

PCTEST

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MEASUREMENT REPORT

FCC Part 90

Applicant Name:

Microsoft Corporation One Microsoft way Redmond, WA, 98052 United States

Date of Testing:

5/25– 7/6/2021 **Test Site/Location:** PCTEST Lab. Columbia, MD, USA **Test Report Serial No.:** 1M2105200048-06-R1.C3K

FCC ID:

C3K1995

APPLICANT:

Microsoft Corporation

Application Type: Model: EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s): Certification 1995 Portable Handset PCS Licensed Transmitter Held to Ear (PCE) §2.1049, §90(S), §90(R) ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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.

Note: This revised Test Report (S/N: 1M2105060048-06-R1.C3K) 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

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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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Measureme nt	Max. Power [W]	Max. Power [dBm]	Emission Designator
	10 MHz	QPSK	793.0	ERP	0.241	23.82	8M99G7D
LTE Band 14 =		16QAM	793.0	ERP	0.208	23.17	8M99W7D
	5 MHz	QPSK	790.5 - 795.5	ERP	0.247	23.93	4M51G7D
		16QAM	790.5 - 795.5	ERP	0.210	23.23	4M51W7D
=	15 MHz	QPSK	821.5	ERP	0.142	21.51	13M5G7D
		16QAM	821.5	ERP	0.121	20.81	13M5W7D
	15 MHz	QPSK	821.5	Conducted	0.330	25.18	13M5G7D
		16QAM	821.5	Conducted	0.282	24.51	13M5W7D
	10 MHz	QPSK	819.0	Conducted	0.336	25.27	9M01G7D
LTE Band 26		16QAM	819.0	Conducted	0.278	24.44	8M99W7D
LTE Ballu 20	5 MHz	QPSK	816.5 - 821.5	Conducted	0.338	25.29	4M52G7D
		16QAM	816.5 - 821.5	Conducted	0.295	24.70	4M51W7D
	3 MHz	QPSK	815.5 - 822.5	Conducted	0.339	25.30	2M71G7D
		16QAM	815.5 - 822.5	Conducted	0.285	24.54	2M71W7D
	1.4 MHz	QPSK	814.7 - 823.3	Conducted	0.337	25.28	1M10G7D
		16QAM	814.7 - 823.3	Conducted	0.286	24.57	1M10W7D
			FUT Overview				

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 **Microsoft Corporation Portable Handset FCC ID: C3K1995**. 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.

Test Device Serial No.: 45346, 48084, 47888, 46328, 50387

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS, 850/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz), 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 TEST RESULTS of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports open and closed configurations. Multiple angles are tested and the worst case radiated emissions data is shown in the report.

2.4 Software and Firmware

The firmware installed during testing was Build number developer - generic 2021.728.20.

2.5 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 document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

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 wooden turntable 80cm above the ground plane and 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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then 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:

 $P_{d [dBm]} = P_{g [dBm]} - cable loss _{[dB]} + antenna gain _{[dBd/dBi]}$

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 fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-E-2016.

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 474788 D01.

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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 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
-	LTx4	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx4
-	LTx5	LIcensed Transmitter Cable Set	3/3/2021	Annual	3/3/2022	LTx5
Agilent	E5515C	Wireless Communications Test Set		N/A		GB45360985
Agilent	E5515C	Wireless Communications Test Set	N/A			GB46310798
Agilent	N9030A	50GHz PXA Signal Analyzer	1/20/2021	Annual	1/20/2022	US51350301
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6200901190
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201525694
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	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
Keysight Technologies	N9030A	PXA Signal Analyzer	10/16/2020	Annual	10/16/2021	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer	9/2/2020	Annual	9/2/2021	MY55410501
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/17/2020 Annual 9/17/2021		MY57141001	
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A		112347	
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	2/10/2021	Annual	2/10/2022	103187

Table 5-1. Summary of Test Results

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

Emission Designator

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 – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average 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 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80).

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7.0 TEST RESULTS

7.1 Summary

Company Name:	Microsoft Corporation
FCC ID:	<u>C3K1995</u>
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	LTE

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
	Occupied Bandwidth	2.1049	N/A	PASS	Section 7.2
TED	Conducted Band Edge / Spurious Emissions (LTE Band 14)	2.1051, 90.691(a)	Un all frequencies between 769-775 MHZ and 799-805 MHz, attenuation by a factor not less than 65 + 10 log(P) dB in a 6.25 kHz band segment, for mobile and portable stations.	PASS	Sections 7.3, 7.4
CONDUCTED	Conducted Band Edge / Spurious Emissions (LTE Band 26)	2.1051, 90.543(a)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions except > 50 + 10 log10 (P[Watts]) at Band Edge and for all out- of-band emissions within 37.5kHz of Block Edge	PASS	Sections 7.3, 7.4
O	Frequency Stability	2.1055, 90.213	< 2.5 ppm	PASS	Section 7.8
	Conducted Power	2.1046, 90.635	< 100 Watts	PASS	Section 7.5
	Effective Radiated Power (LTE Band 14)	90.542(a)(7)	< 3 Watts max. ERP	PASS	Section 7.6
ED	Effective Radiated Power (LTE Band 26)	22.913(a.2)	< 7 Watts max. ERP	PASS	Section 7.6
RADIATED	Radiated Spurious Emissions (LTE Band 14)	2.1053, 90.543(e)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions except emissions in the 1559 - 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals	PASS	Section 7.7
	Radiated Spurious Emissions (LTE Band 26)	2.1053, 90.543(e)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions except > 50 + 10 log10 (P[Watts]) at Band Edge and for all out- of-band emissions within 37 5kHz of Block Edge	PASS	Section 7.7

Table 7-1.	Summary	of Test	Results
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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 shown in Section 7.0 were 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.

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- 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) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST EMC Software Tool Beta 8.

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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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LTE Band 14



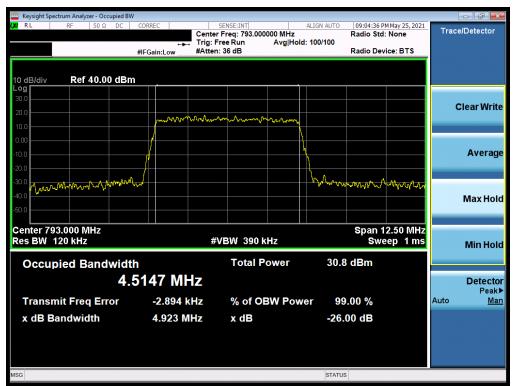
Plot 7-1. Occupied Bandwidth Plot (LTE Band 14 - 10MHz QPSK - Full RB)



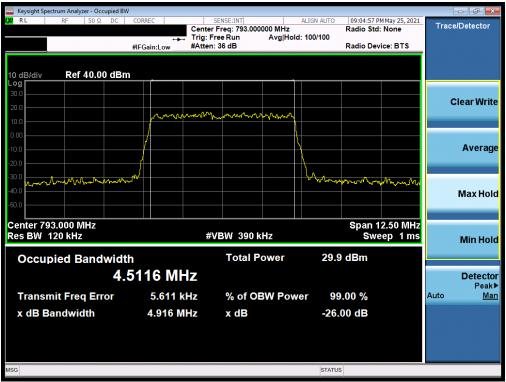
Plot 7-2. Occupied Bandwidth Plot (LTE Band 14 - 10MHz 16-QAM - Full RB - North)

