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FCC Carrier Aggregation REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
June 15, 2021

Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-2105-FC028-R1

FCC ID:	**A3LSMG990U**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model(s):	SM-G990U
Additional Model(s):	SM-G990U1/DS, SM-G990U1
EUT Type:	Mobile Phone
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22, §2

Mode (PCC+SCC)	Tx Frequency (MHz)	Modulation	Emission Designator	ERP	
				Max. Power (dBm)	Max. Power (W)
3MHz+5MHz	825.6 - 846.5	QPSK	7M42G7D	20.11	0.103
		16QAM	7M48W7D	19.68	0.093
		64QAM	7M51W7D	19.52	0.089
		256QAM	7M52W7D	19.50	0.089
5MHz+3MHz	825.6 - 847.4	QPSK	7M50G7D	19.48	0.089
		16QAM	7M51W7D	19.29	0.085
		64QAM	7M52W7D	19.25	0.084
		256QAM	7M53W7D	19.10	0.081
5MHz+10MHz	826.8 - 844.0	QPSK	13M8G7D	19.11	0.082
		16QAM	13M8W7D	18.67	0.074
		64QAM	13M9W7D	17.46	0.056
		256QAM	13M9W7D	14.29	0.027
10MHz+5MHz	829.0 - 846.2	QPSK	13M8G7D	18.89	0.078
		16QAM	13M9W7D	18.46	0.070
		64QAM	13M9W7D	17.43	0.055
		256QAM	13M9W7D	14.30	0.027
10MHz+10MHz	829.0 - 844.0	QPSK	18M7G7D	19.10	0.081
		16QAM	18M7W7D	18.68	0.074
		64QAM	18M8W7D	17.48	0.056
		256QAM	18M8W7D	14.33	0.027

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

REVIEWED BY

Report prepared by : Jae Mun Do
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2105-FC028	May 26, 2021	- First Approval Report
HCT-RF-2105-FC028-R1	June 15, 2021	- Revised the Additional model(s). (SM-G990U1 added)

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

Table of Contents

REVIEWED BY 2
1. GENERAL INFORMATION 5
2. INTRODUCTION 6
2.1. DESCRIPTION OF EUT 6
2.2. MEASURING INSTRUMENT CALIBRATION 6
2.3. TEST FACILITY 6
3. DESCRIPTION OF TESTS 7
3.1 TEST PROCEDURE 7
3.2 RADIATED POWER 8
3.3 RADIATED SPURIOUS EMISSIONS 9
3.4 OCCUPIED BANDWIDTH. 10
3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL 11
3.6 BAND EDGE 12
3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE 13
4. LIST OF TEST EQUIPMENT 14
5. MEASUREMENT UNCERTAINTY 15
6. SUMMARY OF TEST RESULTS 16
7. SAMPLE CALCULATION 17
8. TEST DATA 19
8.1 Conducted Power 22
8.2 Equivalent Radiated Power 25
8.3 Conducted Spurious Emissions 28
8.4 Band Edge 40
8.5 Frequency Stability / Variation Of Ambient Temperature 56
8.6 Radiated Spurious Emissions 61
8.7 Occupied Bandwidth 64
8.8 Peak- to- Average Ratio 70
9. ANNEX A_ TEST SETUP PHOTO 76

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMG990U
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22, §2
EUT Type:	Mobile Phone
Model(s):	SM-G990U
Additional Model(s):	SM-G990U1/DS, SM-G990U1
Tx Frequency:	826.8 - 844.0: 5MHz+10MHz 829.0 - 846.2: 10MHz+5MHz 829.0 - 844.0: 10MHz+10MHz
Date(s) of Tests:	April 19, 2021 ~ May 18, 2021
Serial number:	Radiated: R3CR315S6MD Conducted: R3CR3117FBH
LTE CA :	CA 5B(Uplink)

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS, CDMA(BC0, 1, 10) and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (HT20/40/80), Bluetooth, BT LE, NFC, WPT, mmWave(n260/261).

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.**

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 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 ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points > 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

Test Note

1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
2. 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 and the previously recorded signal was duplicated.

   The power is calculated by the following formula;

   $$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

   Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.
3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
5. 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.

3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points > 2 x span / RBW
5. Detector = Peak
6. Trace mode = Max Hold
7. The trace was allowed to stabilize
8. Test channel : Low/ Middle/ High
9. Frequency range : We are performed all frequency to 10^{th} harmonics from 9 kHz.

Test Note

1. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
2. The EUT was tested in three orthogonal planes(X, Y, Z) 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 test data
3. For spurious emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
   The spurious emissions is calculated by the following formula;

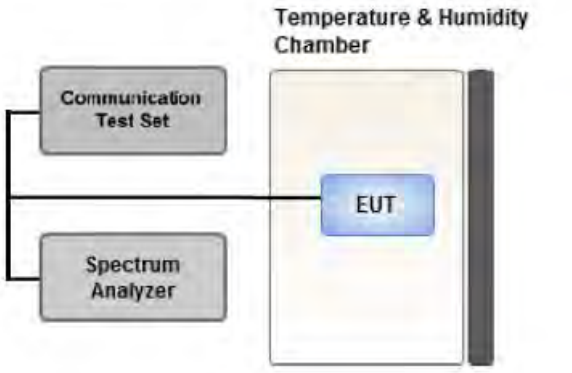
$$Result_{(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   Where: $P_g$is the generator output power into the substitution antenna.

   If the fundamental frequency is below 1GHz, RF output power has been converted to EIRP.

$$EIRP_{(dBm)} = ERP_{(dBm)} + 2.15$$

3.4 OCCUPIED BANDWIDTH.



Test setup

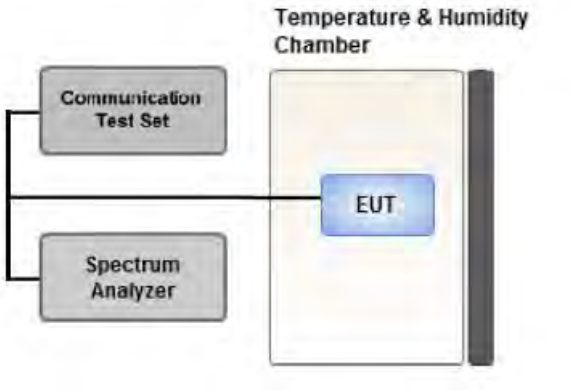
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

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 ≥ 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

3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

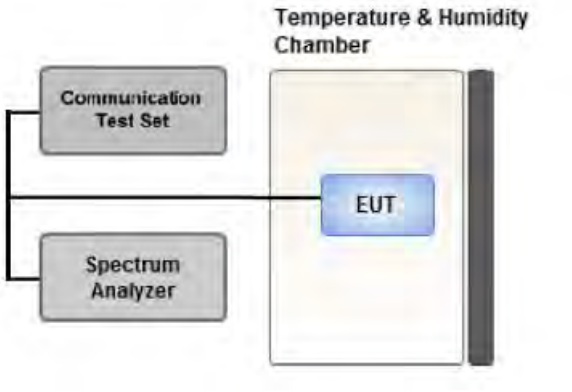
Test Overview

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 its maximum duty cycle, 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.

Test Settings

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = trace average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x Span / RBW

3.6 BAND EDGE



Test setup

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 its maximum duty cycle, 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.

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 > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

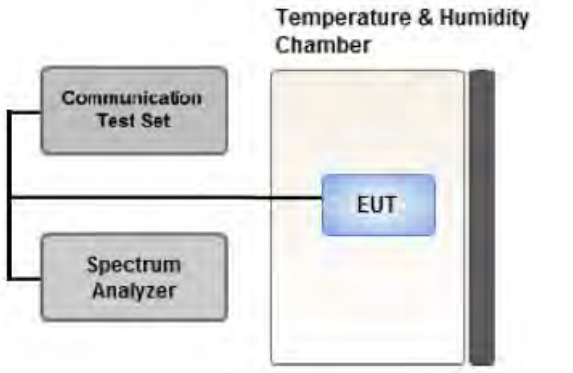
Test Notes

According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. 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.

All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.

The frequency stability of the transmitter is measured by:

1. Temperature:

   The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

2. Primary Supply Voltage:

   .- Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

   .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

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.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	03/02/2021	Annual	03/02/2022
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	03/02/2021	Annual	03/02/2022
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	04/07/2021	Annual	04/07/2022
Hewlett Packard	E3632A/DC Power Supply	MY40004427	09/16/2020	Annual	09/16/2021
Schwarzbeck	UHAP/ Dipole Antenna	557	04/05/2021	Biennial	04/05/2023
Schwarzbeck	UHAP/ Dipole Antenna	558	04/05/2021	Biennial	04/05/2023
ESPEC	SU-642 / Chamber	93008124	03/15/2021	Annual	03/15/2022
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	08/29/2019	Biennial	08/29/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	09/25/2019	Biennial	09/25/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	10/13/2020	Biennial	10/13/2022
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	02/11/2020	Biennial	02/11/2022
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY50200093	11/17/2020	Annual	11/17/2021
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2020	Annual	06/04/2021
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2020	Annual	10/14/2021
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/26/2020	Annual	08/26/2021
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-333	03/19/2020	Biennial	03/19/2022
Schwarzbeck	VULB9160/ Bilog Antenna	3150	03/03/2021	Biennial	03/03/2023
Schwarzbeck	VULB9168/ Hybrid Antenna	760	02/22/2021	Biennial	02/22/2023
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6262116770	07/22/2020	Annual	07/22/2021
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/07/2021	Annual	01/07/2022
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/13/2020	Annual	07/13/2021
KEYSIGHT	N9030B / Signal Analyzer(5Hz~40.0GHz)	MY55480167	06/04/2020	Annual	06/04/2021
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. 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 data shown herein 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.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §22.917(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Frequency stability / variation of ambient temperature	§2.1055, §22.355	< 2.5 ppm	PASS

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§22.913(a)(5)	< 7 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §22.917(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
channel	Freq.(MHz)						W	dBm
128	824.20	-21.37	38.40	-10.61	0.95	H	0.483	26.84

ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test , the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test , the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

8. TEST DATA

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers 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 its maximum duty cycle, 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.

Test Note

1. All tests were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth.
2. Channel bandwidth is shown in the tables below based only on the channel bandwidths that were supported in this device.

Channel Bandwidth (PCC)	Channel Bandwidth (SCC)	Maximum aggregated bandwidth (MHz)
3	5	8
5	3	8
5	10	15
10	5	15
10	10	20

3. All modes of operation were investigated and the worst case configuration results are reported in this section.

Please refer to the table below.

- Worst case(Conducted Spurious Emissions, Band Edge)

: We have selected higher of the Conduction Output Power.

- Worst case(Radiated Spurious Emissions) : We have selected higher of the ERP.

- Worst case(OBW, Frequency stability)

: All modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

Test Description	Mod	Operating frequency	PCC					SCC				
			BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset	BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset
Conducted Spurious Emissions/ Band Edge	QPSK	Low	10	829.0	20450	1	49	5	836.2	20522	1	0
	QPSK	Mid	10	831.6	20476	1	49	10	841.5	20575	1	0
	QPSK	High	5	836.8	20528	1	24	10	844.0	20600	1	0
	QPSK	Low	10	829.0	20450	1	0	5	836.2	20522	1	24
	QPSK	Mid	10	831.6	20476	1	0	10	841.5	20575	1	49
	QPSK	High	5	836.8	20528	1	0	10	844.0	20600	1	49
	QPSK	Low	10	829.0	20450	50	0	5	836.2	20522	25	0
	QPSK	Mid	10	831.6	20476	50	0	10	841.5	20575	50	0
	QPSK	High	5	836.8	20528	25	0	10	844.0	20600	50	0
	QPSK	Low	10	829.0	20450	50	0	10	838.9	20549	50	0
	QPSK	Mid	10	831.6	20476	50	0	10	841.5	20575	50	0
	QPSK	High	10	834.1	20501	50	0	10	844.0	20600	50	0
Radiated Spurious Emissions	QPSK	Low	3	825.6	20416	1	14	5	829.5	20455	1	0
	QPSK	Mid	3	834.1	20501	1	14	5	838.0	20540	1	0
	QPSK	High	10	834.1	20501	1	49	10	244.0	20600	1	0

[Worst case]

Test Description	Mod	Operating frequency	PCC					SCC				
			BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset	BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset
OBW, PAR	QPSK, 16QAM, 64QAM, 256QAM	Mid	3	834.1	20501	15	0	5	838.0	20540	25	0
			5	835.0	20510	25	0	3	838.9	20549	15	0
			5	831.8	20478	25	0	10	839.0	20550	50	0
			10	834.0	20500	50	0	5	841.2	20572	25	0
			10	831.6	20476	50	0	10	841.5	20575	50	0
Frequency stability	QPSK	Mid	3	834.1	20501	15	0	5	838.0	20540	25	0
			5	835.0	20510	25	0	3	838.9	20549	15	0
			5	831.8	20478	25	0	10	839.0	20550	50	0
			10	834.0	20500	50	0	5	841.2	20572	25	0
			10	831.6	20476	50	0	10	841.5	20575	50	0

.

