

PCTEST

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PART 27 MEASUREMENT REPORT

Applicant Name:

SONY Corporation 1-7-1 Konan Minato-ku Tokyo, 108-0075, Japan

Date of Testing:

8/2 – 10/04/2021 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M2108040087-17-R2.PY7

FCC ID:

SONY Corporation

PY7-95324M

Application Type: EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s):

Applicant Name:

Certification Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 27 ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

Note: This revised Test Report (S/N: 1M2108040087-17-R2.PY7) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Randy Ortanez President



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				Ell	RP	
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Emission Designator
		π/2 BPSK	3750.0 - 3930.0	0.060	17.79	96M9G7D
	100 MHz	QPSK	3750.0 - 3930.0	0.062	17.90	97M8G7D
		16QAM	3750.0 - 3930.0	0.035	15.39	97M8W7D
		Π/2 BPSK	3745.0 - 3935.0	0.061	17.87	87M2G7D
	90 MHz	QPSK	3745.0 - 3935.0	0.062	17.94	87M7G7D
		16QAM	3745.0 - 3935.0	0.034	15.29	87M8W7D
		Π/2 BPSK	3740.0 - 3940.0	0.064	18.07	77M4G7D
	80 MHz	QPSK	3740.0 - 3940.0	0.061	17.87	77M7G7D
		16QAM	3740.0 - 3940.0	0.033	15.23	77M8W7D
	70 MHz	Π/2 BPSK	3735.0 - 3945.0	0.062	17.94	68M4G7D
		QPSK	3735.0 - 3945.0	0.045	16.55	67M7G7D
		16QAM	3735.0 - 3945.0	0.027	14.35	67M7W7D
NR Band n77	60 MHz	Π/2 BPSK	3730.0 - 3950.0	0.061	17.85	58M5G7D
(3700 - 3980MHz)		QPSK	3730.0 - 3950.0	0.063	18.03	58M2G7D
(3700 - 330010112)		16QAM	3730.0 - 3950.0	0.032	15.11	58M2W7D
	50 MHz	Π/2 BPSK	3725.0 - 3955.0	0.067	18.29	46M0G7D
		QPSK	3725.0 - 3955.0	0.068	18.35	48M0G7D
		16QAM	3725.0 - 3955.0	0.033	15.23	47M7W7D
		Π/2 BPSK	3720.0 - 3960.0	0.068	18.34	35M8G7D
	40 MHz	QPSK	3720.0 - 3960.0	0.069	18.39	38M0G7D
		16QAM	3720.0 - 3960.0	0.036	15.51	38M0W7D
		π/2 BPSK	3715.0 - 3965.0	0.069	18.37	27M1G7D
	30 MHz	QPSK	3715.0 - 3965.0	0.070	18.45	28M0G7D
		16QAM	3715.0 - 3965.0	0.036	15.53	28M0W7D
		π/2 BPSK	3710.0 - 3970.0	0.070	18.45	18M0G7D
	20 MHz	QPSK	3710.0 - 3970.0	0.073	18.64	18M3G7D
		16QAM	3710.0 - 3970.0	0.036	15.58	18M3W7D

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **SONY Portable Handset FCC ID:PY7-95324M**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27.

Test Device Serial No.: 43745, 43844, 43869, 43786

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900, WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR , 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 0 of this test report for a description of the radiated and antenna port conducted emissions tests.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated power measurements, substitution method is used per the guidance of ANSI/TIA-603-E-2016. A halfwave dipole is substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

P_{d [dBm]} = P_{g [dBm]} - cable loss [dB]</sub> + antenna gain [dBd/dBi];

where P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to P_g [dBm] – cable loss [dB].

For radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:

$$\begin{split} E_{[dB\mu V/m]} &= Measured \ amplitude \ level_{[dBm]} + 107 + Cable \ Loss_{[dB]} + Antenna \ Factor_{[dB/m]} \\ And \\ EIRP_{[dBm]} &= E_{[dB\mu V/m]} + 20 logD - 104.8; \ where \ D \ is the measurement \ distance \ in \ meters. \end{split}$$

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

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4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description Cal Date Cal Interval Cal E		Cal Due	Serial Number	
-	AP2	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	AP2
-	AP1	EMC Cable and Switch System	3/9/2021	Annual	3/9/2022	AP1
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx1	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx1
-	LTx2	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx2
-	LTx3	LIcensed Transmitter Cable Set	2/26/2021	Annual	2/26/2022	LTx3
Anritsu	MT8821C	Radio Communication Analyzer		N/A		6201525694
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Annual	8/27/2022	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/20/2021	Biennial	4/20/2023	00125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS Lindgren	3816/2NM	LISN	7/9/2020	Biennial	7/9/2022	00114451
Keysight Technologies	N9020A	MXA Signal Analyzer	9/22/2020	Annual	9/22/2021	MY54500644
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11208010032
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11403100002
Rohde & Schwarz	CMW500	Radio Communication Tester		N/A		100976
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A		112347	
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
Sunol	JB6	LB6 Antenna	11/13/2020	Biennial	11/13/2022	A082816

Table 5-1. Test Equipment

Notes:

- 1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- 2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz G = Phase Modulation 7 = Quantized/Digital Info D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission, telemetry, telecommand

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 3700.40 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm -(-24.80) = 50.3 dBc.

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7.0 TEST RESULTS

7.1 Summary

Company Name:	SONY Corporation
FCC ID:	<u>PY7-95324M</u>
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
	Transmitter Conducted Output Power	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2
Ð	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
CONDUCTED	Conducted Band Edge / Spurious Emissions (NR Band n77)	2.1051, 27.53(I), 27.53(n)	≤ 13 dBm / MHz	PASS	Sections 7.4, 7.5
ខ	Peak-to-Average Ratio (NR Band n77)	27.53(j)(4), 27.53(k)(4)	≤ 13 dB	PASS	Section 7.6
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block.	PASS	Section 7.9
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band n77)	27.53(j)(3), 27.53(k)(3)	≤ 1 Watt EIRP	PASS	Section 7.7
RADI	Radiated Spurious Emissions (NR Band n77)	2.1053, 27.53(I), 27.53(n)	≤ 13 dBm / MHz	PASS	Section 7.8

Table 7-1. Summary of Test Results (FCC)

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST EMC Software Tool v1.0.

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7.2 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW \geq 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
 - 1-5% of the 99% occupied bandwidth observed in Step 7

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

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NR Band n77 – MAIN Antenna



Plot 7-1. Occupied Bandwidth Plot (NR Band n77 - 100MHz $\pi/2$ BPSK - Full RB)

1 Graph * Scale/Div 10.0 dB Ref Value 20.00 dBm Log CF Step 1 Graph CF Step 25.000 MHz 20.0 1 Graph 1 Graph <t< th=""><th></th><th>na oci i Autono RE i</th><th>hput Z: 50 Ω Corr GCorr req Ref. Int (S) IFE: Off</th><th>Atten 30 dB</th><th>Trig. Free Run Gate: Off #IF Gain Low</th><th>Center Freq AvgiHold 10 Radio Std N</th><th></th><th>SHZ</th><th>3.8400</th><th>Frequency 000000 GHz</th><th>Setting</th></t<>		na oci i Autono RE i	hput Z: 50 Ω Corr GCorr req Ref. Int (S) IFE: Off	Atten 30 dB	Trig. Free Run Gate: Off #IF Gain Low	Center Freq AvgiHold 10 Radio Std N		SHZ	3.8400	Frequency 000000 GHz	Setting
Log 104 104 105 100 100 100 100 100 100 100	and and the local second			0.0.0.0						MHz	
200 0 An one of the second s	99 70 00 00								25.000 Au	000 MHz	
Center 3.8400 GHz Span 250 MHz Res BW 2.4000 MHz Sweep 1.00 ms (1001 pts) 2 Metrics Y		adarah kabupatan sa	ليندر			Uniceria	*:	man	and the second second	fset	
	nter 3.8400 GHz			Video BW 8.000	00 MHz	Sw					
	Metrics	Ť									
Occupied Bandwidth 97.816 MHz Total Power 18.9 dBm	Occupied Ba		Hz		Total Power		18.9 dBn	n			
Transmit Freq Error -196.79 kHz % of OBW Power 99.00 % x dB Bandwidth 103.6 MHz x dB -26.00 dB						ver					

Plot 7-2. Occupied Bandwidth Plot (NR Band n77 - 100MHz QPSK - Full RB)

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1 Graph T Scale/Div 10.0 dB Ref Value 20.00 dBm Log 1010		ioling DG G	out Z 50Ω Atten 30 di err CCorr eq Refint (S) ≔E Oft	3 Trig. Free Run Gate: Off #IF Gain Low	Center Freq Avg Hold_10 Radio Std_N			Frequency 00000 GHz	Setting
-org 1918	l Graph			dani ana			The second second	MHz	
All of the second se	- og 18 Ω 0.00 10 0						25.000 Au	000 MHz 10	
Res BW 2.4000 MHz Sweep 1.00 ms (1001 pts) 2 Metrics V Occupied Bandwidth 97.770 MHz Total Power 18.9 dBm Transmit Freq Error -144.03 kHz % ot OBW Power 99.00 %	3010 40.9 50 0 58.9	^ي ىلچىرەسىيەتلەرلىلارىللارىلەر يەلىم			- Longtone	aller and the charge of a default of		fset	
Occupied Bandwidth 97,770 MHz Total Power 18.9 dBm Transmit Freq Error -144.03 kHz % of OBW Power 99.00 %			1 #Video BW 8	.0000 MHz	Sw				
		Bandwidth	IZ	Total Power		18.9 dBm			
					ver				

