

Starry, Inc. TEST REPORT

SCOPE OF WORK

Emissions Testing – 24 GHz Comet Radio, Model COMET 24

REPORT NUMBER 104723800BOX-001

ISSUE DATE October 29, 2021 [REVISED DATE] November 8, 2021 April 15, 2022

DOCUMENT CONTROL NUMBER

Non-Specific Radio Report Shell Rev. August 2020 $\ensuremath{\mathbb{C}}$ 2020 INTERTEK



EMISSIONS TEST REPORT

(FULL COMPLIANCE)

Report Number: 104723800BOX-001 Project Number: G104723800

Report Issue Date: 10/29/2021 Report Revision Date: 04/15/2022

Model(s) Tested: Comet 24 Model(s) Partially Tested: None Model(s) Not Tested but declared equivalent by the client: None

Standards: FCC 47CFR Part 30 Subpart C: 2021 FCC 47CFR Part 2: 2021 KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 April 20, 2021

Tested by: Intertek 70 Codman Hill Road Boxborough, MA 01719 USA Client: Starry, Inc. 38 Chauncy St. Suite 200 Boston, MA 02111 USA

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Non-Specific Radio Report Shell Rev. July 2020 Client: Starry, Inc. – Model: Comet 24

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	
4	Description of Equipment Under Test and Variant Models	
5	System Setup and Method	
6	Output Power & Human RF Exposure FCC §2.1046, FCC §30.202 (a), FCC §30.207	Pass
7	Out of Band (OOB) Domain FCC §30.203 (a) (b)	Pass
8	Radiated Spurious Emissions FCC §30.203 (a) (b)	Pass
9	Occupied Bandwidths FCC §2.1049	Pass
10	Frequency Stability* FCC §2.1055	Pass
11	AC Mains Conducted Emissions FCC 47 CFR Part 15 Subpart B (2021)	Pass
12	Revision History	
13	Appendix – Mixer Conversion Loss	

*Notes: Frequency tolerance is not specified in FCC 47 CFR Part 30 Subpart C. Measurement was performed for reporting purpose.

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3 Client Information

This EUT was tested at the request of:

Client:	Starry, Inc. 38 Chauncy St Suite 200 Boston, MA 02111 USA
Contact:	Robert White
Telephone:	None
Fax:	None
Email:	rwhite@starry.com

4 Description of Equipment Under Test and Variant Models

Manufacturer:	Starry, Inc.
	38 Chauncy St Suite 200
	Boston, MA 02111
	USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
24 GHz Comet Radio	Starry, Inc.	S01311	2123000009

Receive Date:	June 10, 2021
Received Condition:	Good
Туре:	Production

Description of Equipment Under Test (provided by client)

The equipment under test (EUT) is a Comet 24 mmWave based station access point, operating between 24.25-25.25 GHz. It utilizes OFDM IEEE 802.11ac, MCS0-MCS9. Channel bandwidths are 160 MHz and 20 MHz unconverted and transmitted/received at mmWave frequencies between 24.25 GHz and 25.25 GHz. Signals are conveyed in two polarizations – horizontal and vertical through patch array. The antenna is a patch array (16x8) for each polarization. Comet 24 is a CPE radio typically pole mounted outdoors, to the side of a house.

	Equipment Under Tes	t Power Configuration	
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
54 VDC	1.1 A	DC	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Continuous Transmitting

Software used by the EUT:

No. Descriptions of EUT Exercising			
ſ	1 Proprietary Software that controls the operation of the radio.		
	Radio/Receiver Characteristics		

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Frequency Band(s)	24.27-24.29 GHz,
	24.77-25.09 GHz,
	24.34-24.36 GHz,
	24.84-25.16 GHz
Modulation Type(s)	OFDM, MCS0-9 per 802.11ac
Maximum Output Power	39.53 dBm (8.97 W) EIRP, 24.25 – 24.45 GHz
	40.92 dBm (12.36 W) EIRP, 24.75 – 25.25 GHz
Test Channels	24.27 GHz, 24.28 GHz, 24.29 GHz
	24.77 GHz, 24.97 GHz, 25.09 GHz
	24.34 GHz, 24.35 GHz, 24.36 GHz
	24.84 GHz, 25.04 GHz, 25.16 GHz
Occupied Bandwidth	157.16 MHz
MIMO Information (# of Transmit and Receive	2 TX / 2 RX ports, one spatial stream per polarization,
antenna ports)	horizontal and vertical polarization, client-side radio
Equipment Type	Proprietary upbanded and modified 802.11AC Radio
Antenna Type and Gain	Antenna Type and Gain: 24.25 - 25.25 GHz Patch antenna
	array, 19 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

	Cables									
ID	Description	Length (m)	Shielding	Ferrites	Termination					
	AC Cord	1	None	None	AC Mains					
	AC Adapter	1	None	Yes	Power Supply					
	Ethernet	10	None	None	Support Equipment					
	TNC	10	Yes	None	Support Equipment					

Support Equipment								
Description	Manufacturer	Model Number	Serial Number					
Monitor	Dell	P2317H	CN-03GJ21-74261-6BP-3TKM-A00					
Keyboard	Dell	KB216t	CN-ORKRON-71616-6CD-1FLE-A03					
Mouse	Dell	MS116t	CN-0DVORH-LO300-81G-1GFC					
5-Port Gigabit Ethernet Switch	Netgear	GS305v3	5U81095VA3835					
FCC System Tester	Starry	JBC313U591W-31ACB	19CF319X002872					
Labsat GNSS Simulator	Racelogic	LS03	082600					
Wireless Router	Opengear	ACM7004	70041901043136					
Starry Link	Starry	500812	MAC: 00B6F2098A					
48VDC Power Supply	Meanwell	GST200A48	None					

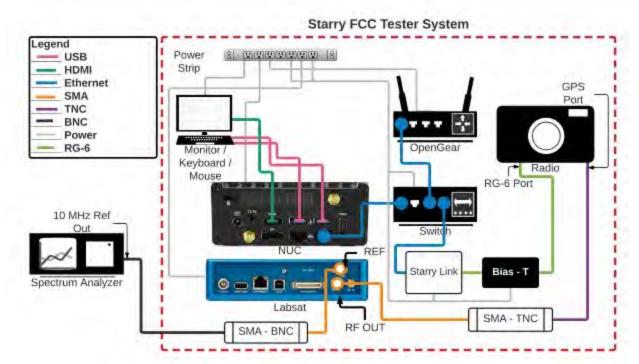
Intertek							
Report Number: 104723800BOX-001	Issued: 10/29/2021						
	Revised: 04/15/2022						

5.1 Method:

Configuration as required by FCC 47CFR Part 30 Subparts C:2021, FCC 47CFR Part 2: 2021, ANSI C63.26-2015, and KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 April 20, 2021.

5.2 EUT Block Diagram:

Comet 24



6 Output Power & Human RF Exposure

6.1 Requirements

FCC §30.202(a) Power limits.

For fixed and base stations operating in connection with mobile systems, the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz. For channel bandwidths less than 100 megahertz the EIRP must be reduced proportionally and linearly based on the bandwidth relative to 100 megahertz.

FCC §30.207 Radio frequency (RF) safety.

Licensees and manufacturers are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 1.1310, 2.1091, and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of mobile or portable devices operating under this section must contain a statement confirming compliance with these requirements. Technical information showing the basis for this statement must be submitted to the Commission upon request.

FCC §1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic field.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm²)	Averaging time (minutes)					
	(A) Limits	for Occupational/Cont	rolled Exposure						
0.3-3.0	614	1.63	*100	6					
3.0-30	1842/f	4.89/f	*900/f ²	6					
30-300	61.4	0.163	1.0	6					
300-1,500			f/300	6					
1,500-100,000			5	6					
	(B) Limits for	General Population/Un	controlled Exposure						
0.3-1.34	614	1.63	*100	30					
1.34-30	842/f	2.19/f	*180/f ²	30					
30-300	27.5	0.073	0.2	30					
300-1,500			f/1500	30					
1,500-100,000			1.0	30					

Table 1 – Limits for Maximum Permissible Exposure (MPE)

F = frequency in MHz * = Plane-wave equivalent power density

6.2 Method

Tests are performed in accordance with FCC 47CFR Part 30 Subparts C: 2021, FCC 47CFR Part 2: 2021, FCC KDB 842590 D01 v01r02 Subclause 4.2, ANSI C63.26:2015 Subclause 5.5.4.

The procedure described in Subclause 5.5.4 (field strength method) of ANSI C63.26-2015 was utilized to determine maximum power. A field strength measurement was performed, and the field strength level was mathematically converted to an equivalent power level for comparison to the applicable limit. Subclause 4.2 of FCC KDB 842590 D01 v01r02 was utilized where radiated power spectral density (EIRP density) is subject to the limit.

The EUT was transmitting at its maximum data rate with MCS8 modulation. During measurement, EIRP radiated power was converted to conducted power by using antenna gain and distance factor. Power shown on the screenshots are conducted power.