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Plot 7-3. Occupied Bandwidth Plot (LTE Band 14 - 5MHz QPSK - Full RB)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 14 - 5MHz 16-QAM - Full RB)

LTE Band 26

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🔤 Keysight Spectrum Analyzer - Occupied B							
LXI RL RF 50Ω AC	CORREC	SENSE:INT nter Freq: 821.500000 MH	ALIGN AUTO	11:57:44 P	May 28, 2021	Trace/D	etector
	🛶 Tri	g:FreeRun Avg l	- Hold: 100/100				
	#IFGain:Low #At	tten: 36 dB		Radio Dev	ice: BTS		
10 dB/div Ref 40.00 dB	n						
30.0							
20.0						Cle	ar Write
10.0	phaselynan	alaward and an a former and a failed and	in tu				_
0.00							
	n.		h				Average
-10.0			1				-ver uge
-20.0	went		Winner	. Martin Martin	who who have		
-30.0							
-40.0 4 10 10 10 10 10 10 10 10 10 10 10 10 10						N	lax Hold
-50.0							
Center 821.50 MHz				Span 3	7.50 MHz		
Res BW 360 kHz		#VBW 1.2 MHz			ep 1 ms	N	/lin Hold
							minnoid
Occupied Bandwid	th	Total Power	31.	7 dBm			
1	3.510 MHz					I	Detector
				/			Peak▶
Transmit Freq Error	11.655 kHz	% of OBW P	ower 9	9.00 %		Auto	<u>Man</u>
x dB Bandwidth	14.57 MHz	x dB	-26	.00 dB			
MSG			STATU	JS			
150			STATU	15			





Plot 7-6. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB)

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Keysight Spectrum Analyze				1						
R L RF	50 Ω AC	CORREC		SENSE:INT nter Freg: 819.00	0000 MU-	ALIGN AUTO	12:11:18 A	M May 29, 2021	Trace	Detector
				g: Free Run		d: 100/100	Radio Stu.	None		
		#IFGain		tten: 36 dB			Radio Dev	ice: BTS		
	40.00 dE	3m								
g										
.0										
o									C	lear Wr
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0 Month marine	me region					horiour	Anne when	ware with an		
.0										
										Max Ho
.0										
nter 819.00 MH	Z							5.00 MHz		
s BW 240 kHz				#VBW 750	kHz		Swe	ep 1 ms		Min Ho
Occupied Ba	andwid	ith		Total F	ower	31.5	5 dBm			
	0	0110	3 MHz							Deter
	2	.0140								Detec
Tropomit Erec	Error	42	.454 kHz	9/	BW Pow	0	.00 %		Auto	Pea
Transmit Freq	HIIOI	-12	.454 KHZ	% of U	BW FOW	ए 99	.00 %		Adio	IV
x dB Bandwid	th	9.	700 MHz	x dB		-26	00 dB			
						201				
						STATUS	5			

Plot 7-7. Occupied Bandwidth Plot (LTE Band 26 - 10MHz QPSK - Full RB)



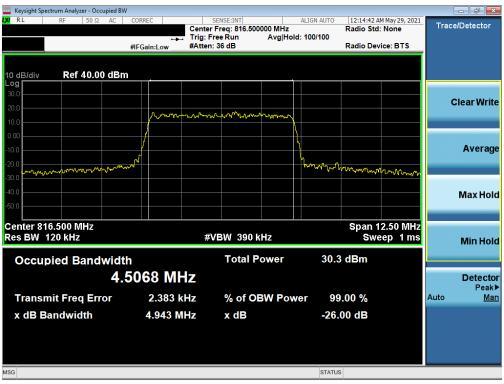
Plot 7-8. Occupied Bandwidth Plot (LTE Band 26 - 10MHz 16-QAM - Full RB)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occup	ied BW					
LXI RF 50 Ω		SENSE:INT Center Freg: 821.500			:54 AM May 29, 2021 Std: None	Trace/Detector
		Trig: Free Run	Avg Hold:		Sta: None	
		#Atten: 36 dB			Device: BTS	
10 dB/div Ref 40.00	dBm					
Log						
30.0						Clear Write
20.0		mmmmm	*			Clear write
10.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and and a draw on				
0.00	{		<u> </u>			
-10.0			1			Average
	لر			1		Average
-20.0 -30.0 mm/My ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	north			Lamman		
-30.0					m har	
-40.0						Max Hold
-50.0						
Center 821.500 MHz Res BW 120 kHz		#VBW 390 k	u.,		n 12.50 MHz	
Res DW 120 KHZ		#VDVV 390 K	пг		Sweep 1 ms	Min Hold
Occupied Bandw	vidth	Total P	ower	31.4 dBm		
		_				
	4.5156 MH	Ζ				Detector Peak►
Transmit Freq Erro	r -4.371 kH	z % of OE	BW Powe	er 99.00 %)	Auto <u>Man</u>
x dB Bandwidth	4.881 MH	z x dB		-26.00 dE		
MSG				STATUS		

Plot 7-9. Occupied Bandwidth Plot (LTE Band 26 - 5MHz QPSK - Full RB)



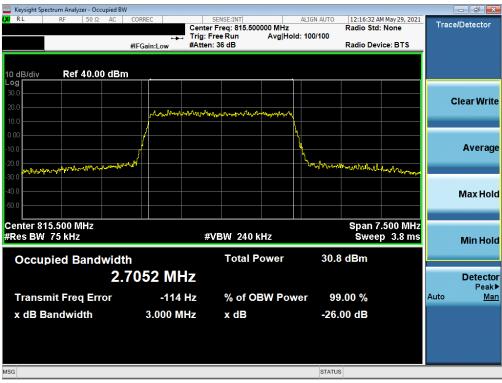
Plot 7-10. Occupied Bandwidth Plot (LTE Band 26 - 5MHz 16-QAM - Full RB)

FCC ID: C3K1995	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dana 47 af 40
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Keysight Spectrum Analyzer						
RL RF !	50 Ω AC	CORREC	SENSE:INT Center Freq: 815.50 Trig: Free Run	ALIGN AUTO 0000 MHz Avg Hold: 100/100	12:16:24 AM May 29, 2021 Radio Std: None	Trace/Detector
		#IFGain:Low	#Atten: 36 dB	, regineral recorde	Radio Device: BTS	
dB/div Ref 4	0.00 dBn	n				
). 0						01
.0		Manan	whether was a second and the second	๛ ^ๅ ๚๛๙๛๛ _๚		Clear Wri
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.0						Avera
.0 .0 what was a fund	Weber and all marks	e wert		Marsh M	AN MARCHINE CONTRACT	
0						Max Ho
.0						maxine
enter 815.500 MH	z				Span 7.500 MHz	
Res BW 75 kHz			#VBW 240	kHz	Sweep 3.8 ms	Min Ho
Occupied Ba			Total F	ower 31.	5 dBm	
	2.	7075 MH	Ηz			Detect
Transmit Freq	Error	-1.541 k	Hz % of O	BW Power 99	9.00 %	Auto <u>M</u>
x dB Bandwidt	h	2.996 M	IHz x dB	-26	.00 dB	
				STATU	IS	