Plot 7-3. Occupied Bandwidth Plot (NR Band n77 - 100MHz 16-QAM - Full RB)

t Graph Scale/Div 10.0 dB Ref Value 40.00 dBm Control 10.0 dB Ref Value 40.0 dBm Control 10.0 dBm Control		Hon Automa RF	Input Z: 50 Ω Con CCorr Freq Ref. Int (S) NFE: Off	Atten 26 dB	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq Avg Hold_1 Radio Sid_N			Frequency 000000 GHz	Settings
Log 301 301 302 301 302 302 300 300 300 300 300 300	1 Graph	*	NEE ON					The second second second	0 MHz	
In C 0 Image: Control of	20 0 10 0	dB						22.50 A	0000 MHz JIO	
Penter 3.8400 GHz \$pan 225 MHz tea BW 2.2000 MHz \$pan 225 MHz Sweep 1.00 ms (1001 pts) 2 Metrics Occupied Bandwidth 87.181 MHz Total Power 31.4 dBm Transmit Freq Error -460.98 kHz % of OBW Power 99.00 %	10/0 20.0 20.0 20.0 20.0					<u> </u>			lfset	
Occupied Bandwidth 87.181 MHz Total Power 31.4 dBm Transmit Freq Error -460.98 kHz % of OBW Power 99.00 %	Center 3.8400		#\	/ideo BW 8.000	0 MHz	Sw				
87.181 MHz Total Power 31.4 dBm Transmit Freq Error -460.98 kHz % of OBW Power 99.00 %	2 Metrics	×								
	Occup		1Hz		Total Power		31.4 dBm			
						ver				

Plot 7-4. Occupied Bandwidth Plot (NR Band n77 - 90MHz $\pi/2$ BPSK - Full RB)

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t Graph Scale/Div 10.0 dB Ref Value 30.00 dBm Cog 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0 d		Souping DG G	iput Z 50 Ω Atten 26 dB on CCon req Ref. int (S) FE: Off	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3.840000000 GHz Avgittold: 100/100 Radio Std: None	Center Frequency 3.640000000 GHz	Setting
CF Step 22.50000 MHz Auto Man Freq Offset 0 Hz Sweep 1.00 ms (1001 pts) CCcupied Bandwidth 87.693 MHz Transmit Freq Error -52.001 kHz * of OBW Power 99.00 %	t Graph	*				The second se	
200 0000000000000000000000000000000000	- 09 70 0 10 0 0 00	1B	Ref Value 3			22.500000 MHz	
Center 3.8400 GHz \$pan 225 MHz Res BW 2.2000 MHz \$pan 225 MHz Sweep 1.00 ms (1001 pts) 2 Metrics * Occupied Bandwidth 87.683 MHz Total Power 29.3 dBm Transmit Freq Error -52.001 kHz % of OBW Power 99.00 %	2010 30.0 40.0 50.0					and the second	
Occupied Bandwidth 87.693 MHz Total Power 29.3 dBm Transmit Freq Error -52.001 kHz % of OBW Power 99.00 %	Center 3.8400 G		↓ #Video BW 8	0000 MHz			
		ed Bandwidth	-1z	Total Power	29.3 dBm		

Plot 7-5. Occupied Bandwidth Plot (NR Band n77 - 90MHz QPSK - Full RB)

	HALL PURCHASE	nput Z: 50 Ω Atten: 26 2011 CCon Freq Ref. Int (S) VFE: Off	dB Trig. Free Run Gate: Off #IF Cain: Low	Center Freq: 3.84000 AvgiHold: 190/100 Radio Std: None	0000 GHz	Center Frequency 3.840000000 GHz	Settings
t Graph	*		C. S. C.			Span 225.00 MHz	
Scale/Div 10.0 1 20 0 10 0 0.00	1B		30.00 dBm			CF Step 22.500000 MHz Auto Man	
10.0 2010 30.0 40.0 50.0				Law-	and and all and a start	Freq Offset 0 Hz	
Center 3.8400 C Res BW 2.2000		#Video BV	V 8.0000 MHz		Span 225 MHz ms (1001 pts)		
2 Métrics	¥						
Occupi	ied Bandwidth 87.825 M	IHz	Total Power	29.4	4 dBm		
	nit Freq Error andwidth	-188.13 kHz 93.26 MHz	% of OBW Pov x dB		00 % 00 dB		
151	3 7 2	Sep 01, 2021		.:: 🔌	X		

Plot 7-6. Occupied Bandwidth Plot (NR Band n77 - 90MHz 16-QAM - Full RB)

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RI + High Automo RC	Input Z: 50 Ω Atten: 26 di Con CCon Freq Ref. Int (S) NEE: Off	3 Trig. Free Run Gate: Off #IF Gain Low	Center Freq: 3 Avg Hold: 100 Radio Std: Nor		Center Frequericy 3.840000000 GHz	Settings
Graph Y	24 C 250	ital alt			Span 200.00 MHz	
cale/Div 10.0 dB .og .gr .gr .gr .gr .gr .gr .gr .gr .gr .g	Ref Value 4				CF Step 20.000000 MHz Auto Man	
0.00 10.0 20.0 21.0 40.0	~		han		Freq Offset 0 Hz	
56 0 Center 3.8400 GHz Res BW 1.8000 MHz	#Video BW 6	0.0000 MHz	Swee	Span 200 Mi		
2 Metrics 😽						
Occupied Bandwidth 77.358	MHz	Total Power		31.4 dBm		
Transmit Freq Error x dB Bandwidth	-269.44 kHz 81.58 MHz	% of OBW Por x dB	war	99.00 % -26.00 dB		
15012	Sep 01, 2021			N X		

Plot 7-7. Occupied Bandwidth Plot (NR Band n77 - 80MHz $\pi/2$ BPSK - Full RB)

NFE: Off NFE: Off 1 Graph * Scale/Div 10.0 dB Ref Value 30.00 dBm Log	Span 200.00 MHz CF Step 20.000000 MHz Auto Man Freq Offset 0 Hz
Log 20 B 10 U 10 U 10 0 20 C 10 C 10 C 10 C 10 C 10 C 10 C 10 C 1	20.00000 MHz Auto Man Freq Offset
000	
	Span 200 MHz ms (1001 pts)
2 Motrics T	
Occupied Bandwidth 77.744 MHz Total Power 29.2	2 dBm
	00 % 00 dB

Plot 7-8. Occupied Bandwidth Plot (NR Band n77 - 80MHz QPSK - Full RB)

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Gouping DG Gor Bign Automo RF Free	it Z 50 Ω Atten 26 dB CCorr a Rel Int (S) ⊂ Off	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3.84000000 GHz Avg[Hold>100/100 Radio Std. None	3.84000000 GHz	ettings
Graph 🔻				Span 200.00 MHz	
cale/Div 10.0 dB og 00 00 00 00	Ref Value 30	.00 dBm		CF Step 20.000000 MHz Auto Man	
	ud		hannan	Hen Offset 0 Hz	
enter 3.8400 GHz es BW 1.8000 MHz	#Video BW 6.0	0000 MHz	Span 200 M Sweep 1.00 ms (1001 p		
Metrics r					
77.809 MHz		Total Power	29.2 dBm		
Transmit Freq Error x dB Bandwidth	-103.08 kHz 82.29 MHz	% of OBW Pov x dB	wer 99.00 % -26.00 dB		

Plot 7-9. Occupied Bandwidth Plot (NR Band n77 - 80MHz 16-QAM - Full RB)

Keysight Spectrum Analyzer - Occupied B	w					
LX RL RF 50Ω DC		SENSE:INT Center Freq: 3.84000	ALIGN I	Radio Std:	None	Trace/Detector
	++→ #IFGain:Low	Trig: Free Run #Atten: 26 dB	Avg Hold: 100/1	100 Radio Devi	ce: BTS	
	#IFGaIN:LOW	#Atten: 20 db		Radio Devi	CE. DTS	
10 dB/div Ref 20.00 dBr	~					
Log						
10.0	A ALAN HOULA	whenered	An Costo all Mar.			Clear Write
0.00						Clear Wille
-10.0						
-20.0			<u> </u>			
-30.0	N		- John Marine			Average
-40.0 managed by 1					matherite	
-50.0						
-60.0						Max Hold
-70.0						
Center 3.84000 GHz				Snan 1	75.0 MHz	
Res BW 1.6 MHz		#VBW 5 MH	z		ep 1 ms	Min Hold
						Minition
Occupied Bandwid		Total P	ower	21.3 dBm		
64	4.582 M⊦	lz				Detecto
Transmit Freq Error	-1.6848 M	Hz % of O	BW Power	99.00 %		Peak Auto Mar
x dB Bandwidth	68.43 M	Hz x dB		-26.00 dB		
MSG				STATUS		

