TEST REPORT

Report Number: 15496224-E30V3

Applicant	:	APPLE, INC 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A3256
Brand	:	APPLE
FCC ID	:	BCG-E8949A
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC 47 CFR PART 2, PART 27

Date Of Issue:
2025-08-15

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

ACCREDITED
CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2025-07-03	Initial Review	--
V2	2025-07-16	Updated Section 6	Eric Ting
V3	2025-08-15	Revise section 6.5	Mengistu Mekuria

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

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47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

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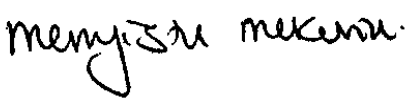
1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A3256
Brand	APPLE
FCC ID	BCG-E8949A
EUT Description	Smartphone
Serial Number	RADIATED: N4QD07QXJ9, CP2H9NGP6C CONDUCTED: C07HG80000L0000WGT, C07HG80000T0000WGT
Sample Receipt Date	2024-11-25
Date Tested	2024-11-25 to 2025-06-03
Applicable Standards	FCC 47 CFR PART 2, PART 27
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 Laboratory Engineer UL Verification Services Inc.	Eric Ting Senior Test Engineer UL Verification Services Inc.	Carlos D. Caudana Project Engineer UL Verification Services Inc.

2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer, which can impact the validity of the 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 and type (see section 6.4)

Requirement Description	Requirement Clause Number (FCC)	Result	Remarks
Equivalent Isotropic Radiated Power	27.50 (d) (4)	Complies	
Occupied Bandwidth	2.1049	Complies	
Band Edge and Emission Mask	2.1051, 27.53 (h)	Complies	
Out of Band Emissions	2.1051, 27.53 (h)	Complies	
Frequency Stability	2.1055, 27.54	Complies	
Peak-to-Average Ratio	27.50 (d) (5)	Complies	
Field Strength of Spurious Radiation	2.1053, 27.53 (h)	Complies	

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following.
FCC published lists of measurement procedures for compliance testing.

- ANSI C63.26:2015
- ANSI/TIA-603-E (2016)
- FCC 47 CFR Part 2, Part 27
- 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

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			

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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 dB
Power Spectral Density	2.466 dB
Time Domain Measurements Using SA	3.39 %
RF Power Measurement Direct Method Using Power Meter	0.450 dB Ave. 1.300 dB Peak
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

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6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with cellular GSM, GPRS, EGPRS, WCDMA, LTE, 5GNR1, 5GNR2, IEEE 802.11a/b/g/n/ac/ax/be, Bluetooth (BT), Ultra-Wideband (UWB), Global Positioning System (GPS), Near-Field Communication (NFC), Narrow-Band (NB) UNII, 802.15.4, 802.15.4ab-Narrow Band (NB), Wireless Power Transfer (WPT) 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

ERP/EIRP = PMeas + GT − 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:

5G NR n70

Part 27	
EIRP Limit (W)	1.00
Antenna Gain (dBi)Ant 2	-2.10

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (MHz)	99% BW (kHz)	Emission Designator
5.0	BPSK	1697.5	1707.5	25.69	23.59	0.229	4.506	4506	4M51G7W
	QPSK			25.69	23.59	0.229	4.509	4509	4M51G7W
	16QAM			24.51	22.41	0.174	4.511	4511	4M51D7W
10.0	BPSK	1700.0	1705.0	25.70	23.60	0.229	8.996	8996	9M00G7W
	QPSK			25.62	23.52	0.225	8.984	8984	8M98G7W
	16QAM			24.57	22.47	0.177	8.990	8990	8M99D7W
15.0	BPSK	1702.5	1702.5	25.66	23.56	0.227	13.496	13496	13M5G7W
	QPSK			25.66	23.56	0.227	13.474	13474	13M5G7W
	16QAM			24.54	22.44	0.175	13.465	13465	13M5D7W

6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 0.08.00.

6.4. MAXIMUM ANTENNA GAIN AND MAXIMUM ALLOWED OUTPUT POWER

The IFA antenna(s) gain/ allowed output power, as provided by the manufacturer' are as follows:

Bands	Frequency Range (MHz)	Antenna	Gain (dBi)	Max Allowed Conducted Output Power (dBm)	ERP/EIRP (dBm)
5G NR n70	1695 - 1710	ANT3	-4.0	25.7	21.70
		ANT4	-2.5	25.7	23.20
		ANT2	-2.1	25.7	**23.60**
		ANT1	-6.5	25.7	19.20

6.5. WORST-CASE CONFIGURATION AND MODE

This report covers the following technologies:

- 5G NR n70

For 5G NRs, conducted spurious emission tests were conducted on wider bandwidth with inner 1RB since this is the worst bandwidth and the highest output power.

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. Then, QPSK and BPSK were observed as the worst mode to LTE bands and 5G NR bands respectively and set for all conducted and radiated. Output power measurements were measured on BPSK, QPSK, 16QAM, 64QAM, and 256QAM modulations. For testing purposes emissions on section 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 port because it has the highest conducted power. The worst-case antenna port is shown in the table below.

5G NR Bands	Worst case Antenna Port
5G NR 70	Ant 3

The EUT was investigated in three orthogonal orientations X/Y/Z on all available antennas to determine the worst-case orientation. The following table exhibits the worst-case orientation. The full tests of the EUT have made upon the orientations shown in the table below.

Frequency Range	ANT3	ANT4	ANT2	ANT1
1695 – 1710 MHz	X	X	Y	Y

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 30MHz, 30MHz-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

Refer to Appendix A for description of test setup.

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47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

