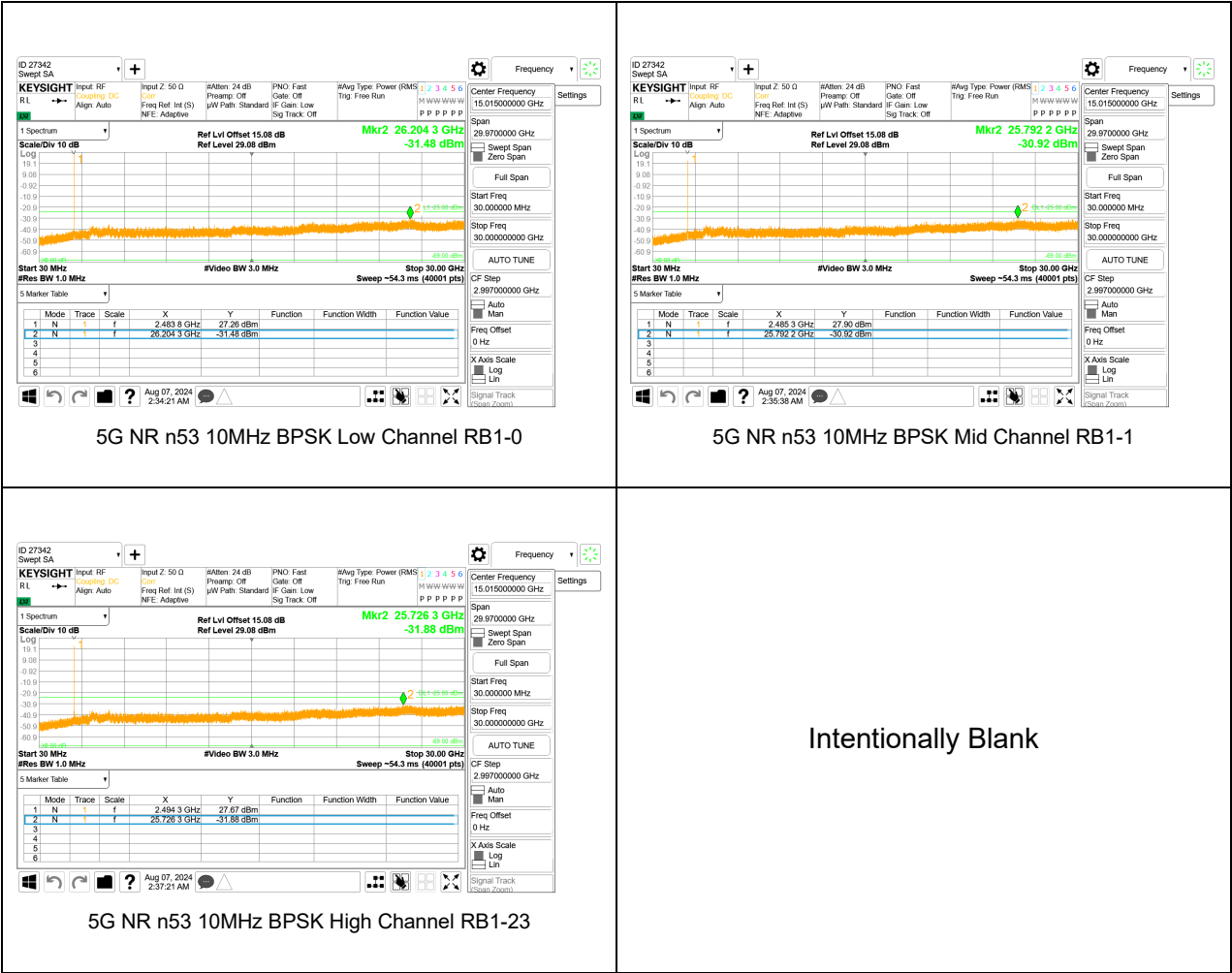
LIMITS

FCC: §25.149 (c)(4)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.

ISED: SMSE-900-20 Annex A 9.g
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.