Plot 7-10. Occupied Bandwidth Plot (NR Band n77 - 70MHz BPSK - Full RB)

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EYSIGHT Input RF Input 2.3 Couping, DC Corr Corr AL + Input 2.4 Couping, DC Corr Corr Augr Automot RF Frag Rel NFE Off	nn (S)	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3,840000000 GHz Avg Hold:>100/100 Radio Sid: None	Center Frequency 3.640000000 GHz
Graph Y				Span 175.00 MHz
cale/Div 10.0 dB .og /// 0 // 0 // 0 // 0	Ref Value 30.00			CF Step 17.500000 MHz Auto Man
			have a service of the	Freq Offset 0 Hz
enter 3.84000 GHz es BW 1.6000 MHz	#Video BW 5.000	00 MHz	Span 175 Sweep 1.00 ms (1001	
Metrics v Occupied Bandwidth 67.739 MHz		Total Power	29.0 dBm	
	2.159 kHz 71.65 MHz	% of OBW Pow x dB	99.00 % -26.00 dB	

Plot 7-11. Occupied Bandwidth Plot (NR Band n77 - 70MHz QPSK - Full RB)

	Houping too	Input Z 50 0 Attr Corr CCorr Freq Ref. Int (S) NFE- Off	en 26 dB	Trig. Free Run Gate: Off #IF Cain: Low	Center Freq Avg Hold 10 Radio Std N			Center Frequency 3.840000000 GHz	Settings
1 Graph	*							Span 175.00 MHz	
Scale/Div 10.0	dB	Ref	Value 30.00	dBm				CF Step 17.500000 MHz Auto Man	
10.0 2010 30.0 40.0 50.0	-				l'anna anna anna anna anna anna anna ann	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Freq Offset 0 Hz	
Center 3.84000 Res BW 1.6000		#Vide	eo BW 5.0000) MHz	Swe	Span 17 ep 1.00 ms (10			
2 Métrics	÷								
Occup	ied Bandwidth 67.720 1	MHz		Total Power		29.1 dBm			
	mit Freq Error Bandwidth	-86.161 kHz 71.67 MHz		% of OBW Pov x dB	ver	99.00 % -26.00 dB			
15	212	Sep 01, 2021					X		

Plot 7-12. Occupied Bandwidth Plot (NR Band n77 - 70MHz 16-QAM - Full RB)

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Coupling DC Con C	tel int (S)	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3.840000000 GHz Avgil-fold: 100/100 Radio Std: None	Center Frequency 3.640000000 GHz
Graph Y				Span 150.00 MHz
cale/Div 10.0 dB .og // 0 // 0 // 0 // 0	Ref Value 30.0	00 dBm		CF Step 15.000000 MHz Auto Man
				Freq Offset 0 Hz
enter 3.84000 GHz es BW 1.5000 MHz	#Video BW 5.0	000 MHz	Span 150 MH Sweep 1.00 ms (1001 pts	
Metrics Y				
Occupied Bandwidth 58.512 MHz		Total Power	31.3 dBm	
Transmit Freq Error x dB Bandwidth	-186.28 kHz 61.89 MHz	% of OBW Pov x dB	wer 99.00 % -26.00 dB	

Plot 7-13. Occupied Bandwidth Plot (NR Band n77 - 60MHz π/2 BPSK - Full RB)

	oupling LNG (con-	Z 50 0 Atten 26 di CGorr Ref. htt (S) Off	B Trig, Free Run Gate: Off #IF Cain: Low	Avg Hold: 100 Radio Std: No		Center Frequency 3.840000000 GH:	
Graph	Ť					Span 150.00 MHz	
cale/Div 10.0 dl	8	Ref Value 3	30.00 dBm	1		CF Step	
00 00		franker un we	and the analysis and the			15.000000 MHz Auto Man	
0.0	and the second second	r'		Toutoway	-	Freq Offset	
0.0 0.0							
enter 3.84000 G s BW 1.5000 N		#Video BW 5	5.0000 MHz	Swe	Span 150 Mi ep 1.00 ms (1001 pt		
Metrics	¥						
Occupie	d Bandwidth 58,244 MHz		Total Power		29.0 dBm		
Transmi	t Freg Error	-104.38 kHz	% of OBW Poy	wer	99.00 %		
x dB Ba		63.54 MHz	x dB		-26.00 dB		

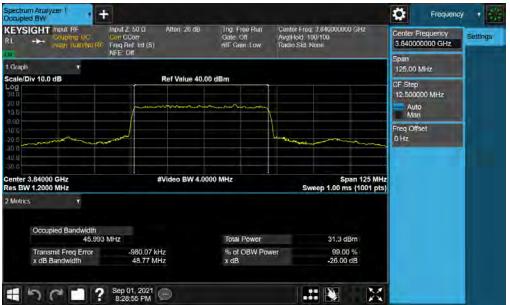
Plot 7-14. Occupied Bandwidth Plot (NR Band n77 - 60MHz QPSK - Full RB)

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Coupling OC Co	nut Z 50 Ω Atten 26 dB m CCorr aq Refint (S) E Off	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3 Avg Hold: 100 Radio Std: Nor		Center Frequency 3.840000000 GHz	Setting
Graph 🔹		an an			Span 150.00 MHz	
cale/Div 10.0 dB .og 200 .000	Ref Value 30	.00 dBm			CF Step 15.000000 MHz Auto Man	
10.0 200 200 200 50.0 50.0			Marria Marria	and in the second second second	Freq Offset 0 Hz	
enter 3.84000 GHz tes BW 1.5000 MHz	#Video BW 5.0	0000 MHz	Swee	Span 150 MH p 1.00 ms (1001 pts		
Metrics Y Occupied Bandwidth 58.217 MH	z	Total Power		29.2 dBm		
Transmit Freq Error x dB Bandwidth	18.639 kHz 61.76 MHz	% of OBW Por x dB	wet	99.00 % -26.00 dB		

Plot 7-15. Occupied Bandwidth Plot (NR Band n77 - 60MHz 16-QAM - Full RB)



Plot 7-16. Occupied Bandwidth Plot (NR Band n77 - 50MHz π/2 BPSK - Full RB)

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EYSIGHT Input RF Input 2 5 Gouping NC Gon CCo High Automo RF Freq Ref. NFE: Off	nt (S)	Trig, Free Run Gate: Off #IF Gain: Low	Center Freq: 3,84000000 GI Avg[Hold: 100/100 Radio Std: None	3.840000000 G	
Graph 🔻	and have been a			Span 125.00 MHz	
cale/Div 10.0 dB og 0 0 0 0 0 0	Ref Value 30.00) dBm		CF Step 12.500000 MH; Auto Man	2
				Freq Offset 0 Hz	
enter 3.84000 GHz es BW 1.2000 MHz	#Video BW 4.000	00 MHz	Span Sweep 1.00 ms (1	125 MHz 1001 pts)	
Metrics v Occupied Bandwidth 47.984 MHz		Total Power	29.2 dBm		
	0.816 kHz 50.70 MHz	% of OBW Pov x dB	ver 99.00 % -26.00 dB		

Plot 7-17. Occupied Bandwidth Plot (NR Band n77 - 50MHz QPSK - Full RB)

	iping, NG 0 F Aupho RE 1	nput Z: 50 Ω Son CCorr Freq Ref. Int (S) NFE: Off	Atten 26 dB	Trig. Free Run Gate: Off #IF Cain: Low	Center Freq AvgiHold 10 Radio Std No		3.8400	Frequency 00000 GHz	Setting
Graph	*		3. a. f a				Span 125.00	MHz	
cale/Div 10.0 dB			lef Value 30.00) dBm 			CF Step 12.500 Aut Ma	000 MHz Io	
10.0 2010 10.0 30.0	29				Lamora	minin num	Freq Off 0 Hz	fset	
enter 3.84000 GH es BW 1.2000 MH		#V	ideo BW 4.000	00 MHz	Swe	Span 125 ep 1.00 ms (1001			
Metrics	Ň								
Occupied	Bandwidth 47,694 M	Hz		Total Power		29.1 dBm			
Transmit F x dB Band		-22.182 kHz 50.62 MHz		% of OBW Por x dB	wet	99.00 % -26.00 dB			

Plot 7-18. Occupied Bandwidth Plot (NR Band n77 - 50MHz 16-QAM - Full RB)

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Coupling OC Coupling OC C	nput Z 50 Ω Atten 26 dE Son CCon req Ref. Int (S) IFE: Off	3 Thg. Free Run Gate: Off #IF Cein: Low	Center Freq: 3,84000000 GHz AvgiHold: 100/100 Radio Sid: None	Center Frequency 3.84000000 GHz
Graph Y				Span 100.00 MHz
cale/Div 10.0 dB .0g // 0 // 0 // 0 // 0	Ref Value 3	0.00 dBm		CF Step 10.000000 MHz Auto Man
			·	Freq Offset 0 Hz
enter 3.84000 GHz es BW 910.00 kHz	#Video BW 3	.0000 MHz	Span 100 Sweep 1.00 ms (1001	
Metrics v				
35.783 M	Hz	Total Power	31.1 dBm	
Transmit Freq Error x dB Bandwidth	-1.1181 MHz 38.28 MHz	% of OBW Pow x dB	rer 99.00 % -26.00 dB	

