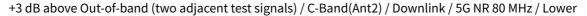


Out-of-band (two adjacent test signals) / C-Band(Ant2) / Downlink / 5G NR 80 MHz / Lower

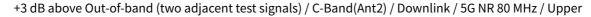
Out-of-band (two adjacent test signals) / C-Band(Ant2) / Downlink / 5G NR 80 MHz / Upper

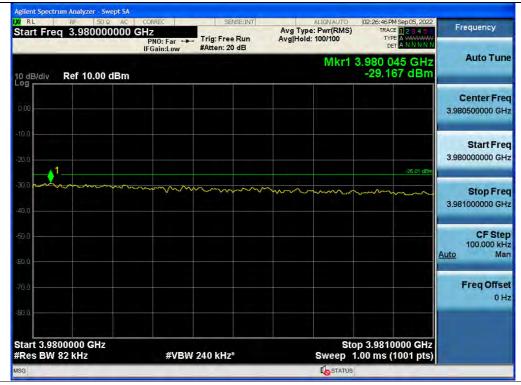




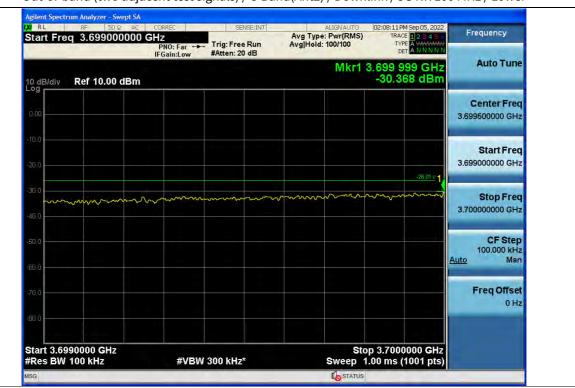












Out-of-band (two adjacent test signals) / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Lower

Out-of-band (two adjacent test signals) / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Upper





+3 dB above Out-of-band (two adjacent test signals) / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Lower

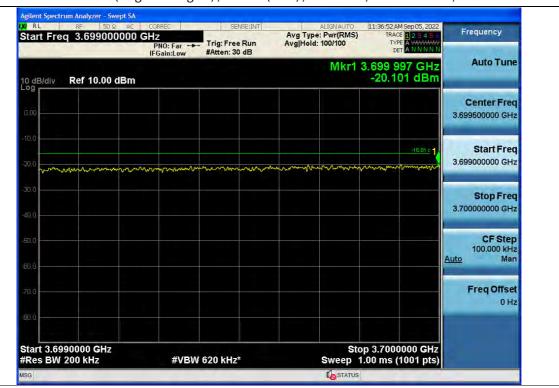


+3 dB above Out-of-band (two adjacent test signals) / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Upper









### Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 20 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 20 MHz / Upper

		3.980 135 GHz -21.520 dBm -15.01 dBm	Auto Tune Center Freq 3.980500000 GHz Start Freq 3.980000000 GHz Stop Freq 3.981000000 GHz
	and the second		3.980500000 GH Start Free 3.980000000 GH Stop Free
- market and the second s	an a		3.980000000 GH Stop Free
			CF Ste 100.000 kH Auto Ma
			Freq Offs 0 F
#VBW 620 kHz*			
	#VBW 620 kHz*		Stop 3.9810000 GHz #VBW 620 kHz* Sweep 1.00 ms (1001 pts)





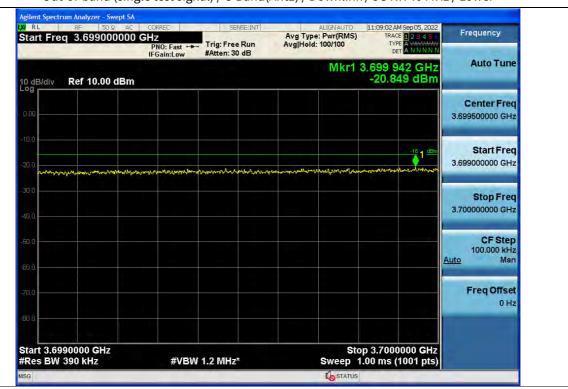
Agilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC 04/ RL RF 50 2 AL Constant Start Freq 3.699000000 GHz PN0: Far ↔ IFGain:Low Sep 05, 202 Avg Type: Pwr(RMS) Avg|Hold: 100/100 11:3 Frequency TRACE 1234 Trig: Free Run #Atten: 30 dB TYPE DET Auto Tune Mkr1 3.699 982 GHz -19.776 dBm Ref 10.00 dBm 10 dB/div **Center Freq** 3.699500000 GHz -16.01 c Start Freq 3.699000000 GHz Stop Freq 3.70000000 GHz CF Step 100.000 kHz Man Auto Freq Offset 0 Hz Start 3.6990000 GHz #Res BW 200 kHz Stop 3.7000000 GHz Sweep 1.00 ms (1001 pts) #VBW 620 kHz\* TATUS