- Connect the test antenna to a spectrum analyzer.
- Set spectrum analyzer's RBW, VBW, detector, span, etc. to the proper values.
- Place the EUT 1.5 meters above the ground reference plane and the far field test distance of 3 meters from the edge of the EUT to the test antenna.
- Set the EUT to transmit continuously on a channel with modulation.
- As the surfaces of the EUT are scanned, keep the test antenna pointed toward the EUT and slowly vary the test antenna polarization to cover all possible polarizations and orientations of the emission. And vary the test antenna height from 1 to 4 meters to maximize the emission.
- Record the measured reading with the test antenna fixed at the maximized position, polarization, and orientation. Record the measurement distance.
- EIRP power is calculated by using the following equation:

EIRP =	$E_{Meas} + 20\log(d_{Meas}) -$	- 104.7
		-

where

EIRP	is the equivalent isotopically radiated power, in dBm
E _{Meas}	is the field strength of the emission at the measurement distance, in $dB\mu V/m$
d _{Meas}	is the measurement distance, in m

• Measurements was made at 3 meters distance. Far Field Distance (Rm) Calculation: $Rm = 2D^2/\lambda$, where: D = largest dimension of the antenna aperture in meters, λ = wavelength of the emission under investigation [300/f_{MHz}] in meters.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)
Radiated Emissions, 10m	30-1000 MHz	5.0 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB
Radiated Emissions, 3m	40-140 GHz	5.09 dB

Sample Calculation

The cable loss, antenna factor, and path loss at 3 meters were compensated in the Spectrum Analyzer as a dB offset without the EUT antenna factor. The EIRP power is calculated from field strength reading at 3 meters as below.

EIRP (dBm) = E (dB μ /m) + 20 * LOG (D) – 104.7; where D is the measurement distance (in the far field region) in meters.

EIRP (dBm) = E (dB μ V/m) – 95.2, where D = 3 m

Conducted Power (dBm) = EIRP (dBm) – EUT antenna gain (dBi)

6.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/28/2021	01/28/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CBLHF2012-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/19/2021	02/19/2022

Software Utilized:

Name	Manufacturer	Version
None		

6.4 Results – Output Power:

The sample tested was found to Comply.

Modulation: MCS8

Measurement Distance: 3m

Frequency (GHz)	Antenna Polarity	Bandwidth (MHz)	EIRP From Plots (0 path) (dBm)	Total EIRP Power (dBm/ 100MHz)	Limit (dBm/100M Hz)	Margin (dBm)
24.27	V	20	39.53	46.52	75	-28.48
24.28	V	20	39.31	46.30	75	-28.70
24.29	V	20	39.51	46.50	75	-28.50
24.77	V	20	38.16	45.15	75	-29.85
24.97	V	20	38.35	45.34	75	-29.66
25.09	V	20	37.30	44.29	75	-30.71
24.27	Н	20	35.07	42.06	75	-32.94
24.28	Н	20	35.01	42.00	75	-33.00
24.29	Н	20	38.62	45.61	75	-29.39
24.77	Н	20	38.02	45.01	75	-29.99
24.97	Н	20	38.41	45.40	75	-29.60
25.09	Н	20	36.61	43.60	75	-31.40

Modulation: MCS8 Measurement Distance: 3m

Frequency (GHz)	Antenna Polarity	Bandwidth (MHz)	EIRP From Plots (0 path) (dBm)	Total EIRP Power (dBm/ 100MHz)	Limit (dBm/100M Hz)	Margin (dBm)
24.34	V	160	39.44	37.40	75	-37.60
24.35	V	160	39.08	37.04	75	-37.96
24.36	V	160	40.92	38.88	75	-36.12
24.84	V	160	39.04	37.00	75	-38.00
25.04	V	160	38.51	36.47	75	-38.53
25.16	V	160	38.98	36.94	75	-38.06
24.34	Н	160	39.54	37.50	75	-37.50
24.35	Н	160	39.14	37.10	75	-37.90
24.36	н	160	40.04	38.00	75	-37.00
24.84	Н	160	40.80	38.76	75	-36.24
25.04	н	160	39.01	36.97	75	-38.03
25.16	Н	160	38.56	36.52	75	-38.48

6.5 Results – Human RF Exposure

MPE Safe Distance Calculation

RF exposure for licensed transmitter is handled at the time of licensing, however, an MPE calculation was performed in order to show the distance at which the device is compliant with the limits of §1.1310. The highest measured EIRP output power was used.

FCC Limit for General Population/Uncontrolled Exposure at 24 GHz = 1 mW/cm²

Power Density = [EIRP] / $[4\pi x (D_{cm})^2]$, where EIRP is in milliwatts and D is in centimeters

Setting the power density equal to the limit of 1 mW/cm^2 and solving for D_{cm} yields the following results.

Results:

EUT EIRP = EIRP Output Power

Power Density Limit = [EIRP] / $[4\pi x (D_{cm})^2]$

 $1 \text{ mW/cm}^2 = [\text{EIRP}] / [4\pi \text{ x} (\text{D}_{\text{cm}})^2]$

 $D_{cm} = ([EIRP] / [4\pi])^{1/2}$, where maximum EIRP = 46.52 dBm or 44874.538993 mW

Safe Distance, D_{cm} = 56.77 cm

6.6 Setup Photographs:

Confidential – Photo not included in this report

6.7 Plots/Data:

EIRP Output Power (Vertical Polarity) – 24.27GHz_20MHz BW_MCS8_att0_Mixer28

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EIRP Output Power (Vertical Polarity) – 24.28GHz_20MHz BW_MCS8_att0.25_Mixer28

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EIRP Output Power (Vertical Polarity) – 24.29GHz_20MHz BW_MCS8_att0.75_Mixer27

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EIRP Output Power (Vertical Polarity) – 24.77GHz_20MHz BW_MCS8_att0_Mixer24

RefLevel 39.6	Spectrum	Spec	= RBW 500 k	Z Spectr	um a	(2)			_	-
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EIRP Output Power (Vertical Polarity) – 24.97GHz_20MHz BW_MCS8_att0.25_Mixer25

17:24:56 13.09.2021

EIRP Output Power (Vertical Polarity) – 25.09 BW_MCS8_att0.75_Mixer23

	dBni Offsi 0 dB = SWI		77 dB = RBW 1 ms) = VBW	2 Mftz Mode	e Auto FFT			Count 100/100
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17:34:44 13.09.2021

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N) CIENT									
IQ dBsi		_							
_									
0.dBn:									
io dini-									_
F 24.27 GHz			10000	ots		3.71 MHz/	-	-	Span 37.1 MH
Result Summ Channe		Bandwidt	D 1	Offset	None	Dower	Ĩ.		_
Tx1 (Rel Tx Tota	E)	18.260 MH	2	Onset		25.07 dBm 35.07 dBm 35.07 dBm	Ke		_
	1						Measuring	-	16(43)35
							-		10:43:3

EIRP Output Power (Horizontal Polarity) – 24.27GHz_20MHz BW_MCS8_att0_Mixer28

16:43:33 13.09.2021

MultiView	Spectrum		Spectrum 2	Z Spect	Jum S	(E)			
RefLevel 39.1 Att	0 dB = SWT		3 dB = RBW 500	KHz MHz Mode Au	to FFT				Count 100/100
I ACLR	5 40 - 5 401	3100		ting mond					- IRm Ave
								-M1(1)	21,26 dBn 27542000 GM
30 dbm	_				tin		-	-	
20 dBm		-		~			-		
10 984-								-	
0.2011		\rightarrow					1	-	
-10 dBn-	-						-		
20 cites							-	-	
-30 dBm	_						-		
-40.dBm		_							
-50 dbm		-							
		1							
CF 24.28 GHz			10000			3.71 MHz/			Span 37.1 MHz
2 Result Summ Channe Tx1 (Ref Tx Tota	5 1	Bandwidt 18.260 MH		Offset	one	Power 35.01 dBm 35.01 dBm	ſ.		
	1						Measuring	1	16:49:03

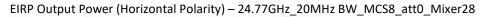
16:49:03 13.09.2021

EIRP Output Power (Horizontal Polarity) – 24.28GHz_20MHz BW_MCS8_att0_Mixer28

MultiView	Spectrum		ectrum 2	Z Spectro	um S	1			-
Ref Level 39.1 Att		5 ms(481 m	dB = 198W 500 (5) = VBW 2	Mftz Mode Auto	FET				ount 100/100
I ACLR									1Rm Avd
		100						-M1(1)	24,85 dBn
to dbm							-	- 1	28551200 04
				Ti-	1		-		
20 dBm		1					-		
		1							1
10 08/		1					2		
		/ I							
0.200		1						-	1
10 dBin								-	
10 000								-	
20 685								() ()	
and caref									
-32 CB-0									
-10 GB-1									
-40.cBn								_	-
- 40. OB/1									
-50 dbm-									
-SS CENT									
3F 24.29 GHz		-	10000 (_	3.71 MHz/			Span 37.1 MHz
2 Result Summ		Bandurre	_	Nor	1C	Distance	T.		
Channe Tat (Rel	0	Bandwidth 18.260 MHz		Offset		38.62 dBm	1		
Tx1 (Re) Tx Tota						38.62 dBm			
	1						Measuring	Summer of Street, or other	17:02:44

EIRP Output Power (Horizontal Polarity) – 24.29GHz_20MHz BW_MCS8_att0.25_Mixer28

17:02:44 13.09.2021



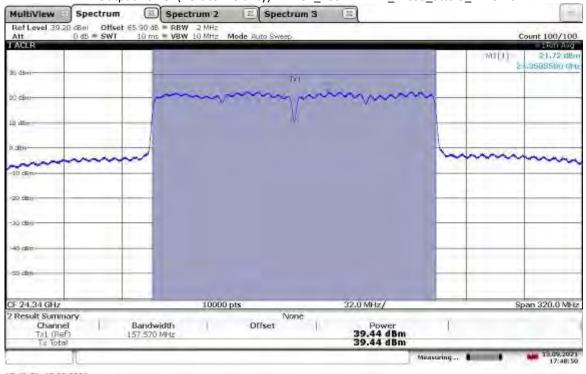
RefLevel 39.6 Att			B BBW 500	MHz Mode Auto	FFT			Count 100/100
I ACLR	0 db = 341	2102(040110	2) 4047 2	mile mode woo	04110			Rm Avd
			-					M1(1) 23.10 dBm 24.76210060 042
N dim-	_		-	1	11			
20 dBm							1	
10 380-							t	
û dam	-	/						
10 (Bit)							-	
-20 cBm		-					-	
-30 skm		-					-	
45 dBm		_						
-\$3.c8m	-							
CF 24.77 GHz		-	10000 (ots		3.71 MHz/	-	Span 37.1 MHz
2 Result Summ Channe Tx1 (Rel Tx Tota		Bandwidth 18.260 MHz	1	Offset	ne	Power 38.02 dBm 38.02 dBm	(
he lota	1				-	30.02 000	Measuring	13.09.2021