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**
Wideband Communication Test Set, Call Box	R&S GmbH & Co.	CMW500	230297	2026-02-28
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169936	2026-02-28
Antenna, Horn 1-18GHz	ETS Lindgren	3117	200897	2026-04-30
RF Filter Box, 1-18GHz, 12 Port	UL-FR1	Frankenstein	217255	2026-01-31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	223460	2026-02-28
RF Filter Box, 1-18GHz, 17 Port	UL-FR1	RATS 2	236726	2025-10-31
Antenna, Horn 1-18GHz	ETS Lindgren	3117	80403	2026-08-31
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	171863	2026-11-30
Amplifier 9 KHz - 1 GHz	SONOMA INSTRUMENT	310N	224490	2026-05-06
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO-METRICS	EM-6871	170013	2025-07-31
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170015	2025-07-31
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	172353	2025-08-31
Link File, RF Amplifier Assembly, 18-26.5GHz, 60dB Gain	AMPLICAL	AMP18G26.5-60	220194	2026-04-29
Antenna, Horn 26.5-40GHz	A.R.A	MWH-2640/B	81105	2025-08-31
Link File, RF Amplifier Assembly, 26.5-40GHz, 65dB Gain	Amplical	AMP26G40-65	220193	2026-04-30
PXA Signal Analyzer	Keysight Technologies Inc	N9030B	262735	2026-03-30
PXA Signal Analyzer	Keysight Technologies Inc	N9030B	231912	2026-04-30
PXA Signal Analyzer	Keysight Technologies Inc	N9030B	259079	2026-02-28
PXA Signal Analyzer	Keysight Technologies Inc	N9030B	262734	2026-04-30
Wideband Communication Call Box	Rohde & Schwarz	CMW500	230298	2026-02-28
Wideband Communication Call Box	Rohde & Schwarz	CMW500	85943	2026-02-28
Wideband Communication Call Box	Rohde & Schwarz	CMW500	262742	2027-02-11
Wideband Communication Call Box	Rohde & Schwarz	CMW500	262741	2027-02-11
Conducted Switch Box	N/A	CSB	221008	2026-04-30
Conducted Switch Box	N/A	CSB	262354	2026-04-30
Filter, BRF 3400-3800MHz, 18GHz max	Micro-Tronics	BRM50711	217364	2025-09-30
Filter, BRF 2305-2315	Micro-Tronics	BRC20553	224186	2026-06-29
Directional Coupler	KRYTAR	152610	254457	2025-10-31
Directional Coupler	KRYTAR	101040010K	254458	2025-10-30
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90718	2026-03-31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	257704	2026-03-31
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	89097	2025-10-31
UL AUTOMATION SOFTWARE				
Conducted Software	UL	CLT	Ver.2023 11.21.0 & .2024.3.20.0	
Conducted Software	UL	Antenna Port	Ver.2022.8.16& 2021.5.13	
Conducted Software	UL	Station Tool	Ver. 5.0 & 5.3	
Radiated Software	UL	UL EMC	Ver 9.5, May 1, 2023	

8. RF OUTPUT POWER VERIFICATION

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All bands conducted average power is obtained from the base station simulator.

The following tests were conducted according to the test requirements outlined in ANSI C63.26 Section 5.2.

RESULTS

EUT has different power levels for head use configuration and body use configuration. All measurements are made with the device operating at the highest average conducted output powers.

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8.1. 5G NR n70

Test Engineer ID:	27342	Test Date:	2025-01-09

OUTPUT POWER FOR 5G NR n70 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Conducted Average (dBm)											
				ANT 3			ANT 4			ANT 2			ANT 1		
				339500	340500	341500	339500	340500	341500	339500	340500	341500	339500	340500	341500
				1697.5	1702.5	1707.5	1697.5	1702.5	1707.5	1697.5	1702.5	1707.5	1697.5	1702.5	1707.5
5.0	BPSK	1	0	25.04	25.10	25.09	25.11	25.09	25.07	25.00	25.10	25.09	25.16	25.13	25.00
		1	1	25.60	25.55	25.54	25.65	25.54	25.61	25.61	25.60	25.61	25.65	**25.70**	25.57
		1	23	25.62	25.60	25.62	**25.70**	**25.70**	25.61	25.62	25.68	25.62	25.63	25.60	25.57
		1	24	25.08	25.10	25.11	25.09	25.04	25.11	25.11	25.12	25.16	25.20	25.20	25.07
		12	6	**25.70**	25.69	**25.70**	25.68	25.61	**25.70**	25.66	**25.69**	25.65	**25.70**	25.66	**25.70**
		25	0	24.94	24.99	25.03	24.98	24.97	24.97	25.07	25.04	24.97	25.00	24.99	25.02
	QPSK	1	0	24.53	24.55	24.55	24.48	24.53	24.53	24.48	24.59	24.50	24.57	24.52	24.54
		1	1	25.55	25.60	25.58	25.56	25.55	25.57	25.50	25.66	25.49	25.58	25.52	25.59
		1	23	25.58	25.69	25.66	25.52	25.61	25.56	25.60	25.68	25.56	25.62	25.60	25.60
		1	24	24.57	24.62	24.62	24.59	24.63	24.56	24.57	24.70	24.64	24.57	24.53	24.54
		12	6	25.64	25.69	**25.70**	25.56	**25.70**	25.64	25.66	**25.69**	25.65	**25.64**	25.62	25.53
		25	0	24.56	24.56	24.60	24.48	24.57	24.52	24.56	24.51	24.50	24.48	24.48	24.45
	16QAM	1	0	24.15	24.21	24.06	24.30	24.16	24.20	24.13	24.11	24.13	24.30	24.07	24.18
		1	1	24.45	24.51	24.46	24.58	24.46	24.45	24.49	24.41	24.45	**24.54**	24.45	24.47
		1	23	24.52	**24.57**	24.51	**24.64**	24.50	24.51	24.49	24.42	**24.51**	24.51	24.50	24.49
		1	24	23.49	23.56	23.50	23.51	23.48	23.39	23.49	23.49	23.58	23.54	23.38	23.46
		12	6	24.47	24.48	24.48	24.51	24.44	24.40	24.41	24.43	24.42	24.49	24.42	24.44
		25	0	23.41	23.44	23.40	23.48	23.44	23.45	23.40	23.43	23.58	23.46	23.36	23.46
	64QAM	1	0	22.88	22.97	22.86	23.02	23.02	22.94	22.99	22.95	23.05	22.99	22.94	22.90
		1	1	**23.03**	22.93	22.94	23.22	23.06	23.02	23.00	23.06	23.10	**23.10**	22.99	22.93
		1	23	22.97	22.95	22.99	23.09	23.12	22.90	**23.13**	22.96	23.08	**23.10**	22.99	22.96
		1	24	22.93	22.92	23.00	**23.23**	23.11	22.83	23.07	22.98	23.05	22.95	22.97	22.92
		12	6	22.94	22.91	22.91	23.17	23.06	22.86	23.06	22.94	22.99	23.01	22.94	22.88
		25	0	22.96	22.87	22.95	23.15	23.10	22.90	22.95	22.92	23.06	22.98	22.94	22.88
	256QAM	1	0	20.93	20.93	20.90	21.11	20.96	20.89	20.87	20.84	20.98	20.88	20.79	20.82
		1	1	20.89	20.87	20.91	21.18	21.14	20.82	20.89	20.86	21.04	21.03	20.92	20.87
		1	23	21.01	21.02	**21.17**	**21.19**	21.15	20.86	21.01	20.94	21.04	20.93	21.03	20.87
		1	24	20.89	20.99	21.02	21.14	20.95	20.86	**21.09**	20.91	20.98	21.02	21.03	20.69
		12	6	20.93	20.98	21.03	21.04	21.11	20.85	20.92	20.91	20.98	20.98	**21.04**	20.82
		25	0	20.94	20.97	21.01	20.98	20.98	20.83	20.90	20.87	20.98	21.01	21.00	20.88