+3 dB above Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 20 MHz / Upper

X RL RF Start Freq 3.			SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGNAUTO Avg Type: Pwr(RMS) Avg Hold: 100/100	12:47:40 PM Sep 05, 2022 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
	10.00 dBm			Mkr1	3.980 058 GHz -21.560 dBm	Auto Tune
0.00						Center Fre 3.980500000 GH
-10,0	man	Jum-Arranovil	-mmmpg ~mmgm	mpurcura market	-16.01 dBm	<b>Start Fre</b> 3.980000000 GH
-30.0						Stop Fre 3.981000000 G⊦
-50,0						CF Ste 100.000 kH <u>Auto</u> Ma
-70,0						Freq Offse 0 ⊢
Start 3.980000 #Res BW 200		#VBW	620 kHz*	Sto Sweep 1	p 3.9810000 GHz .00 ms (1001 pts)	
MSG				Lo STATUS		







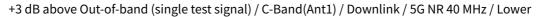
Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 40 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 40 MHz / Upper

RL RF 50Ω AC Start Freq 3.980000000		ALIGNAUTO Avg Type: Pwr(RMS) Avg Held: 100/100	11:04:52 AM Sep 05, 2022 TRACE 1 2 3 4 5 8 TYPE A WWWWW DET A N N N N N	Frequency
IO dB/div Ref 10.00 dBm	in Guine GW	Mkr1 3	.980 041 GHz -20.152 dBm	Auto Tune
0.00				Center Free 3.980500000 GH:
-10.0 1	and the second	Muthe superson of Massersupherprise	-16.01-dBin	Start Free 3.980000000 GH
30.0				Stop Fre 3.981000000 GH
60.0				CF Ste 100.000 k⊢ Auto Ma
70.0				Freq Offso 0 H
80.0			3.9810000 GHz	
#Res BW 390 kHz	#VBW 1.2 MHz*		00 ms (1001 pts)	







lent Spectrum Analyzer - Swept SA Start Freq 3.699000000 GHz PNO: Fast Sep 05, 202 Avg Type: Pwr(RMS) Avg|Hold: 100/100 Frequency TYPE A WAAAA Trig: Free Run #Atten: 30 dB DET Auto Tune Mkr1 3.700 000 GHz -19.965 dBm Ref 10.00 dBm 10 dB/div Center Freq 3.699500000 GHz -16.01 c 1 Start Freq 3.699000000 GHz Anna. Stop Freq 3.70000000 GHz CF Step 100.000 kHz Man Auto **Freq Offset** 0 Hz Start 3.6990000 GHz #Res BW 390 kHz Stop 3.7000000 GHz Sweep 1.00 ms (1001 pts) #VBW 1.2 MHz\* STATUS

+3 dB above Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 40 MHz / Upper

gilent Spectrum Analyzer - Swept SA XI RL ALIGNAUTO Avg Type: Pwr(RMS) Avg|Hold: 100/100 11:05:14 AM Sep 05, 2022 Start Freq 3.980000000 GHz PNO: Fast +--IFGain:Low #Atten: 30 dB Frequency TYPE Mkr1 3.980 178 GHz -20.634 dBm Auto Tune Ref 10.00 dBm 10 dB/div Center Freq 3.980500000 GHz Start Freq ò 3.98000000 GHz Stop Freq 3.981000000 GHz CF Step 100.000 kHz Man Auto **Freq Offset** 0 Hz Start 3.9800000 GHz #Res BW 390 kHz Stop 3.9810000 GHz Sweep 1.00 ms (1001 pts) #VBW 1.2 MHz\* STATUS





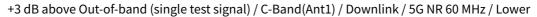


Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 60 MHz / Lower

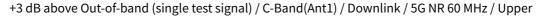
Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 60 MHz / Upper







lent Spectrum Analyzer - Swept SA Sep 05, 202 Start Freq 3.699000000 GHz PN0: Far Avg Type: Pwr(RMS) Avg|Hold: 100/100 Frequency TRACE 1 2 3 4 TYPE A WANN DET A N N N Trig: Free Run #Atten: 30 dB Auto Tune Mkr1 3.699 964 GHz -29.080 dBm Ref 10.00 dBm 10 dB/div Center Freq 3.699500000 GHz Start Freq 3.699000000 GHz -26.0/ Stop Freq 3.70000000 GHz CF Step 100.000 kHz Man Auto **Freq Offset** 0 Hz Start 3.6990000 GHz #Res BW 62 kHz Stop 3.7000000 GHz Sweep 1.00 ms (1001 pts) #VBW 180 kHz\* To STATUS