9.6.2. 5G NR 53



9.7. FREQUENCY STABILITY

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = -30°C to $+50^{\circ}\text{C}$
- Voltage = (85% - 115%)

Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
End Voltage, 2.90VDC.

Frequency Stability vs Temperature:

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

Frequency Stability vs Voltage:

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

RESULTS

See the following pages.

LIMITS

FCC: §25.202 (d)
(d) Frequency tolerance, Earth stations. The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

9.7.1. LTE BAND 53 QPSK (10MHz BANDWIDTH)

Test Engineer ID:	12482	Test Date:	2024-08-26
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Band	53	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		2483.5	2495		10	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	2484.0021	2494.5901			
Extreme (50°C)		2484.0021	2494.5901	-3.8	-0.002	Yes
Extreme (40°C)		2484.0021	2494.5901	-4.5	-0.002	Yes
Extreme (30°C)		2484.0021	2494.5901	-5.6	-0.002	Yes
Extreme (10°C)		2484.0021	2494.5901	-5.9	-0.002	Yes
Extreme (0°C)		2484.0021	2494.5901	-5.8	-0.002	Yes
Extreme (-10°C)		2484.0021	2494.5901	-7.5	-0.003	Yes
Extreme (-20°C)		2484.0021	2494.5901	-6.0	-0.002	Yes
Extreme (-30°C)		2484.0021	2494.5901	-8.2	-0.003	Yes
20°C	15%	2484.0021	2494.5901	-5.1	-0.002	Yes
	-15%	2484.0021	2494.5901	-5.1	-0.002	Yes
	End Point Voltage	2484.0021	2494.5901	8.8	0.004	Yes

9.7.2. 5G NR n53 BPSK (10MHz BANDWIDTH)

Test Engineer ID:	27342	Test Date:	2024-08-19
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Band	53	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		2483.5	2495		10	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	2484.1815	2494.2835			
Extreme (50°C)		2484.1815	2494.2835	1.87	0.001	Yes
Extreme (40°C)		2484.1815	2494.2835	1.15	0.000	Yes
Extreme (30°C)		2484.1815	2494.2835	3.13	0.001	Yes
Extreme (10°C)		2484.1815	2494.2835	5.21	0.002	Yes
Extreme (0°C)		2484.1815	2494.2835	7.99	0.003	Yes
Extreme (-10°C)		2484.1815	2494.2835	4.05	0.002	Yes
Extreme (-20°C)		2484.1815	2494.2835	-4.72	-0.002	Yes
Extreme (-30°C)		2484.1815	2494.2835	-7.52	-0.003	Yes
20°C	15%	2484.1815	2494.2835	-1.17	0.000	Yes
	-15%	2484.1815	2494.2835	1.97	0.001	Yes
	End Point Voltage	2484.1815	2494.2835	-1.56	-0.001	Yes

10. RADIATED TEST RESULTS

Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, we measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement method.

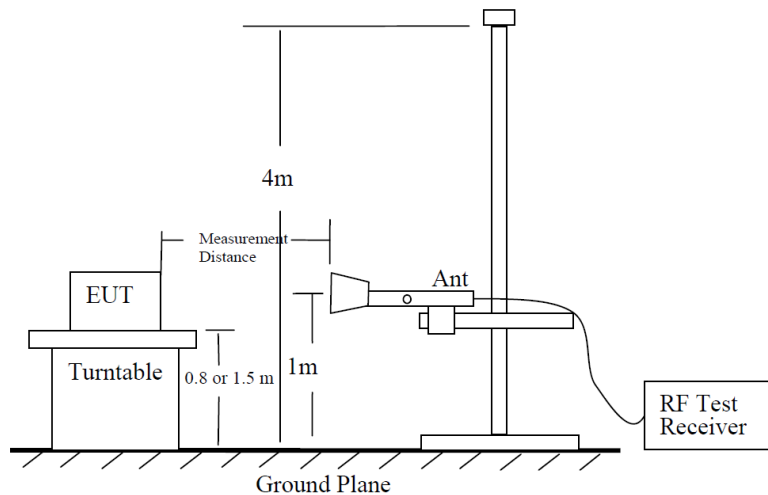


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

Radiated Power Measurement Calculation According to ANSI C63.26-2015

- a) $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$
- b) $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$
- c) $E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20\log(D) + 104.8$; where D is the measurement distance (in the far field region) in m.
- d) $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.