MultiView	Spectrum		Spectrum 2	Z Spectru	ım S	(E)			
Ref Level 39.5 Att	0 dB = SWT		62 dB = RBW 500 1 ms) = VBW 2	MHz Mode Auto	FFT			(Count 100/100
I ACLR	-						-	-	1Rm Avd
								193(1)	24,03 dlln ,06 106500 fl4
ic daw-				12	1				
1									
Q dBin-		1					1	-	-
		1							
1.0500-		1							-
den		/						~	
.080		1.0							
10 cilm									
20 dBm-									
95 dBm								-	
ep uner									
\$9.2BH									
		1						1	
F 24.97 GHz Result Summ		-	10000	pts Non		3.71 MHz/			Span 37.1 MHz
Channe	el i	Bandwid		Offset	1	Power	1		
Tx1 (Re Tx Tota	D.	18.260 M	Htt			38.41 dBm 38.41 dBm		_	
1.0 19/80	Y.	_					Measuring		17:24:55

EIRP Output Power (Horizontal Polarity) – 25.09GHz_20MHz BW_MCS8_att0.5_Mixer24

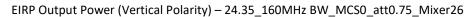
MultiView	Spectrum	Spectr	um 2 🛛	Spectrum 3	(E)		
RefLevel 40.07 Att	dBni Offset 0 dB = SWI 5		RBW SOO KHE VBW 2 MHz	Mode Justo FFT			Count 100/100
I ACLR							IRm Avg
				1	1		M1(1) 22.48 dBn 25.00365660 r80
an dam		-		tia			
an dim		1					
)0 18ja-		-					
0.187		4				5	
15 daw		-				-	
-20 cRm-		-				-	
-100 dBm		-				-	
-+0 dBm		-					
-90 cBm							
CF 25.09 GHz			10000 pts		3.71 MHz/		Span 37,1 MHz
2 Result Summa			10000 prs	Alema	3.71 WHZ/		span 37,1 WH2
Z Resolt Somma Channel Tx1 (Ref) Tx Total	E	andwidth 8.260 MHz	1 0	None	Power 36.61 dBm 36.61 dBm	l.	
	1					Measuring	17:28:28

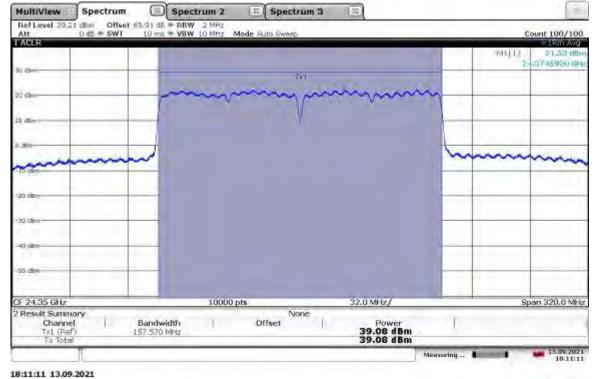
Non-Specific Radio Report Shell Rev. August 2020 Client: Starry, Inc. – Model: Comet 24

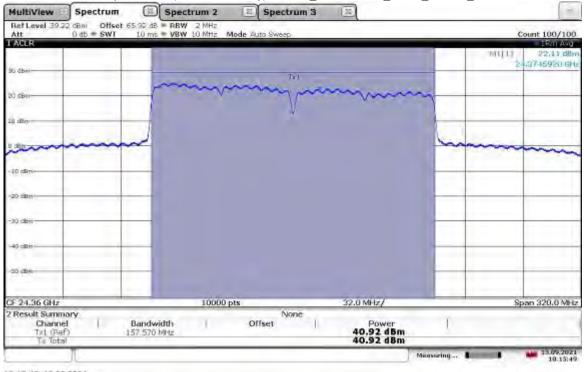


EIRP Output Power (Vertical Polarity) – 24.34_160MHz BW_MCS0_att0.5_Mixer26

17:48:51 13.09.2021

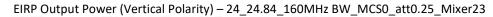


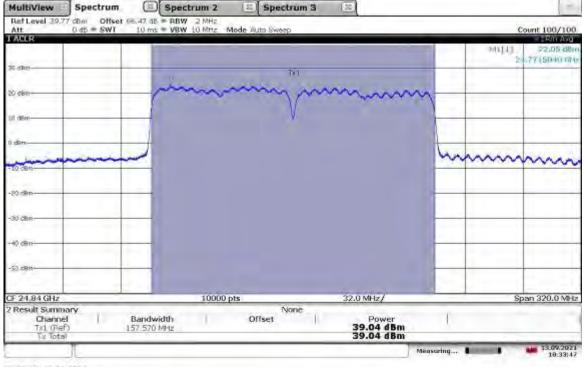




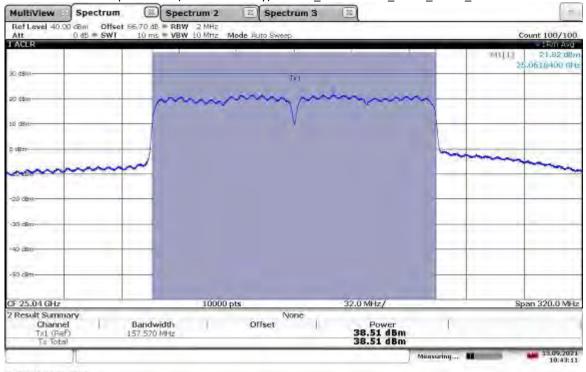
EIRP Output Power (Vertical Polarity) – 24.36_160MHz BW_MCS0_att0.25_Mixer26

18:15:49 13.09.2021



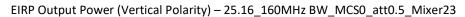


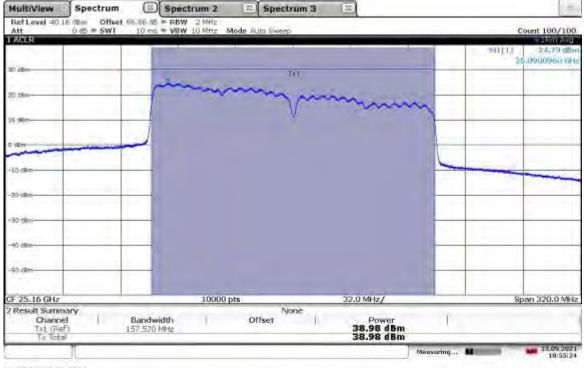
18:33:48 13.09.2021



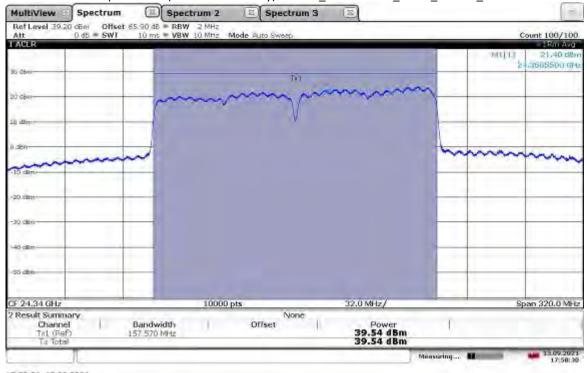
EIRP Output Power (Vertical Polarity) – 25.04_160MHz BW_MCS0_att0.5_Mixer23