Plot 7-11. Occupied Bandwidth Plot (LTE Band 26 - 3MHz QPSK - Full RB)



Plot 7-12. Occupied Bandwidth Plot (LTE Band 26 - 3MHz 16-QAM - Full RB)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 19 of 40	
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Keysight Spectrum Analyzer													
RL RF 5	50 Ω	AC	CORREC			ENSE:INT Freq: 814.70	0000 MH		ALIGN AUTO	12:18:17	AM May 29, 2021	Trac	e/Detector
			#IFGain:I	Low		e Run			100/100	Radio De			
0 dB/div Ref 4	0.00	dBm								-			
0.0 0.0						1 mm	M = 2.00						Clear Writ
0.0				and	᠃ᡙᡗᠳ᠆ᠧᠬᢪᡐ	Ser of the	m www.						
).0			$ \downarrow$					$\left\{ \right\}$					Avera
1.0 m M M M M M M M M M M M M M M M M M M	m ().	MV~4	~~~					-h	᠕᠕᠕᠕	` ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	\sim		
I.O													Max Ho
enter 814.700 MH es BW 33 kHz	z				#V	BW 110	kHz				3.500 MHz 3.067 ms		Min Ho
Occupied Ba	ndv	vidth	า			Total	Power		31.3	dBm			
		1.0)959) MH	z								Detect Pea
Transmit Freq	Erro	r	-2.	474 k	Hz	% of C)BW P	owe	er 99	.00 %		Auto	<u>M</u>
x dB Bandwidt	h		1.2	233 M	Hz	x dB			-26.	00 dB			
3									STATUS	5			

Plot 7-13. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz QPSK - Full RB)



Plot 7-14. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz 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. RBW ≥ 100kHz
- 3. VBW \ge 3 x RBW
- 4. Detector = RMS
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

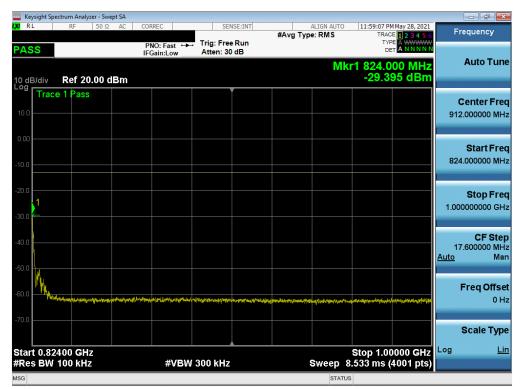
FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 20 of 40
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LTE Band 26

XX RL RI PASS 10 dB/div Re 10 dB/div Re 10 dB/div Re 0 000	f 20.00 dB	PN IFC	REC NO: Fast ↔ Gain:Low			#Avg Typ		TRAC TYP DE 813,843	May 28, 2021 E 1 2 3 4 5 6 A WWWWW A N N N N N 3 2 MHz 66 dBm		equency Auto Tune
10 dB/div Re Log Trace 1 F 10.0 -10.0			Gain:Low	Atten: 30) dB		Mkr1	813.843	3 2 MHz		Auto Tune
10.0	Pass										
10.0											enter Fre .000000 MH
20.0										30.	Start Fre .000000 MH
30.0										814.	Stop Fre .000000 МН
10.0									1	78. <u>Auto</u>	CF Ste 400000 MH Ma
60.0	anda interna a da farina a sera da pada Insta ya aka da ga da ga ga ba sera			ng di Jama di Sanang milang di Sang Sanang Kangga mang di Sanang Mg di Sang Sanang	a policia de la construcción na col a que policia de la composición de la composición de la composición de la composición de la composición na construcción de la composición de la		t ong of a first state and state of			F	F req Offs e 0 H
70.0 Start 30.0 MH								Stop 8	14.0 WILLZ	t og	Scale Typ <u>Li</u> i
Res BW 100	kHz		#VBW	300 kHz		S	weep 37	.33 ms (2	0001 pts)		

Plot 7-15. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-16. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: C3K1995	PCTEST [®] Proud to be part of [®] element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 40
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	ctrum Analyzer - Swej									
LXU RL	RF 50 Ω	AC C	ORREC	SE	NSE:INT	#Avg Ty	ALIGN AUTO		May 28, 2021	Frequency
PASS			PNO: Fast ← FGain:Low	Trig: Fre #Atten: 3		#/ (g ·)		TYP		
10 dB/div Log	Ref 20.00 d	Bm					M	kr1 5.978 -37.58	3 5 GHz 39 dBm	Auto Tun
10.0	e 1 Pass									Center Free 5.500000000 GH
-10.0										Start Free 1.000000000 GH
-20.0					.1					Stop Fre 10.000000000 GH
-40.0		,,, ^{j,,,} ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	~~~			<u></u>				CF Step 900.000000 MH <u>Auto</u> Mar
-60.0										Freq Offse 0 H
-70.0 Start 1.00	0 GHz							Stop 10.	000 GHz	Scale Type
#Res BW			#VB	W 3.0 MHz		\$	Sweep 1	5.60 ms (1	8001 pts)	
MSG							STATU	S		

Plot 7-17. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)

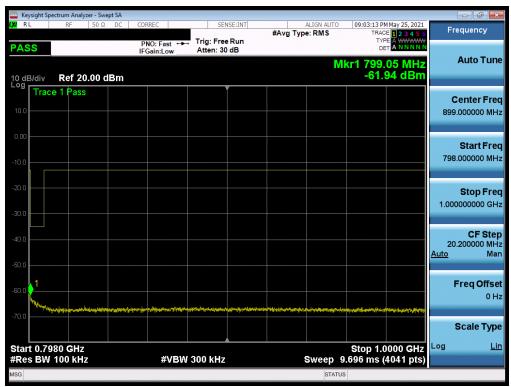
FCC ID: C3K1995	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 22 of 49	
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LTE Band 14

MSG										STATUS	5			
		100 kHz			#V	/BW 3	00 kHz		s	weep 36	.38 ms ('	88.0 MHZ 5161 pts)		
Star	t 30.0	MHz									Stop 7	88.0 MHz	Log	Li
-70.0		A. (1 11 11 11 11 11 11 11 11 11 11 11 11	ar and a colorin colorin .			ang dan ter der der	A DECEMBER OF LEGAL DECEMBER OF LEGAL						Scale T	ур
70.0		- المراقع و وحد و والم		a) Hallan ta Angala	and a local system of									511
-60.0												1	Freq Of	ffse 0 H
-50.0														
40.0													75.800000 <u>Auto</u>	MH Ma
-40.0													CFS	
-30.0													788.000000	мн
-20.0													Stop F	
-10.0														
-10.0													Start F 30.000000	
0.00														
10.0													409.000000	мн
LUg	Trace	1 Pass					,						Center F	Fre
10 dE Log	3/div	Ref 20	.00 dB	m						IVI	-65.	87 dBm		
PAS	S				IFGain:Lov		Atten: 30				_	.05 MHz	Auto T	un
		N	50.32		PNO: Fast		Trig: Free		#Avg Typ		TRA	DE 1 2 3 4 5 6 PE A WWWW	Frequency	1
Ke XI R		ctrum Analy: RF			ORREC		SEN	SE:INT		ALIGN AUTO	00.02.50	M May 25, 2021		×