Plot 7-19. Occupied Bandwidth Plot (NR Band n77 - 40MHz π/2 BPSK - Full RB)

	HOUDING DIS 15	iput Z. 50.Ω Atten 26 di an CCorr req Ref. Int (S) FE: Off	3 Trig. Free Run Gate: Off #IF Cain: Low	Center Freq 3 AvgiHold 100 Radio Std No		Center Frequency 3.640000000 GHz	Settings
1 Graph	*					Span 100.00 MHz	
Scale/Div 10.0	dB	Ref Value 3	0.00 dBm			CF Step 10.000000 MHz Auto Man	
10.0 20.0 30.9 40.0 58.0	****			hum		Freq Offset 0 Hz	
Center 3.84000 Res BW 910.00		#Video BW 3	3.0000 MHz	Swe	Span 100 MH ep 1.00 ms (1001 pts		
2 Metrics	- *						
Occup	pied Bandwidth 38.005 Mi	Hz	Total Power		29.1 dBm		
	mit Freq Error Bandwidth	-79.123 kHz 40.52 MHz	% of OBW Pow x dB	wer	99.00 % -26.00 dB		
15	C* 1 ?	Sep 01, 2021 8:39:11 PM					

Plot 7-20. Occupied Bandwidth Plot (NR Band n77 - 40MHz QPSK - Full RB)

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EYSIGHT Input RF Input Z Gouping: DC Corr CC oupri automor RF Freq Re NFE: Of	orr Fint (S)	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3,84000 Avg Hold: 100/100 Radio Std: None	0000 GHz	Center Frequency 3.840000000 GHz	Settings
Graph v	and the second				Span 100.00 MHz	
cale/Div 10.0 dB og 0 0 0 0 0 0 0 0	Ref Value 30.00				CF Step 10.000000 MHz Auto Man	
					Freq Offset 0 Hz	
enter 3.84000 GHz es BW 910.00 kHz	#Video BW 3.000	0 MHz	Sweep 1.0	Span 100 MHz 0 ms (1001 pts)		
Metrics T						
Occupied Bandwidth 37.965 MHz		Total Power	29	.3 dBm		
	34.770 kHz 40.38 MHz	% of OBW Pow x dB		9.00 % 5.00 dB		

Plot 7-21. Occupied Bandwidth Plot (NR Band n77 - 40MHz 16-QAM - Full RB)

t Graph Scale/Div 10.0 dB Ref Value 40.00 dBm Control 10.0 dB Ref Value 40.00 dBm CF Step 7.500000 MHz Auto Man Freq Offset 0 Hz Sweep 1.00 ms (1001 pts)		HUDING DG	nput Z 50 Ω Atten 26 Sen CCon Feq Ref. Int (S)	dB Trig. Free Run Gate: Off #IF Gain Low	Center Freq: 3.840000 Avg Hold: 100/100 Radio Std: None	0000 GHz	Center Frequence 3.840000000 GH	
CF Step 7.500000 MHz Auto Man Freq Offset 0 Hz Sweep 1.00 ms (1001 pts) 2 Motics Cccupied Bandwidth 27.097 MHz Transmit Freq Error -664.20 kHz % of OBW Power 99.00 %		*	4FC. 001				and the second se	
10.0 group 10.0 group <td>20 0</td> <td>dB</td> <td></td> <td></td> <td></td> <td></td> <td>7.500000 MHz</td> <td></td>	20 0	dB					7.500000 MHz	
Center 3.84000 GHz #Video BW 2.4000 MHz Span 75 MHz Res BW 750.00 kHz Sweep 1.00 ms (1001 pts) 2 Metrics V Occupied Bandwidth 27.097 MHz Total Power 31.3 dBm Transmit Freq Error -664.20 kHz % of OBW Power 99.00 %	10:0 20:0 30:0 40:0				L			
Occupied Bandwidth 27.097 MHz Total Power 31.3 dBm Transmit Freq Error -664.20 kHz % of OBW Power 99.00 %	Center 3.84000		#Video BV	2.4000 MHz	Sweep 1.00			
27.097 MHz Total Power 31.3 dBm Transmit Freq Error -664.20 kHz % of OBW Power 99.00 %	2 Metrics	÷.						
	Occup		Hz	Total Power	31.3	3 dBm		
				% of OBW Pov				

Plot 7-22. Occupied Bandwidth Plot (NR Band n77 - 30MHz $\pi/2$ BPSK - Full RB)

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NFE: Dif NFE: Dif t Graph r Scale/Div 10.0 dB	Ref Valué 30.00 dBm		and a second	Span 75.000 MHz CF Step 7.500000 MHz Auto Man Freq Offset	
Log 70 II 10 0 000 70 0 70 0 70 0 30 9			Warred Verselander and the second	7.500000 MHz Auto Man	
20.0 30.9		- Andrew	and and and the services	Freq Offset	
50.0				0 Hz	
Center 3.84000 GHz # #Res BW 750.00 kHz	Video BW 2.4000 MHz		Span 75 MH Sweep 1.00 ms (1001 pts		
2 Motrics v Occupied Bandwidth 28.017 MHz	Total	Power	29.0 dBm		
Transmit Freq Error -76.148 kH x dB Bandwidth 30.60 MH		DBW Power	99.00 % -26.00 dB		

Plot 7-23. Occupied Bandwidth Plot (NR Band n77 - 30MHz QPSK - Full RB)



Plot 7-24. Occupied Bandwidth Plot (NR Band n77 - 30MHz 16-QAM - Full RB)

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RL + Guiling DC	Input Z: 50 Ω Atten: 26 dB Gen CCorr Freq Ref. Int (S) NFE: Off	Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3.840000000 GHz Avg Hold: 100/100 Radio Std: None	Center Frequency 3.840000000 GHz	Settings
t Graph 🔹				Span 50.000 MHz	
cale/Div 10.0 dB _og _ara _20 0 	Ref Value 40			CF Step 5.000000 MHz Auto Man	
0.00 10.0 20.0 30.0 40.0 50.0			homen	Freq Offset 0 Hz	
Center 3.84000 GHz Res BW 470.00 kHz	#Video BW 1	6000 MHz	Span 5 Sweep 1.00 ms (100		
2 Metrics v Occupied Bandwidth		T-141 D-11-1	A4 A 40		
Transmit Freq Error x dB Bandwidth	7 MHz -212.77 kHz 19.34 MHz	Total Power % of OBW Por x dB	31.2 dBm wer 99.00 % -26.00 dB		
5011	Sep 01, 2021			X	

Plot 7-25. Occupied Bandwidth Plot (NR Band n77 - 20MHz π/2 BPSK - Full RB)



Plot 7-26. Occupied Bandwidth Plot (NR Band n77 - 20MHz QPSK - Full RB)

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Couping OC out Automa RE	Con CCon Freq Ref. Int (S) NFE: Off	B Trig. Free Run Gate: Off #IF Gain: Low	Center Freq: 3.840000000 GH Avg Hold>100/100 Radio Std: None	3.840000000 GHz	Setting
Graph r				Span 50.000 MHz	
cale/Div 10.0 dB .og .ru 0 .ru 0 .ru 0	Ref Value 3	30.00 dBm		CF Step 5.00000 MHz Auto Man	
				Freq Offset 0 Hz	
enter 3.84000 GHz es BW 470.00 kHz	#Video BW 1	1.6000 MHz	Span Sweep 1.00 ms (10	50 MHz 001 pts)	
Metrics r Occupied Bandwidth 18.332 M	1Hz	Total Power	29.1 dBm		
Transmit Freq Error x dB Bandwidth	-5.602 kHz 19.98 MHz	% of OBW Pov x dB	wer 99.00 % -26.00 dB		

Plot 7-27. Occupied Bandwidth Plot (NR Band n77 - 20MHz 16-QAM - Full RB)

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7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
- 2. Detector = $\dot{R}MS$
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

- 1. Per Part 27 and RSS-199, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.
- 2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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NR Band n77 – MAIN Antenna



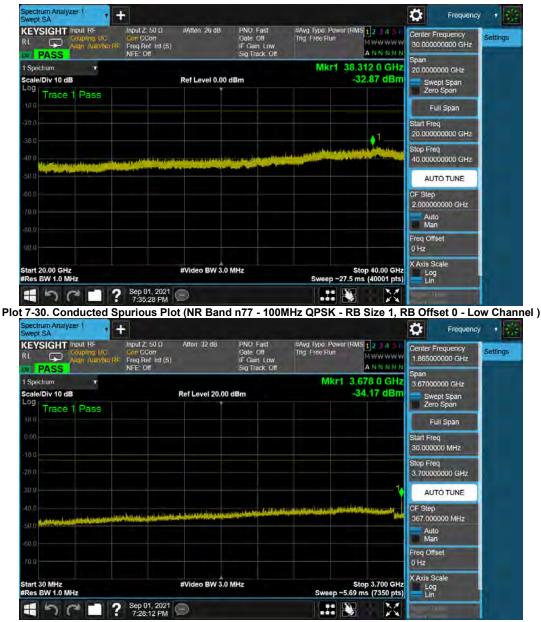
Plot 7-28. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-29. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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Coupling DC Con C	Ref Int (S)	PNO: Fast Gate: Off IF Gain Low Sig Track: Off	#Avg Type: Power (RI Trig. Free Run	45123456 MWWWWW ANNNN	Center Frequency 11.990000000 GHz	Settings
Spectrum v cale/Div 10 dB	Ref Level 20.00	dBm		681 6 GHz 34.78 dBm	Span 16.0200000 GHz Swept Span Zero Span	
Trace 1 Pass					Full Span	
					Start Freq 3.980000000 GHz	
0.0					Stop Freq 20.000000000 GH2	
				1	AUTO TUNE	
					CF Step 1.602000000 GHz Auto Man	
					Freq Offset 0 Hz	
art 3,980 GHz Res BW 1.0 MHz	#Video BW 3.0	MHz		op 20.000 GHz ms (36041 pts)	X Axis Scale Log	