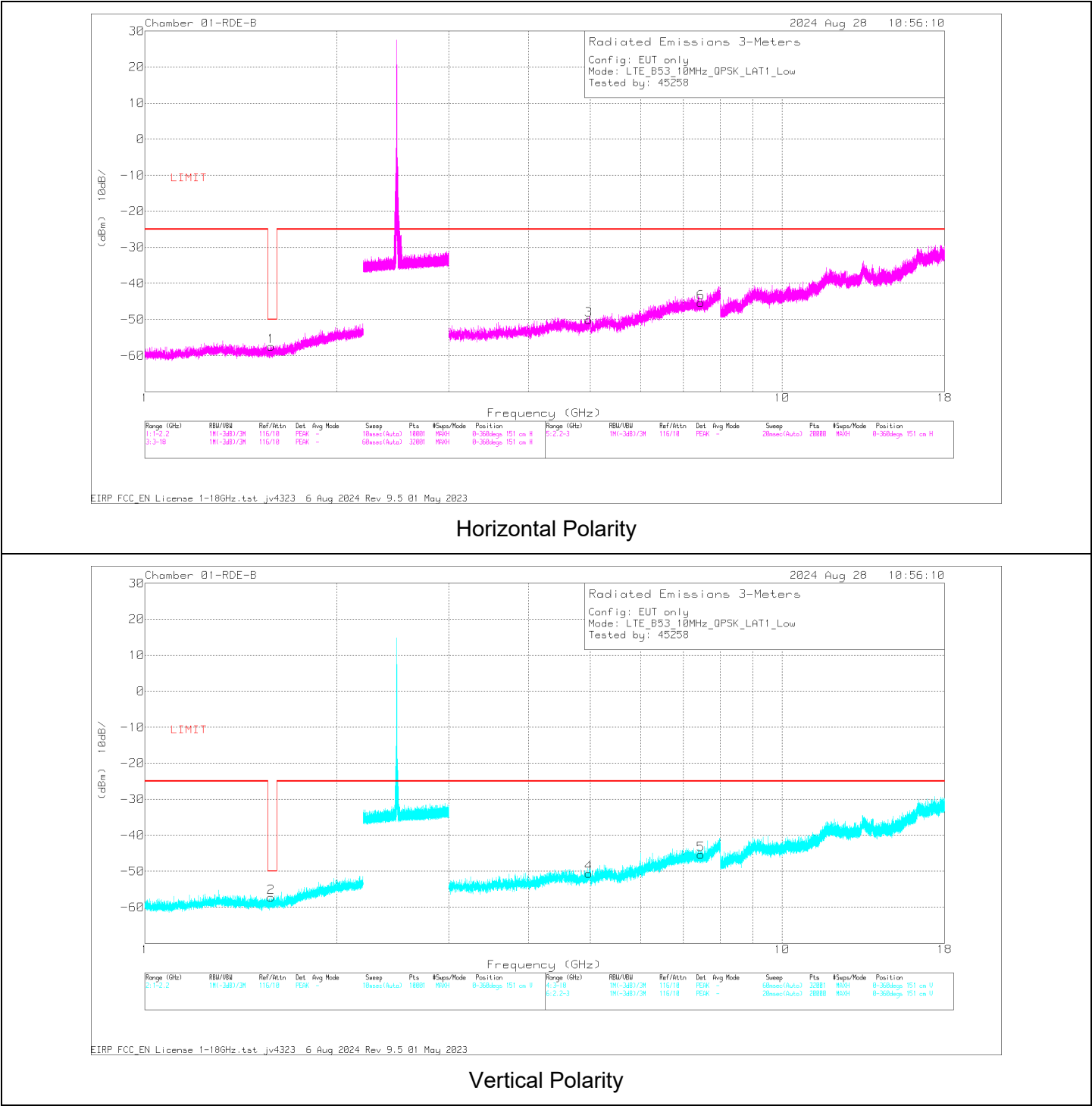
So, from d)

The measuring distance is usually at 3m, then $20 \cdot \log(3) = 9.5424$

Then, $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 9.5424 - 104.8 = E \text{ (dB}\mu\text{V/m)} - 95.2576$

Note: Confidence check of each chamber is performed daily to see if any degradation from expected/normal reading reference data. Ambient check of each chamber is performed monthly.