Plot 7-18. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-19. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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	pectrum Analy:		ot SA										
l XI RL	RF	50 Ω	DC	CORREC		SEI	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS		M May 25, 2021	Fr	equency
PASS				PNO: Fa	ast 🔸	Trig: Free Atten: 36		• ,,		T) C			
				IFGain:L	_ow	Atten: 30	ub		M		5 5 GHz		Auto Tune
10 dB/div	Ref 25	.00 di	Bm							-40.7	90 dBm		
Log Trac	e 1 Pass					, ,							_
15.0													enter Freq
15.0												5.500	000000 GHZ
5.00													
													Start Freq
-5.00												1.000	000000 GHz
-15.0													Stop Freq
-25.0												10.000	0000000 GHz
-25.0													
-35.0													CF Step
				. (♦ ',								900 Auto	.000000 MHz Man
-45.0		-		\sim		~~~~~	\sim	and the second second					
THE OWNER OF THE OWNER OF		No. of Concession, Name										F	req Offset
-55.0													0 Hz
-65.0													Scale Type
Start 1.0										Stop 1	0.000 GHz	Log	Lin
#Res BW	1.0 MHz			#	#VBW	3.0 MHz		s			18001 pts)		
MSG									STATU	S			

Plot 7-20. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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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.

For LTE B26 operation under Part 90.691, the minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by greater than 37.5 kHz is $43 + 10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts. The minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by up to and including 37.5 kHz is 50 + $10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

For LTE B14 operation under Part 90.543, the power of any emission must be reduced below the mean output power (P) by at least 43+10log (P) dB measured in a 100kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

Additionally, for LTE B14 operation, on all frequencies between 769 – 775 MHz and 799 – 805 MHz, the power of any emission shall be attenuated by a factor not less than 65 + 10log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

Test Settings

- 1. Span was set large enough so as to capture all out of band emissions near the band edge
- 2. RBW = 100 kHz
- 3. VBW = 300 kHz
- 4. Detector = RMS
- 5. Trace mode = trace average
- 6. Sweep time = auto couple
- 7. 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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Test Notes

- 1) For channel edge emission, the signal analyzer's "ACP" measurement capability is used.
- 2) Per 90.543(e)(5) for B14 operations, in the 100kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30kHz may be employed.
- 3) For LTE Band 14 operation under Part 90.543, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.
- 4) Additionally, for LTE Band 14 operation, on all frequencies between 769-775 MHz and 799-805 MHz, the power of any emission shall be attenuated by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

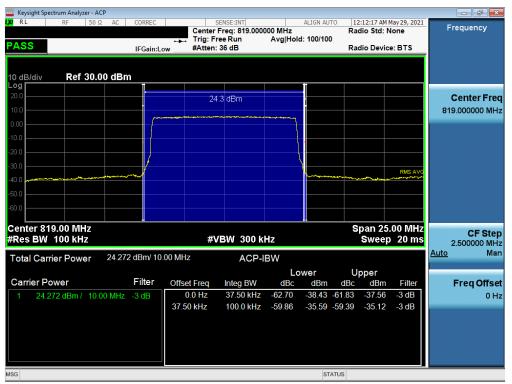
FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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LTE Band 26

Keysight Spectrum Ana	lyzer - ACP											
XIRL RF	50 Ω	AC	CORREC			NSE:INT reg: 821.5000	00 MHz	ALIGN AU		1:58:26 PM dio Std:	May 28, 2021	Frequency
PASS			IFGain:L	- T	rig: Free Atten: 3	e Run	Avg Hold	d: 100/10	0	dio Devi		
	f 30.00	dBn	า									
Log 20.0 10.0					24.2	dBm		-				Center Fred 821.500000 MHz
0.00												
-20.0	and the second						\ 	· · · · · · · · · · · · · · · · · · ·		~~~~	RMS AVG	
-50.0												
Center 821.50 M #Res BW 100 k					#VE	3W 300 k	Hz		s	pan 37 Sweej	7.50 MHz p 20 ms	CF Step 3.750000 MH
Total Carrier Pov	ver	24.20	7 dBm/ 15	.00 MHz		ACP-I	BW					<u>Auto</u> Mar
							Lo	wer	U	pper		
Carrier Power			Filter	Offset F		Integ BW	dBc	dBm	dBc	dBm		Freq Offse
1 24.207 dBm	/ 15.00	MHz	-3 dB	0.0 37.50 k		37.50 kHz 100.0 kHz	-65.04 -61.65		-63.79 -60.87	-39.58 -36.67	_	0 H:

Plot 7-21. Channel Edge Plot (LTE Band 26 - 15MHz QPSK - Mid Channel)



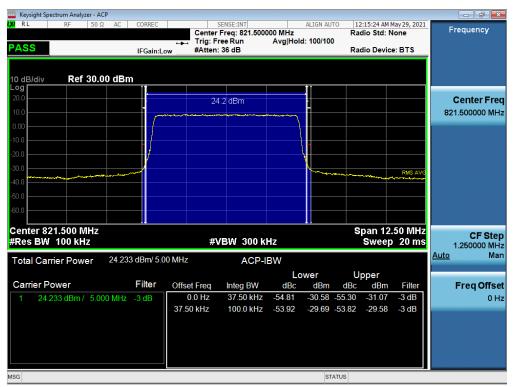
Plot 7-22. Channel Edge Plot (LTE Band 26 - 10MHz QPSK - Mid Channel)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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	yzer - ACP											
RL RF	50 Ω	AC	CORREC			NSE:INT		ALIGN AUT			May 29, 2021	Frequency
ASS			IFGain:L		Center Fr Trig: Free #Atten: 36			d: 100/100		lio Std: I lio Devic		rrequency
) dB/div Re l	f 30.00	dBm										
-9 0.0 0.0					24.3	dBm		-				Center F 816,500000
.00												
0.0												
0.0		~	~~~^						****	•••••	RMS AVG	
0.0												
								<u>+</u> +	S	pan 12	.50 MHz	
					#VB	SW 300 ki	Hz				o 20 ms	CF S 1.250000
enter 816.500 I Res BW 100 kl	Hz	24.261	dBm/ 5.	00 MHz	#VB	ACP-II						
Res BW 100 kl	Hz	24.261				ACP-II	BW Lo	wer	Up	Sweep	o 20 ms	1.250000 <u>Auto</u>
Res BW 100 kl otal Carrier Pov Carrier Power	Hz ver 2		Filter	Offset	Freq	ACP-II	BW Lo dBc	dBm	Ur dBc	Sweep oper dBm	20 ms	1.250000 <u>Auto</u> Freq Of
Res BW 100 kl	Hz ver 2		Filter	Offset	Freq) Hz	ACP-II Integ BW 37.50 kHz	BW Lo dBc -55.07	dBm -30.80 -	Ur dBc 54.92	Sweer oper dBm -30.66	Filter	1.250000 <u>Auto</u>
Res BW 100 kl otal Carrier Pov Carrier Power	Hz ver 2		Filter	Offset	Freq) Hz	ACP-II	BW Lo dBc	dBm	Ur dBc 54.92	Sweep oper dBm	20 ms	1.250000 <u>Auto</u> Freq Of

Plot 7-23. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - Low Channel)