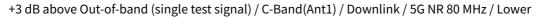
### Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 80 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 80 MHz / Upper

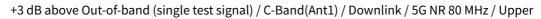








a RL RF 50Ω AC Start Freq 3.699000000		SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGNAUTO Avg Type: Pwr(RMS) Avg Hold: 100/100	10:18:40 AM Sep 05, 2022 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency	
Mkr1 3.699 963 GHz 10 dB/div Ref 10.00 dBm -29.087 dBm						
					Center Freq 3.699500000 GHz	
0.0					Start Freq 3.699000000 GHz	
	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		-26.01 1 1	Stop Freq 3.700000000 GHz	
0.0					CF Step 100.000 kHz Auto Man	
0.0					Freq Offset 0 Hz	
8000 Start 3.6990000 GHz Res BW 82 kHz	#VBW	240 kHz*		op 3.7000000 GHz 1.00 ms (1001 pts)		
SG			Lo STATUS			



Frequency	10:13:47 AM Sep 05, 2022 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	ALIGNAUTO Avg Type: Pwr(RMS) Avg Hold: 100/100	Trig: Free Run #Atten: 30 dB	AC CORREC 00 GHz PNO: Far ↔ IFGain:Low	RF 50Ω A q 3.98000000	XI RL Start Freq
Auto Tun	.980 000 GHz -28.544 dBm	Mkr1 3			Ref 10.00 dBr	10 dB/div
Center Fre 3.980500000 GH						0.00
Start Fre 3.980000000 GH	-26.01 dBin					20.0
Stop Fre 3.981000000 GH			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			30.0 ×~~~
CF Ste 100.000 kH <u>Auto</u> Ma						-50,0
Freq Offso 0 H						.70,0
	3.9810000 GHz 00 ms (1001 pts)	Stop Sweep 1.	V 240 kHz*	#VBW	00000 GHz 82 kHz	
		TATUS				MSG

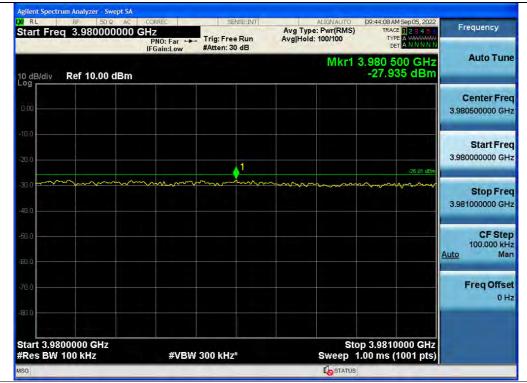




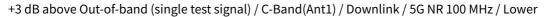


### Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 100 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 100 MHz / Upper







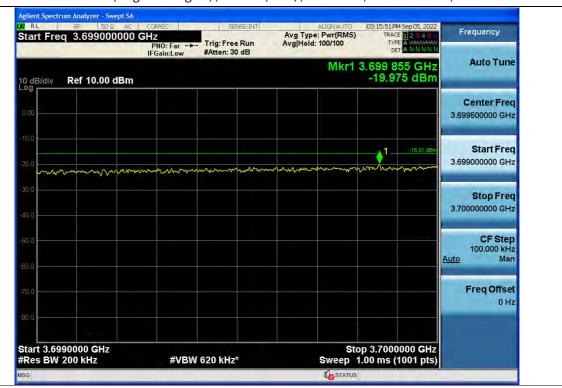
RL RF 50Ω AK Start Freq 3.69900000		SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGNAUTO Avg Type: Pwr(RMS) Avg Hold: 100/100	09:50:18 AM Sep 05, 2022 TRACE 1 2 3 4 5 6 TYPE A WAVANA DET A N N N N N	Frequency		
0 dB/div Ref 10.00 dBn	n		Mkr1 3	.699 999 GHz -28.722 dBm	Auto Tune		
3.00					Center Freq 3.699500000 GHz		
0.0				-26,01 6 <b>1</b> 7	Start Freq 3.699000000 GHz		
0.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				Stop Freq 3.700000000 GHz		
0.0 0.0					CF Step 100.000 kHz Auto Man		
0,0					Freq Offset 0 Hz		
tart 3.6990000 GHz Res BW 100 kHz	#VBW	300 kHz*	Stop	3.7000000 GHz 00 ms (1001 pts)			

<sup>+3</sup> dB above Out-of-band (single test signal) / C-Band(Ant1) / Downlink / 5G NR 100 MHz / Upper







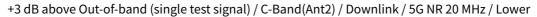


### Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 20 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 20 MHz / Upper