Example Plot Above 1GHz



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
2	1.577200	44.66	Pk	28.1	.5	-95.2	-35.3	-57.24	-50	-7.24	V
1	1.577440	44.47	Pk	28.1	.5	-95.2	-35.3	-57.43	-50	-7.43	H
4	4.976719	41.32	Pk	34.0	.3	-95.2	-31.0	-50.58	-25	-25.58	V
3	4.979063	41.76	Pk	34.0	.3	-95.2	-31.0	-50.14	-25	-25.14	H
6	7.465313	40.60	Pk	35.6	.4	-95.2	-26.7	-45.30	-25	-20.30	H
5	7.465781	40.56	Pk	35.6	.4	-95.2	-26.7	-45.34	-25	-20.34	V

10.1. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 1

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02r02

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz.

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

FCC: §25.149 (c)(4)

(vii) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately above and adjacent to the 2495 MHz a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. If 1 percent of the emission bandwidth of the fundamental emission is less than 1 MHz, the power measured must be integrated over the required measurement bandwidth of 1 MHz. A resolution bandwidth narrower than 1 MHz is permitted to improve measurement accuracy, provided the measured power is integrated over the full required measurement bandwidth (*i.e.*, 1 MHz). The emission bandwidth of the fundamental emission of a transmitter 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. When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

ISED: SMSE-009-20 Annex A 9

j. Compliance with this limit may be based on the use of a measurement resolution bandwidth of at least 1% of the occupied bandwidth. If 1% of the occupied bandwidth is less than 1 MHz, the power measured shall be integrated over the required measurement bandwidth of 1 MHz.

RESULTS

10.1.1. LTE BAND 53

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	15173542
Date:	2024-08-28
Test Engineer:	45258
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	01-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.577200	44.66	Pk	28.1	.5	-95.2	-35.30	-57.24	-50	-7.24	V
1.577440	44.47	Pk	28.1	.5	-95.2	-35.30	-57.43	-50	-7.43	H
4.976719	41.32	Pk	34.0	.3	-95.2	-31.00	-50.58	-25	-25.58	V
4.979063	41.76	Pk	34.0	.3	-95.2	-31.00	-50.14	-25	-25.14	H
7.465313	40.60	Pk	35.6	.4	-95.2	-26.70	-45.30	-25	-20.30	H
7.465781	40.56	Pk	35.6	.4	-95.2	-26.70	-45.34	-25	-20.34	V
Mid Channel, 2489MHz										
1.584400	44.67	Pk	28.1	.5	-95.2	-35.24	-57.17	-50	-7.17	V
1.586080	43.81	Pk	28.1	.5	-95.2	-35.20	-57.99	-50	-7.99	H
4.977188	41.69	Pk	34.0	.3	-95.2	-31.00	-50.21	-25	-25.21	V
4.977656	43.57	Pk	34.0	.3	-95.2	-31.00	-48.33	-25	-23.33	H
7.466719	40.16	Pk	35.6	.4	-95.2	-26.70	-45.74	-25	-20.74	H
7.467188	40.96	Pk	35.6	.4	-95.2	-26.70	-44.94	-25	-19.94	V
High Channel, 2490MHz										
1.573000	44.40	Pk	28.1	.5	-95.2	-35.30	-57.50	-50	-7.50	H
1.600600	44.66	Pk	28.2	.6	-95.2	-35.24	-56.98	-50	-6.98	V
4.980000	41.83	Pk	34.0	.3	-95.2	-31.00	-50.07	-25	-25.07	H
4.980469	41.27	Pk	34.0	.3	-95.2	-31.00	-50.63	-25	-25.63	V
7.468125	41.82	Pk	35.6	.4	-95.2	-26.70	-44.08	-25	-19.08	H
7.470469	40.53	Pk	35.6	.4	-95.2	-26.60	-45.27	-25	-20.27	V