OUTPUT POWER FOR 5G NR n70 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Conducted Average (dBm)											
				ANT 3			ANT 4			ANT 2			ANT 1		
				340000	340500	341000	340000	340500	341000	340000	340500	341000	340000	340500	341000
				1700.0	1702.5	1705.0	1700.0	1702.5	1705.0	1700.0	1702.5	1705.0	1700.0	1702.5	1705.0
10.0	BPSK	1	0	25.02	24.96	25.04	24.98	24.97	25.02	24.99	24.83	25.02	24.94	24.97	24.96
		1	1	25.61	25.63	25.68	**25.70**	25.58	25.68	25.53	25.44	25.65	25.56	25.56	25.60
		1	50	25.69	**25.70**	25.68	25.69	25.58	25.69	25.62	25.60	**25.70**	25.62	25.67	**25.69**
		1	51	25.06	25.12	25.09	25.08	25.02	25.11	25.04	24.99	25.11	25.05	25.04	25.09
		25	12	25.66	25.65	25.64	25.56	25.66	25.58	25.56	25.54	25.62	25.53	25.57	25.55
		50	0	25.10	25.08	25.05	25.04	25.08	25.09	24.99	24.98	25.06	24.96	25.02	25.07
	QPSK	1	0	24.55	24.50	24.55	24.39	24.57	24.56	24.33	24.32	24.45	24.41	24.48	24.52
		1	1	25.67	25.63	25.64	25.48	25.66	25.54	25.53	25.44	25.59	25.49	25.60	25.64
		1	50	25.69	**25.70**	25.68	25.56	25.64	**25.69**	**25.62**	25.60	25.60	25.62	25.67	**25.69**
		1	51	24.57	24.57	24.61	24.40	24.54	24.59	24.50	24.44	24.52	24.48	24.54	24.59
		25	12	25.69	25.65	25.63	25.43	25.61	25.65	25.51	25.49	25.55	25.56	25.66	25.63
		50	0	24.61	24.55	24.60	24.37	24.56	24.59	24.38	24.49	24.50	24.39	24.58	24.53
	16QAM	1	0	23.53	23.46	23.42	23.44	23.60	23.51	23.40	23.27	23.36	23.34	23.49	23.51
		1	1	24.47	24.41	24.52	24.48	**24.57**	24.52	24.38	24.30	**24.57**	24.33	24.50	24.44
		1	50	24.51	**24.56**	24.49	24.48	24.56	24.40	24.50	24.50	24.53	24.48	24.52	**24.58**
		1	51	23.49	23.46	23.43	23.34	23.44	23.44	23.43	23.50	23.50	23.37	23.50	23.41
		25	12	24.45	24.43	24.43	24.40	24.50	24.45	24.45	24.42	24.40	24.35	24.50	24.48
		50	0	23.51	23.46	23.46	23.33	23.53	23.41	23.42	23.45	23.38	23.40	23.49	23.47
	64QAM	1	0	22.94	22.93	22.93	22.80	23.05	22.84	22.83	22.83	22.80	22.77	22.94	22.82
		1	1	22.90	22.88	22.91	22.84	23.03	22.94	22.96	22.92	22.92	22.82	22.93	22.90
		1	50	**23.04**	22.99	22.93	22.98	23.08	22.93	22.91	23.10	23.00	23.05	**23.13**	23.06
		1	51	23.00	22.91	22.89	22.89	**23.16**	22.91	23.07	23.00	22.87	22.88	23.06	22.96
		25	12	22.99	22.89	22.89	22.93	23.03	22.90	23.10	22.95	22.86	22.89	22.98	22.98
		50	0	22.93	22.90	22.89	22.94	23.02	22.87	**23.14**	22.86	22.83	22.83	23.01	23.00
	256QAM	1	0	20.86	20.91	20.97	20.97	21.12	20.80	21.13	20.85	20.84	20.79	20.78	**20.98**
		1	1	20.94	20.91	20.93	20.90	**21.15**	20.97	21.02	20.80	20.81	20.76	20.85	20.90
		1	50	20.94	20.90	20.94	20.89	21.09	20.72	21.13	20.89	20.80	20.88	20.91	20.96
		1	51	20.84	20.82	**20.98**	20.78	20.94	20.87	21.10	20.85	20.88	20.79	20.97	20.90
		25	12	20.89	20.96	20.85	20.87	21.04	20.84	21.08	20.89	20.83	20.79	20.90	20.96
		50	0	20.87	20.88	20.91	20.86	21.02	20.88	**21.14**	20.90	20.92	20.82	20.92	20.90

OUTPUT POWER FOR 5G NR n70 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Conducted Average (dBm)											
				ANT 3			ANT 4			ANT 2			ANT 1		
				N/A	340500	N/A	N/A	340500	N/A	N/A	340500	N/A	N/A	340500	N/A
				N/A	1702.5	N/A	N/A	1702.5	N/A	N/A	1702.5	N/A	N/A	1702.5	N/A
15.0	BPSK	1	0		25.01			25.08			24.98			24.96	
		1	1		25.65			25.64			25.60			25.52	
		1	77		**25.69**			**25.70**			**25.66**			**25.69**	
		1	78		25.12			25.09			25.10			25.05	
		36	18		25.60			25.62			25.63			25.62	
		75	0		24.93			24.92			25.06			24.92	
	QPSK	1	0		24.54			24.51			24.45			24.50	
		1	1		**25.69**			25.57			25.55			**25.69**	
		1	77		25.63			**25.64**			**25.66**			25.67	
		1	78		24.56			24.50			24.57			24.62	
		36	18		25.56			25.53			25.62			25.56	
		75	0		24.44			24.48			24.51			24.41	
	16QAM	1	0		23.40			23.39			23.29			23.40	
		1	1		24.43			24.47			24.35			24.33	
		1	77		**24.45**			24.43			**24.54**			**24.56**	
		1	78		23.49			23.48			23.44			23.51	
		36	18		24.40			**24.48**			24.42			24.26	
		75	0		23.39			23.47			23.43			23.32	
	64QAM	1	0		22.89			22.96			22.93			22.75	
		1	1		22.95			22.88			22.91			22.84	
		1	77		23.01			22.97			**23.11**			22.91	
		1	78		**23.03**			**23.15**			23.00			**22.92**	
		36	18		22.88			22.92			23.00			22.71	
		75	0		22.86			22.91			23.01			22.73	
	256QAM	1	0		**20.99**			20.95			21.03			20.70	
		1	1		20.95			21.08			20.99			**20.84**	
		1	77		20.84			21.06			**21.06**			20.82	
		1	78		20.89			21.01			20.94			20.76	
		36	18		20.83			20.91			20.89			20.73	
		75	0		20.83			**21.54**			20.94			20.72	

9. CONDUCTED TEST RESULTS

9.1. 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.