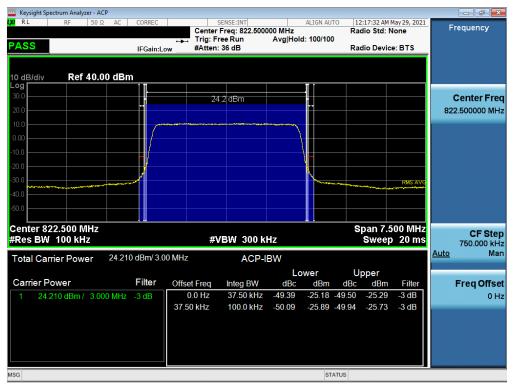
Plot 7-24. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - High Channel)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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Keysight Spectrum Analyzer - A	ACP										
RL RF 50	Ω AC	CORREC		SENSE:INT		ALIGN AUT			May 29, 2021	F	requency
ASS		IFGain:Lo	Trig: F	Freq: 815.5000 Free Run : 36 dB	000 MHz Avg Hold	: 100/100		io Std: N io Devic			equency
	00 dBm	1									
). 0		- ∎	24	4.3 dBm							Center Fre
0.0		*				*				81	5.500000 MH
0.0		1			1						
).0		/									
).0						k					
.0	*****					Theman		· · · · · · · · · · · · · · · · · · ·	RMS AVG		
).0).0											
enter 815.500 MHz Res BW 100 kHz		_↓ II	#	VBW 300 ki	Hz				i00 MHz 20 ms		CF Ste 750.000 ki
otal Carrier Power	24.267	' dBm/ 3.0	0 MHz	ACP-I	BW					<u>Auto</u>	750.000 K
					Lov	ver	Up	per			
arrier Power		Filter	Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter		Freq Offs
1 24.267 dBm / 3.0	000 MHz	-3 dB	0.0 Hz	37.50 kHz	-49.73	-25.47 -	50.43	-26.16	-3 dB		0
			37.50 kHz	100.0 kHz	-50.14	-25.87 -	49.93	-25.66	-3 dB		
							TUS				

Plot 7-25. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - Low Channel)



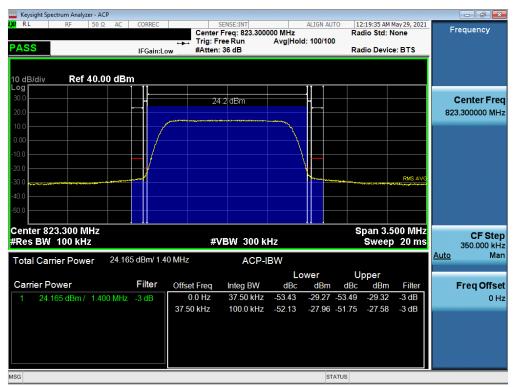
Plot 7-26. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - High Channel)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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	er - ACP										
RL RF	50 Ω AC	CORREC		SENSE:INT		ALIGN AUTO			4ay 29, 2021	E	requency
ASS		IFGain:L	🛶 Trig: F	Freq: 814.7000 Free Run : 36 dB	000 MHz Avg Hold	: 100/100		o Std: N o Devic			requency
	40.00 dB	m									
			2.	4.2 dBm							Center Fre
J.O				• • •						014	4.700000 IVIF
00											
.0					}	harrower		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	RMS AVG		
.0											
).0											
	H7								00 MHz		CF Ste
			#`	VBW 300 ki	Hz			sweep	20 ms		350.000 ki
enter 814.700 M Res BW 100 kHz otal Carrier Powe	Z	29 dBm/ 1.4		VBW 300 ki ACP-li				Sweep	20 ms	<u>Auto</u>	350.000 ki
Res BW 100 kHz	Z		40 MHz	ACP-II	BW Lov	wer	Up	per			350.000 kl Mi
Res BW 100 kHz otal Carrier Powe carrier Power	z er 24.22	Filter	40 MHz Offset Freq	ACP-II	BW Lov dBc	dBm	Up dBc	per dBm	Filter		350.000 kl Mi Freq Offs
Res BW 100 kHz	z er 24.22	Filter	40 MHz Offset Freq 0.0 Hz	ACP-II Integ BW 37.50 kHz	BW Lov dBc -53.28	dBm -29.05 -	Up dBc 53.54	per dBm -29.31	Filter -3 dB		350.000 kl M Freq Offs
Res BW 100 kHz otal Carrier Powe Carrier Power	z er 24.22	Filter	40 MHz Offset Freq	ACP-II	BW Lov dBc -53.28	dBm	Up dBc 53.54	per dBm	Filter		350.000 kł Ma Freq Offs 0 ł

Plot 7-27. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - Low Channel)



Plot 7-28. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - High Channel)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager	
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LTE Band 14



Plot 7-29. Lower Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)



Plot 7-30. Lower Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: C3K1995	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dama 04 af 40	
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	ectrum Analyze	r - Swept SA									
LXI RL	RF	50Ω DC	CORREC	SEI	ISE:INT	#Avg Typ	ALIGN AUTO	09:01:42 PM TRACE	May 25, 2021	F	requency
PASS			PNO: Wide ↔ IFGain:Low	Trig: Free #Atten: 3				TYP DE	ANNNN		Auto Tune
10 dB/div	Ref 25.0	00 dBm					Mk	r1 798.0 -33.8	26 MHz 34 dBm		Autorune
	e 1 Pass										Center Freq
15.0										798	3.000000 MHz
5.00	~~~~~	m									Start Freq
-5.00										79	7.000000 MHz
-15.0											Stop Freq
-25.0			MM	.						799	9.000000 MHz
-35.0				Wern							CF Step 200.000 kHz
-45.0					ىرىسىر	hand	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	······	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>Auto</u>	200.000 kHz Man
											Freq Offset
-55.0											0 Hz
-65.0											Scale Type
Center 79		iz						Span 2.	000 MHz	Log	<u>Lin</u>
#Res BW	100 kHz		#VBW	300 kHz				.000 ms (′	1001 pts)		
MSG							STATUS	5			

Plot 7-31. Upper Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)



Plot 7-32. Upper Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dama 20 af 40	
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🔤 Keysight Sp	ctrum Analyzer -	Swept SA									
LXI RL	RF 5	0Ω DC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO		May 25, 2021	E	requency
PASS			PNO: Wide ↔ IFGain:Low	. Trig: Free #Atten: 36		#Avg Typ		TYP De			
10 dB/div Log	Ref 25.0	0 dBm					Mk	r1 787.9 -26.	64 MHz 75 dBm		Auto Tune
15.0	e 1 Pass					man	and the second second	And marker	mmmm		Center Freq 8.000000 MHz
-5.00										78	Start Freq 6.000000 MHz
-15.0					1 \ N					79	Stop Freq 0.000000 MHz
-35.0 -45.0	wand	unnun	nn Mar	arread N						<u>Auto</u>	CF Step 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 78 #Res BW	8.000 MH; 100 kHz	Z	#VBW	300 kHz			Sweep 2	Span 4 2.000 ms (.000 MHz 1001 pts)	Log	Lin
MSG							STATU	IS			

Plot 7-33. Lower Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)