18:43:12 13.09.2021



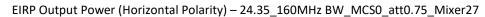


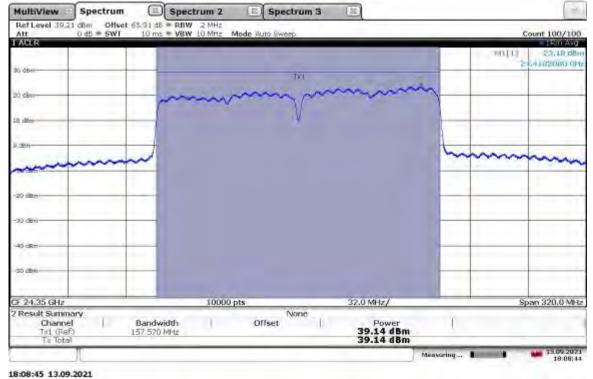
18:55:24 13.09.2021

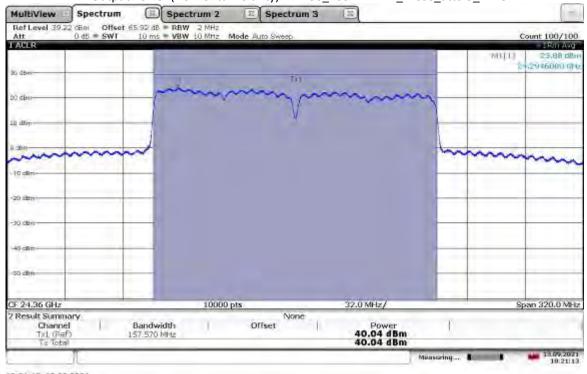


EIRP Output Power (Horizontal Polarity) – 24.34_160MHz BW_MCS0_att0.25_Mixer27

17:58:31 13.09.2021

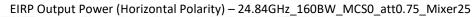


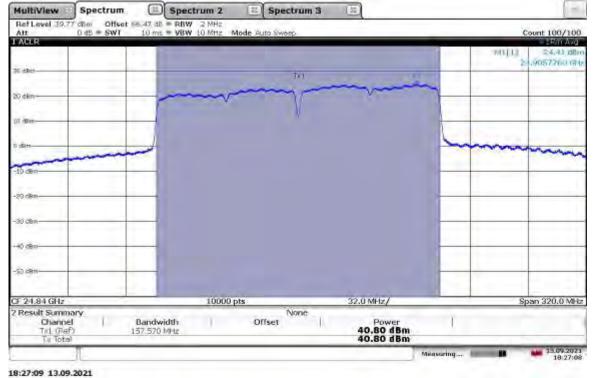


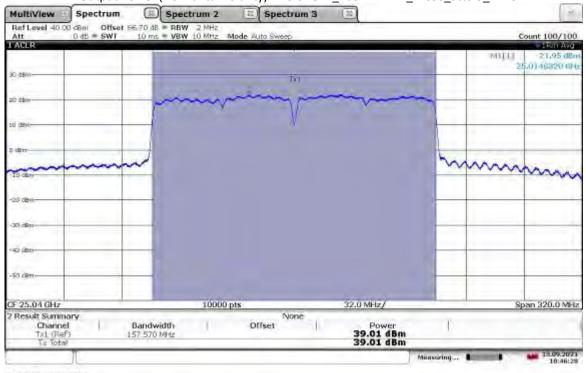


EIRP Output Power (Horizontal Polarity) – 24.36_160MHz BW_MCS0_att0.5_Mixer27

18:21:13 13.09.2021

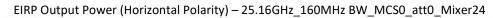


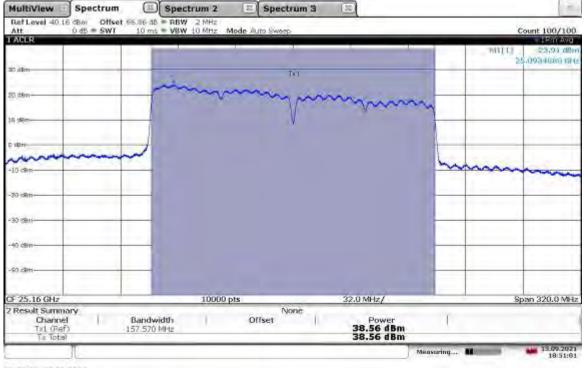




EIRP Output Power (Horizontal Polarity) – 25.04GHz_160MHz BW_MCS0_att0.5_Mixer24

18:46:29 13.09.2021





18:51:01 13.09.2021

Supervising/Reviewing	Vathana F. Ven	Test Date:	_09/13/2021
Engineer:			
(Where Applicable)	N/A		
Product Standard:	FCC 47CFR Part 30 Subpart C	Limit Applied:	See Report Section 6.3
Input Voltage:	48 VDC Via External P/S		
Pretest Verification w/		Ambient Temperature:	27 ºC
BB Source:	Yes	Relative Humidity:	31 %
		Atmospheric Pressure:	1008 mbars

Deviations, Additions, or Exclusions: None

7 Out of Band (OOB) Domain

7.1 Requirements

FCC §30.203 Emission limits.

(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

(b)

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.

(3) The measurements of emission power can be expressed in peak or average values

7.2 Method

Tests are performed in accordance with FCC 47CFR Part 30 Subpart C and KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 April 20, 2021 Subclause 4.4.2. The measurement was made on the maximum field strength in the same worst-case orientation as in report Section 6.1

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)
Radiated Emissions, 10m	30-1000 MHz	5.0 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB
Radiated Emissions, 3m	40-140 GHz	5.09 dB

Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF	- AG
Where	FS = Field Strength in $dB\mu V/m$
	RA = Receiver Amplitude (including preamplifier) in $dB\mu V$
	CF = Cable Attenuation Factor in dB
	AF = Antenna Factor in dB
	AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dBμV AF = 7.4 dB/m CF = 1.6 dB AG = 29.0 dB FS = 32 dBμV/m

To convert from $dB\mu V$ to μV or mV the following was used:

UF = $10^{(NF/20)}$ where UF = Net Reading in μ V NF = Net Reading in dB μ V

Example:

FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0 UF = $10^{(32 \text{ dB}\mu\text{V}/20)}$ = 39.8 $\mu\text{V/m}$

Alternately, when BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the "Level" column.

Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

7.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/28/2021	01/28/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CBLHF2012-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/19/2021	02/19/2022

Software Utilized:

Name	Manufacturer	Version
None		

7.4 Results:

The sample tested was found to Comply.

7.5 Setup Photographs:

Confidential – Photo not included in this report

Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

7.6 Plots/Data:

Authorized Band 24.25-24.45 GHz, Emission Mask (Vertical Polarity) – 24.27GHz_20MHz BW_MCS8_att0_Mixer28 Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum	E Spec	trum 2	E Spect	rum 3	32.			1.0
Ref Level 205	0 dBm Offset 0 db = SWI		BBW I MH		PPT .	-			Count 100/100
I Frequency St	weep							-	THE DAY.
				1	1	1		M4]4]	d4,17 day
									2 = 00000 G I
10 dB/r					-	-	-	MULT	25000000 nH
									pesonition in the
0 28m-						-		- F	
-	-				-				
G 20								1	
~53.clan-	-1- 300 V	S1							
								1	
~30 dBm						+	+	1	
							1	C 1	
-30 dm							10		
						· · · · · ·	7		
						1	1		1
-40.684						-			
-50 cBm						-	-		
-10 201									
- So San									
A									
-30 ¢8m						-			-
CF 24-226 GHz			10000 pt	ne.		10.0 MHz/			pan 100.0 MHz
1. 27-220 OF 12	. 17		10000 p			110.0100.00/	and the second second		1109-2021
	1						Measuring_	among the	10:44:07

16:44:07 13:09:2021

Authorized Band 24.25-24.45 GHz, Emission Mask (Horizontal Polarity) – 24.27GHz_20MHz BW_MCS8_att0_Mixer28

Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum		ectrum 2	Spectr	um 3 🔤	1			18
Ref Level 203 Att	0 db = SWI		(5 = PBW 1 M (5) = VBW 3 M	Hz Hz Made ALKOF	PT.				Count 100/100
Frequency S									Photo: Contract of
10 db#						-		M2[1]	di4,12 da 1,2 =800000 G -35,63 da 1,25000000 G
an-		_						ŕ	
10 clin-		Ú den							
-20 (Bm						-		1	
00 ¢b+-							W.S.		-
-40 KB									-
90 dim			-	-					
10 dbm-									
-99 CF-									
F 24.726 GH	2	-	10000	pts	10	NO MHZ/		5	pan 100.0 MH
	1						Menearing_	timent to	1100.302

Non-Specific Radio Report Shell Rev. August 2020 Client: Starry, Inc. – Model: Comet 24

Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Authorized Band 24.25-24.45 GHz, Emission Mask (Vertical Polarity) – 24.29GHz_20MHz BW_MCS8_att0.75_Mixer27

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

Ref Level 20.0	2 dBm Offset 46.	84 dB = BBW 1 MHz			
Att Frequency St	0 dB = SWT 5 ms (>32	8 ms) = VBW 3 MHz Mode Auto	行 1:		Count 100/100 18m Avg
10 den				MILLE	
0 dere					
-10.dBm					
-20 dan-	1				
-30 dBm	1				
- 40 dBm		-		init.	
-SD dBm					-
-60 dBm					
-70 dBm					
CF 24.384 GHz		10000 pts	20.0 MHz/		Span 200.0 MH
1.000	1			Misosuring	16:59:10

16:59:11 13.09.2021

Authorized Band 24.25-24.45 GHz, Emission Mask (Horizontal Polarity) – 24.29GHz_20MHz BW_MCS8_att0.25_Mixer28

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

Intertek

MultiView	Spectrum (Spectrum 2	Spectrum 3	(22)		-
RefLevel 20.0	2 dBm Offset	46.84 dB = RBW 1 M (+328 ms) = VBW 3 M	HE MAN HE WAS BEEN	-		C
T Frequency Sv	Udb = SWI SInsi Ween	(*328 ms) = VBW 3 m	12. MIQUE AURO FET			Count 100/100
					742(1	
						24.4520000 GHz
10 080					-MI [1	
non 1						24,4500000 GH
0 date						
	and the second se					
-10 cBm						
-10.084						
1						
-20 dbs	4					
	1					
al and	1					
-30 GBm						
						10000
-40 dBm	~				40 b/ L	
1 million 1						
						1 1 1 1 1 1
-SD dBm						
						10.000
-60 (80)						
100 C C C C C C C C C C C C C C C C C C		and the second s	and the second second			1 1 1 1 1 1 1
Sec						
-70 dBm						
CE 24 224 C				200 0 1 41 1 - 1		Con 1900 0 4 5 5
CF 24.384 GHz	-	10000 [its .	20.0 MHz/	1	Span 200.0 MHz
	1				Measuring	13.09.2021

17:03:50 13.09.2021

Authorized Band 24.75-25.25 GHz, Emission Mask (Vertical Polarity) – 24.77GHz_20MHz BW_MCS8_att0_Mixer24 Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum 🗵) Spectrum 2 🛛 🕮	Spectrum 3 💷	10.
Ref Level 20.5	7 dBm Offset	17.39 dB = RBW 1 MHE 372 ms) = VBW 3 MHz Mod		Count 100/100
Encquency Sy		57.2 ms) = VBW 51012 5000	6. AUG2 (71)	- IP/0 AV0
10 tØrs-				M1[1] 30.15 dia 24.7 isonoon GH M2[1] 24.34 dia 24.7500000 GH
idami				
dii) diwo	-c-11001.2m			
tu 094				
30 d2in				
iù da				
50 0910-				
80 dbi+				
10 dim				
F 24.752 GHz		10000 pts	5.0 MHz/	Span 50.0 MH
				Moesuning 🖬 🗰 13.09.292 17:15:33