RL RF 50 Ω tart Freq 3.980000	AC CORREC 000 GHz PNO: Far ↔ IFGain:Low		ALIGNAUTO Avg Type: Pwr(RMS) Avg Hold: 100/100	03:09:15 PM Sep 05, 2022 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
0 dB/div Ref 10.00 d	Bm		Mkr1 3	3.980 022 GHz -22.102 dBm	Auto Tune
					Center Free 3.980500000 GH
20.0 1 20.0 1	man lange of a property	ym han mar an tripuc names a		-16.01 dBm	<b>Start Fre</b> 3.980000000 GH
80.0 40.0					Stop Fre 3.981000000 GH
80.0 80.0					CF Ste 100.000 kH <u>Auto</u> Ma
70.0					Freq Offse 0 H
and			Sto	p 3.9810000 GHz	
Res BW 200 kHz	#VBV	√ 620 kHz*	Sweep 1	.00 ms (1001 pts)	





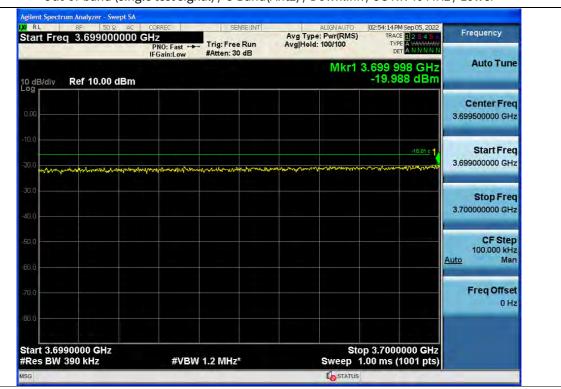
lent Spectrum Analyzer - Swept SA Start Freq 3.699000000 GHz PN0: Far Sep 05, 202 Avg Type: Pwr(RMS) Avg|Hold: 100/100 Frequency TYPE A WANN Trig: Free Run #Atten: 30 dB Auto Tune Mkr1 3.699 928 GHz -20.437 dBm Ref 10.00 dBm 10 dB/div Center Freq 3.699500000 GHz 1 <u>21 de</u> Start Freq 3.699000000 GHz Stop Freq 3.70000000 GHz CF Step 100.000 kHz Man Auto **Freq Offset** 0 Hz Start 3.6990000 GHz #Res BW 200 kHz Stop 3.7000000 GHz Sweep 1.00 ms (1001 pts) #VBW 620 kHz\* To STATUS

+3 dB above Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 20 MHz / Upper

gilent Spectrum Analyzer - Swept SA XI RL ALIGNAUTO Avg Type: Pwr(RMS) Avg|Hold: 100/100 03:09:36 PM Sep 05, 2022 SENSE:INT Start Freq 3.980000000 GHz PNO: Far ++-IFGain:Low #Atten: 30 dB Frequency TRACE DET A N N N N TYPE Auto Tune Mkr1 3.980 025 GHz -22.748 dBm Ref 10.00 dBm 10 dB/div Center Fred 3.980500000 GHz Start Freq 1 3.98000000 GHz Stop Freq 3.981000000 GHz CF Step 100.000 kHz Man Auto **Freq Offset** 0 Hz Start 3.9800000 GHz #Res BW 200 kHz Stop 3.9810000 GHz Sweep 1.00 ms (1001 pts) #VBW 620 kHz\* STATUS







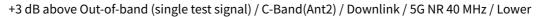
Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 40 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 40 MHz / Upper

#Atten: 30 dB	wayaatadaaatad		.980 016	-15.01 dBm	Auto Tun Center Fre 3.980500000 GH Start Fre 3.980000000 GH
	wr.p.a.t.Menetall			-16.01 dBm	3.980500000 GH Start Fre 3.980000000 GH
		hongestungerichninger		-16.01 dBm	3.980000000 GH
					Stop Fre
					3.981000000 GH
				A	CF Ste 100.000 kH Auto Ma
					Freq Offse 0 H
4 0 MIL-*		Stop	) 3.981000	0 GHz	
	1.2 MHz*	1.2 MHz*	1.2 MHz* Sweep 1.	Stop 3.981000 1.2 MHz* Sweep 1.00 ms (10)	







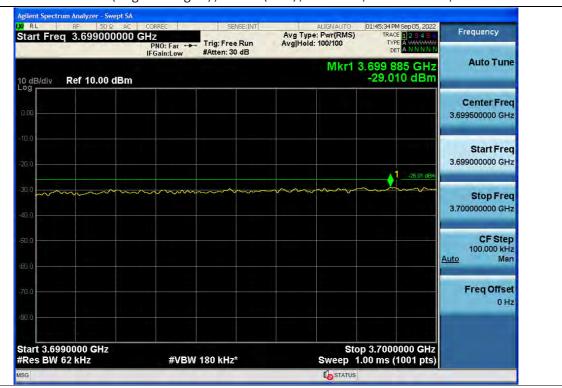
lent Spectrum Analyzer - Swept SA Start Freq 3.699000000 GHz PNO: Fast Sep 05, 202 Frequency Avg Type: Pwr(RMS) Avg|Hold: 100/100 TYPE A WARA Trig: Free Run #Atten: 30 dB DET Auto Tune Mkr1 3.699 983 GHz -19.954 dBm Ref 10.00 dBm 10 dB/div Center Freq 3.699500000 GHz Start Freq 3.699000000 GHz Stop Freq 3.70000000 GHz CF Step 100.000 kHz Man Auto **Freq Offset** 0 Hz Start 3.6990000 GHz #Res BW 390 kHz Stop 3.7000000 GHz Sweep 1.00 ms (1001 pts) #VBW 1.2 MHz\* STATUS