Plot 7-34. Lower Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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🔤 Keysight Spectrum Analyzer - Swept SA 🚽					
LX RL RF 50 Ω DC	CORREC	SENSE:INT #Avg	ALIGN AUTO	09:12:58 PM May 25, 2021 TRACE 1 2 3 4 5 6	Frequency
PASS	PNO: Wide ↔ Trig: Fr IFGain:Low #Atten:	ree Run		TYPE A WWWW DET A NNNNN	Auto Tune
10 dB/div Ref 25.00 dBm			Mkr	1 798.010 MHz -26.70 dBm	AutoTune
15.0 Trace 1 Pass					Center Freq 798.000000 MHz
-5.00					Start Freq 797.000000 MHz
-15.0	- Why	1			Stop Freq 799.000000 MHz
-35.0		w.W.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mmmm	CF Step 200.000 kHz <u>Auto</u> Man
-55.0					Freq Offset 0 Hz
-65.0					Scale Type
Center 798.000 MHz #Res BW 100 kHz	#VBW 300 kH		Swoon 4	Span 2.000 MHz	Log <u>Lin</u>
	#VBW 300 KH	2	Sweep 1.	000 ms (1001 pts)	

Plot 7-35. Upper Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)



Plot 7-36. Upper Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Vicrosoft	Approved by: Technical Manager	
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7.5 Conducted Power Output Data §2.1046 §2.1046 §90.635

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
15 MHz	QPSK	26765	821.5	1/0	25.18	0.330	50.00	-24.82
	16-QAM	26765	821.5	1/0	24.51	0.282	50.00	-25.49
10 MHz	QPSK	26740	819.0	1 / 25	25.27	0.336	50.00	-24.73
	16-QAM	26740	819.0	1/0	24.44	0.278	50.00	-25.56
	QPSK	26715	816.5	1 / 12	25.29	0.338	50.00	-24.71
5 MHz	QPSK	26765	821.5	1 / 12	25.27	0.336	50.00	-24.73
	16-QAM	26715	816.5	1 / 12	24.70	0.295	50.00	-25.30
	10-02/101	26765	821.5	1/0	24.55	0.285	50.00	-25.45
	QPSK	26705	815.5	1/7	25.30	0.339	50.00	-24.70
3 MHz	QF SK	26775	822.5	1/7	25.30	0.339	50.00	-24.70
JIVITIZ	16-QAM	26705	815.5	1/7	24.54	0.285	50.00	-25.46
	10-QAIVI	26775	822.5	1 / 14	24.43	0.277	50.00	-25.57
	QPSK	26697	814.7	1/3	25.28	0.337	50.00	-24.72
1.4 MHz	UP SK	26783	823.3	1/3	25.24	0.334	50.00	-24.76
1.4 101712	16-QAM	26697	814.7	1/3	24.45	0.279	50.00	-25.55
	10-QAIVI	26783	823.3	1/3	24.57	0.286	50.00	-25.43

Table 7-2. Conducted Power Output Data (LTE Band 26)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin (dB)
15 MHz	QPSK	26765	821.5	1 / 37	23.90	0.245	50.00	-26.10
	16-QAM	26765	821.5	1 / 37	23.80	0.240	50.00	-26.20
10 MHz	QPSK	26740	819.0	1/0	23.87	0.244	50.00	-26.13
	16-QAM	26740	819.0	1/0	24.04	0.253	50.00	-25.96
	QPSK	26715	816.5	1 / 12	23.96	0.249	50.00	-26.04
5 MHz	QF5K	26765	821.5	1 / 12	23.87	0.244	50.00	-26.13
	16-QAM	26715	816.5	1 / 24	24.23	0.265	50.00	-25.77
		26765	821.5	1/0	23.97	0.250	50.00	-26.03
	QPSK	26705	815.5	1/7	24.04	0.253	50.00	-25.96
3 MHz	QI OK	26775	822.5	1/0	23.90	0.245	50.00	-26.10
5 10112	16-QAM	26705	815.5	1/7	24.08	0.256	50.00	-25.92
		26775	822.5	1/0	23.96	0.249	50.00	-26.04
	QPSK	26697	814.7	1/3	23.98	0.250	50.00	-26.02
1.4 MHz	QF SK	26783	823.3	1/0	23.86	0.243	50.00	-26.14
1.4 WIF12	16-QAM	26697	814.7	1/0	24.03	0.253	50.00	-25.97
	10-QAIVI	26783	823.3	1/3	23.98	0.250	50.00	-26.02

Table 7-3. Conducted Power Output Data (LTE Band 26)

NOTES:

- 1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 2. This unit was tested with its standard battery.

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7.6 Radiated Power (ERP)

Test Overview

Effective Radiated Power (ERP) 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. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, 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.
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW \geq 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".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

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Test Setup

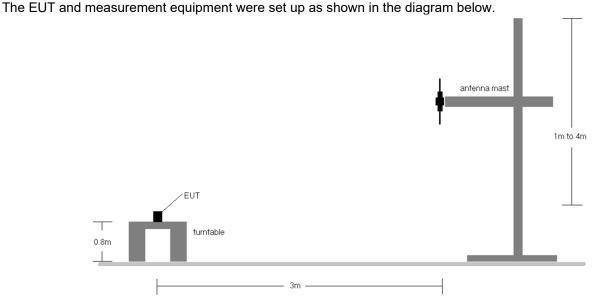


Figure 7-4. Radiated Test Setup <1GHz

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.

FCC ID: C3K1995	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	/licrosoft	Approved by: Technical Manager		
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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]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
	QPSK	821.5	V	157	56	6.12	1/0	17.54	21.51	0.142	38.45	-16.94
15 MHz	16-QAM	821.5	V	157	56	6.12	1/0	16.84	20.81	0.121	38.45	-17.64
	QPSK	821.5	Н	220	106	6.62	1/0	16.73	21.20	0.132	38.45	-17.25
	QPSK (Half Open)	821.5	v	161	123	6.12	1/0	16.72	20.69	0.117	38.45	-17.76

Table 7-4. ERP Data (LTE Band 26 – South - Open)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
	QPSK	821.5	V	115	72	6.12	1/0	16.70	20.67	0.117	38.45	-17.78
15 MHz	16-QAM	821.5	V	115	72	6.12	1/0	16.20	20.17	0.104	38.45	-18.28
	QPSK	821.5	Н	100	119	6.12	1/3	15.25	19.22	0.084	38.45	-19.23
	QPSK (Half Open)	821.5	V	116	128	6.12	1/3	16.08	20.05	0.101	38.45	-18.40

Table 7-5. ERP Data (LTE Band 26 – North - Open)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
40 1411-	QPSK	793.0	Н	238	107	6.41	1 / 25	18.83	23.09	0.204	34.77	-11.68
10 MHz	16-QAM	793.0	Н	238	107	6.41	1 / 49	17.63	21.89	0.155	34.77	-12.88
		790.5	Н	238	107	6.39	1 / 24	19.05	23.29	0.213	34.77	-11.49
5 MHz	QPSK	793.0	Н	238	107	6.41	1 / 12	18.80	23.07	0.203	34.77	-11.70
2 MILZ		795.5	Н	238	107	6.44	1/0	18.88	23.17	0.207	34.77	-11.60
	16-QAM	790.5	Н	238	107	6.39	1 / 12	18.01	22.25	0.168	34.77	-12.52
40 MU-	QPSK	795.5	V	145	55	6.21	1 / 25	18.42	22.48	0.177	34.77	-12.29
10 MHz	QPSK (Half Open)	790.5	V	144	125	6.21	1 / 49	18.93	22.99	0.199	34.77	-11.78