17:15:31 13.09.2021

Authorized Band 24.75-25.25 GHz, Emission Mask (Horizontal Polarity) – 24.77GHz_20MHz BW_MCS8_att0_Mixer28

Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum	Spectrum :	2 🖾 Spectru	m 3 🖾	1.1
Ref Level 20.5	7 dBm Offset	47.39 dB = RBW	1 MHz		- Constant and a second second
Att Frequency Sy		mis (~372 ms) = WiW	314Hz Mode Auto FF1		Count 100/100
and the second second					Mt[1] <0.00 dia
					24.7 (BOGDOD G)
Ditters					ME[1] -25,85 dB
				-	24 75000000 0
				1	
dami-				/	
7	12 -S OCTO Pileri				
til davo					
		tn -		1	
tu an-					
an ear			n.E.		
Gar. 11		1	1 I		
30 mility				-	
10.000			_		
50 1891					
60 dbit					
TO day					
	100 C 100				
F 24.752 GHz		100	00 atr	5 0 50357	Pr E0 19 M
24.732 GHZ		10	00 pts	5.0 MHz/	Span 50.0 MH
	1			1	Motsuring 11 100 202 17:10:0

Authorized Band 24.75-25.25 GHz, Emission Mask (Vertical Polarity) – 24.77GHz_20MHz BW_MCS8_att0.75_Mixer23

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

I feduciticy Sweep	12			Spectrum 3	Spectrum 2	ALTER AND A DECIMAL OF A DECIMA	MultiView
Interpretexy Sweep METU Interpretexy Sweep Interpretexy Sweep Interpretexy Sweep Interp	Caint 100/100	0		Mode Auto FFT	77 d5 = RBW 1 MHz 8 mil = VBW 3 MHz	(Em Offset 17.7) dB = SWT Sms1~328	
b 1980	= 18m 4%;						
b (6).	16h 86 6E-						
0 (8)	2520000 GH						
	- Ifi 28 dBr						D YERN
	2-2500060 GH						man .
							1
							dear
							til dies-
							2
						C	a.c. 4
10.0615						6	217 0875
10.0614						S	
50 stor						1	30 0811
10 dex-							
10 dex-	1	PU/S					water a
tó đơn							In Obse
tó śm							
	+						50 2821
							il den
70 I\$ra							cit case
70 I\$rat							S
			-				70 BRIS
F 25.133 GH2 10000 pts 20.0 MH2/ Sp	pan 200.0 MH	50	20.034457		10000 ats		E 25 193 GH2
P 22/10/ UNIX 20/04/2/ Sp	13.04.262		ANALISETE?		Tunou po		- adriga GH2

17:35:47 13.09.2021

Authorized Band 24.75-25.25 GHz, Emission Mask (Horizontal Polarity) – 24.77GHz_20MHz BW_MCS8_att0.5_Mixer24

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum	Spec	trum 2	Spectrum	3 🔳			7
Ref Level 20.3 Att	0 dB = SWT S		RBW 1 MPtz	Made dury DT			-	Count 100/100
I requency Sv	veep	014-1-0-2000-00143	1011 30412	Province Presson (17)				180.400
							M2[1]	-39 95 rbs
								2520000 GH
D YBEY							MILLI	- IR D & IR
in								22000000 64
diax								
til direi	10-17.00 5	~						
X	10-17-041-2							
20 din							-	
1	6							
30 (84	1							
So open	5							
	-						4790	
dD Obse-								
FI) pilot								
tó din-							_	_
10.0011								
70 Mars-								
in the			1000					the set
F 25, 183 GHz	-		10000 pts		20.0 MHz/		S	pan 200.0 MH
						Measuring	And in case of the local division of the loc	13:04:362

Non-Specific Radio Report Shell Rev. August 2020 Client: Starry, Inc. – Model: Comet 24 Authorized Band 24.25-24.45 GHz, Emission Mask (Vertical Polarity) – 24.34GHz_160MHz BW_MCS0_att0.5_Mixer26

Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum		Spectrum 2		Spectru	m 3	2			17
Ref Level 20.0 Att	8 dBm Offset 0 dB = SWT	1. ms 1-52	90.45 = RBW 1 M 0.mm) = VBW 3 M	Hz Mor	de Auto FF	T-				Count 100/100
I requency Sv	veep									 18m 4%0
_	1 ··· ··· ··· ··· ··· ··· ··· ··· ··· ·		-					1.000	MILLIN	-26.55 (B) 24.2340000 GH
									50111	-26.71 (8)
ID OBIN										24-2500000 GH
1000								1.00		
1 (84+			-	-	-	_	-	-	200	Van Pa
	1000 C		-	-	-		-		-	1 1
10 180		-								
		0.0397					-			-
50 Gen-			-	-					-	
							· · · · · · · · · · · · · · · · · · ·	1. Then the	1	
-20 (8/10-							and and	at and	-	
ou party -				1.00	~	-				
Sector 11			11.00							
ió din-							1			
-SO tains		-	-	-			-	-		
tū dini				-				-		
TD ciller		-	-	-			-			-
		-		1	_		12.000		-	1000
F 24,166 GHz			10000	pts		- 3	30.0 MH27			Span 300.0 MH

17:55:05 13.09.2021

Authorized Band 24.25-24.45 GHz, Emission Mask (Horizontal Polarity) – 24.34GHz_160MHz BW_MCS0_att0.25_Mixer27

Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum		Spectrum 2	Spect	um 3	2			1
Ref Level 20.0 Att	8 dBm Offiser 0 dB = SWT	1 ms 1-55	.90.d5 = RBW 11 (0.ms) = VBW 31	MHZ Mode Auto i	FT.				Caint 100/100
I requency Sv	veep								= 18m Avc
	1			1	-	1		MILLI	-17.03 /19
									-27.33 dB
D GBrs-		-			-	-	-	MZILL	2500000 (8
diam-									
	u-samee			_		_	-	NIN	1 may
10 (80)	1							1	1
10 1808		0.121		_	-		-	1	
					_			1	
\$0.08m-	-		-	-	-	-		1	-
						1000	in the	1	
20 (80)									
-						10.00		1	11.0 0.1
10 60									
	1								
A									
10 tBit		-				-			
								1.00	
tū dini			_	-					-
· · · · · · ·									
10 cBrrl		-		-		_	-		-
			1.00	0.000		here and		1.000	the second
F 24,166 GHz	-	_	10000	pts		30.0 MHz7		S	pan 300.0 MH
	1						Measuring	Concession in which the	17:5%4

Authorized Band 24.25-24.45 GHz, Emission Mask (Vertical Polarity) – 24.36GHz_160MHz BW_MCS0_att0.25_Mixer26

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

Ref Level 20.3	Sidemi Offiset	Spectrum 2	Spectrum 3			(
Att	0 dB = 8W7 5 ms1	(~328 mi) = VBW 3 MH	2. Mode Auto FFT			Coant 100/100
I requency Sy	veep				WSU	3 660000 GH
15 VB6v-					MIC	21 4500000 rai
1.000		whend			_	
til dire-	+0-12.000 dam-					-
50 din			-anten			
30 OBN						
30 (Bre-						
<0.akol						
tó din-						1
TO HEVE				1.000	-	A Local
F 24.462 GHz	-	10000 p	ts.	20.0 MHz/		Span 200.0 MHz

18:18:14 13.09.2021

Authorized Band 24.25-24.45 GHz, Emission Mask (Horizontal Polarity) – 24.36GHz_160MHz BW_MCS0_att0.5_Mixer27

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum	Spectrum 2	Spectrum 3	(<u>=</u>)		7
Ref Level 20.1 Att	OdEm Offset	45.92 d5 = RBW 1 M (~328 m) = VBW 3 M	Hz Mode duro PFT			Count 100/100
I requency Sv			and the rate of the			= 18m Avg
ib des-						12[1] -25.20 den ≥ 3660000 GH 11[1] -72.94 dBn ≥ 4500000 GH
·····	mh	mon				
iù dha				-		
20 Gim-			non an	4000		
-20 pb/g-					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
40 din			-	-		
			-	-		
tū alin				-		_
10 dikrs				-		
CF 24,462 GHz		10000 (its	20.0 MHz/		Span 200.0 MHz
					Measuring_	18.00/2021

Authorized Band 24.75-25.25 GHz, Emission Mask (Vertical Polarity) – 24.84GHz_160MHz BW_MCS0_att0.25_Mixer23

Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum	3	pectrum 2	Spect	rum 3	(E)			
Ref Level 20.10 Att	0 dB = SWT 51	45 93 mis 1~328	2 d5 = RBW 1 MP m1) = VBW 3 MP	tz Mode Auto	FFT.	-			dent 100/100
If requency Sw				_					= 18m Avg
Jb (Bry								MZLL	-25-21 den 7840000 GH -20.90 den 7500000 GH
9.08#					-	-		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	show a
-10 (80)					-				1
\$0 Gira-									
-20 play-	_					-in	i		
*#17 d591						1.00		1	
- 1980 02-		_			-	-			
59 dim					-	-	-		
-10 dkm					-	-			
-			1		· · · ·			<u> </u>	and the
CF 24.702 GHz			10000 p	ts		20.0 MHz/		S	an 200.0 MHz

18:35:42 13.09.2021

Authorized Band 24.75-25.25 GHz, Emission Mask (Horizontal Polarity) – 24.84GHz_160MHz BW_MCS0_att0.75_Mixer25

Lower Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

Att Effectuency S	U dB = SWI	1 ms(0522 m	s) = VBW 3 MH	z. Mode Auto-	CE L				Count 100/100 18m Ave
			-		-			MI[1]	25,60 dBr
									-7340000 GI
10 dBro-								M2[1]	-25,11 dB
									24.7500000 GF
den								~~~~~	mon
(din.							1000		1
0.0							4	V	
10.dBm-	45 13 00	o effect						b)	-
	15 5 6 10	0 OBH							
20 cBrit	-				45-1				
					R and				
30 dBm			in	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				_	
		m			1				
40 (Bn-									
SD dBm		-							
60 dBm					_			_	-
70 dBm-									
to one									
									-
F 24.732 GH	z		10000 pt	5	3	0.0 MHz/		S	pan 300.0 MH