+3 dB above Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 40 MHz / Upper

gilent Spectrum Analyzer - Swept SA XI RL :50:19 PM Sep 05, 2022 ALIGNAUTO Avg Type: Pwr(RMS) Avg|Hold: 100/100 Start Freq 3.980000000 GHz PNO: Fast +--IFGain:Low #Atten: 30 dB Frequency TYPE Auto Tune Mkr1 3.980 046 GHz -21.200 dBm Ref 10.00 dBm 10 dB/div Center Fred 3.980500000 GHz Start Freq 1 3.98000000 GHz Stop Freq 3.981000000 GHz CF Step 100.000 kHz Man Auto **Freq Offset** 0 Hz Stop 3.9810000 GHz Sweep 1.00 ms (1001 pts) Start 3.9800000 GHz #Res BW 390 kHz #VBW 1.2 MHz\* STATUS







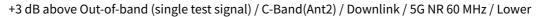
### Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 60 MHz / Lower

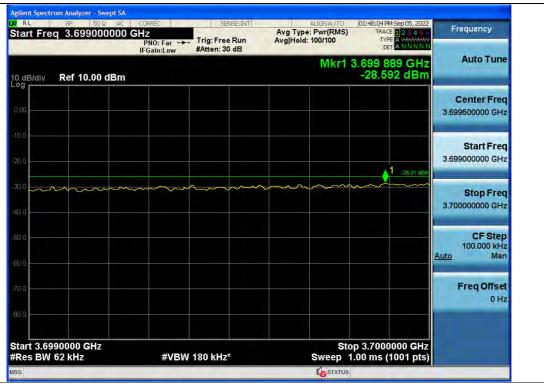
Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 60 MHz / Upper









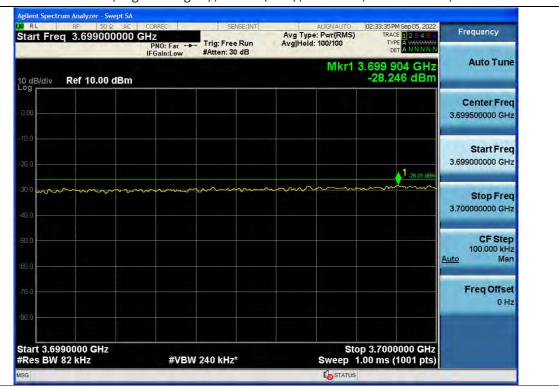


+3 dB above Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 60 MHz / Upper









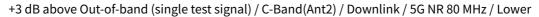
### Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 80 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 80 MHz / Upper









ilent Spectrum Analyzer - Swept SA RL V RL RF 5000000 GHz Start Freq 3.699000000 GHz PNO: Far Freq IFGain:Low Sep 05, 202 Avg Type: Pwr(RMS) Avg|Hold: 100/100 Frequency Trig: Free Run #Atten: 30 dB TYPE DET Auto Tune Mkr1 3.699 929 GHz -28.374 dBm 10 dB/div Ref 10.00 dBm **Center Freq** 3.699500000 GHz Start Freq 3.699000000 GHz 1 in de Stop Freq 3.70000000 GHz CF Step 100.000 kHz Man Auto Freq Offset 0 Hz Start 3.6990000 GHz #Res BW 82 kHz Stop 3.7000000 GHz Sweep 1.00 ms (1001 pts) #VBW 240 kHz\* TATUS



	TRACE 12345 E TYPE A WAVAAAAA DET A N N N N N
lz Auto Tuno M	3.980 080 GHz -28.102 dBm
Center Fre 3.980500000 GH	
Start Fre 3.980000000 GH	-26.01 dBm
Stop Fre 3.981000000 GH	
CF Ste 100.000 kF Auto Ma	
Freq Offso 0 H	
Stop 3.9810000 G W 240 kHz* Sweep 1.00 ms (1001 p الله status	W 240 kHz* Sweep 1





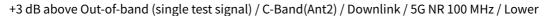


### Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Lower

Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Upper









+3 dB above Out-of-band (single test signal) / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Upper