5G NR n70

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
5G NR n70	5MHz, BPSK	25/0	1702.5	4.506	5.17
	5MHz, QPSK			4.509	5.19
	5MHz, 16QAM			4.511	5.27
	10MHz, BPSK	50/0		8.996	9.88
	10MHz, QPSK			8.984	9.91
	10MHz, 16QAM			8.990	10.01
	15MHz, BPSK	75/0		13.496	14.54
	15MHz, QPSK			13.474	14.50
	15MHz, 16QAM			13.465	14.53
	15MHz, BPSK	1/0		0.242	0.42

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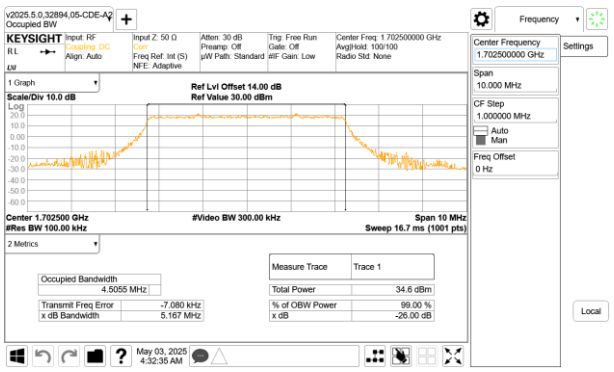
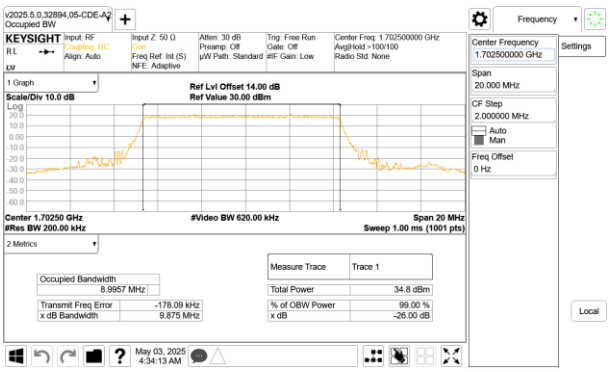
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

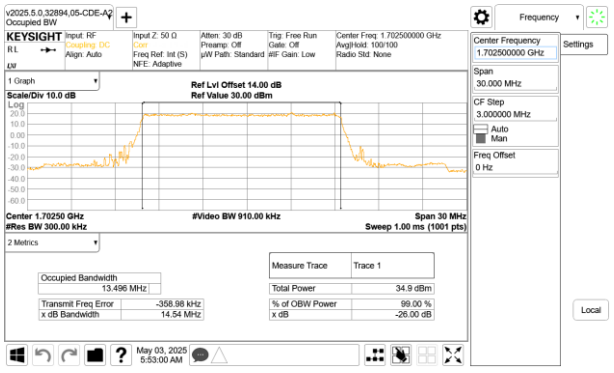
9.1.1. 5G NR n70



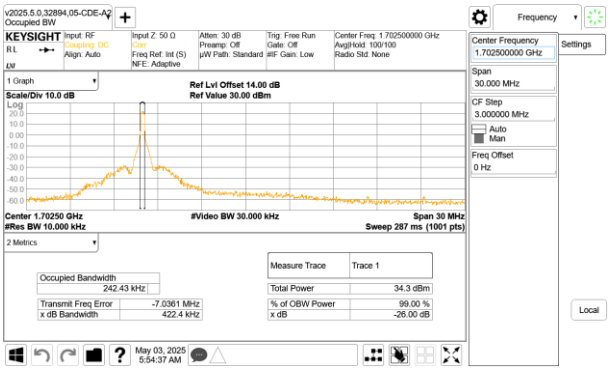
5G NR n70 5MHz BPSK Middle Channel RB25-0



5G NR n70 10MHz BPSK Middle Channel RB50-0



5G NR n70 15MHz BPSK Middle Channel RB75-0



5G NR n70 15MHz BPSK Middle Channel RB1-0

9.2. EMISSION MASK AND ADJACENT CHANNEL POWER

LIMITS

FCC: §27.53(h)
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.

TEST PROCEDURE

For Spectrum Emission Mask plots, the spectrum analyzer is configured to sweep with a moving integration window, the width of which can be adjusted to different sizes across the sweep. The window width is configured to be greater than or equal to the required reference bandwidth. The center frequencies of the integration window for the different integration windows was set such that the upper and lower edges of the windows are aligned with the transition points in the reference bandwidths. This is achieved by setting the start / stop frequencies of the window with an offset equal to the reference bandwidth / 2 from the transition point.

The transmitter output was connected to a base station simulator 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.

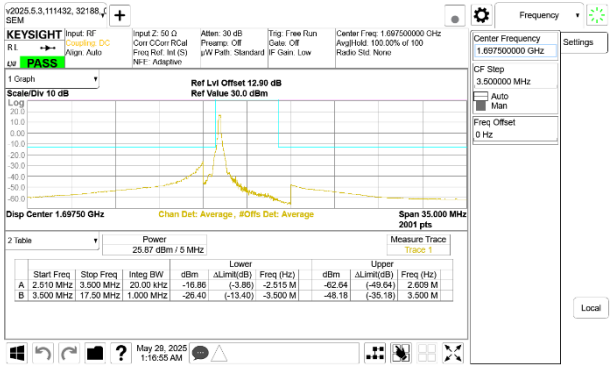
For each band edge measurement:

1. Set the spectrum analyzer span to include the block edge frequency.
2. Set a marker to point the corresponding band edge frequency in each test case.
3. Set display line at required limit.
4. Set resolution bandwidth to at least 1% of emission bandwidth.

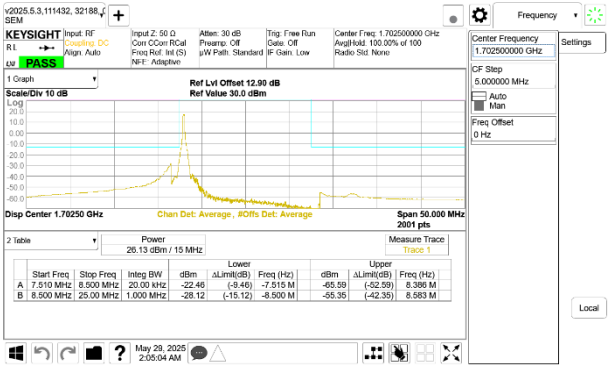
RESULTS

20MHz and 25MHz Bandwidth Upper Block Bandedge is covered by 5G NR n66 20MHz and 25MHz Bandwidth.