18:30:16 13.09.2021

Authorized Band 24.75-25.25 GHz, Emission Mask (Vertical Polarity) – 25.16GHz_160MHz BW_MCS0_att0.5_Mixer23

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum	2 5	pectrum 2	Spect	rum 3	11. () () () () () () () () () (-
Ref Level 2011	O dBm Offise	t 45.92	d5 = RBW 1M	the second second	-	-			
Att.	U da = SWI	>ms[~sast	nt) = VBW 314	H2: Mode Auto	111-				Count 100/100
125						-		MELL	-33.27 (B)
ib obes-						1			25-2500000 Gi
i der	in and	200							
10 mm		a lian	Prov	m				-	
20 Gim-				-	-	-	-	-	-
-20 pho-					Li				
40 din		-			-				
50 tBit 02		-	-		-	-		-	-
60 dini							-		
TO citys-		-			-	-			-
F 25.238 GHz			10000 p	its		20.0 MHz/	1		Span 200.0 MH

18:56:25 13.09.2021

Authorized Band 24.75-25.25 GHz, Emission Mask (Vertical Polarity) – 25.16GHz_160MHz BW_MCS0_att0_Mixer24

Upper Edge – From Mark 1 to Mark 2 the limit is -5 dBm and outside of Mark 1 to the left the limit is -13 dBm

MultiView	Spectrum		ctrum 2	E Spect	rum 3 🛛 [8			-
Ref Level 20.10 Att	0 dBm Offset 0 dB = SWT 5		B BBW 1 MH		100	S		~	ount 100/100
Frequency Sw	veep	1115 (0-320,1112	- apti 200	2. Milling March					1Rm Avd
10 1911								M2[1] 25 M1[1]	-32,29 dB 3,2660000 Gi -31,36 dB
	-					-		23	5.2500000 GH
		and the	~~~	~~~					
10 dbm	A +2-13 000 0	84	V				-		
20 dbs-					1				
30 CBm						- the		~~~	
40 dBm									
SD dBm									
60 dBm									
70. dbm-									
≠ 25.238 GHz			10000 pl	ts	2	0.0 MHz/		St	an 200.0 MH
	1						Measuring	diameter in the	18:52:32

18:52:37 13.09.2021

		Intertek	
Report Number: 104	4723800BOX-001		Issued: 10/29/2021
-			Revised: 04/15/2022
Test Personnel: Supervising/Reviewing Engineer: (Where Applicable)	Vathana F. Ven	Test Date:	09/13/2021

Input Voltage:	48 VDC Via External P/S	-	
Verification w/		Ambient Temperature:	27 ºC
BB Source:	Yes	Relative Humidity:	31 %
		Atmospheric Pressure:	1008 mbars

Limit Applied: See Report Section 7.3

Deviations, Additions, or Exclusions: None

Product Standard: and E

Pretest Verification w/

FCC 47CFR Part 30 Subpart C

8 Radiated Spurious Emissions

8.1 Requirements

FCC §30.203 Emission limits.

(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

(b)

- (1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.
- (3) The measurements of emission power can be expressed in peak or average values

8.2 Method

Tests are performed in accordance with FCC 47CFR Part 30 Subpart C and KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 April 20, 2021 Subclause 4.4.3. From 9kHz-1000 MHz and 1-13 GHz the measurements were made at 10 meters using the BAT-EMC automated software. From 13-100 GHz measurement was made manually at 3 meters with test antenna and EUT fixed at 1.5 meters high. The EUT was rotated from 0 to 360 degrees to find the worst-case emissions.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)
Radiated Emissions, 10m	30-1000 MHz	5.0 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB
Radiated Emissions, 3m	40-140 GHz	5.09 dB

Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF	- AG
Where	FS = Field Strength in $dB\mu V/m$
	RA = Receiver Amplitude (including preamplifier) in $dB\mu V$
	CF = Cable Attenuation Factor in dB
	AF = Antenna Factor in dB
	AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dBμV AF = 7.4 dB/m CF = 1.6 dB AG = 29.0 dB FS = 32 dBμV/m

To convert from $dB\mu V$ to μV or mV the following was used:

UF = $10^{(NF/20)}$ where UF = Net Reading in μ V NF = Net Reading in dB μ V

Example:

FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0 UF = $10^{(32 \text{ dB}\mu\text{V}/20)}$ = 39.8 $\mu\text{V/m}$

Alternately, when BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the "Level" column.

8.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145109'	DC Block	Coaxial Components	5985-9	none	VBU	Verified
PRE11'	50dB gain pre-amp	Pasternack	PRE11	PRE11	09/11/2020	09/11/2021
145108'	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	11/25/2020	11/25/2021
HS003'	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	10/07/2020	10/07/2021
IW006'	DC-18GHz cable 8.4m long	Insulated Wire	2800-NPS	IW006	11/25/2020	11/25/2021
IW003'	8.4 meter cable	Insulated Wire	2800-NPS	003	10/08/2020	10/08/2021
PRE12'	Pre-amplifier	Com Power	PAM-118A	18040117	12/07/2020	12/07/2021
ETS002'	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	08/03/2020	08/03/2021
145-414'	Cables 145-400 145-403 145-405 145-409	Huber + Suhner	3m Track A cables	multiple	07/09/2021	07/09/2022
IW002'	2 meter Armored cable	Insulated Wire	2800-NPS	002	09/23/2020	09/23/2021
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/28/2021	01/28/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CBLHF2012-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/19/2021	02/19/2022
ETS003'	9kHz-30MHz Active Loop Antenna	ETS Lindgren	6502	00143396	07/28/2020	07/28/2021
	40-60 GHz Spectrum Analyzer Extension Module	Virginia Diodes, Inc.	VDIWR19.0SAX-F	SAX835	03/31/2021	03/31/2023
	60-90 GHz Spectrum Analyzer Extension Module	Virginia Diodes, Inc.	VDIWR12.0SAX-F	SAX836	04/12/2021	04/12/2023
	90-140 GHz Spectrum Analyzer Extension					
	Module	Virginia Diodes, Inc.	VDIWR8.0SAX-F	SAX837	06/11/2021	06/11/2023
	40-60 GHz Conical Horn Antenna	Virginia Diodes, Inc.	WR-19	RCH019R	03/31/2021	03/31/2023
	60-90 GHz Conical Horn Antenna	Virginia Diodes, Inc.	WR-12	RCH012RL	04/12/2021	04/12/2023
	90-100 GHz Conical Horn Antenna	Virginia Diodes, Inc.	WR-8.0	RCH08RL	06/11/2021	06/11/2023

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.18.0.16
EMI Boxborough.xls	Intertek	08/27/2010

Note: Your Laptop may use a different version of Excel. Record the version you actually used!

8.4 Results:

The sample tested was found to Comply.

8.5 Setup Photographs:

Confidential – Photo not included in this report

8.6 Plots/Data:

Lower Band: All channels, 160 MHz Bandwidth, MCS0 Modulation, 9 kHz-30 MHz Radiated Spurious Emissions

	Starry Comet 24 212300000	9					Antenna:	a & Cables: ETS003 IW01, IW02		Bands: N, I ETS003 NONE.	F, HF, SHF
Engineers:	Vathana Ve	en			Location:	10m Chamber	Barometer:	DAV007		Filter:	NONE
0	G10472380		Date(s):	09/13/21							
		0, Subpart C	. ,				Temp/Humic	lity/Pressure:	23c	39%	1007mB
		145-128) 06-		Limit Di	stance (m):	10	1.	J .			
PreAmp:	,				stance (m):						
•		ed? (Y or N):	Ν		Frequency:		DE	Freque	ncy Range:	9kHz-	30MHz
	•	ading (dBuV/		0				•	, ,		
Peak:		Peak: QP Av	,		,		, .	, ,		· ,	W/VBW
	Ant.		0	Antenna	Cable	Pre-amp	Distance	EIRP	EIRP		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm	dBm	dB	
Note:	All channels	s, no emissio	ns were det	ected above	e the measu	ring equipm	ent noise flo	or, readings	below wer	e all for nois	e floor
	Note: EIRP	Obtained by	/ applying th	e path loss	correction fo	or a 3m test	distance, E(dBuV/m)@	10m - 84.7 :	= dBm EIRP)
PK	V	5.000	35.88	12.30	0.34	0.00	0.00	-36.18	-13.00	-23.18	1/3 MHz
PK	V	10.000	31.64	11.50	0.34	0.00	0.00	-41.22	-13.00	-28.22	1/3 MHz
PK	V	15.000	30.06	11.00	0.34	0.00	0.00	-43.30	-13.00	-30.30	1/3 MHz
PK	V	20.000	29.67	10.30	0.34	0.00	0.00	-44.39	-13.00	-31.39	1/3 MHz
PK	V	25.000	29.35	9.70	0.34	0.00	0.00	-45.31	-13.00	-32.31	1/3 MHz
PK	V	30.000	37.07	9.80	0.34	0.00	0.00	-37.49	-13.00	-24.49	1/3 MHz

Lower Band: Low Channel 24.34 GHz, 160 MHz Bandwidth, MCS0 Modulation, 30-1000 MHz Radiated Spurious Emissions, Tx at 24.34GHz