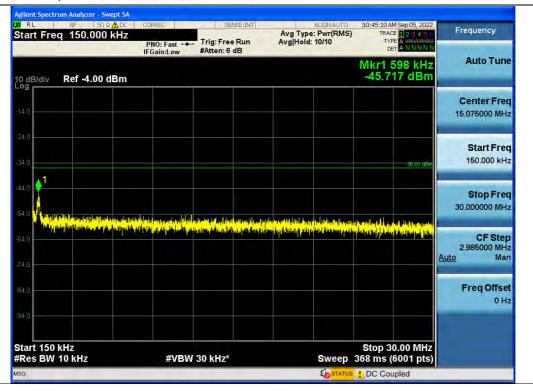


## Plot data of Spurious Emissions



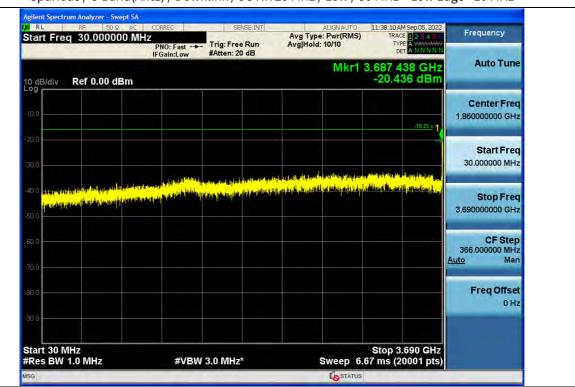
Spurious / C-Band(Ant1) / Downlink / 5G NR 80 MHz / Middle / 9 kHz ~ 150 kHz

Spurious / C-Band(Ant1) / Downlink / 5G NR 60 MHz / Low / 150 kHz ~ 30 MHz









Spurious / C-Band(Ant1) / Downlink / 5G NR 20 MHz / Low / 30 MHz ~ Low Edge - 10 MHz

Spurious / C-Band(Ant1) / Downlink / 5G NR 20 MHz / Low / Low Edge - 10 MHz ~ Low Edge



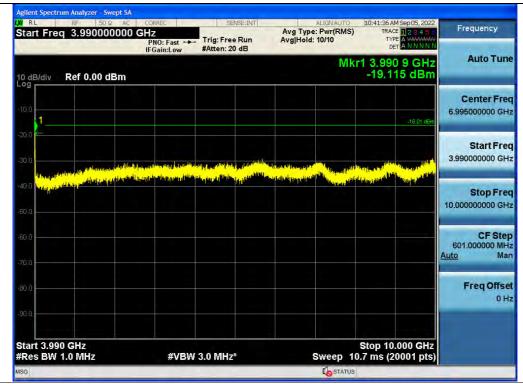






Spurious / C-Band(Ant1) / Downlink / 5G NR 60 MHz /High / High Edge ~ High Edge + 10 MHz

Spurious / C-Band(Ant1) / Downlink / 5G NR 60 MHz / High / High Edge + 10 MHz ~ 10 GHz



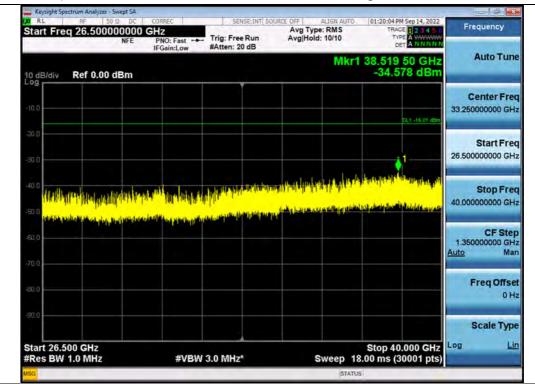






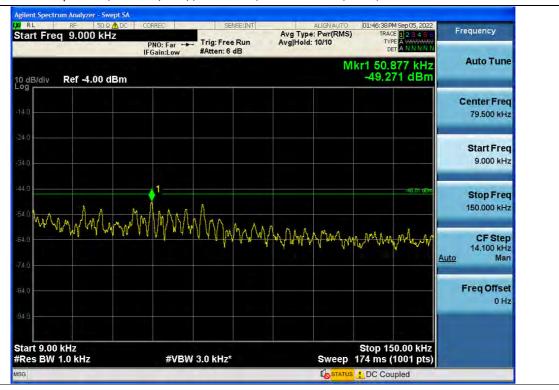


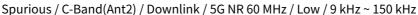
Spurious / C-Band(Ant1) / Downlink / 5G NR 100 MHz / High / 26.5 GHz ~ 40 GHz