Plot 7-32. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-33. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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RL Coupling DC Go Augn AutorNo.RF Fre	ul Z' 50 Ω Atten: 32 dB I GCorr Iq Ref. Int (S) E: Off	PNO: Fast Gate: Off IF Gain Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4] Trig. Free Run M W/W W/ A N N N N	1.86500000 GHz	Setting
Spectrum v Scale/Div 10 dB	Ref Level 20.00	dBm	Mkr1 3.302 0 Gl -38.24 dB	Z 3.67000000 GHz	
ing Trace 1 Pass				Full Span	
				Start Freq 30.000000 MHz	
20.0				Stop Freq 3.700000000 GHz	
			1	AUTO TUNE	
40.0 50.0 deseting on a line for fully line on a statistic pro-	and the state of the		ويرزي المرجة فأطعوك فمعمون ومريع يعتدوان العراق	CF Step 367.000000 MHz	
50.0				Auto Man	
				Freq Offset 0 Hz	
itart 30 MHz Res BW 1.0 MHz	#Video BW 3.0	MHz	Stop 3.700 G Sweep ~5.68 ms (7341 p		

Plot 7-34. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-35. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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RL Coupling DC Augn Auto/No RF	Input Z, 50 Ω #Atten: 26 dB Gen CCon Freq Ref. Int (S) NFE: Off	PNO: Fast Gate: Off IF Cam Low Sig Track: Off	#Avg Type: Power (RM Trig. Free Run	S123458 MWWWWW ANNNN	Center Frequency 30.000000000 GHz Span	Setting
Spectrum v Scale/Div 10 dB	Ref Level 0.00	dBm		622 5 GHz 2.02 dBm	20.0000000 GHz Swept Span Zero Span	
10 0 Trace 1 Pass					Full Span	
30.0				1	Start Freq 20.000000000 GHz	
40.0	general Born by the second				Stop Freq 40.000000000 GHz	
50.0	ان الكالم علكة فتقد عالم التوس				AUTO TUNE	
					CF Step 2.000000000 GHz	
					Auto Man	
					Freq Offset 0 Hz	
tart 20.00 GHz Res BW 1.0 MHz	#Video BW 3.0) MHz	Sweep ~27.5 m	top 40.00 GHz	X Axis Scale Log	

Plot 7-36. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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7.4 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW \geq 1% of the emission bandwidth
- 4. VBW \geq 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-3. Test Instrument & Measurement Setup

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- 1. Per 27.53(h), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.
- 2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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NR Band n77 – MAIN Antenna



Plot 7-37. Lower ACP Plot (NR Band n77 - 100MHz CP-OFDM-QPSK - Full RB)



Plot 7-38. Upper ACP Plot (NR Band n77 - 100MHz CP-OFDM-QPSK - Full RB)

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PASS	n Re bing DG F Automa R	(Com C	Corr tel int (S)	Atten 26 dB	Gate	Free Run Off in Low	Radio Std. N	3,70000000 lone) GHZ	Select Pe Trigger Sy Off	erladic ync Source 7	Trigger Gate
d Range Graph ale/Div 10.0 dB	*		R	ef Value 30.0	00 dBm					C Trigge Dk	r Settings agram	Source Gate Settings
g 0 0 0 0												Periodic Sync Sn
00												Auto/ Holdoff
IT 3.588 GHz	¥.							Stop	3.813 GHz			
						asure Tra ice Type		Trace Avera	Trace 1 ge (Active)			
Spur Ran			Stop Freq 3.6950 GHz	RBW 1.000 MHz	Freque 3.694462		Amplitude	ΔLimi -22.32				
2 3 4	2 3.695 3 3.699	0 GHz 3 0 GHz 3	3.6990 GHz 3.7000 GHz 3.8125 GHz	510.0 kHz 360.0 kHz	3.698686 3.700000 3.721562	667 GHz 000 GHz	-36.85 dBm -35.49 dBm -1.414 dBm	-23.85 -22.49 -27.41	dB dB			

Plot 7-39. Lower ACP Plot (NR Band n77 - 90MHz CP-OFDM-QPSK - Full RB)

Spectrum Analyzer 1 Spurious Emissions		ŧ.					Ö	Trigger	• 5
	I RE Sing DC I Automa RE	Input Z 50 0 Corr CCorr Freq Ref. Int (5) NFE: Off	Atten 26 dB	Trig. Free Run Gate: Off IF Gain Low	Center Freq 2 Radio Std: No	1,98000000 GH2 nc		Periodic r Sync Source r	Trigger Gate
3 All Range Graph	*						2 Tri	gger Settings	Source
Scale/Div 10.0 dB			Ref Value 30.	00 dBm			N.	Diagram	Gate Settings
20.0									
10.0									Periodic Sync Src
0.00									Auto/
10.0									Holdott
20.0									
30 0 									
50 0					and the second sec				
àùù							1		
Start 3.868 GHz						Stop 4.093 GH	,		
4 All Range Table	÷.								
				Measure Tra	ice	Trace 1			
				Trace Type		race Average (Active)			
Spur Ran			RBW	Frequency	Amplitude	ALImit			
		GHz 3.9800 GH		3.924125000 GHz	-1.329 dBm	-27.33 dB			
2		GHz 3.9810 GH GHz 3.9850 GH		3.980046667 GHz 3.981833333 GHz	-30.70 dBm -36.52 dBm	-17.70 dB -23.52 dB			
4		GHz 4.0925 GH		3.986075000 GHz	-34.21 dBm	-21.21 dB			
150		Sep 01, 2021	-						
	6	7:52:32 PM	9						

Plot 7-40. Upper ACP Plot (NR Band n77 - 90MHz CP-OFDM-QPSK - Full RB)

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	oupling.	DG. (501	CCorr Ref. int (S)	Atten 26 dB	Gate	Frée Run Off in Low	Center Free Radio Std: 1	13,70000000 None	0 GHZ	Select Pe Trigger Sy Off	riodic nc Source 7	Trigger Gate
di Range Graph ale/Div 10.0 d			-	ef Value 30.	00 dBm					K Trigger Dia	Settings gram	Source Gate
9				ter value ou.								Settings
0								-				Periodic Sync St
10												Auto/
												Holdoff
0			and the second									
u												
rt 3.600 GHz								Sto	3.800 GHz			
Il Range Table		1										
						easure Tra ace Type	ce	Trace Avera	Trace 1 ge (Active)			
Spur F	Range	Start Freq	Stop Freq	RBW	Frequ		Amplitude	ΔLim				
2	2	3.6000 GHz 3.6950 GHz	3.6950 GHz 3.6990 GHz	1.000 MHz 510.0 kHz	3.693416		-35.33 dBm -36.34 dBm	-22.3				
3	3	3.6990 GHz	3.7000 GHz	360.0 kHz	3.699443	333 GHz	-34.59 dBm	-21.59	dB			
4	4	3.7000 GHz	3.8000 GHz	1.000 MHz	3.702500	000 GHz	-0.737 dBm	-26.74	t dB			

Plot 7-41. Lower ACP Plot (NR Band n77 - 80MHz CP-OFDM-QPSK - Full RB)



Plot 7-42. Upper ACP Plot (NR Band n77 - 80MHz CP-OFDM-QPSK - Full RB)

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L ++ Rodio Std: Con CCorr Gate: Off Rodio Std: None Augn (Judofic RC Freq Ref. htt (S) IF Gain Low NFE: Off							Center Fred Radio Std 1	Select Periodic Trigger Sync Source Off 7		Trigger Gate		
VI Range Graph	Ť									K Trigge	r Settings agram	Source Gate
ale/Div 10.0 dE	3		ŝ	lef Value 30.	00 dBm						grow	Settings
10												Periodic Sync Sr
06							****	1				Auto/ Holdoff
0												
									1000 C			
art 3.613 GHz								Stop	3.788 GHz			
II Range Table												
						easure Tra ace Type	ce	Trace Averag	Trace 1 e (Active)			
Spur R	ange	Start Freq	Stop Freq	RBW	Frequ		Amplitude	۵Limit				
2		3.6125 GHz 3.6950 GHz	3.6950 GHz 3.6990 GHz	1.000 MHz 510.0 kHz	3.694862		-33.68 dBm -34.24 dBm	-20.68				
3		3.6990 GHz	3.7000 GHz	360.0 kHz	3.699805		-27.77 dBm	-14.77				
4	4	3.7000 GHz	3.7875 GHz	1.000 MHz	3.701750	000 GHz	-0.341 dBm	-26.34	dB			