	Starry Comet 24 212300000	9					Antenna & Cables: N Antenna: 145-145 Cable(s): IW01, HS002, HS003, 145-4.			145-145	₋F, HF, SHF
Engineers:	Vathana Ve	en			Location:	10m Chamber	Barometer:			Filter:	NONE
0	G10472380		Date(s):	09/13/21							
,		0, Subpart C	()	00/10/21			Temp/Humic	lity/Pressure:	23c	39%	1007mB
		145-128) 06		Limit Di	stance (m):	10		,			
PreAmp:		,			stance (m):						
F	PreAmp Use	ed? (Y or N):	Y		. ,		DE	Freque	ncy Range:	30MHz	- 1GHz
	Net = Rea	, ding (dBuV/	m) + Antenr	a Factor (dl	31/m) + Cat	ole Loss (dB) - Preamp	Factor (dB)	- Distance F	actor (dB)	
Peak:		Peak: QP Av					,	. ,		. ,	W/VBW
	Ant.		, j	Antenna	Cable	Pre-amp	Correction	EIRP	EIRP		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm	dBm	dB	
	Not	e: Low CH 2	4.34GHz (L	ower band)	Tx mode_N	//CS0_160M	IHz BW, BT	CH1, 5G R	adio on CH	157	
	Note: EIRP	Obtained by	applying the	e path loss c	orrection fo	r a 10m test	t distance, E	(dBuV/m)@	10m - 84.7	= dBm EIRF	C
PK	V	32.705	52.98				14.34	-46.06	-13.00	-33.06	1/3 MHz
PK	V	37.926	61.39				18.19	-41.50	-13.00	-28.50	1/3 MHz
PK	V	54.663	62.04				25.93	-48.59	-13.00	-35.59	1/3 MHz
PK	V	58.009	71.78				25.39	-38.31	-13.00	-25.31	1/3 MHz
PK	Н	238.295	43.26				20.57	-62.01	-13.00	-49.01	1/3 MHz
PK	V	830.179	41.69				7.43	-50.44	-13.00	-37.44	1/3 MHz

Lower Band: Mid Channel 24.35 GHz, 160 MHz Bandwidth, MCS0 Modulation, 30-1000 MHz Radiated Spurious Emissions, Tx at 24.35GHz

Company:								a & Cables:	Ν	,	_F, HF, SHF
Model #:	Comet 24						Antenna:	145-145		145-145	
Serial #:	212300000	9					Cable(s):	IW01, HS002, H	IS003, 145-422	NONE.	
Engineers:	Vathana Ve	en			Location:	10m Chamber	Barometer:	DAV007		Filter:	NONE
Project #:	G10472380	00	Date(s):	09/13/21							
Standard:	FCC Part 3	0, Subpart C	;				Temp/Humic	lity/Pressure:	23c	39%	1007mB
Receiver:	R&S ESE (145-128) 06-	-22-2022	Limit Di	stance (m):	10					
PreAmp:	PRE11			Test Di	stance (m):	10					
F	PreAmp Use	ed? (Y or N):	Y		Frequency:		DE	Freque	ncy Range:	30MHz	- 1GHz
	•	, iding (dBuV/i		-) - Preamp	•	, ,		
Peak:		Peak: QP Av	,		,		, .	. ,		, ,	N/VBW
	Ant.		Ŭ	Antenna	Cable		Correction	EIRP	EIRP		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm	dBm	dB	
	No	te: Mid CH 2	4.35GHz (L	ower band)	Tx mode N	1000 AUCSO 1601	Hz BW. BT	CH1. 5G Ra	adio on CH	157	
		Obtained by		,=							C
PK	V	30.863	55.48	·			14.01	-43.23	-13.00	-30.23	1/3 MHz
PK	V	37.874	58.14				18.16	-44.72	-13.00	-31.72	1/3 MHz
PK	V	53.316	67.54				25.88	-43.04	-13.00	-30.04	1/3 MHz
PK	V	61.474	71.04				25.55	-39.21	-13.00	-26.21	1/3 MHz
PK	V	66.800	67.60				25.11	-42.21	-13.00	-29.21	1/3 MHz
PK	V	785.600	42.37				8.28	-50.61	-13.00	-37.61	1/3 MHz

Lower Band: High Channel 24.36 GHz, 160 MHz Bandwidth, MCS0 Modulation, 30-1000 MHz Radiated Spurious Emissions, Tx at 24.36GHz

Company:	Starry Comet 24						Antenn Antenna:	a & Cables:	Ν	Bands: N, I 145-145	_F, HF, SHF
		0									
	212300000						. ,	IW01, HS002, H	IS003, 145-422		
Engineers:	Vathana Ve	en			Location:	10m Chamber	Barometer:	DAV007		Filter:	NONE
Project #:	G10472380	00	Date(s):	09/13/21							
Standard:	FCC Part 3	0, Subpart C	;				Temp/Humic	lity/Pressure:	23c	39%	1007mB
Receiver:	R&S ESE (145-128) 06	-22-2022	Limit Di	stance (m):	10					
PreAmp:	PRE11			Test Di	stance (m):	10					
F	PreAmp Use	ed? (Y or N):	Y	Voltage/	Frequency:	P	ЭE	Freque	ncy Range:	30MHz	z - 1GHz
		ading (dBuV/		na Factor (dl	B1/m) + Cal	ole Loss (dB) - Preamp	-			
Peak:		Peak: QP Av	,		,	•	, .	()		()	N/VBW
	Ant.			Antenna	Cable	Pre-amp	Correction	EIRP	EIRP		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm	dBm	dB	
	Not	e: High CH 2	24.36GHz (L	ower band)	_Tx mode_I	MCS0_160N	<mark>/Hz BW, BT</mark>	CH1, 5G R	adio on CH	157	
	Note: EIRP	Obtained by	applying the	e path loss c	orrection fo	r a 10m test	t distance, E	(dBuV/m)@	10m - 84.7	= dBm EIR	Р
PK	V	31.547	56.53				14.43	-42.60	-13.00	-29.60	1/3 MHz
PK	V	37.379	61.86				17.86	-40.70	-13.00	-27.70	1/3 MHz
PK	V	52.737	69.19				25.83	-41.34	-13.00	-28.34	1/3 MHz
PK	V	54.389	65.29				25.93	-45.34	-13.00	-32.34	1/3 MHz
PK	V	69.960	70.26				24.94	-39.38	-13.00	-26.38	1/3 MHz
PK	V	785.505	43.00				8.26	-49.96	-13.00	-36.96	1/3 MHz

Upper Band: Low Channel 24.84 GHz, 160 MHz Bandwidth, MCS0 Modulation, 30-1000 MHz Radiated Spurious Emissions, Tx at 24.84GHz

	Starry Comet 24 212300000	9					Antenna & Cables: Antenna: 145-145 Cable(s): IW01, HS002, HS003,			Bands: N, LF, HF, S 145-145 NONE.	
Enaineers:	Vathana Ve	en			Location:	10m Chamber	Barometer:			Filter:	NONE
0	G10472380		Date(s):	09/13/21							
,		0, Subpart C	()				Temp/Humic	lity/Pressure:	23c	39%	1007mB
Receiver:	R&S ESE (145-128) 06	-22-2022	Limit Di	stance (m):	10		,			
PreAmp:	PRE11	,		Test Di	stance (m):	10					
F	PreAmp Used? (Y or N): Y Voltage/Frequency: POE Frequence										: - 1GHz
	Net = Rea	ding (dBuV/i	m) + Antenn	a Factor (dl	31/m) + Cal	ole Loss (dB) - Preamp	Factor (dB)	- Distance F	actor (dB)	
Peak: I	PK Quasi-F	Peak: QP Av	erage: AVG	RMS: RMS	S; NF = Nois	se Floor, RB	= Restricte	d Band; Bar	ndwidth den	oted as RB\	N/VBW
	Ant.			Antenna	Cable	Pre-amp	Correction	EIRP	EIRP		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm	dBm	dB	
	Not	e: Low CH 2	<mark>4.84GHz (U</mark>	pper band)	_Tx mode_N	MCS0_160N	<mark>IHz BW, BT</mark>	CH1, 5G R	adio on CH	157	
	Note: EIRP	Obtained by	applying the	e path loss c	orrection fo	r a 10m test	distance, E	(dBuV/m)@	10m - 84.7	= dBm EIRI	C
PK	V	31.411	56.42				14.35	-42.63	-13.00	-29.63	1/3 MHz
PK	V	37.632	61.17				18.01	-41.54	-13.00	-28.54	1/3 MHz
PK	V	52.832	65.85				25.84	-44.69	-13.00	-31.69	1/3 MHz
PK	V	54.389	65.22				25.93	-45.41	-13.00	-32.41	1/3 MHz
PK	V	69.960	72.21				24.94	-37.43	-13.00	-24.43	1/3 MHz
PK	V	785.505	41.20				8.26	-51.76	-13.00	-38.76	1/3 MHz

Upper Band: Mid Channel 25.04 GHz, 160 MHz Bandwidth, MCS0 Modulation, 30-1000 MHz Radiated Spurious Emissions, Tx at 25.04GHz