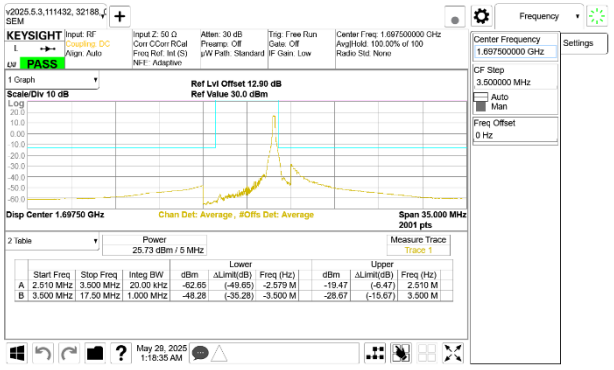
9.2.1. 5G NR n70



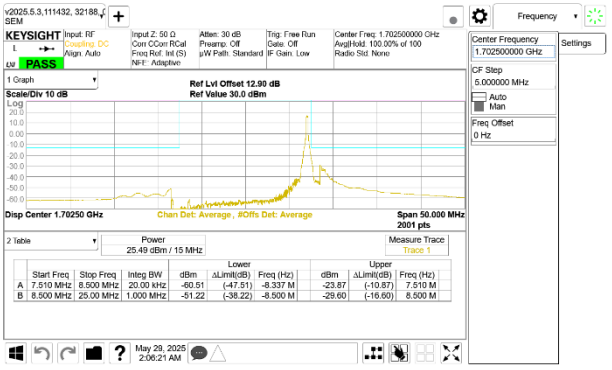
5G NR n70 5MHz BPSK Low Channel (Lower Block) RB1-0



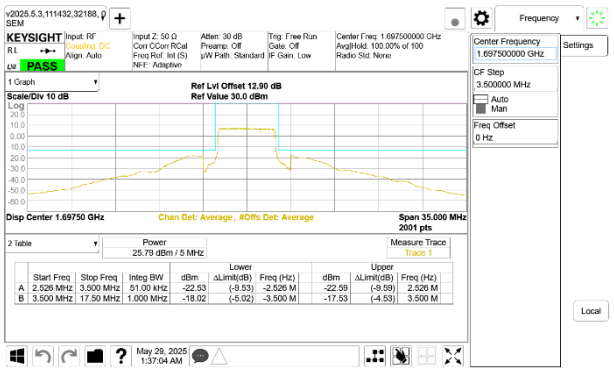
5G NR n70 15MHz BPSK Middle Channel (Full Block) RB1-0



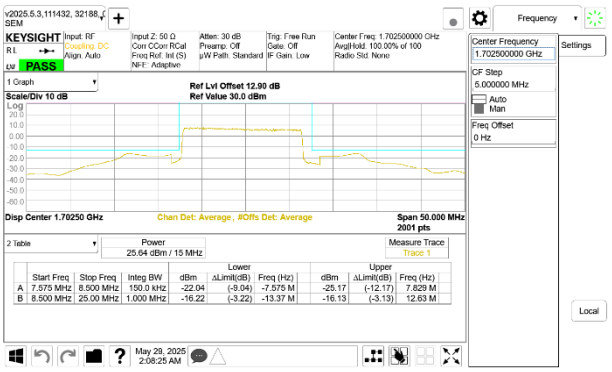
5G NR n70 5MHz BPSK Low Channel (Lower Block) RB1-24



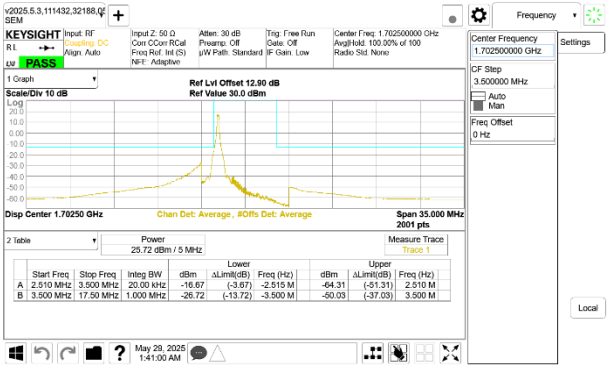
NR n70 15MHz BPSK Middle Channel (Full Block) RB1-78



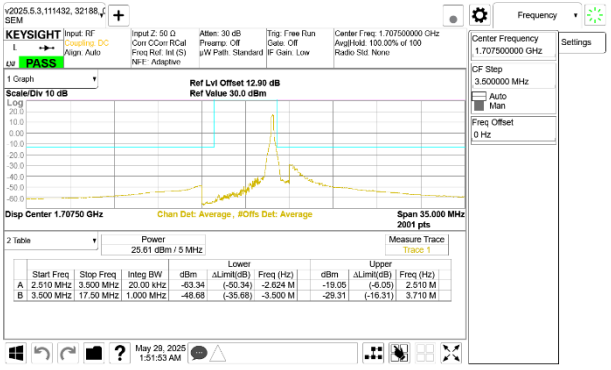
5G NR n70 5MHz BPSK Low Channel (Full Block) RB25-0



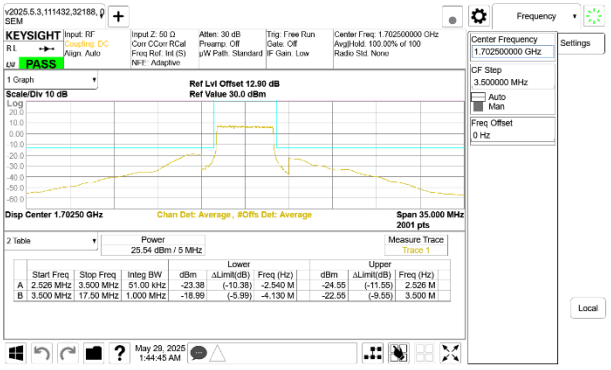
5G NR n70 15MHz BPSK Middle Channel (Full Block) RB75-0



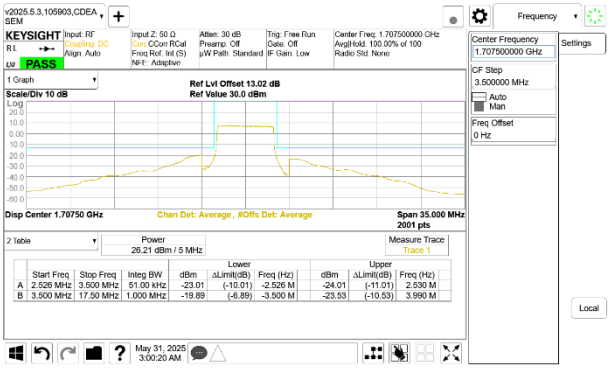
5G NR n70 5MHz BPSK Middle Channel (Upper Block) RB1-0



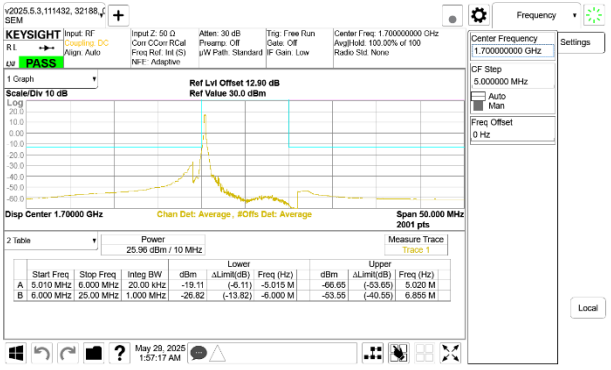
5G NR n70 5MHz BPSK High Channel (Upper Block) RB1-24