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 50 RB

Project #:	15173542
Date:	2024-09-12
Test Engineer:	32145
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	01-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.590330	44.16	Pk	28.1	.5	-95.2	-35.30	-57.74	-50	-7.74	H
1.590980	44.50	Pk	28.1	.5	-95.2	-35.30	-57.40	-50	-7.40	V
4.977656	40.82	Pk	34.0	.6	-95.2	-31.00	-50.78	-25	-25.78	H
4.977656	40.59	Pk	34.0	.6	-95.2	-31.00	-51.01	-25	-26.01	V
7.464375	42.40	Pk	35.6	.4	-95.2	-26.70	-43.50	-25	-18.5	V
7.464844	41.07	Pk	35.6	.4	-95.2	-26.70	-44.83	-25	-19.83	H
Mid Channel, 2489MHz										
1.581360	45.16	Pk	28.1	.5	-95.2	-35.20	-56.64	-50	-6.64	V
1.582400	44.86	Pk	28.1	.5	-95.2	-35.24	-56.98	-50	-6.98	H
4.977188	42.27	Pk	34.0	.6	-95.2	-31.00	-49.33	-25	-24.33	V
4.978125	41.98	Pk	34.0	.6	-95.2	-31.00	-49.62	-25	-24.62	H
7.466719	42.21	Pk	35.6	.4	-95.2	-26.70	-43.69	-25	-18.69	H
7.466719	40.58	Pk	35.6	.4	-95.2	-26.70	-45.32	-25	-20.32	V
High Channel, 2490MHz										
1.593060	44.89	Pk	28.2	.5	-95.2	-35.20	-56.81	-50	-6.81	V
1.594100	44.08	Pk	28.2	.5	-95.2	-35.20	-57.62	-50	-7.62	H
4.978594	42.59	Pk	34.0	.6	-95.2	-31.00	-49.01	-25	-24.01	H
4.980000	41.15	Pk	34.0	.6	-95.2	-31.00	-50.45	-25	-25.45	V
7.470000	40.82	Pk	35.6	.3	-95.2	-26.60	-45.08	-25	-20.08	H
7.470000	40.52	Pk	35.6	.3	-95.2	-26.60	-45.38	-25	-20.38	V

10.1.2. 5G NR n53

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	15173542
Date:	2024-09-18
Test Engineer:	313000
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	01-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.584160	44.56	Pk	28.1	.5	-95.2	-35.22	-57.26	-50	-7.26	H
1.584160	45.85	Pk	28.1	.5	-95.2	-35.22	-55.97	-50	-5.97	V
4.977656	41.42	Pk	34.0	.3	-95.2	-31.00	-50.48	-25	-25.48	H
4.977656	40.01	Pk	34.0	.3	-95.2	-31.00	-51.89	-25	-26.89	V
7.464844	41.72	Pk	35.6	.4	-95.2	-26.70	-44.18	-25	-19.18	H
7.467656	40.91	Pk	35.6	.4	-95.2	-26.70	-44.99	-25	-19.99	V
Mid Channel, 2489MHz										
1.606240	43.87	Pk	28.2	.6	-95.2	-35.28	-57.81	-50	-7.81	V
1.606480	45.19	Pk	28.2	.6	-95.2	-35.25	-56.46	-50	-6.46	H
4.977656	40.81	Pk	34.0	.3	-95.2	-31.00	-51.09	-25	-26.09	V
4.978125	40.54	Pk	34.0	.3	-95.2	-31.00	-51.36	-25	-26.36	H
7.468125	39.54	Pk	35.6	.4	-95.2	-26.70	-46.36	-25	-21.36	H
7.468125	39.24	Pk	35.6	.4	-95.2	-26.70	-46.66	-25	-21.66	V
High Channel, 2490MHz										
1.586800	44.96	Pk	28.1	.5	-95.2	-35.20	-56.84	-50	-6.84	H
1.587400	43.76	Pk	28.1	.5	-95.2	-35.24	-58.08	-50	-8.08	V
4.979063	42.09	Pk	34.0	.3	-95.2	-31.00	-49.81	-25	-24.81	H
4.979531	40.83	Pk	34.0	.3	-95.2	-31.00	-51.07	-25	-26.07	V
7.470000	39.44	Pk	35.6	.4	-95.2	-26.60	-46.36	-25	-21.36	H
7.470000	39.47	Pk	35.6	.4	-95.2	-26.60	-46.33	-25	-21.33	V