8.1 Conducted Power

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	3	825.6	20416	1	14	5	829.5	20455	1	0	24.15
	5	826.5	20425	1	24	3	830.4	20464	1	0	24.10
	5	826.8	20428	1	24	10	834.0	20500	1	0	24.26
	10	***829.0***	***20450***	***1***	***49***	***5***	***836.2***	***20522***	***1***	***0***	***24.29***
	10	829.0	20450	1	49	10	838.9	20549	1	0	24.22
Mid	3	834.1	20501	1	14	5	838.0	20540	1	0	24.23
	5	835.0	20510	1	24	3	838.9	20549	1	0	24.15
	5	831.8	20478	1	24	10	839.0	20550	1	0	24.28
	10	834.0	20500	1	49	5	841.2	20572	1	0	24.24
	10	***831.6***	***20476***	***1***	***49***	***10***	***841.5***	***20575***	***1***	***0***	***24.30***
High	3	842.6	20586	1	14	5	846.5	20625	1	0	24.06
	5	843.5	20595	1	24	3	847.4	20634	1	0	24.31
	5	***836.8***	***20528***	***1***	***24***	***10***	***844.0***	***20600***	***1***	***0***	***24.34***
	10	839.0	20550	1	49	5	846.2	20622	1	0	24.26
	10	834.1	20501	1	49	10	844.0	20600	1	0	24.07

Note:

Modulation : QPSK(1RB)

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	3	825.6	20416	15	0	5	829.5	20455	25	0	22.24
	5	826.5	20425	1	24	3	830.4	20464	15	0	22.11
	5	826.8	20428	25	0	10	834.0	20500	50	0	22.29
	10	***829.0***	***20450***	***50***	***0***	***5***	***836.2***	***20522***	***25***	***0***	***22.33***
	10	829.0	20450	50	0	10	838.9	20549	50	0	22.30
Mid	3	834.1	20501	15	0	5	838.0	20540	25	0	22.31
	5	835.0	20510	25	0	3	838.9	20549	15	0	22.21
	5	831.8	20478	25	0	10	839.0	20550	50	0	22.25
	10	834.0	20500	50	0	5	841.2	20572	25	0	22.28
	10	***831.6***	***20476***	***50***	***0***	***10***	***841.5***	***20575***	***50***	***0***	***22.33***
High	3	842.6	20586	15	0	5	846.5	20625	25	0	22.24
	5	843.5	20595	25	0	3	847.4	20634	15	0	22.19
	5	***836.8***	***20528***	***25***	***0***	***10***	***844.0***	***20600***	***50***	***0***	***22.38***
	10	839.0	20550	50	0	5	846.2	20622	25	0	22.29
	10	834.1	20501	50	0	10	844.0	20600	50	0	22.31

Note:

Modulation : QPSK(Full RB)

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	10	829.0	20450	1	49	5	836.2	20522	1	0	23.93
Mid	10	831.6	20476	1	49	10	841.5	20575	1	0	23.75
High	5	836.8	20528	1	24	10	844.0	20600	1	0	23.78
Low	10	829.0	20450	50	0	5	836.2	20522	25	0	21.16
Mid	10	831.6	20476	50	0	10	841.5	20575	50	0	21.23
High	5	836.8	20528	25	0	10	844.0	20600	50	0	21.64

Note:

Modulation : 16QAM

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	10	829.0	20450	1	49	5	836.2	20522	1	0	22.84
Mid	10	831.6	20476	1	49	10	841.5	20575	1	0	22.72
High	5	836.8	20528	1	24	10	844.0	20600	1	0	22.92
Low	10	829.0	20450	50	0	5	836.2	20522	25	0	21.02
Mid	10	831.6	20476	50	0	10	841.5	20575	50	0	21.17
High	5	836.8	20528	25	0	10	844.0	20600	50	0	21.49

Note:

Modulation : 64QAM

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	10	829.0	20450	1	49	5	836.2	20522	1	0	19.60
Mid	10	831.6	20476	1	49	10	841.5	20575	1	0	19.53
High	5	836.8	20528	1	24	10	844.0	20600	1	0	19.51
Low	10	829.0	20450	50	0	5	836.2	20522	25	0	19.05
Mid	10	831.6	20476	50	0	10	841.5	20575	50	0	19.22
High	5	836.8	20528	25	0	10	844.0	20600	50	0	19.54

Note:

Modulation : 256QAM

8.2 Equivalent Radiated Power

	PCC			SCC			Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	E.R.P	
	BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset						W	dBm
Low	***3***	***20416***	***1/14***	***5***	***20455***	***1/0***	***-32.75***	***31.35***	***-10.41***	***1.29***	***H***	***0.092***	***19.65***
	5	20425	1/24	3	20464	1/0	-33.58	30.52	-10.41	1.29	H	0.076	18.82
	5	20428	1/24	10	20500	1/0	-33.42	30.68	-10.41	1.29	H	0.079	18.98
	10	20450	1/49	5	20522	1/0	-33.71	30.39	-10.41	1.29	H	0.074	18.69
	10	20450	1/49	10	20549	1/0	-33.75	30.35	-10.41	1.29	H	0.073	18.65
Mid	***3***	***20501***	***1/14***	***5***	***20540***	***1/0***	***-32.59***	***31.80***	***-10.40***	***1.29***	***H***	***0.103***	***20.11***
	5	20510	1/24	3	20549	1/0	-33.22	31.17	-10.40	1.29	H	0.089	19.48
	5	20478	1/24	10	20550	1/0	-33.59	30.80	-10.40	1.29	H	0.082	19.11
	10	20500	1/49	5	20572	1/0	-33.81	30.58	-10.40	1.29	H	0.078	18.89
	10	20476	1/49	10	20575	1/0	-33.60	30.79	-10.40	1.29	H	0.081	19.10
High	3	20586	1/14	5	20625	1/0	-34.27	30.16	-10.40	1.30	H	0.070	18.46
	5	20595	1/24	3	20634	1/0	-34.75	29.68	-10.40	1.30	H	0.063	17.98
	5	20528	1/24	10	20600	1/0	-33.95	30.48	-10.40	1.30	H	0.076	18.78
	10	20550	1/49	5	20622	1/0	-34.55	29.88	-10.40	1.30	H	0.066	18.18
	10	***20501***	***1/49***	***10***	***20600***	***1/0***	***-33.92***	***30.51***	***-10.40***	***1.30***	***H***	***0.076***	***18.81***

Note:

1. Modulation : QPSK
2. Limit : < 2 Watts

PCC			SCC			Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	E.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset						W	dBm
3	20416	1/14	5	20455	1/0	-32.79	32.34	-10.41	2.32	H	0.091	19.61
3	20501	1/14	5	20540	1/0	-33.02	32.43	-10.40	2.35	H	0.093	19.68
5	20510	1/24	3	20549	1/0	-33.41	32.04	-10.40	2.35	H	0.085	19.29
5	20478	1/24	10	20550	1/0	-34.03	31.42	-10.40	2.35	H	0.074	18.67
10	20500	1/49	5	20572	1/0	-34.24	31.21	-10.40	2.35	H	0.070	18.46
10	20476	1/49	10	20575	1/0	-34.14	31.31	-10.40	2.35	H	0.072	18.56
10	20501	1/49	10	20600	1/0	-34.05	31.47	-10.40	2.39	H	0.074	18.68

Note:

1. Modulation : 16QAM

2. Limit : < 2 Watts

PCC			SCC			Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	E.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset						W	dBm
3	20416	1/14	5	20455	1/0	-32.88	32.25	-10.41	2.32	H	0.089	19.52
3	20501	1/14	5	20540	1/0	-33.21	32.24	-10.40	2.35	H	0.089	19.49
5	20510	1/24	3	20549	1/0	-33.45	32.00	-10.40	2.35	H	0.084	19.25
5	20478	1/24	10	20550	1/0	-35.24	30.21	-10.40	2.35	H	0.056	17.46
10	20500	1/49	5	20572	1/0	-35.27	30.18	-10.40	2.35	H	0.055	17.43
10	20476	1/49	10	20575	1/0	-35.22	30.23	-10.40	2.35	H	0.056	17.48
10	20501	1/49	10	20600	1/0	-35.36	30.16	-10.40	2.39	H	0.055	17.37

Note:

1. Modulation : 64QAM

2. Limit : < 2 Watts

PCC			SCC			Measured	Substitute	Ant.			E.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset	Level (dBm)	Level (dBm)	Gain (dBd)	C.L	Pol.	W	dBm
3	20416	1/14	5	20455	1/0	-32.90	32.23	-10.41	2.32	H	0.089	19.50
3	20501	1/14	5	20540	1/0	-33.55	31.90	-10.40	2.35	H	0.082	19.15
5	20510	1/24	3	20549	1/0	-33.60	31.85	-10.40	2.35	H	0.081	19.10
5	20478	1/24	10	20550	1/0	-38.41	27.04	-10.40	2.35	H	0.027	14.29
10	20500	1/49	5	20572	1/0	-38.40	27.05	-10.40	2.35	H	0.027	14.30
10	20476	1/49	10	20575	1/0	-38.37	27.08	-10.40	2.35	H	0.027	14.33
10	20501	1/49	10	20600	1/0	-38.42	27.10	-10.40	2.39	H	0.027	14.31

Note:

1. Modulation : 256QAM

2. Limit : < 2 Watts

8.3 Conducted Spurious Emissions

Operating frequency	PCC				SCC				Measurement Maximum Frequency (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)
	BW [MHz]	Ch.	Freq. (MHz)	RB/ Offset	BW [MHz]	Ch.	Freq. (MHz)	RB/ Offset				
Low	10	20450	829.0	1/49	5	20522	836.2	1/0	8.0175	28.591	-75.37	-46.78
Mid	10	20476	831.6	1/49	10	20575	841.5	1/0	8.0050	28.591	-75.41	-46.82
High	5	20528	836.8	1/24	10	20600	844.0	1/0	8.0205	28.591	-76.07	-47.48
Low	10	20450	829.0	1/0	5	20522	836.2	1/24	6.2737	28.591	-75.75	-47.16
Mid	10	20476	831.6	1/0	10	20575	841.5	1/49	7.9925	28.591	-74.65	-46.06
High	5	20528	836.8	1/0	10	20600	844.0	1/49	9.4576	28.591	-75.49	-46.90
Low	10	20450	829.0	50/0	5	20522	836.2	25/0	4.0579	27.976	-75.67	-47.69
Mid	10	20476	831.6	50/0	10	20575	841.5	50/0	3.2418	27.976	-76.60	-48.63
High	5	20528	836.8	25/0	10	20600	844.0	50/0	6.0160	28.591	-76.14	-47.55
Low	10	20450	829.0	50/0	10	20549	838.9	50/0	8.0269	28.591	-75.00	-46.41
Mid	10	20476	831.6	50/0	10	20575	841.5	50/0	9.9676	28.591	-75.66	-47.07
High	10	20501	834.1	50/0	10	20600	844.0	50/0	8.8854	28.591	-75.19	-46.60

Note:

1. Modulation : QPSK

2. Factor(dB) = Cable Loss + Ext. Attenuator + Power Splitter

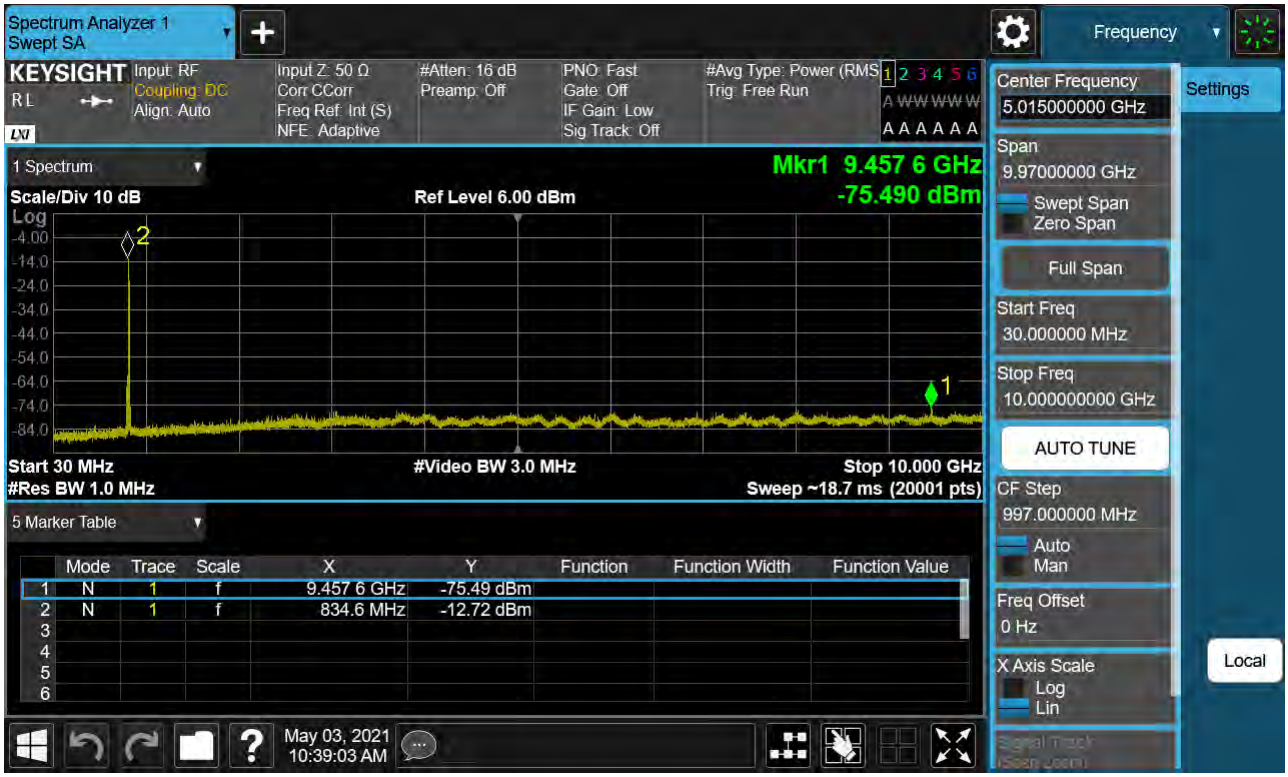
3. Factors for frequency :

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20(26.5)	30.131

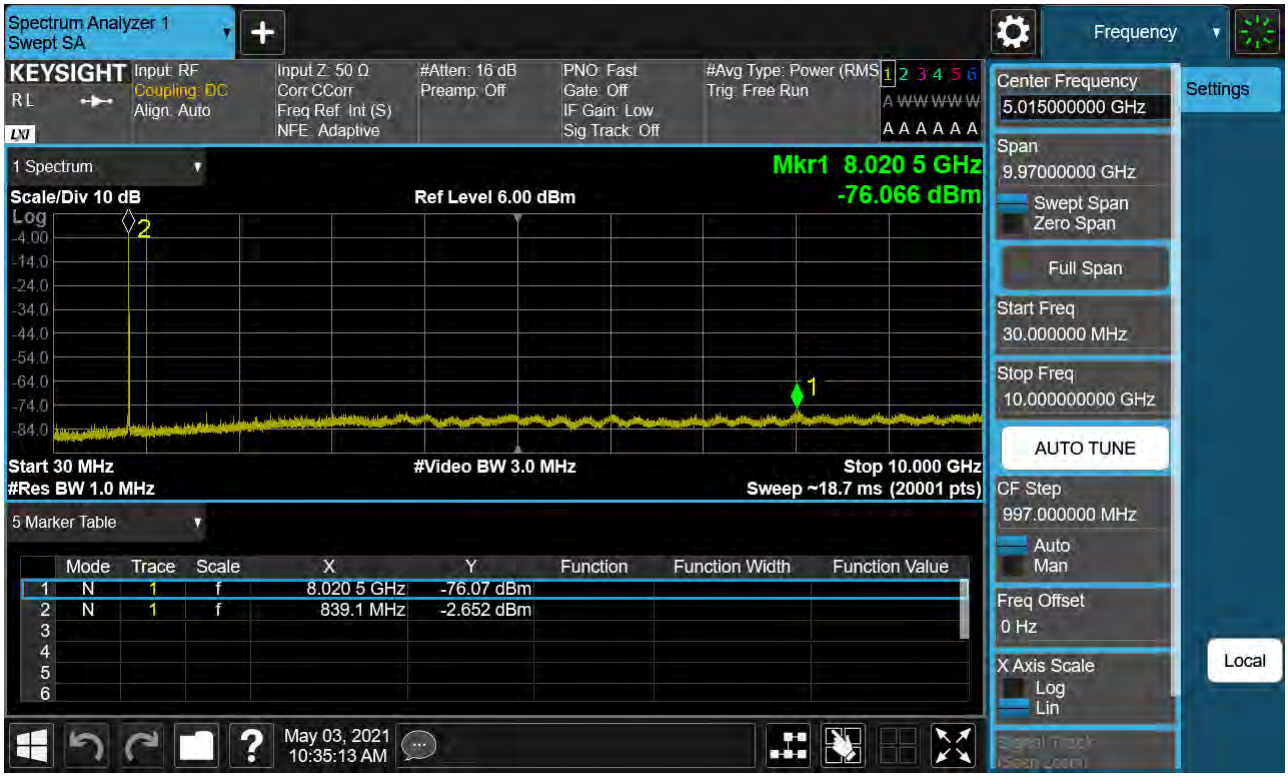
4. Limit : -13.0 dBm

Frequency Range : 30MHz ~ 10GHz

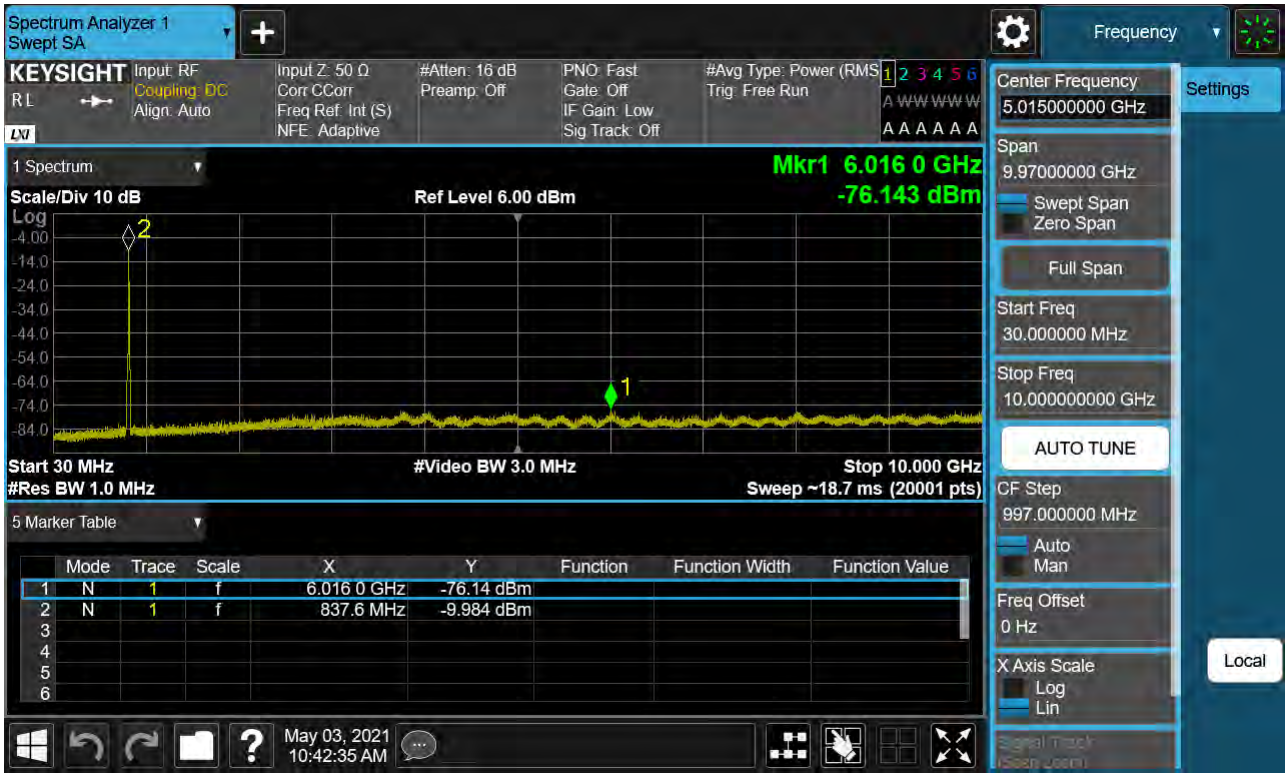
PCC 5MHz Ch20528 RB1 Offset0 SCC 10MHz Ch20600 RB1 Offset49



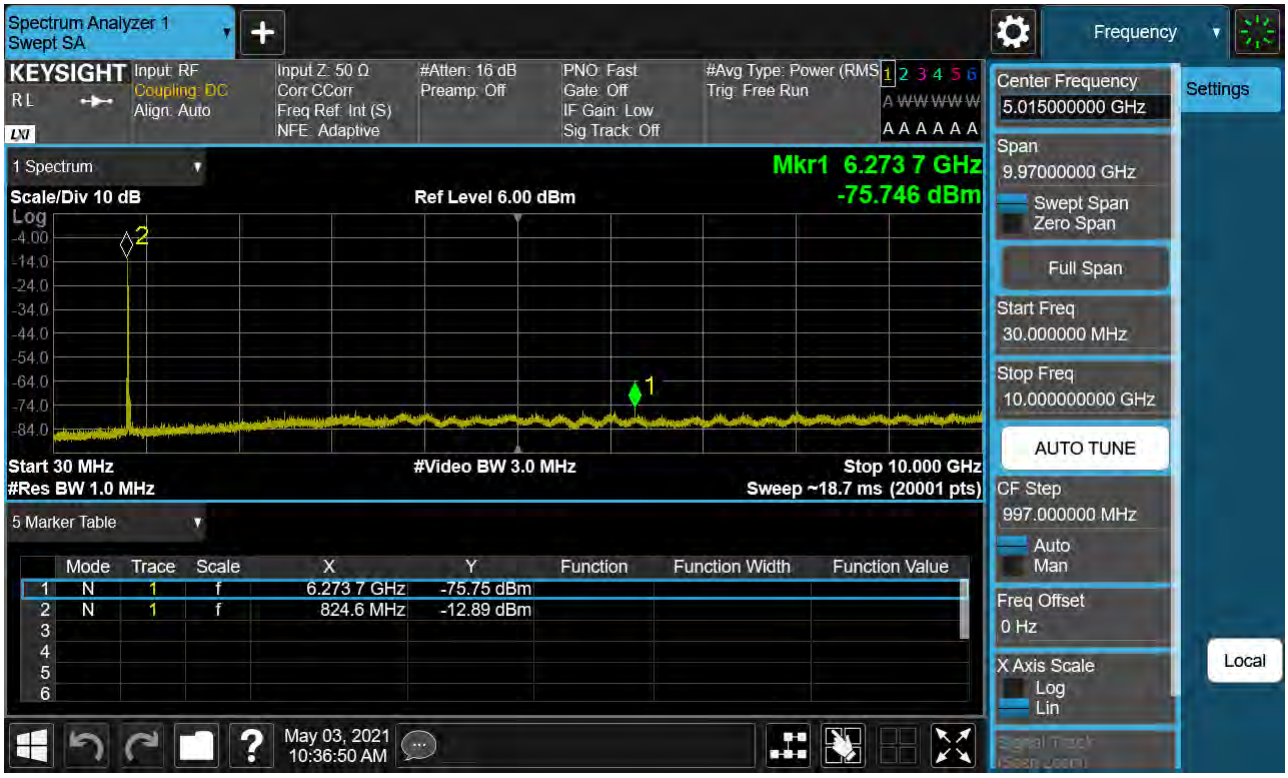
PCC 5MHz Ch20528 RB1 Offset24 SCC 10MHz Ch20600 RB1 Offset0