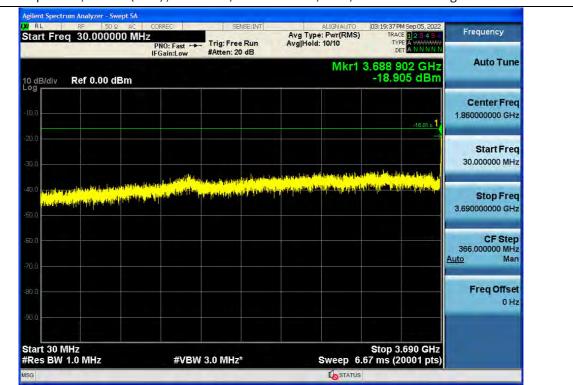


Spurious / C-Band(Ant2) / Downlink / 5G NR 20 MHz / Low / 150 kHz ~ 30 MHz









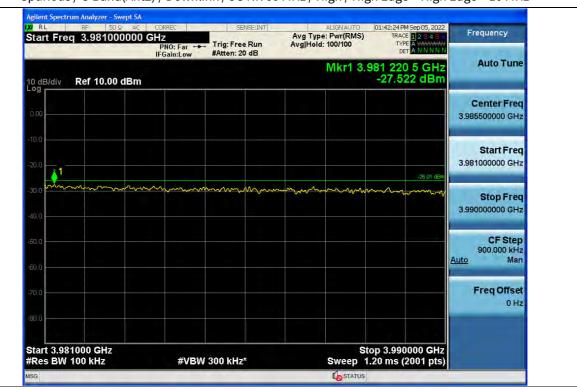
Spurious / C-Band(Ant2) / Downlink / 5G NR 20 MHz / Low / 30 MHz ~ Low Edge - 10 MHz

Spurious / C-Band(Ant2) / Downlink / 5G NR 20 MHz / Low / Low Edge - 10 MHz ~ Low Edge



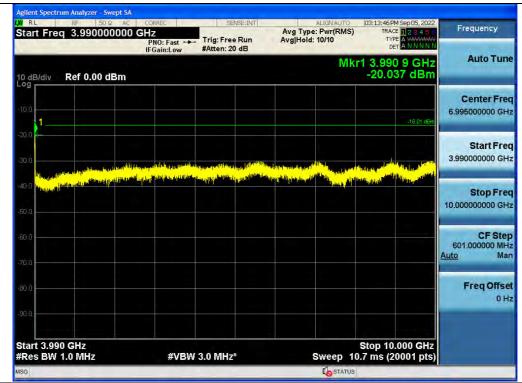






Spurious / C-Band(Ant2) / Downlink / 5G NR 60 MHz / High / High Edge ~ High Edge + 10 MHz

Spurious / C-Band(Ant2) / Downlink / 5G NR 20 MHz / High / High Edge + 10 MHz ~ 10 GHz



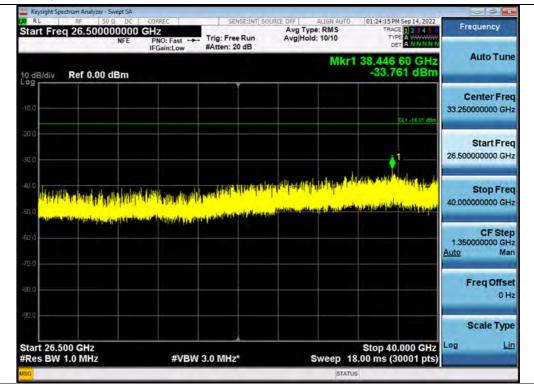








Spurious / C-Band(Ant2) / Downlink / 5G NR 100 MHz / Middle / 26.5 GHz ~ 40 GHz



Note : Only the worst case Spurious Emissions plots are attached for each frequency range.



### **5.6. RADIATED SPURIOUS EMISSIONS**

### **Test Requirements:**

### § 2.1053 Measurements required: Field strength of spurious radiation.

- (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
- (b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
  - (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
  - (2) All equipment operating on frequencies higher than 25 MHz.
  - (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
  - (4) Other types of equipment as required, when deemed necessary by the Commission.

### § 27.53 Emission limits.

- (I) 3.7 GHz Service. The following emission limits apply to station transmitting in the 3700-3980 MHz band:
  - (1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.



### **Test Procedures:**

Because KDB 935210 D05 procedure does not provide this requirement, measurements were in accordance with the test methods section 5.5 of ANSI C63.26-2015

- a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard nonradiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.
- b) Each emission under consideration shall be evaluated:
  - 1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
  - 2) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
  - 3) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - 4) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - 5) Record the measured emission amplitude level and frequency using the appropriate RBW.
- c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.