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 24 RB

Project #:	15173542
Date:	2024-09-18
Test Engineer:	31300
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	01-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.596160	43.99	Pk	28.2	.6	-95.2	-35.22	-57.63	-50	-7.63	V
1.597000	44.69	Pk	28.2	.6	-95.2	-35.30	-57.01	-50	-7.01	H
4.978125	40.75	Pk	34.0	.3	-95.2	-31.00	-51.15	-25	-26.15	H
4.978594	40.13	Pk	34.0	.3	-95.2	-31.00	-51.77	-25	-26.77	V
7.465781	40.32	Pk	35.6	.4	-95.2	-26.70	-45.58	-25	-20.58	H
7.465781	42.17	Pk	35.6	.4	-95.2	-26.70	-43.73	-25	-18.73	V
Mid Channel, 2489MHz										
1.584640	43.88	Pk	28.1	.5	-95.2	-35.26	-57.98	-50	-7.98	V
1.585240	45.31	Pk	28.1	.5	-95.2	-35.28	-56.57	-50	-6.57	H
4.978125	41.74	Pk	34.0	.3	-95.2	-31.00	-50.16	-25	-25.16	V
4.978594	40.74	Pk	34.0	.3	-95.2	-31.00	-51.16	-25	-26.16	H
7.466719	41.26	Pk	35.6	.4	-95.2	-26.70	-44.64	-25	-19.64	V
7.467656	40.97	Pk	35.6	.4	-95.2	-26.70	-44.93	-25	-19.93	H
High Channel, 2490MHz										
1.581760	44.86	Pk	28.1	.5	-95.2	-35.2	-56.94	-50	-6.94	H
1.581760	43.55	Pk	28.1	.5	-95.2	-35.2	-58.25	-50	-8.25	V
4.980000	41.74	Pk	34.0	.3	-95.2	-31.0	-50.16	-25	-25.16	V
4.980469	41.42	Pk	34.0	.3	-95.2	-31.0	-50.48	-25	-25.48	H
7.470000	41.77	Pk	35.6	.4	-95.2	-26.6	-44.03	-25	-19.03	H
7.470000	39.57	Pk	35.6	.4	-95.2	-26.6	-46.23	-25	-21.23	V