Plot 7-43. Lower ACP Plot (NR Band n77 - 70MHz CP-OFDM-QPSK - Full RB)

Spectrum Analyzer Spurious Emissions		+								Ċ	Trigger	1
	ul: RF Iping, OC In: Automa R	Input Z Gom Ci Freq R NFE: C	Corr of Int (S)	Atten 26 dB	Gat	Free Run 5 Off am Low	Center Freq Radio Std N	: 3,98000000 Ione	GHz		Periodic r Sync Source	Trigger Gate
All Range Graph	*									(TH	gger Settings	Source
Scale/Div 10.0 dB			R	ef Value 30.	00 dBm						Diagram	Gate Settings
.0g												Periodic
10.0												Sync Sn
3 06				-								Auto/
10.0				1								Holdon
0.05												
30.0					here	-						
40.0												
69 G 60 G												
Start 3.893 GHz								Stop	4.068 GHz			
All Range Table	Ť.											
					1	leasure Tra	ice		Trace 1			
					т	race Type		Trace Average	ge (Active)			
Spur Ra			Stop Freq	RBW		uency	Amplitude	۵Limi				
1			3.9800 GHz	1.000 MHz		7500 GHz	-0.193 dBm	-26.19				
2			9810 GHz	360.0 kHz 510.0 kHz		1667 GHz 6667 GHz	-32.53 dBm -34.69 dBm	-19.53				
4			.0675 GHz	1.000 MHz		2500 GHz	-33.67 dBm	-20.67				
100							1100		ALC: N			
5 6			01, 2021 53 PM	9					X			

Plot 7-44. Upper ACP Plot (NR Band n77 - 70MHz CP-OFDM-QPSK - Full RB)

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PASS	ul RF Iping DC In Automo	Gom	CCorr Ref. int (S)	Atten 26 dB	Gate	Frée Run Off in Low	Center Freq Radio Std: N	: 3,70000000 Gi None	HZ	Select Pe Trigger S Off	eriadic ync Source 7	Trigger Gate
Il Range Graph ale/Div 10.0 dB	Ť		-	ef Value 30.	00 dBm						r Settings agram	Source Gate
g			R	ter value ov.	oo abm							Settings
												Periodic Sync Sr
						+						Auto/
												Holdoff
0		-		m								
0												
rt 3.663 GHz								Stop 3.	738 GHz			
Il Range Table	÷											
						easure Tra ace Type		Trace Average	Trace 1 (Active)			
Spur Ra		art Freq	Stop Freq	RBW	Frequ		Amplitude	ΔLimit				
2		625 GHz 950 GHz	3.6950 GHz 3.6990 GHz	1.000 MHz 510.0 kHz	3.688716		-31.96 dBm -35.15 dBm	-18.96 de -22.15 de				
3		990 GHz	3.7000 GHz	360.0 kHz	3.699060		-28,49 dBm	-15.49 dE				
4	4 3.7	000 GHz	3.7375 GHz	1.000 MHz	3.729312	500 GHz	2.930 dBm	-23.07 dB	3			

Plot 7-45. Lower ACP Plot (NR Band n77 - 60MHz CP-OFDM-QPSK - Full RB)

KEYSIGHT Inot	I RE	Input Z 50 Q	Atten: 26 dB	Trio	Free Run	Center Fred	3,98000000 GHz	\$		
C-01	oling, DC F Automo Ri	(Con CCon		Gate		Radio Std N			r Periodic r Sync Source	Trigger Gate
Al Range Graph	*							217	igger Settings	Source
cale/Div 10.0 dB			Ref Value 30.0	00 dBm				×	Diagram	Gate Settings
.0g										
10.0										Periodic Sync Sr
0.00										Auto/
										Holdon
20.0			1							
40.0			1	(
50 0										
tart 3.943 GHz							Stop 4.018 0	Hz		
All Range Table	÷									
				M	easure Tra	ce	Trace	1		
				Tr	ace Type		Trace Average (Activ	e)		
Spur Rai				Frequ		Amplilude	ALImit			
2		GHz 3.9800 G GHz 3.9810 G		3.945875		0.302 dBm	-25.70 dB			
3		GHz 3.9850 G		3.981040		-34.76 dBm	-21.76 dB			
4	4 3.9850) GHz 4.0175 G	Hz 1.000 MHz	3.985270	833 GHz	-33.64 dBm	-20.64 dB			
	_									

Plot 7-46. Upper ACP Plot (NR Band n77 - 60MHz CP-OFDM-QPSK - Full RB)

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CEYSIGHT Input Z Std D Atten 26 dB Trig, Free Run Canter Free 3,70000000 GHz Control Coper - Gale Off - Gale Off Rodio Sid: None Augrin Automotic Ro - Free Ref. Int (S) IF Gain Lew PASS - Net: Off - Net: Off								00 GHz	Select Periodic Trigger Sync Source Off		Trigger Gate Source	
VI Range Graph ale/Div 10.0 dB	*		R	lef Value 30.	00 dBm					Trigger Settings Diagram	Gate Settings	
99) 0) 0												Periodic Sync Sn
00												Auto/ HoldofT
Art 3.638 GHz	÷.							St	op 3.763 GHz			
er range rabe						easure Tra ace Type	ce	Trace Aver	Trace 1 age (Active)			
Spur Ra		art Freq 375 GHz	Stop Freq 3.6950 GHz	RBW 1.000 MHz	Frequ 3.694904		Amplitude	۵Lir -20 ه	nit 14 dB			
2 3 4	2 3.6 3 3.6	950 GHz 990 GHz	3.6990 GHz 3.7000 GHz	510.0 kHz 360.0 kHz	3.696880 3.699580 3.707083	000 GHz 000 GHz	-35.09 dBr -28.74 dBr 1.455 dBr	n -22.0 n -15.3	09 dB 74 dB 54 dB			

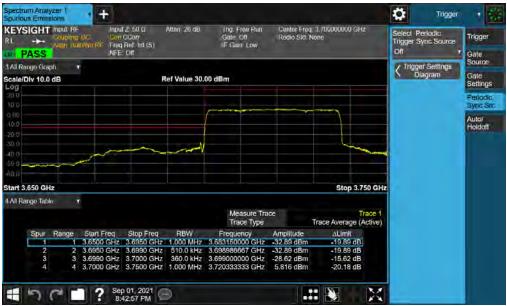
Plot 7-47. Lower ACP Plot (NR Band n77 - 50MHz CP-OFDM-QPSK - Full RB)



Plot 7-48. Upper ACP Plot (NR Band n77 - 50MHz CP-OFDM-QPSK - Full RB)

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Plot 7-49. Lower ACP Plot (NR Band n77 - 40MHz CP-OFDM-QPSK - Full RB)



Plot 7-50. Upper ACP Plot (NR Band n77 - 40MHz CP-OFDM-QPSK - Full RB)

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	Augn Automore RF Frag Ref. Int (S) IF Gain Low NFE: Oit						00 GHZ	Select Periodic Trigger Sync Source Off 7		Trigger Gate		
ll Range Graph ale/Div 10.0 dB			F	ef Value 30.0	00 dBm						r Settings agram	Source Gate Settings
9 0 0 0 0												Periodic Sync Sn
00												Auto/ Holdoff
0		-										
0												
nt 3.663 GHz	÷.							Sto	op 3.738 GHz			
a ready						easure Tra ace Type	ce	Trace Aver	Trace 1 age (Active)			
Spur Ran		t Freq 25 GHz	Stop Freq 3.6950 GHz	RBW 1.000 MHz	Frequ 3.694566		Amplitude -32.47 dBr	۵Lin 19.4 م	nit 17 dB			
2 3 4	3 3.69	90 GHz	3.6990 GHz 3.7000 GHz 3.7375 GHz	510.0 kHz 360.0 kHz 1.000 MHz	3.698973 3.699771 3.717875	667 GHz	-31.66 dBn -27.22 dBn 3.854 dBn	n -14,2	6 dB 22 dB 15 dB			

Plot 7-51. Lower ACP Plot (NR Band n77 - 30MHz CP-OFDM-QPSK - Full RB)



Plot 7-52. Upper ACP Plot (NR Band n77 - 30MHz CP-OFDM-QPSK - Full RB)

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	RF Ing. OC Automo RF	Input Z 50 Ω Gon CCon Freq Ref. Int (S) NFE: Off	Atten 26 dB	Trig. Free Run Gate: Off IF Gam Low	i Center Fre Radio Std	iq: 3,70000000 GHz None	Select Periodic Trigger Sync Source Off	Trigger Gate
M Range Graph ale/Div 10.0 dB	×.		Ref Value 30.0	0 dBm			C Trigger Settings Diagram	Source Gate Settings
) 0								Periodic Sync Sn
00								Auto/ Holdoff
00							•	
10								
Art 3.675 GHz	¥					Stop 3.725 GI	-iz	
an mange repair				Measure T Trace Type		Trace 1 Trace Average (Active		
Spur Rang		req Stop Fre GHz 3.6950 G		Frequency 3.694833333 GH	Amplitude z -31.75 dBm	ALImit -18.75 dB		
2 3 4	2 3.6950 3 3.6990 4 3.7000	GHz 3.7000 G	Hz 360.0 kHz	3.698293333 GH 3.699665000 GH 3.717125000 GH	z -21.80 dBm	-8.802 dB		