Table 7-6. ERP Data (LTE Band 14 – South - Open)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
40 1411-	QPSK	793.0	Н	100	116	6.41	1 / 49	19.56	23.82	0.241	34.77	-10.95
10 MHz	16-QAM	793.0	Н	100	116	6.41	1 / 25	18.91	23.17	0.208	34.77	-11.60
		790.5	Н	100	116	6.39	1 / 12	19.67	23.91	0.246	34.77	-10.86
5 MHz	QPSK	793.0	Н	100	116	6.41	1 / 12	19.66	23.93	0.247	34.77	-10.84
5 MITZ		795.5	Н	100	116	6.44	1/0	19.58	23.87	0.244	34.77	-10.90
	16-QAM	795.5	Н	100	116	6.44	1 / 12	18.93	23.23	0.210	34.77	-11.54
10 MHz	QPSK	795.5	V	130	163	6.21	1 / 12	18.11	22.17	0.165	34.77	-12.60
	QPSK (Half Open)	790.5	Н	100	113	6.41	1 / 12	18.80	23.06	0.203	34.77	-11.71

Table 7-7. ERP Data (LTE Band 14 - North - Open)

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7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions 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 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 peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.8

ANSI/TIA-603-E-2016 - Section 2.2.12

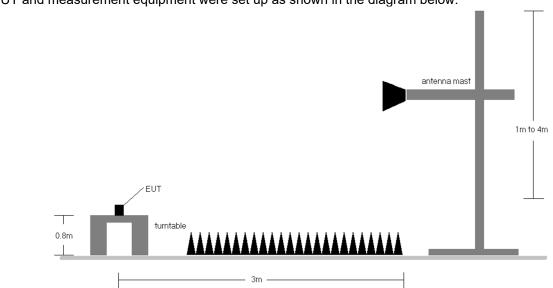
Test Settings

- 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 \geq 2 x span / RBW
- 5. Detector = RMS
- 6. Trace mode = Average (Max Hold for pulsed emissions)
- 7. The trace was allowed to stabilize

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager			
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Test Setup



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

Figure 7-5. Test Instrument & Measurement Setup

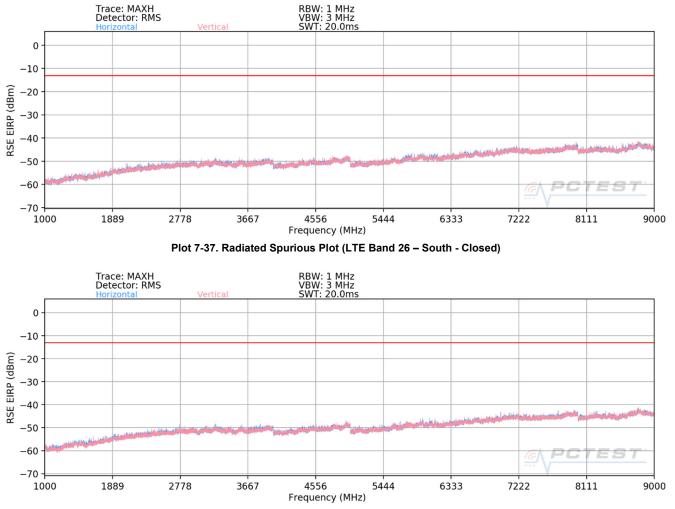
Test Notes

- 1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 2. This unit was tested with its standard battery.
- 3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 4. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 5. Per 90(R)(f), emissions in the 1559 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals. These emission measurements are shown in this section below.

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LTE Band 26 – South



Plot 7-38. Radiated Spurious Plot (LTE Band 26 - South - Open)

Bandwidth (MHz):	10
Frequency (MHz):	819.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 25

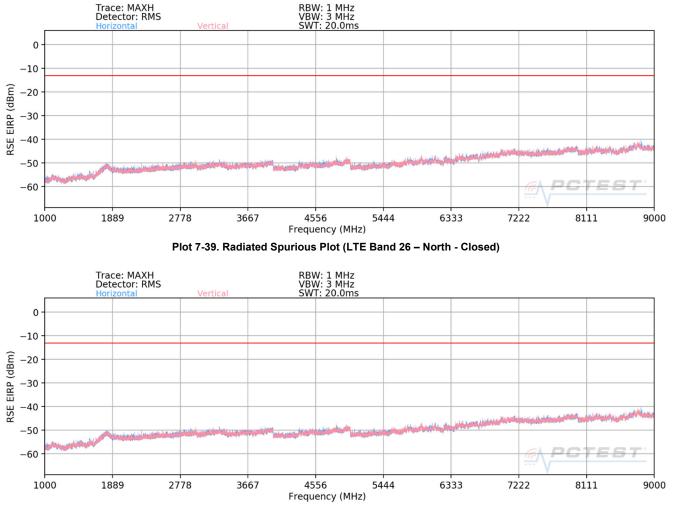
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]		Margin [dB]
1638.0	V	137	26	-72.67	0.75	35.08	-60.18	-13.00	-47.18
2457.0	V	-	-	-79.33	5.00	32.67	-62.59	-13.00	-49.59
3276.0	V	-	-	-80.04	7.21	34.17	-61.08	-13.00	-48.08
4095.0	V	-	-	-80.53	7.95	34.42	-60.84	-13.00	-47.84

Table 7-8. Radiated Spurious Data (LTE Band 26 - Mid Channel - South - Open)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 40
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LTE Band 26 – North



Plot 7-40. Radiated Spurious Plot (LTE Band 26 - North - Open)

Bandwidth (MHz):	10
Frequency (MHz):	819.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 25

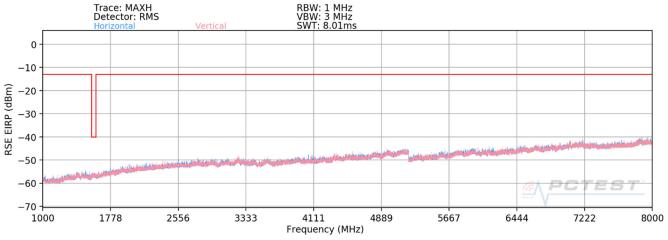
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]		Margin [dB]
1638.0	V	101	33	-73.24	1.50	35.26	-60.00	-13.00	-47.00
2457.0	V	-	-	-79.25	5.37	33.12	-62.14	-13.00	-49.14
3276.0	V	-	-	-80.85	7.59	33.74	-61.51	-13.00	-48.51
4095.0	V	-	-	-80.60	8.05	34.45	-60.81	-13.00	-47.81

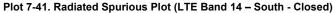
Table 7-9. Radiated Spurious Data (LTE Band 26 - Mid Channel - North - Open)

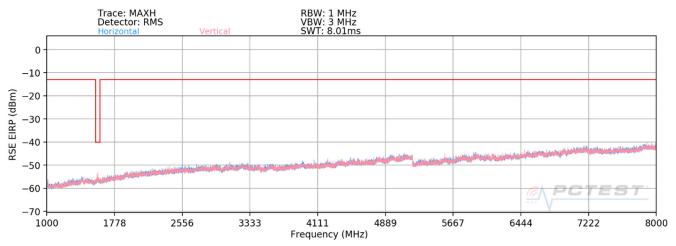
FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 42 of 40
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LTE Band 14 – South