10.2. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 2

10.2.1. LTE BAND 53

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	15173542
Date:	2024-08-28
Test Engineer:	45258
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	01-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.600600	44.66	Pk	28.2	.6	-95.2	-35.24	-56.98	-50	-6.98	V
1.601320	44.84	Pk	28.2	.6	-95.2	-35.17	-56.73	-50	-6.73	H
4.976719	41.92	Pk	34.0	.3	-95.2	-31.00	-49.98	-25	-24.98	H
4.976719	40.55	Pk	34.0	.3	-95.2	-31.00	-51.35	-25	-26.35	V
7.463906	41.46	Pk	35.6	.4	-95.2	-26.70	-44.44	-25	-19.44	H
7.464375	41.62	Pk	35.6	.4	-95.2	-26.70	-44.28	-25	-19.28	V
Mid Channel, 2489MHz										
1.584040	44.21	Pk	28.1	.5	-95.2	-35.20	-57.59	-50	-7.59	H
1.601080	44.81	Pk	28.2	.6	-95.2	-35.19	-56.78	-50	-6.78	V
3.978750	40.18	Pk	33.5	.4	-95.2	-31.88	-53.00	-25	-28.00	H
3.979219	41.28	Pk	33.5	.4	-95.2	-31.90	-51.92	-25	-26.92	V
7.467656	40.84	Pk	35.6	.4	-95.2	-26.70	-45.06	-25	-20.06	H
7.467656	40.76	Pk	35.6	.4	-95.2	-26.70	-45.14	-25	-20.14	V
High Channel, 2490MHz										
1.58416	45.34	Pk	28.1	.5	-95.2	-35.22	-56.48	-50	-6.48	H
1.58572	43.97	Pk	28.1	.5	-95.2	-35.23	-57.86	-50	-7.86	V
4.979531	43.96	Pk	34.0	.3	-95.2	-31.00	-47.94	-25	-22.94	V
4.983281	42.84	Pk	34.0	.4	-95.2	-31.00	-48.96	-25	-23.96	H
7.470938	40.42	Pk	35.6	.4	-95.2	-26.60	-45.38	-25	-20.38	H
7.470938	41.11	Pk	35.6	.4	-95.2	-26.60	-44.69	-25	-19.69	V

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 50 RB

Project #:	15173542
Date:	2024-09-12
Test Engineer:	32145
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	01-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.593710	45.00	Pk	28.2	.5	-95.2	-35.20	-56.70	-50	-6.70	H
1.594490	44.62	Pk	28.2	.5	-95.2	-35.20	-57.08	-50	-7.08	V
4.977656	41.82	Pk	34.0	.6	-95.2	-31.00	-49.78	-25	-24.78	H
4.978594	41.46	Pk	34.0	.6	-95.2	-31.00	-50.14	-25	-25.14	V
7.464844	41.47	Pk	35.6	.4	-95.2	-26.70	-44.43	-25	-19.43	H
7.464844	41.89	Pk	35.6	.4	-95.2	-26.70	-44.01	-25	-19.01	V
Mid Channel, 2489MHz										
1.580320	44.86	Pk	28.1	.5	-95.2	-35.27	-57.01	-50	-7.01	H
1.580580	43.79	Pk	28.1	.5	-95.2	-35.24	-58.05	-50	-8.05	V
4.979063	41.59	Pk	34.0	.6	-95.2	-31.00	-50.01	-25	-25.01	V
4.979531	41.19	Pk	34.0	.6	-95.2	-31.00	-50.41	-25	-25.41	H
7.466719	41.27	Pk	35.6	.4	-95.2	-26.70	-44.63	-25	-19.63	H
7.466719	40.36	Pk	35.6	.4	-95.2	-26.70	-45.54	-25	-20.54	V
High Channel, 2490MHz										
1.596310	44.72	Pk	28.2	.5	-95.2	-35.23	-57.01	-50	-7.01	V
1.597610	45.44	Pk	28.2	.5	-95.2	-35.30	-56.36	-50	-6.36	H
4.979531	42.07	Pk	34.0	.6	-95.2	-31.00	-49.53	-25	-24.53	H
4.979531	40.00	Pk	34.0	.6	-95.2	-31.00	-51.60	-25	-26.6	V
7.470938	40.23	Pk	35.6	.3	-95.2	-26.60	-45.67	-25	-20.67	H
7.470938	41.75	Pk	35.6	.3	-95.2	-26.60	-44.15	-25	-19.15	V