Plot 7-53. Lower ACP Plot (NR Band n77 - 20MHz CP-OFDM-QPSK - Full RB)



Plot 7-54. Upper ACP Plot (NR Band n77 - 20MHz CP-OFDM-QPSK - Full RB)

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7.5 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 5.7.1

Test Settings

- 1. The signal analyzer's CCDF measurement profile is enabled
- 2. Frequency = carrier center frequency
- 3. Measurement BW ≥ OBW or specified reference bandwidth
- 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
- 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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NR Band n77 – MAIN Antenna



Plot 7-55. PAR Plot (NR Band n77 - 100MHz DFT-s-OFDM BPSK - Full RB)



Plot 7-56. PAR Plot (NR Band n77 - 100MHz CP-OFDM QPSK - Full RB)

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Plot 7-57. PAR Plot (NR Band n77 - 100MHz CP-OFDM 256-QAM - Full RB)



Plot 7-58. PAR Plot (NR Band n77 - 90MHz DFT-s-OFDM BPSK - Full RB)

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Plot 7-59. PAR Plot (NR Band n77 - 90MHz CP-OFDM QPSK - Full RB)



Plot 7-60. PAR Plot (NR Band n77 - 90MHz CP-OFDM 256-QAM - Full RB)

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Plot 7-61. PAR Plot (NR Band n77 - 80MHz DFT-s-OFDM BPSK - Full RB)



Plot 7-62. PAR Plot (NR Band n77 - 80MHz CP-OFDM QPSK - Full RB)

FCC ID: PY7-95324M	PCTEST Pread to be part of @element	PART 27 MEASUREMENT REPORT	SONY	Approved by: Technical Manager
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Plot 7-63. PAR Plot (NR Band n77 - 80MHz CP-OFDM 256-QAM - Full RB)



Plot 7-64. PAR Plot (NR Band n77 - 70MHz CP-OFDM QPSK - Full RB)

FCC ID: PY7-95324M	PCTEST Proud to be part of @element	PART 27 MEASUREMENT REPORT	SONY	Approved by: Technical Manager
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Plot 7-65. PAR Plot (NR Band n77 - 70MHz CP-OFDM 256-QAM - Full RB)



Plot 7-66. PAR Plot (NR Band n77 - 60MHz DFT-s-OFDM BPSK - Full RB)

FCC ID: PY7-95324M	PCTEST Proud to be part of @element	PART 27 MEASUREMENT REPORT	SONY	Approved by: Technical Manager
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Plot 7-67. PAR Plot (NR Band n77 - 60MHz CP-OFDM QPSK - Full RB)



Plot 7-68. PAR Plot (NR Band n77 - 60MHz CP-OFDM 256-QAM - Full RB)

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Plot 7-69. PAR Plot (NR Band n77 - 50MHz DFT-s-OFDM BPSK - Full RB)



Plot 7-70. PAR Plot (NR Band n77 - 50MHz CP-OFDM QPSK - Full RB)

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Plot 7-71. PAR Plot (NR Band n77 - 50MHz CP-OFDM 256-QAM - Full RB)



Plot 7-72. PAR Plot (NR Band n77 - 40MHz DFT-s-OFDM BPSK - Full RB)

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Plot 7-73. PAR Plot (NR Band n77 - 40MHz CP-OFDM QPSK - Full RB)



Plot 7-74. PAR Plot (NR Band n77 - 40MHz CP-OFDM 256-QAM - Full RB)

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Plot 7-75. PAR Plot (NR Band n77 - 30MHz DFT-s-OFDM BPSK - Full RB)



Plot 7-76. PAR Plot (NR Band n77 - 30MHz CP-OFDM QPSK - Full RB)

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Plot 7-77. PAR Plot (NR Band n77 - 30MHz CP-OFDM 256-QAM - Full RB)



Plot 7-78. PAR Plot (NR Band n77 - 20MHz DFT-s-OFDM BPSK - Full RB)

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Plot 7-79. PAR Plot (NR Band n77 - 20MHz CP-OFDM QPSK - Full RB)



Plot 7-80. PAR Plot (NR Band n77 - 20MHz CP-OFDM 256-QAM - Full RB)

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7.6 Radiated Power (EIRP)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized tuned broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.2.1

ANSI/TIA-603-E-2016 - Section 2.2.17

Test Settings

- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW \ge 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points \geq 2 x span / RBW
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

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The EUT and measurement equipment were set up as shown in the diagram below.