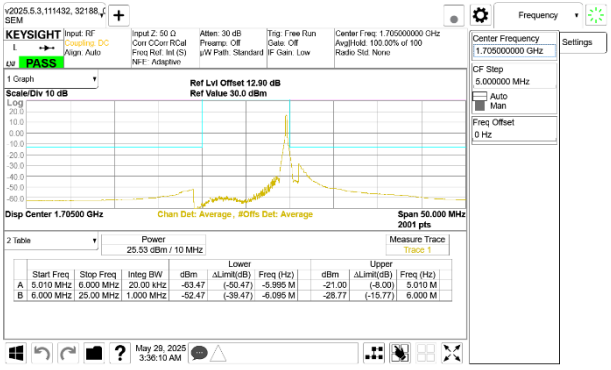
5G NR n70 5MHz BPSK Middle Channel (Upper Block) RB25-0



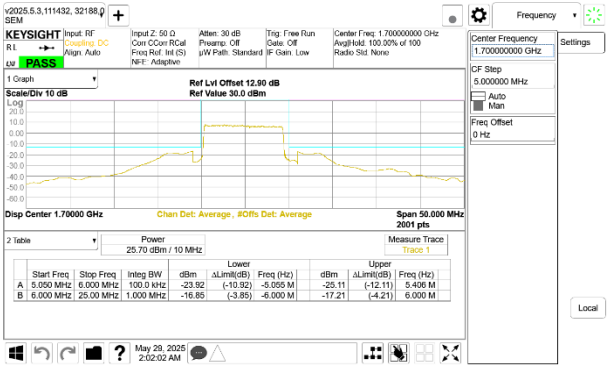
5G NR n70 5MHz BPSK High Channel (Upper Block) RB25-0



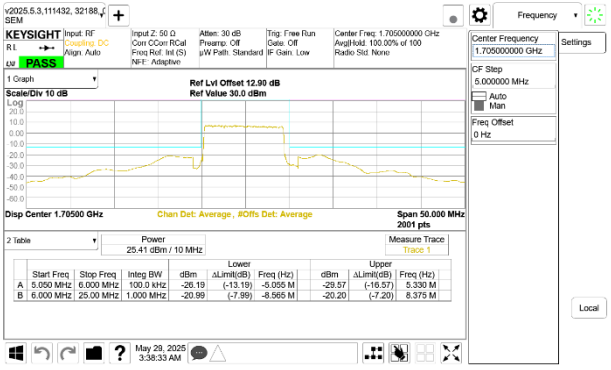
5G NR n70 10MHz BPSK Low Channel (Full Block) RB1-0



5G NR n70 10MHz BPSK High Channel (Full Block) RB1-51



5G NR n70 10MHz BPSK Low Channel (Full Block) RB50-0



5G NR n70 10MHz BPSK High Channel (Full Block) RB50-0

9.3. OUT OF BAND EMISSIONS

LIMITS

FCC: §27.53 (h)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

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 -13 dBm, -25dBm and -40dBm 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

BPSK with 1RB is the highest power and PSD to all bandwidth. 1RB has the same frequency and power to all bandwidth. Therefore, BPSK with 1RB and wider bandwidths results are reported as worst case for 5G NRs.

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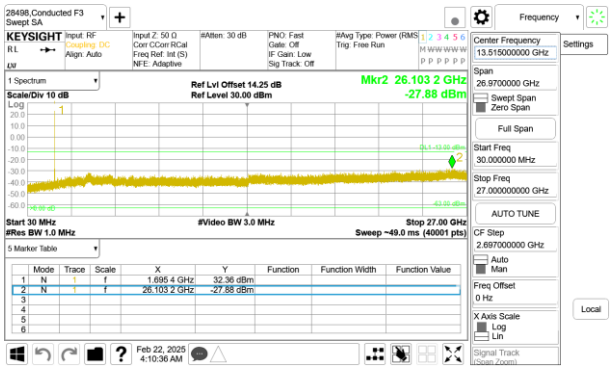
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

9.3.1. 5G NR n70



5G NR n70 15MHz BPSK Middle Channel RB1-1

Intentionally Blank

9.4. FREQUENCY STABILITY

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use base station simulator with Frequency Error measurement capability.

- Temp. = −30°C to +50°C
- Voltage = (85% - 115%)

  Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
  End Voltage, 3.2VDC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC 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 +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

RESULTS

See the following pages.

9.4.1. 5G NR n70 (BPSK 15MHz BANDWIDTH)

Test Engineer ID:	27700	Test Date:	2025-03-07

Band	70	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		1695	1710			
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	1695.4329	1708.8202			
Extreme (50°C)		1695.4329	1708.8202	-3.59	-0.002	Yes
Extreme (40°C)		1695.4329	1708.8202	-1.79	-0.001	Yes
Extreme (30°C)		1695.4329	1708.8202	-2.86	-0.002	Yes
Extreme (10°C)		1695.4329	1708.8202	-2.59	-0.002	Yes
Extreme (0°C)		1695.4329	1708.8202	-2.71	-0.002	Yes
Extreme (-10°C)		1695.4329	1708.8202	-5.63	-0.003	Yes
Extreme (-20°C)		1695.4329	1708.8202	1.06	0.001	Yes
Extreme (-30°C)		1695.4329	1708.8202	-0.73	0.000	Yes
20°C	15%	1695.4329	1708.8202	-4.8	-0.003	Yes
	-15%	1695.4329	1708.8202	0.63	0.000	Yes
	End Point Voltage	1695.4329	1708.8202	-1.65	-0.001	Yes

9.5. PEAK-TO-AVERAGE POWER RATIO

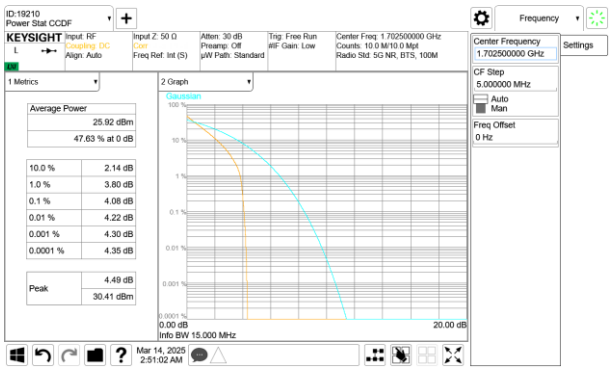
LIMIT

FCC: §27.50 (d) (5)
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

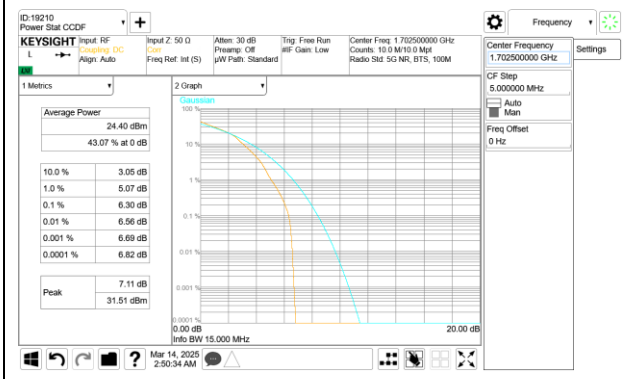
RESULT

Antenna 1 was used to measure as the worst case; full resource block (FRB) for each bandwidth was used to measure as the worst case. The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