## **Test Result:**

-HRDU\_Cband\_M

Band Name	Mode	Frequency (MHz)	Measured Level (dBuV)	Ant. Factor (dB/m)	A.G.+C.L.+H.P.F. (dB)	Pol.	Measured Power (dBm)	Result (dBm/m)
		8 847.45	53.49	37.50	38.37	V	-41.71	-42.58
C David		14 745.65	50.52	42.60	34.36	V	-44.68	-36.44
C-Band	NR 20M	8 141.25	59.11	36.84	38.88	Н	-36.09	-38.13
		16 281.80	48.23	38.22	33.17	Н	-46.97	-41.92

\* C.L.: Cable Loss / A.G.: Amp. Gain / H.P.F.: High Pass Filter

Note:

1. We have done horizontal and vertical polarization in detecting antenna.

2. Measure distance = 3 m

3. The amplitude of the spurious domain emission attenuated by more than 20 dB over the permissible value was not recorded according to ANSI C63.26, clause 5.1.1., c).



## Plot data of radiated spurious emissions



### HRDU\_Cband\_M / Downlink / 5G NR 20 MHz

Note : Only the worst case plots for Radiated Spurious Emissions.

# **5.7. FREQUENCY STABILITY**

## **Test Requirements:**

HCT

## § 2.1055 Measurements required: Frequency stability.

- (a) The frequency stability shall be measured with variation of ambient temperature as follows:
  - (1) From  $-30^{\circ}$  to  $+50^{\circ}$  centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
  - (2) From -20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.
  - (3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part
    73 of this chapter.
- (d) The frequency stability shall be measured with variation of primary supply voltage as follows:
  - (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
  - (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
  - (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

## § 27.54 Frequency stability.

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.



### **Test Procedures:**

The measurement is performed in accordance with Section 5.6.3, 5.6.4 and 5.6.5 of ANSI C63.26.

## 5.6.3 Procedure for frequency stability testing

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

- a) At 10 °C intervals of temperatures between -30 °C and +50 °C at the manufacturer's rated supply voltage, and
- b) At +20 °C temperature and  $\pm$ 15% supply voltage variations. If a product is specified to operate over a range of input voltage then the -15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

### 5.6.4 Frequency stability over variations in temperature

- a) Supply the EUT with a nominal 60 Hz ac voltage, dc voltage, or install a new or fully charged battery in the EUT.
- b) If possible a dummy load should be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible.
- c) Turn on the EUT, and tune it to the center frequency of the operating band.
- d) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible, make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away).

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.



- e) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.
- f) Turn the EUT off, and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.
- g) Set the temperature control on the chamber to the Highest temperature specified in the regulatory requirements for the type of device, and allow the oscillator heater and the chamber temperature to stabilize. Unless otherwise instructed by the regulatory authority, this temperature should be 50 °C.
- h) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and allow sufficient time for the EUT temperature to stabilize.
- i) Measure the frequency.
- j) Switch off the EUT, but do not switch off the oscillator heater.
- k) Lower the chamber temperature to the next level that is required by the standard and allow the temperature inside the chamber to stabilize. Unless otherwise instructed by the regulators, this temperature step should be 10 °C.
- l) Repeat step h) through step k) down to the lowest specified temperature. Unless otherwise instructed by the regulators, this temperature should be -30 °C. When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and Highest channel of operation shall be identified as  $f_L$  and  $f_H$  respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of  $f_L$  and  $f_H$  and the resulting frequencies must remain within the band.
- m) Omitted

5.6.5 Frequency stability when varying supply voltage

- a) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away)
- b) Supply the EUT with nominal ac or dc voltage. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.
   Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.
- c) Turn on the EUT, and couple its output to a frequency counter or other frequency-measuring instrument.
- d) Tune the EUT to the center frequency of the operating band. Adjust the location of the measurement antenna



and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

- e) Measure the frequency.
- f) Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.
- g) 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.
- h) Repeat the frequency measurement.
  NOTE—For band-edge compliance, it can be required to make these measurements at the low and High channel of the operating band.

**Note:** The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each port, so we are attached only the worst case data.



HCT

Report No. HCT-RF-2210-FC008-R1

## **Test Results:**

Valtaga	Tomn	Frequency	Frequency	Deviation	
Voltage (%)	Temp.	Frequency	Frequency	Deviation	ppm
	(°C)	(Hz)	Error (Hz)	(Hz)	PP
100 %	+20(Ref)	3 840 000 004	4.163	0.000	0.00000
	-30	3 840 000 013	8.648	4.486	0.00117
	-20	3 840 000 013	9.145	4.982	0.00130
	-10	3 840 000 007	3.029	-1.133	-0.00030
	0	3 840 000 009	4.954	0.792	0.00021
	+10	3 840 000 012	7.892	3.729	0.00097
	+30	3 840 000 011	6.811	2.649	0.00069
	+40	3 840 000 008	3.782	-0.381	-0.00010
	+50	3 840 000 010	5.344	1.181	0.00031
115 %	+20	3 840 000 009	4.473	0.310	0.0008
85 %	+20	3 840 000 011	6.970	2.807	0.00073





# 6. Annex A\_EUT AND TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2210-FC008-P