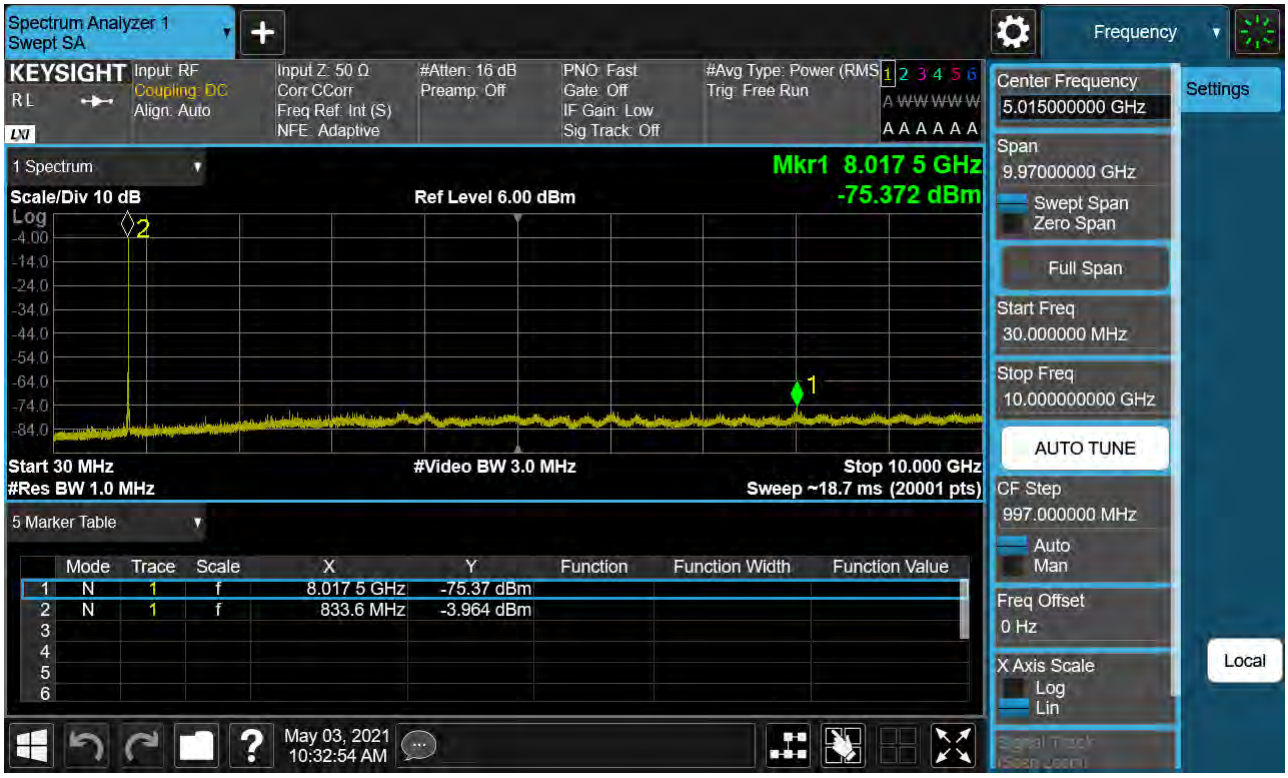
PCC 5MHz Ch20528 RB25 Offset0 SCC 10MHz Ch20600 RB50 Offset0



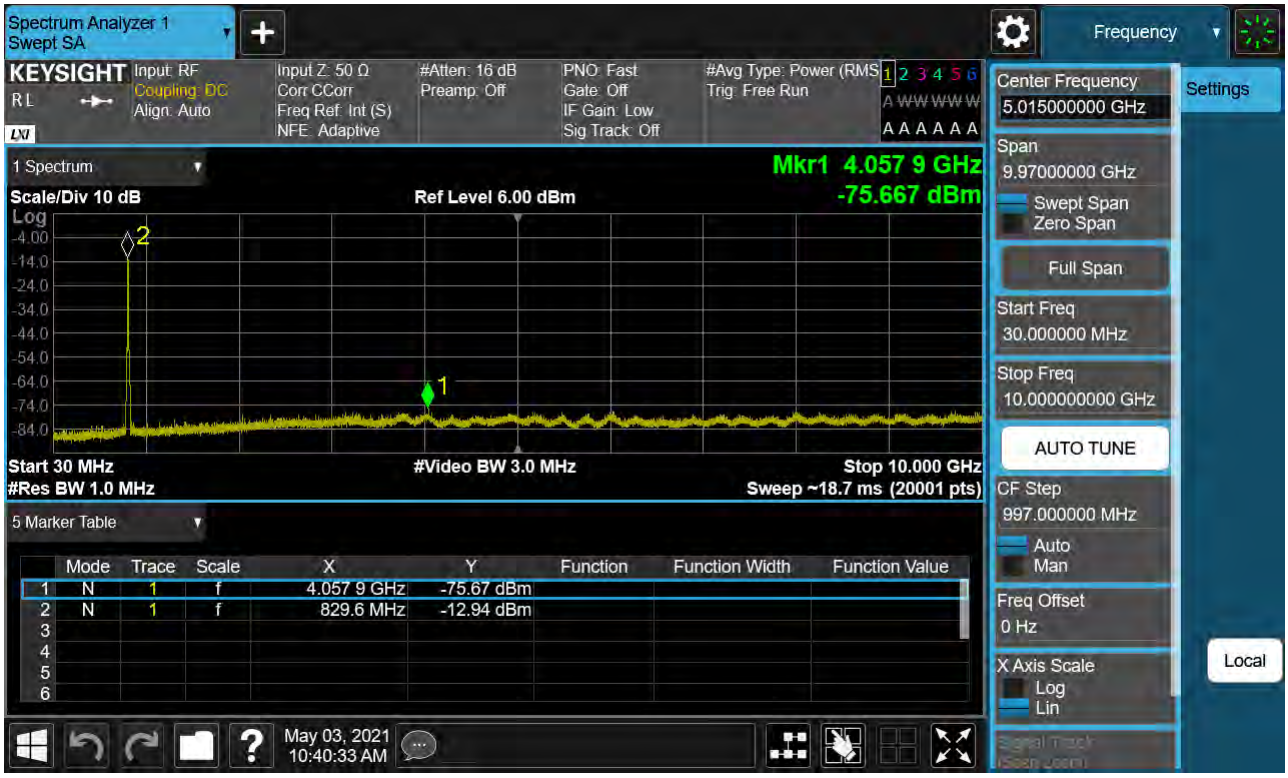
PCC 10MHz Ch20450 RB1 Offset0 SCC 5MHz Ch20522 RB1 Offset24



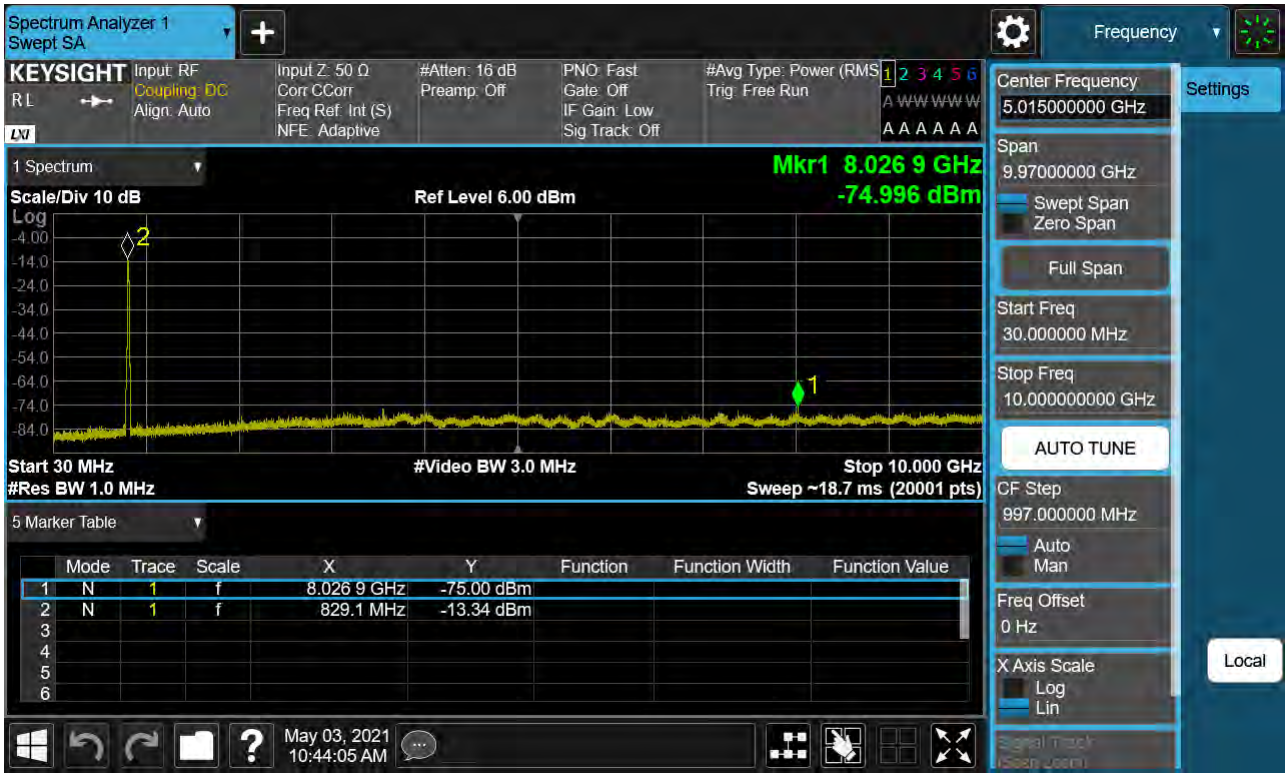
PCC 10MHz Ch20450 RB1 Offset49 SCC 5MHz Ch20522 RB1 Offset0



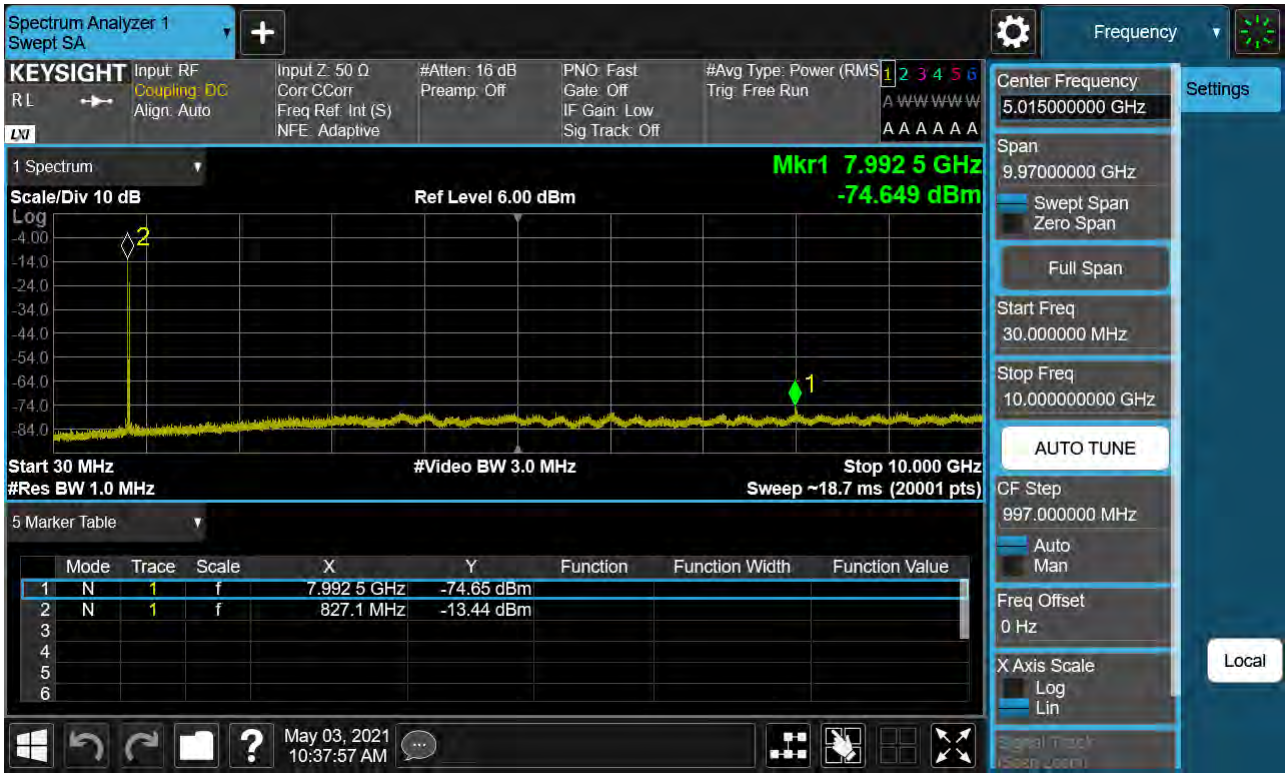
PCC 10MHz Ch20450 RB50 Offset0 SCC 5MHz Ch20522 RB25 Offset0