10.2.2. 5G NR n53

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	15173542
Date:	2024-09-19
Test Engineer:	31300
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	01-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.582360	44.57	Pk	28.1	.5	-95.2	-35.24	-57.27	-50	-7.27	H
1.582960	45.83	Pk	28.1	.5	-95.2	-35.30	-56.07	-50	-6.07	V
4.977188	40.83	Pk	34.0	.3	-95.2	-31.00	-51.07	-25	-26.07	V
4.977656	41.51	Pk	34.0	.3	-95.2	-31.00	-50.39	-25	-25.39	H
7.464844	41.26	Pk	35.6	.4	-95.2	-26.70	-44.64	-25	-19.64	H
7.466719	40.95	Pk	35.6	.4	-95.2	-26.70	-44.95	-25	-19.95	V
Mid Channel, 2489MHz										
1.589320	45.39	Pk	28.1	.6	-95.2	-35.23	-56.34	-50	-6.34	H
1.589440	43.25	Pk	28.1	.6	-95.2	-35.24	-58.49	-50	-8.49	V
4.977188	41.11	Pk	34.0	.3	-95.2	-31.00	-50.79	-25	-25.79	H
4.977188	40.71	Pk	34.0	.3	-95.2	-31.00	-51.19	-25	-26.19	V
7.467188	39.19	Pk	35.6	.4	-95.2	-26.70	-46.71	-25	-21.71	H
7.467188	40.45	Pk	35.6	.4	-95.2	-26.70	-45.45	-25	-20.45	V
High Channel, 2490MHz										
1.577920	45.94	Pk	28.1	.5	-95.2	-35.30	-55.96	-50	-5.96	V
1.578400	43.88	Pk	28.1	.5	-95.2	-35.26	-57.98	-50	-7.98	H
4.980938	41.63	Pk	34.0	.3	-95.2	-31.00	-50.27	-25	-25.27	H
4.981875	41.56	Pk	34.0	.4	-95.2	-31.00	-50.24	-25	-25.24	V
7.470000	41.09	Pk	35.6	.4	-95.2	-26.60	-44.71	-25	-19.71	V
7.470938	40.65	Pk	35.6	.4	-95.2	-26.60	-45.15	-25	-20.15	H

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 24 RB

Project #:	15173542
Date:	2024-06-17
Test Engineer:	32934
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	AF 226671 (dB/m)	BRF 2.4-2.5GHz T1786 1-18GHz	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz										
1.592200	44.54	Pk	28.2	.6	-95.2	-35.2	-57.06	-50	-7.06	H
1.593280	43.60	Pk	28.2	.6	-95.2	-35.2	-58.00	-50	-8.00	V
4.976719	41.38	Pk	34.0	.3	-95.2	-31.0	-50.52	-25	-25.52	H
4.977188	41.00	Pk	34.0	.3	-95.2	-31.0	-50.90	-25	-25.90	V
7.463906	40.91	Pk	35.6	.4	-95.2	-26.7	-44.99	-25	-19.99	H
7.467188	41.77	Pk	35.6	.4	-95.2	-26.7	-44.13	-25	-19.13	V
Mid Channel, 2489MHz										
1.586560	44.69	Pk	28.1	.5	-95.2	-35.2	-57.11	-50	-7.11	H
1.586560	45.99	Pk	28.1	.5	-95.2	-35.2	-55.81	-50	-5.81	V
4.977656	40.57	Pk	34.0	.3	-95.2	-31.0	-51.33	-25	-26.33	V
4.979531	42.14	Pk	34.0	.3	-95.2	-31.0	-49.76	-25	-24.76	H
7.468125	39.54	Pk	35.6	.4	-95.2	-26.7	-46.36	-25	-21.36	V
7.468594	40.16	Pk	35.6	.4	-95.2	-26.7	-45.74	-25	-20.74	H
High Channel, 2490MHz										
1.607200	45.21	Pk	28.2	.6	-95.2	-35.2	-56.39	-50	-6.39	H
1.607440	44.10	Pk	28.2	.6	-95.2	-35.2	-57.50	-50	-7.50	V
4.979063	42.49	Pk	34.0	.3	-95.2	-31.0	-49.41	-25	-24.41	V
4.980938	43.18	Pk	34.0	.3	-95.2	-31.0	-48.72	-25	-23.72	H
7.470938	40.43	Pk	35.6	.4	-95.2	-26.6	-45.37	-25	-20.37	H
7.470938	40.98	Pk	35.6	.4	-95.2	-26.6	-44.82	-25	-19.82	V

11. SETUP PHOTOS

Please refer to 15175342-EP1V1 for setup photos.

END OF REPORT