Example Plots: FULL RB



5G NR n70 15MHz BPSK Middle Channel



5G NR n70 15MHz 16QAM Middle Channel

9.5.1. 5G NR n70

Test Engineer ID:	19210	Test Date:	2025-03-13

Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
5G NR n70	5MHz	1702.5	25	0	BPSK	30.28	25.98	4.30
					16QAM	31.21	24.41	6.80
	10MHz		50	0	BPSK	30.35	25.96	4.39
					16QAM	31.35	24.42	6.93
	15MHz		75	0	BPSK	30.41	25.92	4.49
					16QAM	31.51	24.4	7.11
Duty Cycle Correction Factor (dB) =			0.00					
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor								

10. RADIATED TEST RESULTS

LIMITS

FCC: §27.53 (h)
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.

Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, the radiated emissions is measured 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.

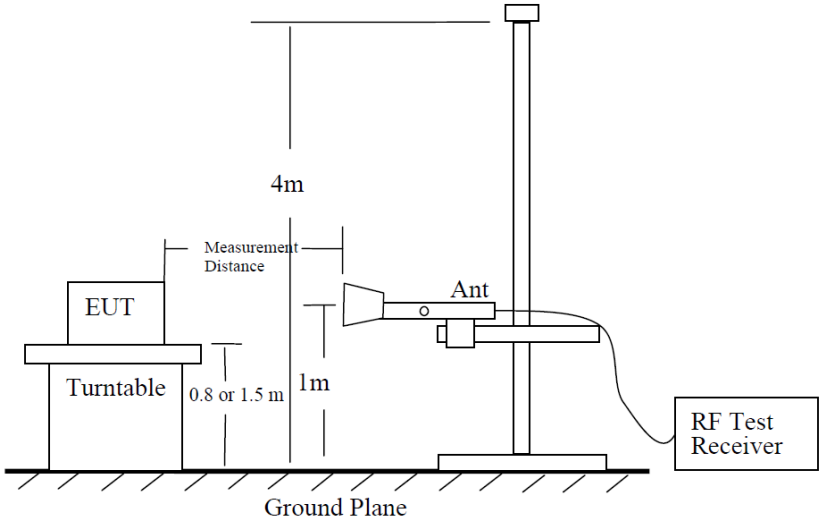


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

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

a) E (dBμV/m) = Measured amplitude level (dBμV) + Cable Loss (dB) + Antenna Factor (dB/m).
b) E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).
c) E (dBμV/m) = EIRP (dBm) − 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.
d) EIRP (dBm) = E (dBμV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

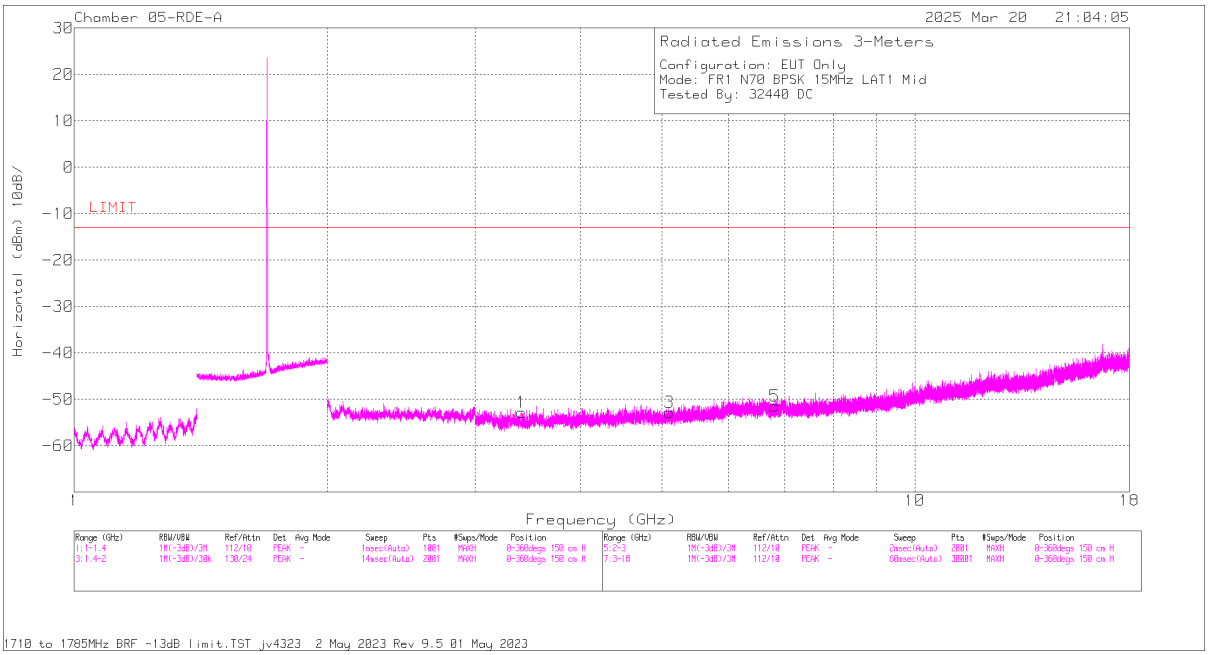
So, from d)