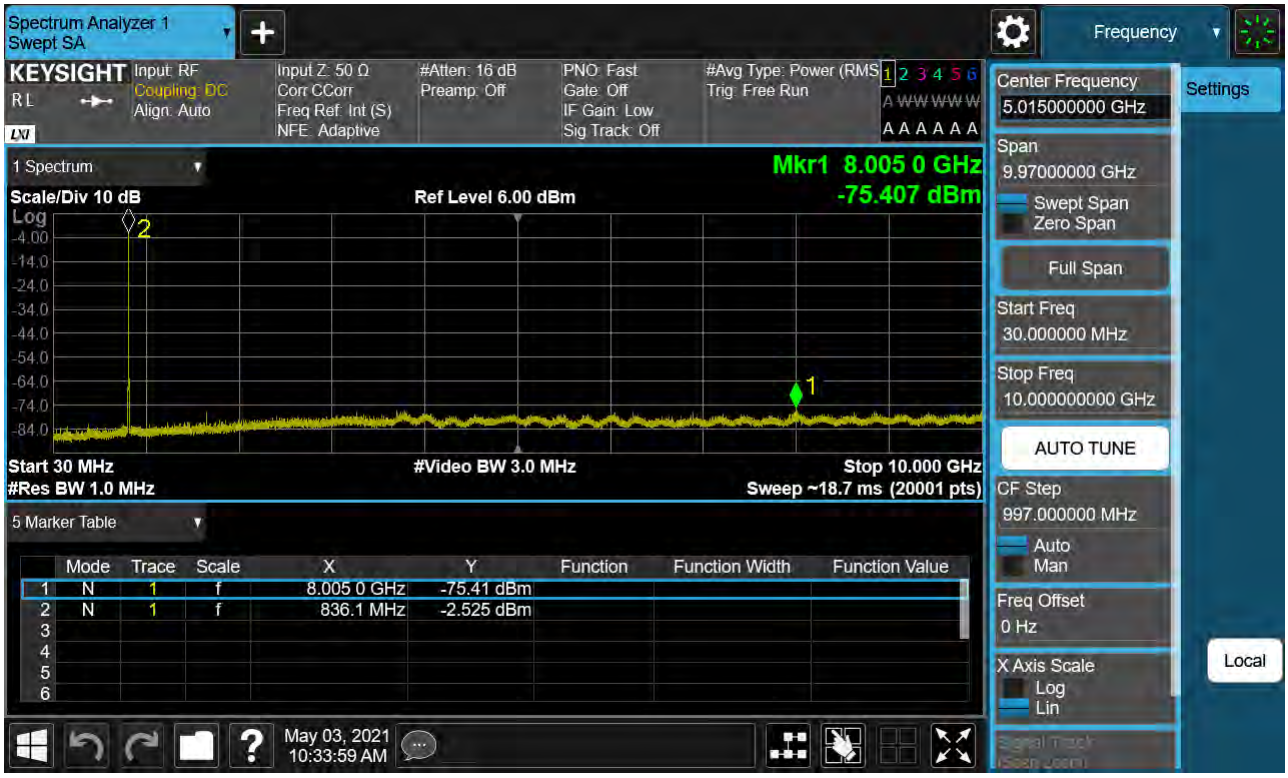
PCC 10MHz Ch20450 RB50 Offset0 SCC 10MHz Ch20549 RB50 Offset0



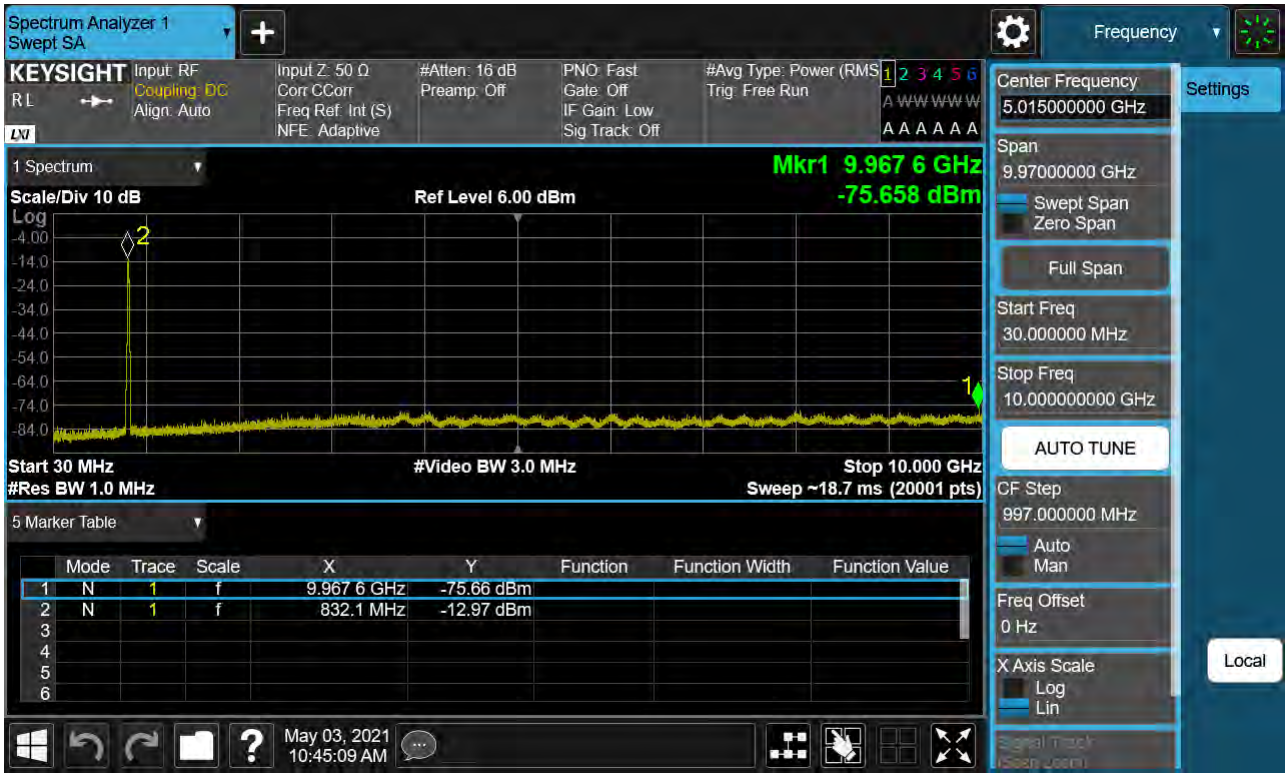
PCC 10MHz Ch20476 RB1 Offset0 SCC 10MHz Ch20575 RB1 Offset49



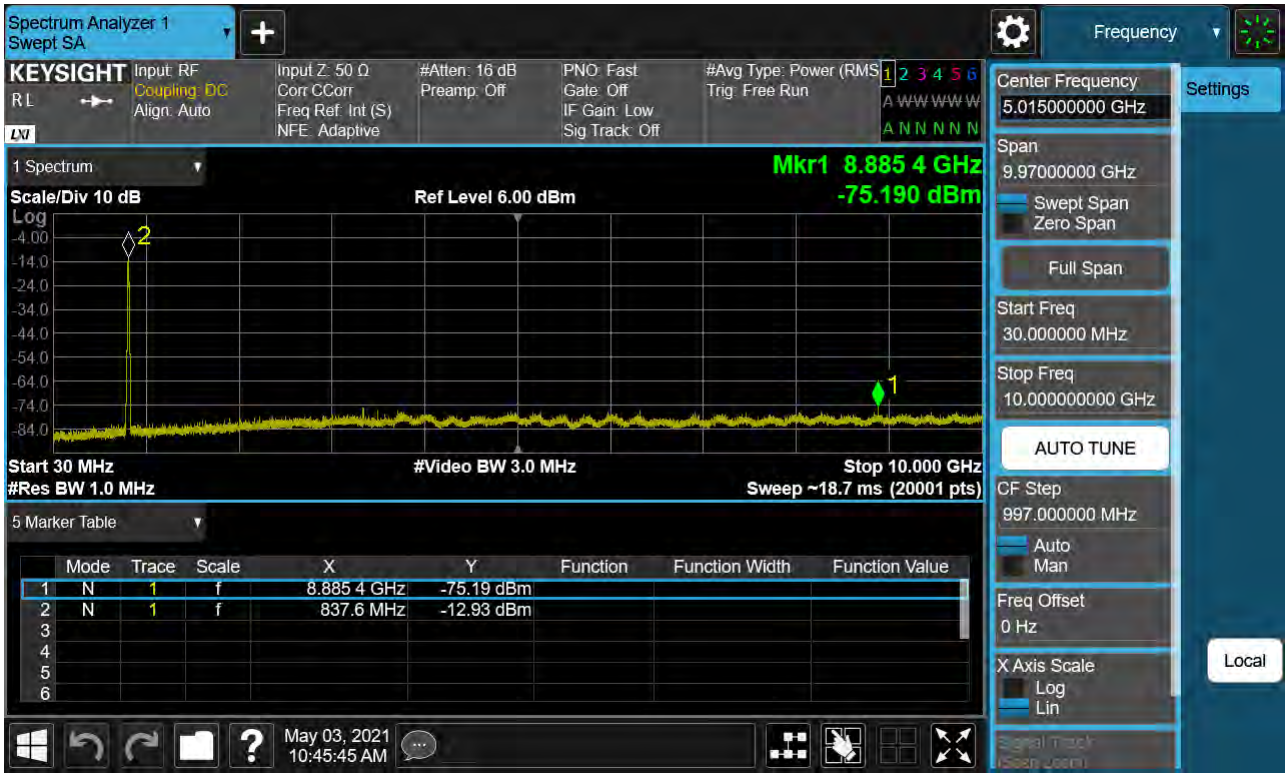
PCC 10MHz Ch20476 RB1 Offset49 SCC 10MHz Ch20575 RB1 Offset0