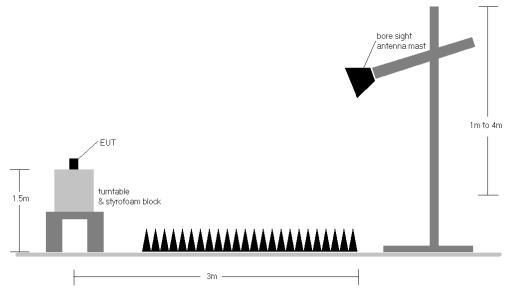


Figure 7-5. Radiated Test Setup >1GHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
	π/2 BPSK	3750.00	Н	116	127	5.98	1 / 68	11.81	17.79	0.060	33.01	-15.22
	π/2 BPSK	3840.00	Н	112	137	6.02	1 / 68	10.92	16.94	0.049	33.01	-16.07
100 MHz	π/2 BPSK	3930.00	н	104	128	5.99	1 / 68	10.04	16.03	0.040	33.01	-16.98
⊿ 0	QPSK	3750.00	н	116	127	5.98	1 / 68	11.92	17.90	0.062	33.01	-15.11
10	QPSK QPSK	3840.00 3930.00	H H	112 104	137 128	6.02 5.99	1 / 68 1 / 68	10.37 10.16	16.39 16.15	0.044	33.01 33.01	-16.62 -16.86
	16-QAM	3930.00	Н	104	128	5.99	1 / 68	9.41	15.39	0.041	33.01	-10.80
	π/2 BPSK	3750.00	Н	116	127	5.98	1 / 122	11.88	17.87	0.035	33.01	-17.02
·	π/2 BPSK	3840.00	н	110	127	6.02	1 / 122	10.69	16.71	0.047	33.01	-16.30
м	π/2 BPSK	3934.98	н	104	128	6.02	1 / 122	10.05	16.07	0.047	33.01	-16.94
Ĥ	QPSK	3745.02	н	116	120	5.99	1 / 122	11.95	17.94	0.062	33.01	-15.07
90 MHz	QPSK	3840.00	Н	112	137	6.02	1 / 122	11.16	17.18	0.052	33.01	-15.83
ത	QPSK	3934.98	Н	104	128	6.02	1 / 122	10.21	16.23	0.042	33.01	-16.78
·	16-QAM	3745.02	Н	116	127	5.99	1 / 122	9.30	15.29	0.034	33.01	-17.72
	π/2 BPSK	3740.01	Н	116	127	5.99	1 / 108	12.07	18.07	0.064	33.01	-14.94
	π/2 BPSK	3840.00	Н	112	137	6.02	1 / 108	10.73	16.75	0.047	33.01	-16.26
N	π/2 BPSK	3939.99	Н	104	128	6.04	1 / 108	10.09	16.14	0.041	33.01	-16.87
HW	QPSK	3740.01	н	116	127	5.99	1 / 108	11.88	17.87	0.061	33.01	-15.14
80 MHz	QPSK	3840.00	Н	112	137	6.02	1 / 108	11.17	17.19	0.052	33.01	-15.83
~	QPSK	3939.99	Н	104	128	6.04	1 / 108	10.26	16.31	0.043	33.01	-16.71
	16-QAM	3740.01	Н	116	127	5.99	1 / 108	9.24	15.23	0.033	33.01	-17.78
	π/2 BPSK	3735.00	Н	116	127	6.00	1 / 95	11.94	17.94	0.062	33.01	-15.07
	π/2 BPSK	3840.00	Н	112	137	6.02	1 / 95	10.75	16.77	0.048	33.01	-16.24
N	π/2 BPSK	3945.00	Н	104	128	6.07	1 / 95	10.00	16.08	0.041	33.01	-16.93
¥	QPSK	3735.00	Н	116	127	6.00	1 / 95	10.55	16.55	0.045	33.01	-16.46
70 MHz	QPSK	3840.00	Н	112	137	6.02	1 / 95	9.52	15.54	0.036	33.01	-17.47
	QPSK	3945.00	Н	104	128	6.07	1 / 95	8.44	14.52	0.028	33.01	-18.49
	16-QAM	3735.00	Н	116	127	6.00	1 / 95	8.35	14.35	0.027	33.01	-18.66
	π/2 BPSK	3730.02	Н	116	127	6.00	1 / 81	11.85	17.85	0.061	33.01	-15.16
	π/2 BPSK	3840.00	Н	112	137	6.02	1 / 81	10.80	16.82	0.048	33.01	-16.19
7	π/2 BPSK	3949.98	Н	104	128	6.10	1 / 81	10.06	16.16	0.041	33.01	-16.85
60 MHz	QPSK	3730.02	Н	116	127	6.00	1 / 81	12.02	18.03	0.063	33.01	-14.98
60	QPSK	3840.00	Н	112	137	6.02	1 / 81	11.19	17.21	0.053	33.01	-15.80
	QPSK	3949.98	Н	104	128	6.10	1 / 81	10.17	16.27	0.042	33.01	-16.74
	16-QAM	3730.02	Н	116	127	6.00	1 / 81	9.10	15.11	0.032	33.01	-17.90
	π/2 BPSK	3725.01	Н	116	127	6.01	1 / 99	12.28	18.29	0.067	33.01	-14.72
	π/2 BPSK	3840.00	Н	112	137	6.02	1 / 99	11.07	17.09	0.051	33.01	-15.92
50 MHz	π/2 BPSK	3954.99	Н	104	128	6.13	1/99	10.40	16.52	0.045	33.01	-16.49
N N	QPSK	3725.01	н	116	127	6.01	1 / 99	12.34	18.35	0.068	33.01	-14.66
5(QPSK	3840.00	н	112	137	6.02	1 / 99	11.55	17.57	0.057	33.01	-15.45
	QPSK	3954.99	н	104	128	6.13	1 / 99	10.55	16.68	0.047	33.01	-16.33
	16-QAM π/2 BPSK	3725.01 3720.00	H H	116 116	127 127	6.01 6.01	1 / 99 1 / 79	9.22	15.23 18.34	0.033	33.01 33.01	-17.78 -14.67
	π/2 BPSK	3720.00	Н	110	127	6.02	1 / 79	12.32	17.25	0.053	33.01	-14.07
N	π/2 BPSK	3960.00	Н	104	137	6.15	1 / 26	10.48	17.25	0.053	33.01	-15.76
40 MHz	QPSK	3720.00	H	104	120	6.01	1 / 79	12.38	18.39	0.040	33.01	-10.30
V 0	QPSK	3840.00	Н	110	127	6.02	1 / 79	12.30	17.64	0.058	33.01	-14.02
4	QPSK	3960.00	н	104	128	6.15	1 / 79	10.77	16.92	0.049	33.01	-16.09
	16-QAM	3720.00	н	116	120	6.01	1 / 79	9.49	15.51	0.036	33.01	-17.50
	π/2 BPSK	3715.02	н	116	127	6.02	1 / 58	12.35	18.37	0.069	33.01	-14.64
	π/2 BPSK	3840.00	Н	112	137	6.02	1 / 58	11.22	17.24	0.053	33.01	-15.77
м	π/2 BPSK	3964.98	Н	104	128	6.18	1 / 58	10.43	16.61	0.046	33.01	-16.40
30 MHz	QPSK	3715.02	н	116	127	6.02	1 / 58	12.43	18.45	0.070	33.01	-14.56
30	QPSK	3840.00	Н	112	137	6.02	1 / 58	11.70	17.72	0.059	33.01	-15.29
	QPSK	3964.98	н	104	128	6.18	1 / 58	10.60	16.77	0.048	33.01	-16.24
	16-QAM	3715.02	Н	116	127	6.02	1 / 58	9.51	15.53	0.036	33.01	-17.48
	π/2 BPSK	3710.01	Н	116	127	6.03	1 / 13	12.43	18.45	0.070	33.01	-14.56
	π/2 BPSK	3840.00	Н	112	137	6.02	1 / 13	11.22	17.24	0.053	33.01	-15.77
N	π/2 BPSK	3969.99	Н	104	128	6.20	1 / 13	10.36	16.56	0.045	33.01	-16.45
20 MHz	QPSK	3710.01	Н	116	127	6.03	1 / 13	12.61	18.64	0.073	33.01	-14.37
20	QPSK	3840.00	Н	112	137	6.02	1 / 13	11.69	17.71	0.059	33.01	-15.30
	QPSK	3969.99	Н	104	128	6.20	1 / 13	10.47	16.67	0.046	33.01	-16.34
	10.0111	3710.01	Н	116	127	6.03	1 / 13	9.56	15.58	0.036	33.01	-17.43
	16-QAM	3710.01		110	121	0.00	17 15	0.00	10.00		00.01	
100 MHz	QPSK (CP-OFDM)	3750.0	н	116	207	5.98	1 / 136	9.83	15.81	0.038	33.01	-17.20

Table 7-2. EIRP Data (NR Band n77 – MAIN Antenna)

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7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

Test Settings

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW \geq 3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = RMS
- 6. Trace mode = Average (Max Hold for pulsed emissions)
- 7. The trace was allowed to stabilize

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The EUT and measurement equipment were set up as shown in the diagram below.

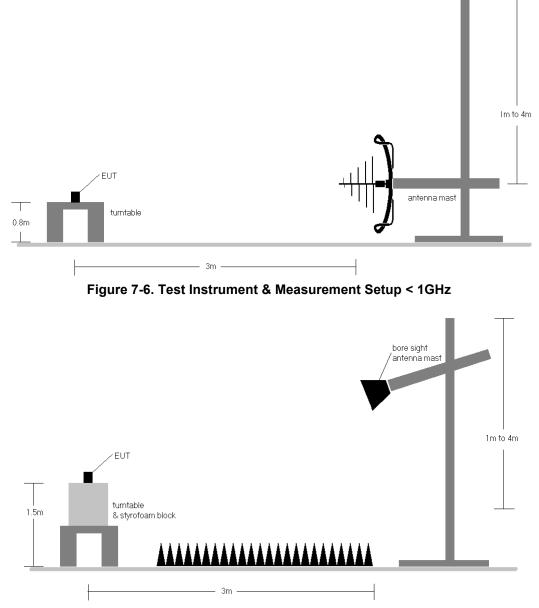


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

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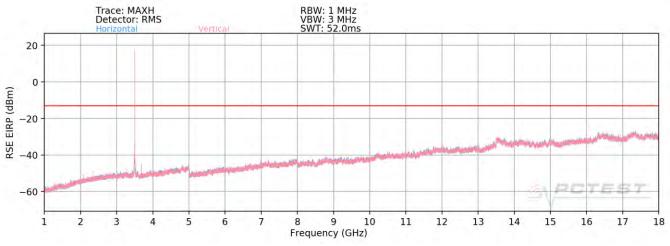


- Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
 a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
 b) EIRP (dBm) = E(dBµV/m) + 20logD 104.8; where D is the measurement distance in meters.
- 2) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 3) This unit was tested with its standard battery.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 7) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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NR Band n77 – MAIN Antenna





Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7500.00	V	116	27	-70.98	21.68	57.70	-37.56	-13.00	-24.56
11250.00	V	-	-	-72.29	27.04	61.75	-33.51	-13.00	-20.51
15000.00	V	-	-	-73.01	31.34	65.33	-29.93	-13.00	-16.93

Table 7-3. Radiated Spurious Data (NR Band n77 – Low Channel – MAIN Antenna)

Frequency (MHz):	3840.00
RB / Offset:	1 / 135
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7680.00	V	113	32	-71.22	22.43	58.21	-37.05	-13.00	-24.05
11520.00	V	-	-	-73.38	27.82	61.44	-33.81	-13.00	-20.81
15360.00	V	-	-	-73.11	31.62	65.51	-29.75	-13.00	-16.75

Table 7-4. Radiated Spurious Data (NR Band n77 - Mid Channel - MAIN Antenna)

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Bandwidth (MHz):	100
Frequency (MHz):	3930.00
RB / Offset:	1 / 135
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7860.00	V	-	-	-71.44	22.32	57.88	-37.37	-13.00	-24.37
11790.00	V	-	-	-73.36	28.03	61.67	-33.59	-13.00	-20.59
15720.00	V	-	-	-72.98	32.41	66.43	-28.83	-13.00	-15.83

Table 7-5. Radiated Spurious Data (NR Band n77 – High Channel – MAIN Antenna)

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7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

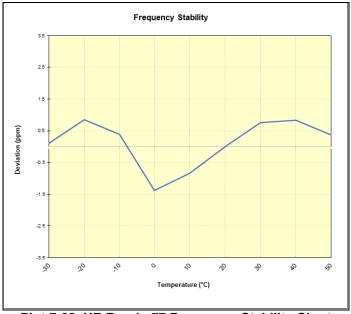
None

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NR Band n77									
	Operating F	requency (Hz):	3,840,0	3,840,000,000					
	Ref.	Voltage (VDC):	3.8	86					
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)				
		- 30	3,840,014,676	444	0.0000116				
		- 20	3,840,017,477	3,245	0.0000845				
		- 10	3,840,015,701	1,469	0.0000383				
		0	3,840,008,964	-5,268	-0.0001372				
100 %	3.86	+ 10	3,840,011,018	-3,214	-0.0000837				
		+ 20 (Ref)	3,840,014,232	0	0.0000000				
		+ 30	3,840,017,128	2,896	0.0000754				
		+ 40	3,840,017,446	3,214	0.0000837				
		+ 50	3,840,015,637	1,405	0.0000366				
Battery Endpoint	3.32	+ 20	3,840,016,676	2,444	0.0000636				

Table 7-6. NR Band n77 Frequency Stability Data



Plot 7-82. NR Band n77 Frequency Stability Chart

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the SONY **Portable Handset FCC ID: PY7-95324M** complies with all the requirements of Part 27 of the FCC rules.

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