Bandwidth (MHz):	5
Frequency (MHz):	790.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

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]		Margin [dB]
1581.0	V	216	13	-74.92	1.14	33.22	-62.04	-40.00	-22.04
2371.5	V	-	-	-78.98	4.81	32.83	-62.42	-13.00	-49.42
3162.0	V	-	-	-79.58	6.36	33.78	-61.47	-13.00	-48.47
3952.5	V	-	-	-81.76	8.38	33.62	-61.64	-13.00	-48.64

Table 7-10. Radiated Spurious Data (LTE Band 14 – Low Channel – South)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 42 of 40
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5
793.0
QPSK
1 / 12

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]		Margin [dB]
1586.0	V	230	64	-72.73	1.26	35.53	-59.72	-40.00	-19.72
2379.0	V	-	-	-79.06	4.88	32.82	-62.44	-13.00	-49.44
3172.0	V	-	-	-79.59	6.29	33.70	-61.55	-13.00	-48.55
3965.0	V	-	-	-80.69	7.99	34.30	-60.96	-13.00	-47.96

Table 7-11. Radiated Spurious Data (LTE Band 14 – Mid Channel – South - Open)

Bandwidth (MHz):	5
Frequency (MHz):	795.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

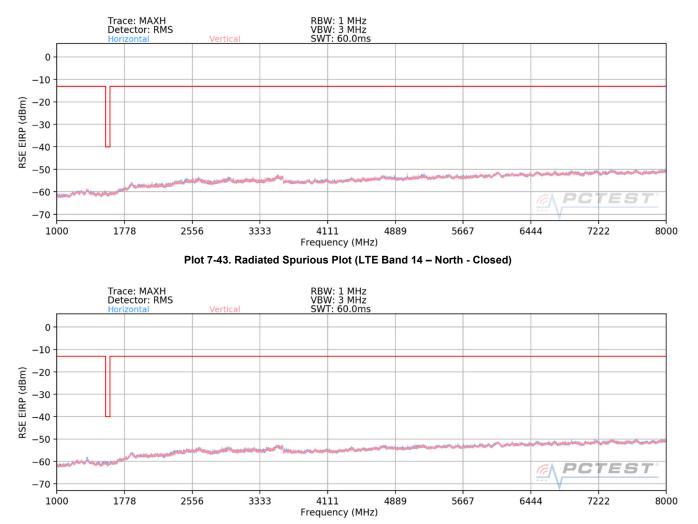
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]		Margin [dB]
1591.0	V	172	63	-72.92	1.39	35.47	-59.79	-40.00	-19.79
2386.5	V	-	-	-79.07	4.96	32.89	-62.37	-13.00	-49.37
3182.0	V	-	-	-79.67	6.40	33.73	-61.52	-13.00	-48.52
3977.5	V	-	-	-80.28	7.75	34.47	-60.79	-13.00	-47.79

Table 7-12. Radiated Spurious Data (LTE Band 14 – High Channel – South Ant 1 - Open)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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LTE Band 14 – North



Plot 7-44. Radiated Spurious	s Plot (LTE Band 14 – North - Open)
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Bandwidth (MHz):	10
Frequency (MHz):	793.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 25
RB connig (Size / Onset).	1725

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]		Margin [dB]
1586.0	V	115	164	-74.97	-2.95	29.08	-66.18	-40.00	-26.18
2379.0	V	-	-	-77.47	2.09	31.62	-63.64	-13.00	-50.64
3172.0	V	-	-	-77.66	2.86	32.20	-63.06	-13.00	-50.06

Table 7-13. Radiated Spurious Data (LTE Band 14 - Mid Channel - North - Open)

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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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.

The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

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

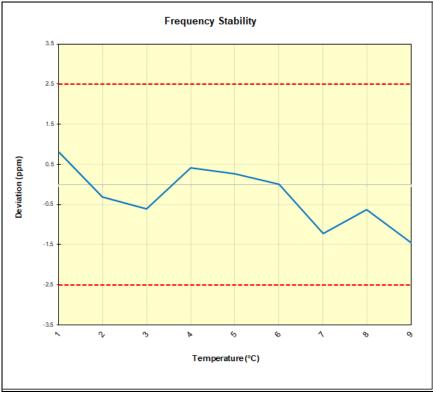
FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager	
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Frequency Stability / Temperature Variation

LTE Band 26						
	Operating	Frequency (Hz):	819,000,000			
	Ref. Voltage (VDC):		4.24			
	Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
		- 30	819,003,240	658	0.0000804	
		- 20	819,002,320	-262	-0.0000320	
		- 10	819,002,076	-506	-0.0000617	
		0	819,002,920	339	0.0000414	
100 %	4.24	+ 10	819,002,795	213	0.0000261	
		+ 20 (Ref)	819,002,582	0	0.0000000	
		+ 30	819,001,577	-1,005	-0.0001227	
		+ 40	819,002,069	-512	-0.0000625	
		+ 50	819,001,393	-1,189	-0.0001452	
Battery Endpoint	3.70	+ 20	819,001,881	-701	-0.0000855	

Table 7-14. LTE Band 26 Frequency Stability Data



Plot 7-45. LTE Band 26 Frequency Stability Chart

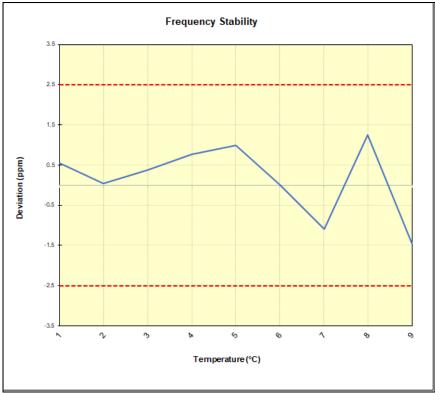
FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	rosoft	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 47 of 40	
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Frequency Stability / Temperature Variation

LTE Band 14						
	Operating	Frequency (Hz):	793,000,000		Ī	
	Ref. Voltage (VDC):		4.	4.24		
					•	
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
		- 30	793,000,590	424	0.0000535	
		- 20	793,000,194	28	0.0000035	
		- 10	793,000,461	295	0.0000372	
		0	793,000,775	610	0.0000769	
100 %	4.24	+ 10	793,000,945	779	0.0000982	
		+ 20 (Ref)	793,000,165	0	0.0000000	
		+ 30	792,999,302	-863	-0.0001089	
		+ 40	793,001,153	988	0.0001245	
		+ 50	792,999,011	-1,154	-0.0001456	
Battery Endpoint	3.70	+ 20	793,000,339	174	0.0000219	

Table 7-15. LTE Band 14 Frequency Stability Data



Plot 7-46. LTE Band 14 Frequency Stability Chart

FCC ID: C3K1995	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Microsoft	Approved by: Technical Manager
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Microsoft Corporation Portable Handset FCC ID: C3K1995** complies with all the requirements of Part 90 of the FCC rules.

FCC ID: C3K1995	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	osoft	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 40	
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