PCC 10MHz Ch20476 RB50 Offset0 SCC 10MHz Ch20575 RB50 Offset0

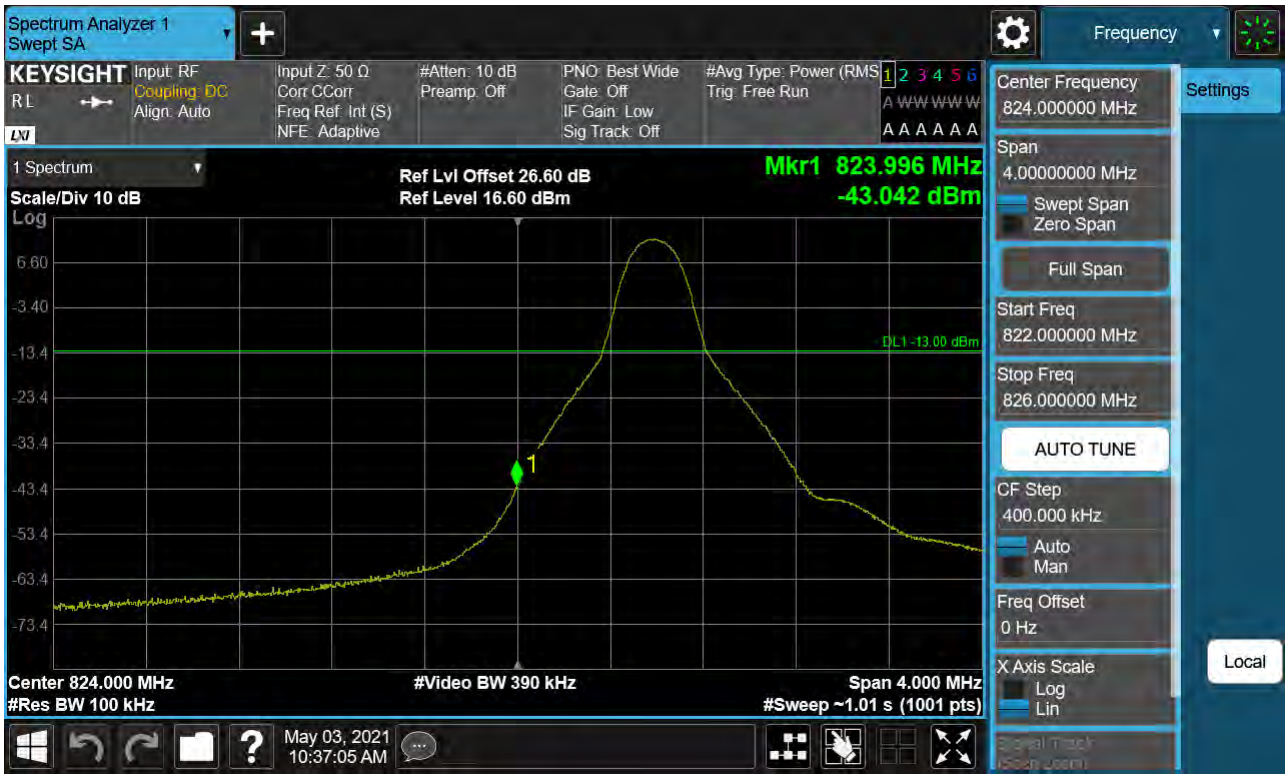


PCC 10MHz Ch20501 RB50 Offset0 SCC 10MHz Ch20600 RB50 Offset0



8.4 Band Edge

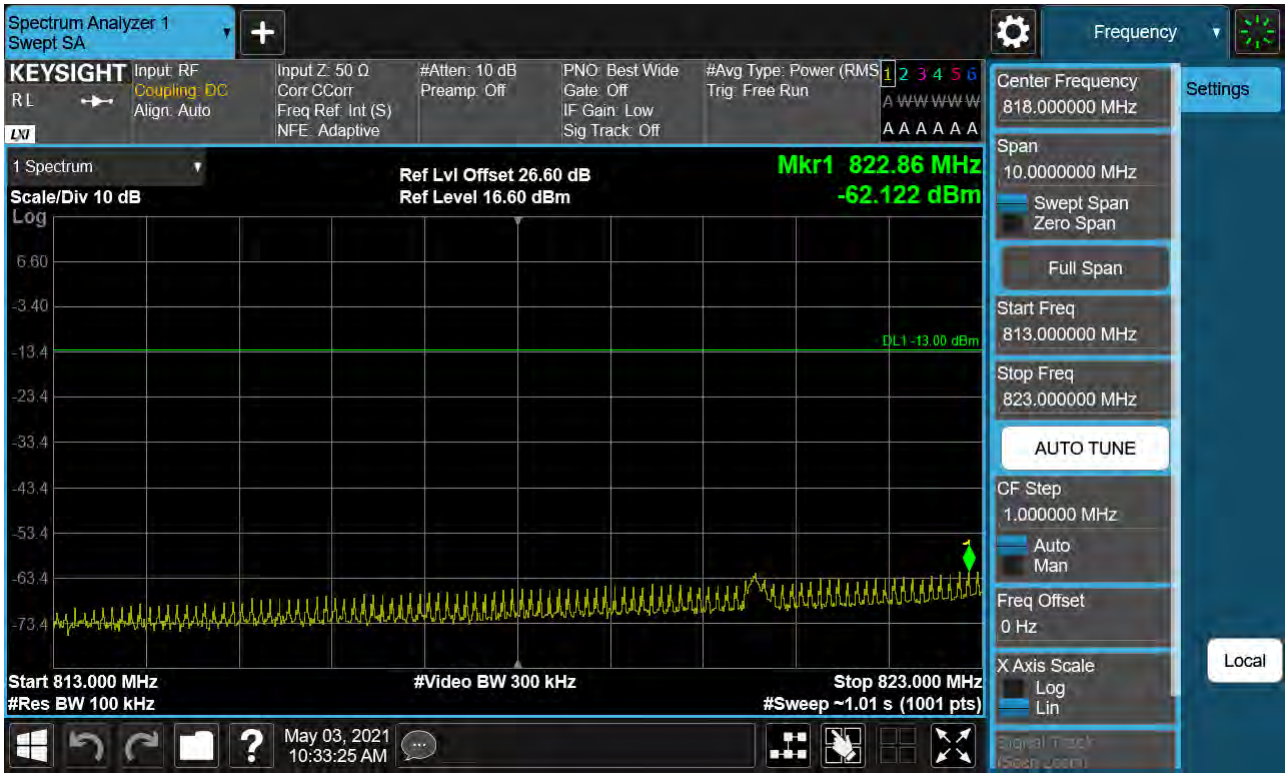
Lowest Channel_PCC 10MHz Ch20450 RB1 Offset0 SCC 5MHz Ch20522 RB1 Offset24(1)



Lowest Channel_PCC 10MHz Ch20450 RB1 Offset0 SCC 5MHz Ch20522 RB1 Offset24(2)

Lowest Channel_PCC 10MHz Ch20450 RB1 Offset49 SCC 5MHz Ch20522 RB1 Offset0(1)

Lowest Channel_PCC 10MHz Ch20450 RB1 Offset49 SCC 5MHz Ch20522 RB1 Offset0(2)



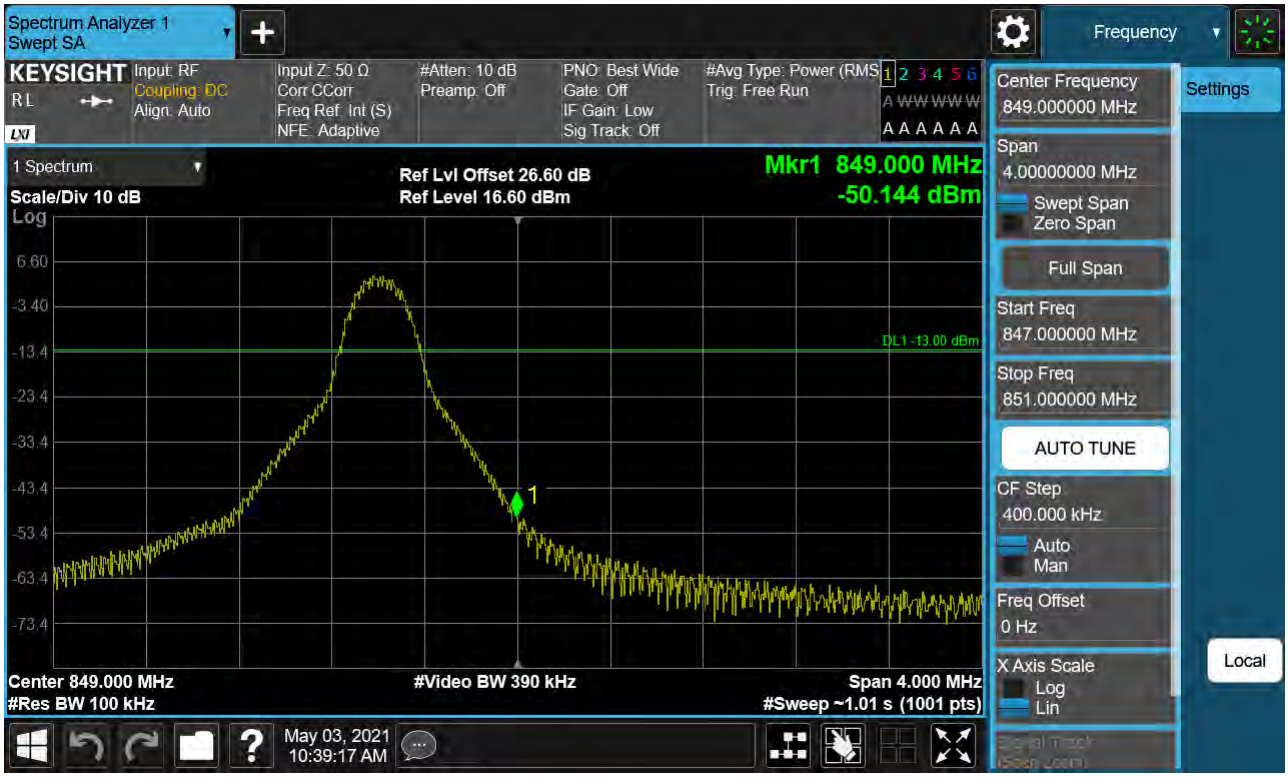
Lowest Channel_PCC 10MHz Ch20450 RB50 Offset0 SCC 5MHz Ch20522 RB25 Offset0(1)

Lowest Channel_PCC 10MHz Ch20450 RB50 Offset0 SCC 5MHz Ch20522 RB25 Offset0(2)

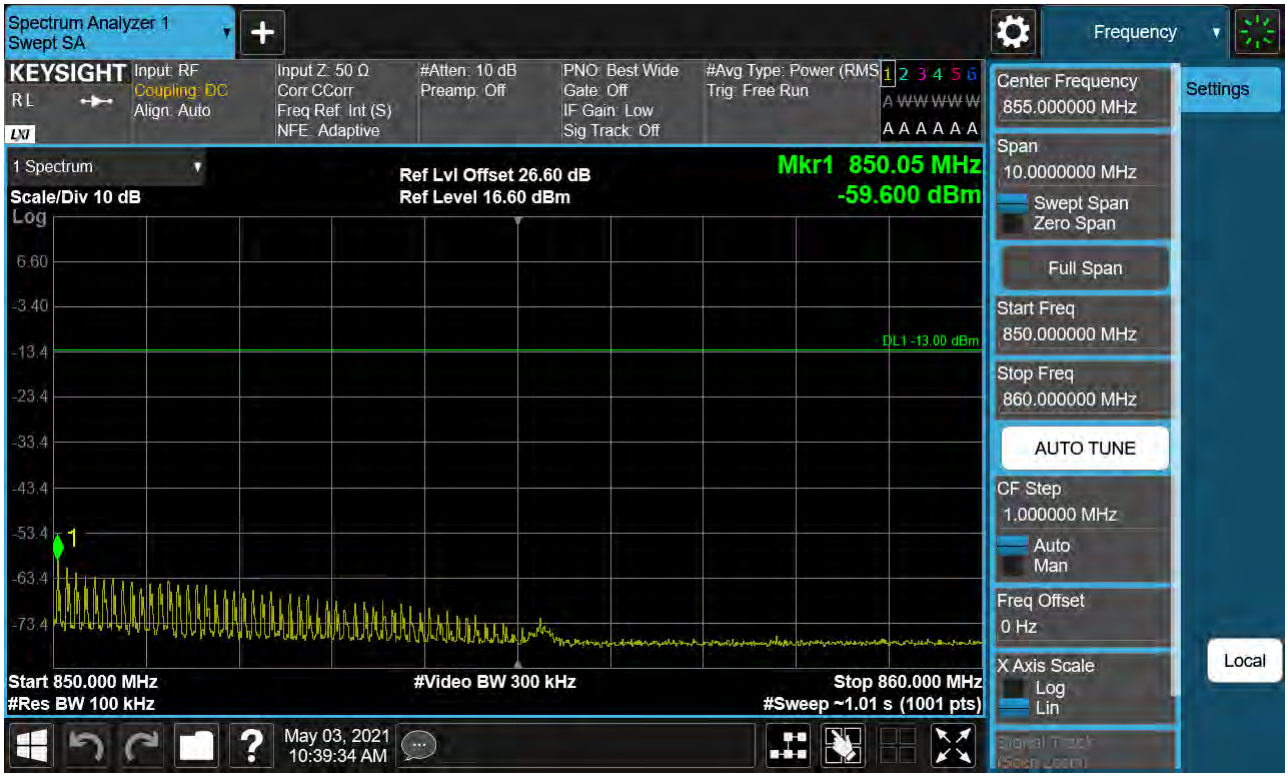
Lowest Channel_PCC 10MHz Ch20450 RB50 Offset0 SCC 10MHz Ch20549 RB50 Offset0(1)

Lowest Channel_PCC 10MHz Ch20450 RB50 Offset0 SCC 10MHz Ch20549 RB50 Offset0(2)

Highest Channel_PCC 5MHz Ch20528 RB1 Offset0 SCC 10MHz Ch20600 RB1 Offset49(1)