The measuring distance is usually at 3m, then 20*Log(3)=9.5424

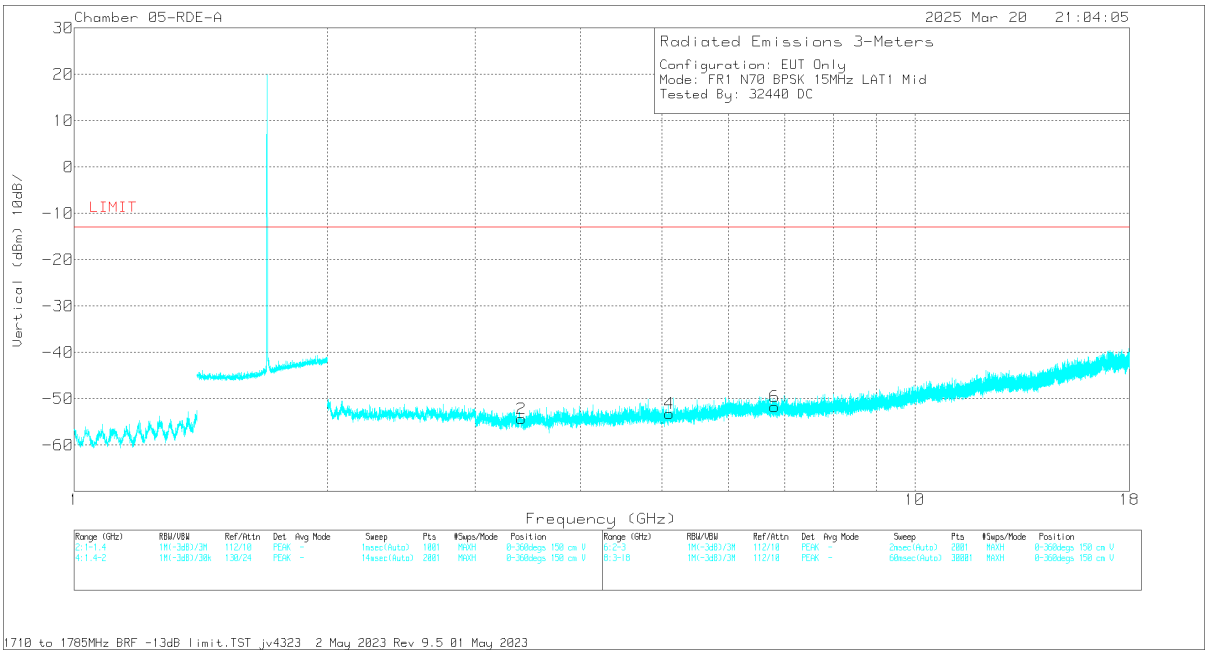
Then, EIRP (dBm) = E (dBμV/m) + 9.5424 − 104.8 = E (dBμV/m) – 95.2576

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



Horizontal Polarity



Vertical Polarity

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	80403 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT (dBm)	Margin (dB)	Polarity
3.404000	55.46	Pk	32.8	-95.2	-45.90	-52.84	-13	-39.84	H
3.407500	54.11	Pk	32.8	-95.2	-46.05	-54.34	-13	-41.34	V
5.105000	55.42	Pk	34.3	-95.2	-47.30	-52.78	-13	-39.78	H
5.106000	54.97	Pk	34.3	-95.2	-47.30	-53.23	-13	-40.23	V
6.810500	52.79	Pk	35.7	-95.2	-44.75	-51.46	-13	-38.46	H
6.812500	52.59	Pk	35.7	-95.2	-44.85	-51.76	-13	-38.76	V

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10.1. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz

TEST PROCEDURE

KDB 971168 D01 /D02

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

RESULTS

10.1.1. 5G NR n70

5G NR n70 (BPSK 15.0MHZ BANDWIDTH, ANT 3, based on 5G NR n70 maximum frequency range)

Date:	2025-03-20
Test Engineer:	32440
Configuration:	EUT Only
Mode:	5G NR n70 15MHz BPSK
Chamber #:	05-RDE-A

Frequency (GHz)	Meter Reading (dBuV)	Det	80403 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity
Mid Channel, 1702.5MHz									
3.404000	55.46	Pk	32.8	-95.2	-45.90	-52.84	-13	-39.84	H
3.407500	54.11	Pk	32.8	-95.2	-46.05	-54.34	-13	-41.34	V
5.105000	55.42	Pk	34.3	-95.2	-47.30	-52.78	-13	-39.78	H
5.106000	54.97	Pk	34.3	-95.2	-47.30	-53.23	-13	-40.23	V
6.810500	52.79	Pk	35.7	-95.2	-44.75	-51.46	-13	-38.46	H
6.812500	52.59	Pk	35.7	-95.2	-44.85	-51.76	-13	-38.76	V

5G NR n70 (BPSK 15.0MHZ BANDWIDTH, ANT 4, based on 5G NR n70 maximum frequency range)

Date:	2025-03-20
Test Engineer:	32440
Configuration:	EUT Only
Mode:	5G NR n70 15MHz BPSK
Chamber #:	05-RDE-A

Frequency (MHz)	Meter Reading (dBuV)	Det	80403 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity
Mid Channel, 1702.5MHz									
3.404500	53.20	Pk	32.8	-95.2	-45.95	-55.15	-13	-42.15	H
3.402500	53.80	Pk	32.8	-95.2	-45.95	-54.55	-13	-41.55	V
5.112500	55.11	Pk	34.3	-95.2	-47.35	-53.14	-13	-40.14	H
5.113000	56.06	Pk	34.3	-95.2	-47.40	-52.24	-13	-39.24	V
6.814000	53.00	Pk	35.7	-95.2	-45.00	-51.50	-13	-38.50	H
6.811000	53.39	Pk	35.7	-95.2	-44.80	-50.91	-13	-37.91	V

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5G NR n70 (BPSK 15.0MHZ BANDWIDTH, ANT 2, based on 5G NR n70 maximum frequency range)

Date:	2025-03-20
Test Engineer:	32440
Configuration:	EUT Only
Mode:	5G NR n70 15MHz BPSK
Chamber #:	05-RDE-A

Frequency (MHz)	Meter Reading (dBuV)	Det	80403 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity
Mid Channel, 1702.5MHz									
3.404500	55.16	Pk	32.8	-95.2	-45.95	-53.19	-13	-40.19	H
3.405500	54.42	Pk	32.8	-95.2	-46.05	-54.03	-13	-41.03	V
5.105000	54.52	Pk	34.3	-95.2	-47.30	-53.68	-13	-40.68	H
5.106500	55.42	Pk	34.3	-95.2	-47.30	-52.78	-13	-39.78	V
6.814000	52.94	Pk	35.7	-95.2	-45.00	-51.56	-13	-38.56	H
6.812000	52.52	Pk	35.7	-95.2	-44.80	-51.78	-13	-38.78	V

5G NR n70 (BPSK 15.0MHZ BANDWIDTH, ANT 1, based on 5G NR n70 maximum frequency range)

Date:	2025-03-21
Test Engineer:	25019
Configuration:	EUT Only
Mode:	5G NR n70 15MHz BPSK
Chamber #:	04-RDE-P

Frequency (MHz)	Meter Reading (dBuV)	Det	80403 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity
Mid Channel, 1702.5MHz									
3.390500	54.05	Pk	32.7	-95.2	-46.46	-54.91	-13	-41.91	H
3.390500	55.30	Pk	32.7	-95.2	-46.46	-53.66	-13	-40.66	V
5.085500	55.27	Pk	33.9	-95.2	-49.00	-55.03	-13	-42.03	H
5.085500	56.18	Pk	33.9	-95.2	-49.00	-54.12	-13	-41.12	V
6.785500	53.29	Pk	35.8	-95.2	-45.49	-51.60	-13	-38.60	H
6.785500	52.43	Pk	35.8	-95.2	-45.49	-52.46	-13	-39.46	V

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11. SETUP PHOTOS

Refer to 15496224-EP1V1 for setup photos.

END OF REPORT