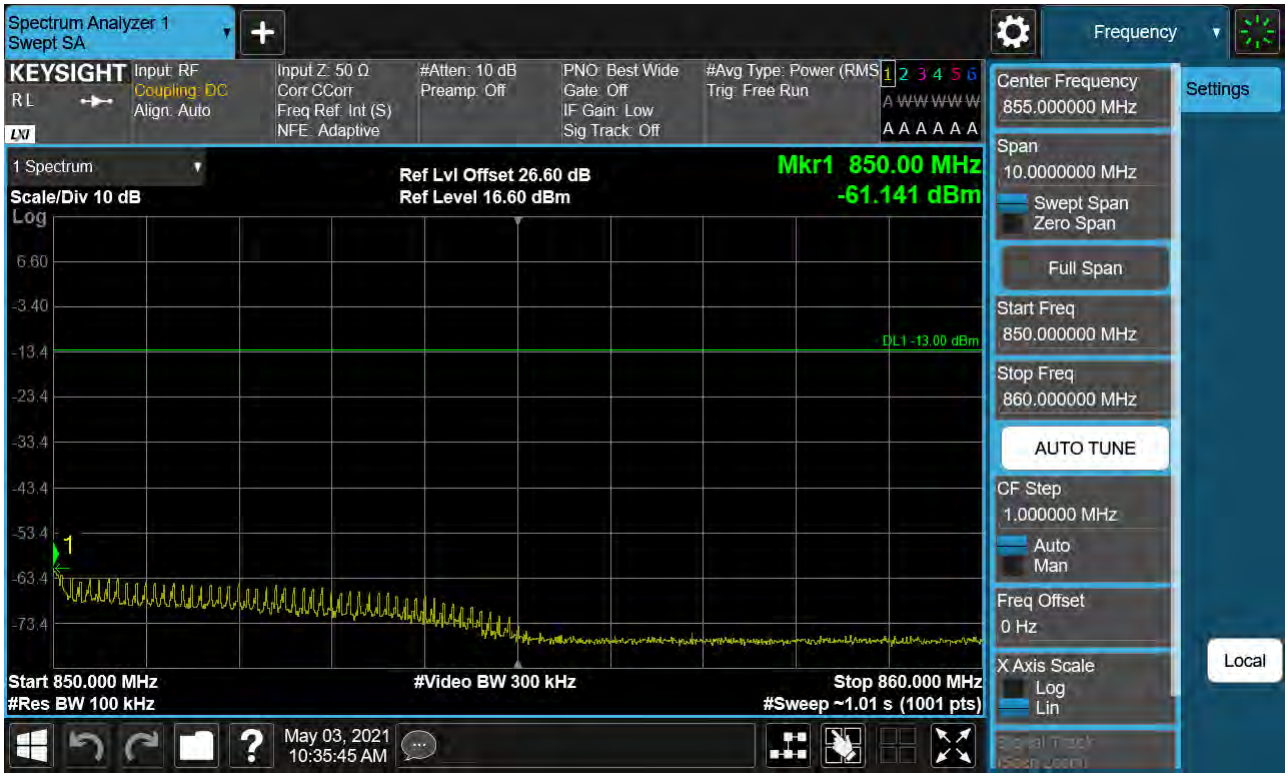


Highest Channel_PCC 5MHz Ch20528 RB1 Offset0 SCC 10MHz Ch20600 RB1 Offset49(2)



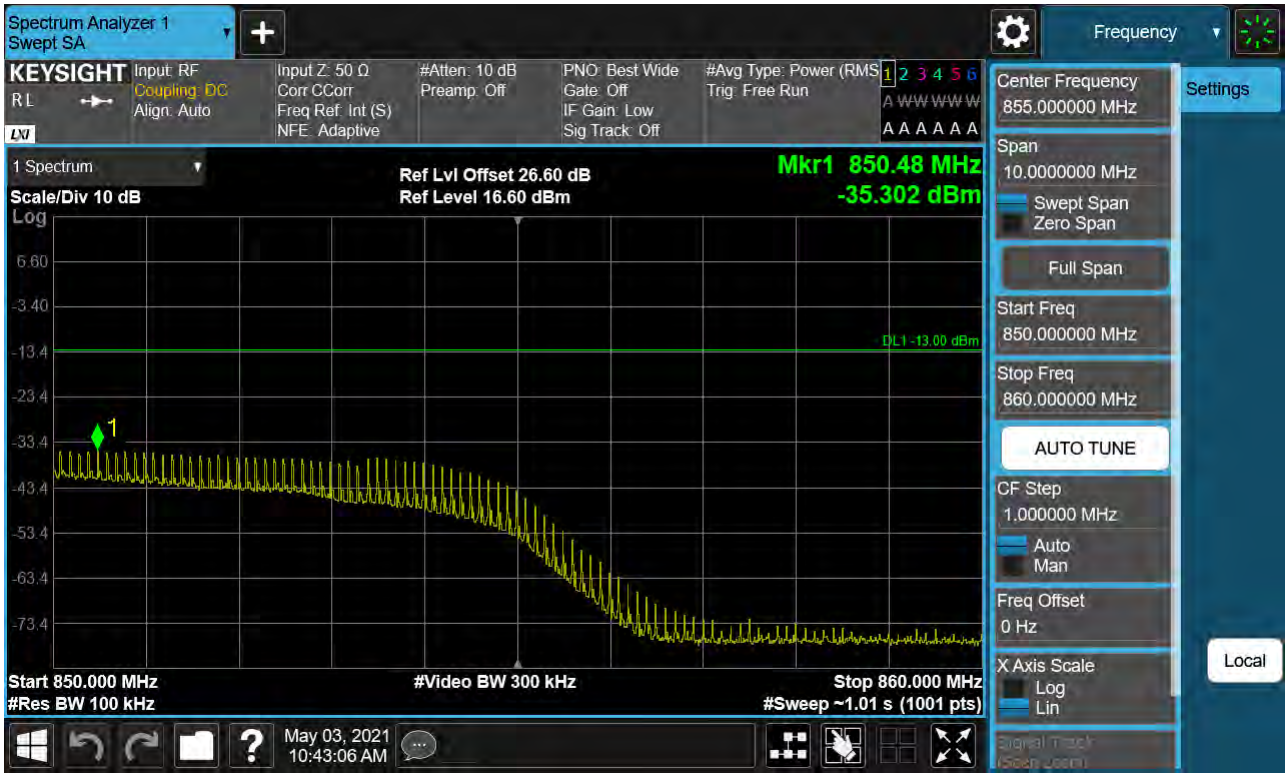
Highest Channel_PCC 5MHz Ch20528 RB1 Offset24 SCC 10MHz Ch20600 RB1 Offset0(1)

Highest Channel_PCC 5MHz Ch20528 RB1 Offset24 SCC 10MHz Ch20600 RB1 Offset0(2)



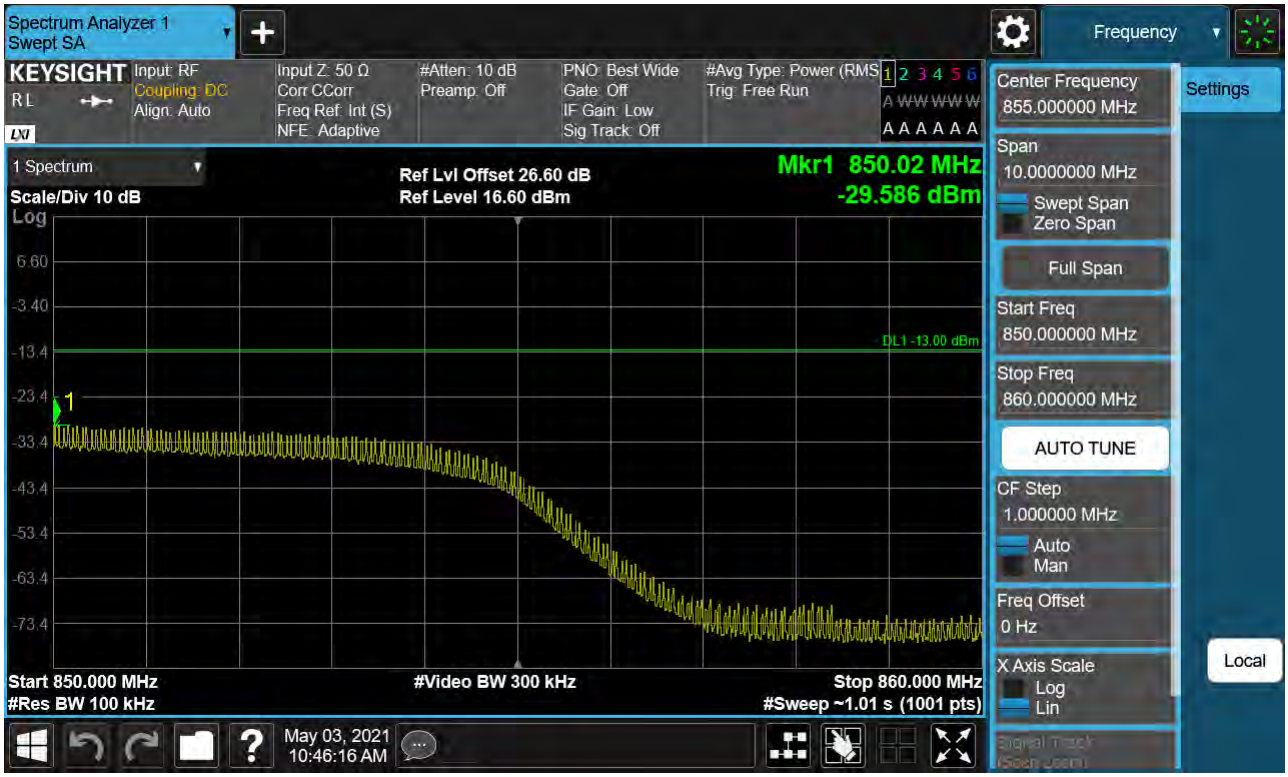
Highest Channel_PCC 5MHz Ch20528 RB25 Offset0 SCC 10MHz Ch20600 RB50 Offset0(1)

Highest Channel_PCC 5MHz Ch20528 RB25 Offset0 SCC 10MHz Ch20600 RB50 Offset0(2)



Highest Channel_PCC 10MHz Ch20501 RB50 Offset0 SCC 10MHz Ch20600 RB50 Offset0(1)

Highest Channel_PCC 10MHz Ch20501 RB50 Offset0 SCC 10MHz Ch20600 RB50 Offset0(2)



8.5 Frequency Stability / Variation Of Ambient Temperature

▣ PCC Channel:	20501	
▣ PCC Frequency:	834.1	MHz
▣ PCC BandWidth:	3	MHz
▣ SCC Channel:	20540	
▣ SCC Frequency:	838.0	MHz
▣ SCC BandWidth:	5	MHz
▣ Voltage :	3.880	VDC
▣ LIMIT:	Emission must remain in band	

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100%	3.880	+20(Ref)	0.045	0.051	834.10004	838.00004
100%		-30	-0.055	0.045	834.09995	838.00004
100%		-20	0.049	0.049	834.10004	838.00004
100%		-10	0.046	0.045	834.10004	838.00004
100%		0	-0.037	-0.054	834.09997	837.99995
100%		10	0.048	0.053	834.10004	838.00004
100%		30	0.054	0.055	834.10005	838.00005
100%		40	-0.050	-0.050	834.09996	837.99996
100%		50	-0.054	-0.050	834.09995	837.99996
Batt. Endpoint	3.650	20	0.050	-0.048	834.10004	837.99996

▣ PCC Channel: 20510
▣ PCC Frequency: 835.0 MHz
▣ PCC BandWidth: 5 MHz
▣ SCC Channel: 20549
▣ SCC Frequency: 838.9 MHz
▣ SCC BandWidth: 3 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100%	3.880	+20(Ref)	0.053	0.040	835.00004	838.90003
100%		-30	0.053	-0.048	835.00004	838.89996
100%		-20	0.040	0.036	835.00003	838.90003
100%		-10	0.052	0.047	835.00004	838.90004
100%		0	0.049	0.039	835.00004	838.90003
100%		10	0.043	-0.042	835.00004	838.89996
100%		30	0.046	-0.046	835.00004	838.89996
100%		40	0.042	0.054	835.00003	838.90005
100%		50	0.038	0.036	835.00003	838.90003
Batt. Endpoint	3.650	20	0.038	0.045	835.00003	838.90004

▣ PCC Channel: 20478
▣ PCC Frequency: 831.8 MHz
▣ PCC BandWidth: 5 MHz
▣ SCC Channel: 20550
▣ SCC Frequency: 839.0 MHz
▣ SCC BandWidth: 10 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100%	3.880	+20(Ref)	-0.050	0.054	831.79996	839.00005
100%		-30	0.052	0.037	831.80004	839.00003
100%		-20	0.038	-0.040	831.80003	838.99997
100%		-10	-0.051	-0.040	831.79996	838.99997
100%		0	0.055	0.041	831.80005	839.00003
100%		10	-0.042	0.051	831.79997	839.00004
100%		30	0.051	0.036	831.80004	839.00003
100%		40	-0.042	-0.040	831.79997	838.99997
100%		50	0.036	-0.053	831.80003	838.99996
Batt. Endpoint	3.650	20	0.044	-0.043	831.80004	838.99996

▣ PCC Channel: 20500

▣ PCC Frequency: 834.0 MHz

▣ PCC BandWidth: 10 MHz

▣ SCC Channel: 20572

▣ SCC Frequency: 841.2 MHz

▣ SCC BandWidth: 5 MHz

▣ Voltage : 3.880 VDC

▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100%	3.880	+20(Ref)	-0.038	-0.036	833.99997	841.19997
100%		-30	0.049	0.051	834.00004	841.20004
100%		-20	0.053	-0.054	834.00004	841.19995
100%		-10	0.035	0.044	834.00003	841.20004
100%		0	0.037	0.039	834.00003	841.20003
100%		10	-0.040	0.053	833.99997	841.20004
100%		30	-0.039	0.049	833.99997	841.20004
100%		40	-0.039	0.049	833.99997	841.20004
100%		50	-0.037	-0.047	833.99997	841.19996
Batt. Endpoint	3.650	20	-0.048	0.039	833.99996	841.20003

▣ PCC Channel: 20476
▣ PCC Frequency: 831.6 MHz
▣ PCC BandWidth: 10 MHz
▣ SCC Channel: 20575
▣ SCC Frequency: 841.5 MHz
▣ SCC BandWidth: 10 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100%	3.880	+20(Ref)	0.050	-0.038	831.60004	841.49997
100%		-30	-0.047	-0.038	831.59996	841.49997
100%		-20	0.048	0.046	831.60004	841.50004
100%		-10	0.040	0.041	831.60003	841.50003
100%		0	0.047	0.042	831.60004	841.50004
100%		10	0.036	0.047	831.60003	841.50004
100%		30	0.043	0.043	831.60004	841.50004
100%		40	0.044	0.047	831.60004	841.50004
100%		50	0.038	-0.036	831.60003	841.49997
Batt. Endpoint	3.650	20	0.036	0.053	831.60003	841.50004

8.6 Radiated Spurious Emissions

▣ PCC Channel : 20416 (825.6MHz)

▣ PCC BW(MHz) : 3

▣ PCC RB/ RB Offset : 1/ 14

▣ SCC Channel : 20455 (829.5MHz)

▣ SCC BW(MHz) : 5

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
1 655.10	-53.03	9.54	-62.83	2.00	H	-55.29
2 482.65	-52.58	10.60	-56.85	2.48	V	-48.73
3 310.20	-57.31	12.35	-58.40	2.90	V	-48.95

▣ PCC Channel : 20501 (834.1MHz)

▣ PCC BW(MHz) : 3

▣ PCC RB/ RB Offset : 1/ 14

▣ SCC Channel : 20540 (838.0MHz)

▣ SCC BW(MHz) : 5

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
1 672.10	-52.98	9.65	-62.75	2.01	V	-55.11
2 508.15	-49.43	10.75	-53.15	2.50	H	-44.90
3 344.20	-58.38	12.48	-59.37	2.92	V	-49.81

▣ PCC Channel : 20501 (834.1MHz)

▣ PCC BW(MHz) : 10

▣ PCC RB/ RB Offset : 1/ 49

▣ SCC Channel : 20600 (244.0MHz)

▣ SCC BW(MHz) : 10

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
1 678.10	-53.39	9.65	-63.17	2.02	H	-55.54
2 517.15	-52.29	10.80	-56.24	2.50	V	-47.94
3 356.20	-58.06	12.53	-59.16	2.93	H	-49.56

8.7 Occupied Bandwidth

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	QPSK	15/ 0	5	20540	838.0	QPSK	25/ 0	7.4195
5	20510	835.0	QPSK	25/ 0	3	20549	838.9	QPSK	15/ 0	7.4949
5	20478	831.8	QPSK	25/ 0	10	20550	839.0	QPSK	50/ 0	13.808
10	20500	834.0	QPSK	50/ 0	5	20572	841.2	QPSK	25/ 0	13.817
10	20476	831.6	QPSK	50/ 0	10	20575	841.5	QPSK	50/ 0	18.704

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	16QAM	15/ 0	5	20540	838.0	16QAM	25/ 0	7.4834
5	20510	835.0	16QAM	25/ 0	3	20549	838.9	16QAM	15/ 0	7.5080
5	20478	831.8	16QAM	25/ 0	10	20550	839.0	16QAM	50/ 0	13.820
10	20500	834.0	16QAM	50/ 0	5	20572	841.2	16QAM	25/ 0	13.904
10	20476	831.6	16QAM	50/ 0	10	20575	841.5	16QAM	50/ 0	18.672

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	64QAM	15/ 0	5	20540	838.0	64QAM	25/ 0	7.5096
5	20510	835.0	64QAM	25/ 0	3	20549	838.9	64QAM	15/ 0	7.5234
5	20478	831.8	64QAM	25/ 0	10	20550	839.0	64QAM	50/ 0	13.891
10	20500	834.0	64QAM	50/ 0	5	20572	841.2	64QAM	25/ 0	13.876
10	20476	831.6	64QAM	50/ 0	10	20575	841.5	64QAM	50/ 0	18.769

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	256QAM	15/ 0	5	20540	838.0	256QAM	25/ 0	7.5154
5	20510	835.0	256QAM	25/ 0	3	20549	838.9	256QAM	15/ 0	7.5271
5	20478	831.8	256QAM	25/ 0	10	20550	839.0	256QAM	50/ 0	13.852
10	20500	834.0	256QAM	50/ 0	5	20572	841.2	256QAM	25/ 0	13.859
10	20476	831.6	256QAM	50/ 0	10	20575	841.5	256QAM	50/ 0	18.747

Note:

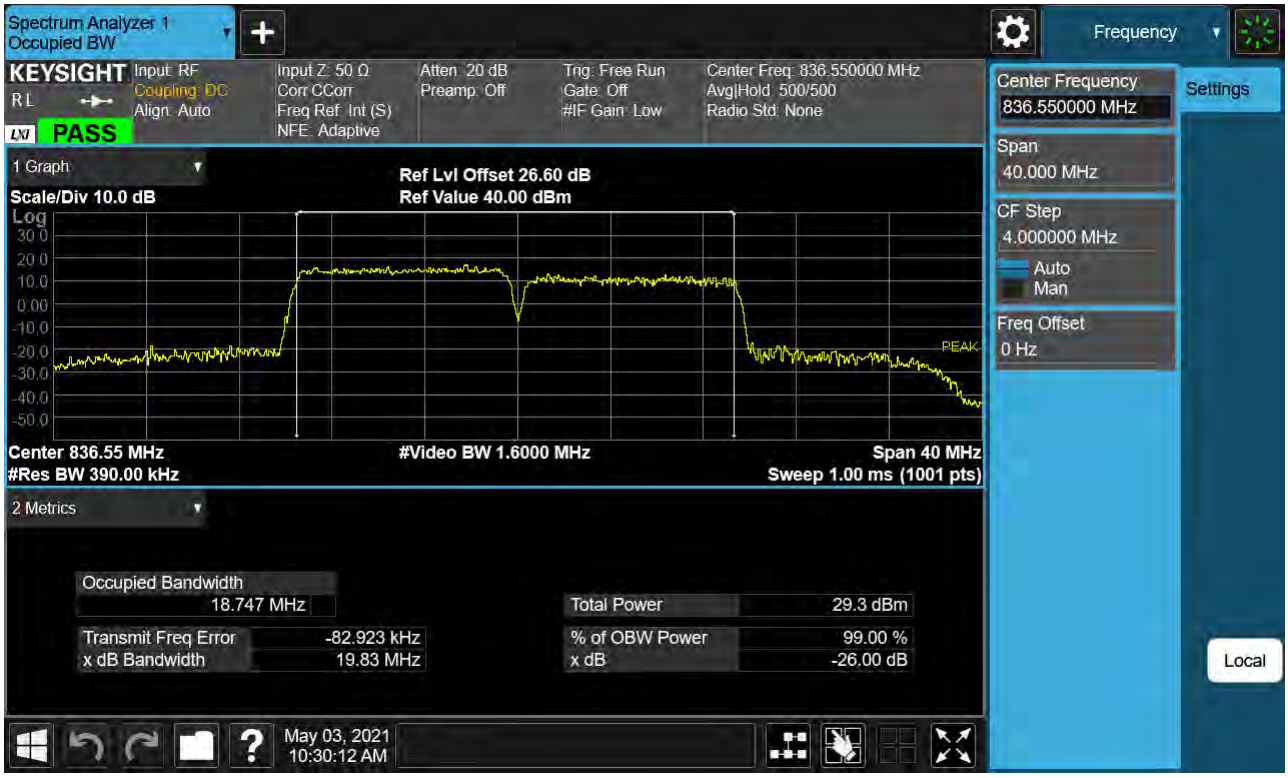
In order to simplify the report, attached plots were only Max.Bandwidth(10+10)

PCC 10MHz Ch20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0_(QPSK)

PCC 10MHz Ch20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0_(16QAM)

PCC 10MHz Ch20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0_(64QAM)

PCC 10MHz Ch20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0_(256QAM)



8.8 Peak- to- Average Ratio

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	QPSK	15/ 0	5	20540	838.0	QPSK	25/ 0	4.28
5	20510	835.0	QPSK	25/ 0	3	20549	838.9	QPSK	15/ 0	4.31
5	20478	831.8	QPSK	25/ 0	10	20550	839.0	QPSK	50/ 0	5.06
10	20500	834.0	QPSK	50/ 0	5	20572	841.2	QPSK	25/ 0	5.18
10	20476	831.6	QPSK	50/ 0	10	20575	841.5	QPSK	50/ 0	5.09

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	16QAM	15/ 0	5	20540	838.0	16QAM	25/ 0	4.37
5	20510	835.0	16QAM	25/ 0	3	20549	838.9	16QAM	15/ 0	4.41
5	20478	831.8	16QAM	25/ 0	10	20550	839.0	16QAM	50/ 0	5.75
10	20500	834.0	16QAM	50/ 0	5	20572	841.2	16QAM	25/ 0	5.92
10	20476	831.6	16QAM	50/ 0	10	20575	841.5	16QAM	50/ 0	5.82

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	64QAM	15/ 0	5	20540	838.0	64QAM	25/ 0	4.38
5	20510	835.0	64QAM	25/ 0	3	20549	838.9	64QAM	15/ 0	4.44
5	20478	831.8	64QAM	25/ 0	10	20550	839.0	64QAM	50/ 0	5.80
10	20500	834.0	64QAM	50/ 0	5	20572	841.2	64QAM	25/ 0	6.11
10	20476	831.6	64QAM	50/ 0	10	20575	841.5	64QAM	50/ 0	6.49

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	256QAM	15/ 0	5	20540	838.0	256QAM	25/ 0	4.37
5	20510	835.0	256QAM	25/ 0	3	20549	838.9	256QAM	15/ 0	4.45
5	20478	831.8	256QAM	25/ 0	10	20550	839.0	256QAM	50/ 0	6.65
10	20500	834.0	256QAM	50/ 0	5	20572	841.2	256QAM	25/ 0	6.70
10	20476	831.6	256QAM	50/ 0	10	20575	841.5	256QAM	50/ 0	7.35

Note:

In order to simplify the report, attached plots were only Max.Bandwidth(10+10)

PCC 10MHz 20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0 (QPSK)

PCC 10MHz 20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0 (16QAM)

PCC 10MHz 20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0 (64QAM)

PCC 10MHz 20476 RB50 Offset0, SCC 10MHz Ch20575 RB50 Offset0 (256QAM)

9. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2105-FC028-P