	Starry Comet 24 212300000	9					Antenna:	a & Cables: 145-145 IW01, HS002, F		145-145	F, HF, SHF
Engineers:	Vathana Ve	en			Location:	10m Chamber	Barometer:	DAV007		Filter:	NONE
Project #:	G10472380	00	Date(s):	09/13/21							
Standard:	FCC Part 3	0, Subpart C	;				Temp/Humic	lity/Pressure:	23c	39%	1007mB
Receiver:	R&S ESE (145-128) 06	-22-2022	Limit Di	stance (m):	10					
PreAmp:	PRE11			Test Di	stance (m):	10					
F	PreAmp Use	d? (Y or N):	Y	Voltage/	Frequency:	P	DE	Freque	ncy Range:	30MHz	- 1GHz
	Net = Rea	iding (dBuV/i	m) + Antenn	a Factor (dl	31/m) + Cal	ole Loss (dB) - Preamp	Factor (dB)	- Distance F	actor (dB)	
Peak: I	PK Quasi-P	eak: QP Av	erage: AVG	RMS: RMS	S; NF = Nois	se Floor, RB	= Restricte	d Band; Bar	ndwidth den	oted as RB\	W/VBW
	Ant.			Antenna	Cable	Pre-amp	Correction	EIRP	EIRP		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm	dBm	dB	
	Not	e: Mid CH 2	5.04GHz (U	pper band)	_Tx mode_N	//CS0_160N	1Hz BW, BT	CH1, 5G R	adio on CH	157	
	Note: EIRP	Obtained by	applying the	e path loss c	orrection fo	r a 10m test	distance, E	(dBuV/m)@	10m - 84.7	= dBm EIRF	D
PK	V	37.505	57.31				17.94	-45.33	-13.00	-32.33	1/3 MHz
PK	V	56.926	72.21				25.90	-38.39	-13.00	-25.39	1/3 MHz
PK	V	59.937	71.03				25.67	-39.34	-13.00	-26.34	1/3 MHz
PK	V	61.579	59.44				25.54	-50.80	-13.00	-37.80	1/3 MHz
PK	V	69.960	60.23				24.94	-49.41	-13.00	-36.41	1/3 MHz
PK	V	713.074	43.01				9.58	-51.27	-13.00	-38.27	1/3 MHz

Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Upper Band: High Channel 25.16 GHz, 160 MHz Bandwidth, MCS0 Modulation, 30-1000 MHz Radiated Spurious Emissions, Tx at 25.16GHz

	Starry Comet 24 212300000	9					Antenna:	a & Cables: 145-145 IW01, HS002, F		145-145	LF, HF, SHF
	Vathana Ve	-			Location:	10m Chambor	Barometer:		10000, 110 122	Filter:	NONE
0	G10472380		Date(s):	09/13/21	Location.		Darometer.	DAVOOI			NONE
-			()	03/13/21			To non // Is main		220	39%	1007mB
		0, Subpart C				4.0	Temp/Humic	lity/Pressure:	230	39%	10071116
		145-128) 06	-22-2022		stance (m):						
PreAmp:	PRE11			Test Di	stance (m):	10					
F	PreAmp Use	ed? (Y or N):	Y	Voltage/	Frequency:	P	DE	Freque	ncy Range:	30MHz	: - 1GHz
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Fact							Factor (dB)	- Distance F	actor (dB)		
Peak:	PK Quasi-F	eak: QP Av	erage: AVG	RMS: RMS	S; NF = Nois	se Floor, RB	= Restricte	d Band; Bar	ndwidth den	oted as RB	N/VBW
	Ant.			Antenna	Cable	Pre-amp	Correction	EIRP	EIRP		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm	dBm	dB	
	Note	e: High CH 2	25.16GHz (l	Jpper band)	Tx mode	MCS0_160N	MHz BW, BT	CH1, 5G F	Radio on CH	157	
	Note: EIRP	Obtained by	applying the	e path loss c	orrection fo	r a 10m test	distance, E	(dBuV/m)@	10m - 84.7	= dBm EIRI	Р
PK	V	31.674	66.28				14.51	-32.93	-13.00	-19.93	1/3 MHz
PK	V	37.653	59.13				18.02	-43.59	-13.00	-30.59	1/3 MHz
PK	V	54.189	64.35				25.93	-46.28	-13.00	-33.28	1/3 MHz
PK	V	63.284	72.09				25.40	-38.01	-13.00	-25.01	1/3 MHz
PK	V	69.960	65.44				24.94	-44.20	-13.00	-31.20	1/3 MHz
PK	Н	844.432	42.11				7.31	-49.90	-13.00	-36.90	1/3 MHz

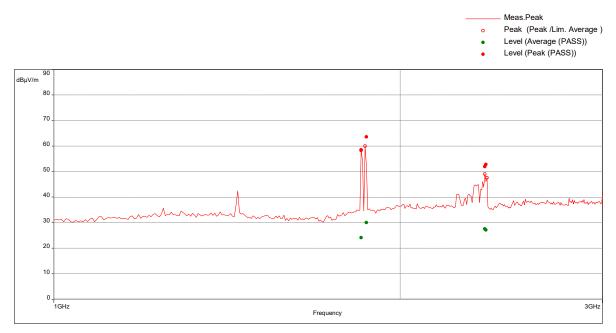
Intertek									
Report Number: 104723800BOX-001	Issued: 10/29/2021								
	Revised: 04/15/2022								

Lower Band: Low Channel 24.34 GHz, 160 MHz Bandwidth, MCS0 Modulation, 1-3 GHz

Test Information:

Date and Time	7/2/2021 10:58:26 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Lower Band: Low Channel 24.34 GHz, 160 MHz BW, MCSO, att0.25mixer27, BT Tx
	Low CH_5GHz Tx CH157 80 MHz BW_1-3GHz Part 30

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1851.052632	58.27	-36.99	-13	-23.99	62.00	2.55	Vertical	100000.00	-4.73
1867.894737	63.53	-31.73	-13	-18.73	76.00	3.55	Vertical	100000.00	-4.72
2371.578947	51.95	-43.31	-13	-30.31	33.00	1.35	Horizontal	1000000.00	-3.77
2375.263158	52.79	-42.47	-13	-29.47	33.00	2.15	Horizontal	100000.00	-3.75

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

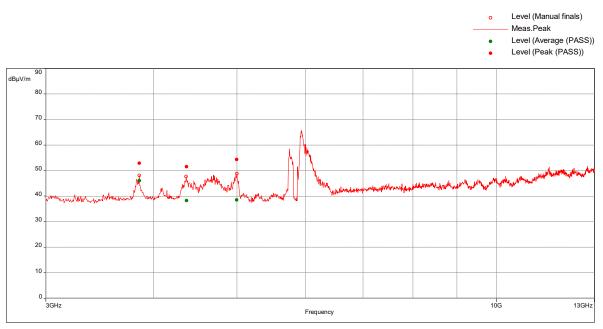
Intertek								
Report Number: 104723800BOX-001	Issued: 10/29/2021							
	Revised: 04/15/2022							

Lower Band: Low Channel 24.34 GHz, 160 MHz Bandwidth, MCS0 Modulation, 3-18 GHz

Test Information:

Date and Time	7/2/2021 10:37:07 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Lower Band: Low Channel 24.34 GHz, 160 MHz BW, MCSO, att0.25mixer27, BT Tx
	Low CH 5GHz Tx CH157 80 MHz BW 3-13GHz Part 30

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3850	52.84	-42.42	-13	-29.42	359.00	2.30	Horizontal	1000000.00	-1.06
4368.947368	51.48	-43.78	-13	-30.78	314.00	1.25	Horizontal	1000000.00	-0.22
4996.842105	54.33	-40.93	-13	-27.93	343.00	1.85	Horizontal	100000.00	1.14

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Notes: The high peaks are the fundamental frequency signals.

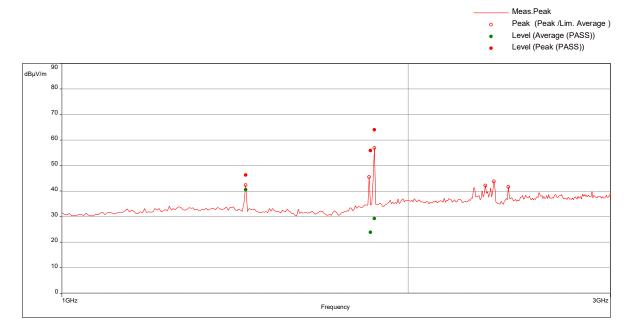
Intertek								
Report Number: 104723800BOX-001	Issued: 10/29/2021							
	Revised: 04/15/2022							

Lower Band: Mid Channel 24.35 GHz, 160 MHz Bandwidth, MCS0 Modulation, 1-3 GHz

Test Information:

Date and Time	7/2/2021 9:54:06 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Lower Band: Mid Channel 24.35 GHz, 160 MHz BW, MCSO, att0.75mixer27, BT Tx
	Mid CH_5GHz Tx CH157 80 MHz BW_1-3GHz Part 30

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
1443.684211	46.33	-48.93	-13	-35.93	0.00	2.70	Horizontal	1000000.00	-7.57
1852.631579	55.87	-39.39	-13	-26.39	239.00	3.79	Horizontal	1000000.00	-4.73
1867.894737	64.01	-31.25	-13	-18.25	98.00	3.10	Vertical	100000.00	-4.72

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

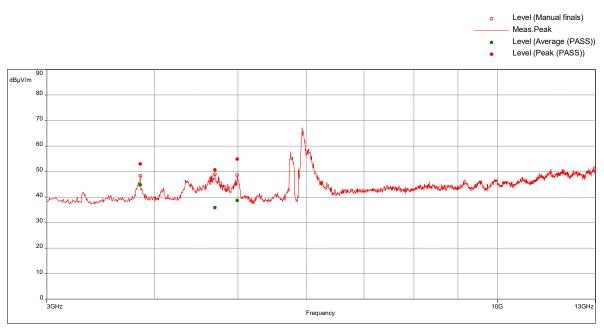
Intertek								
Report Number: 104723800BOX-001	Issued: 10/29/2021							
	Revised: 04/15/2022							

Lower Band: Mid Channel 24.35 GHz, 160 MHz Bandwidth, MCS0 Modulation, 3-18 GHz

Test Information:

Date and Time	7/2/2021 10:13:29 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Lower Band: Mid Channel 24.35 GHz, 160 MHz BW, MCSO, att0.75mixer27, BT Tx
	Mid CH 5GHz Tx CH157 80 MHz BW 3-13GHz Part 30

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3849.736842	52.98	-42.28	-13	-29.28	0.00	2.30	Horizontal	1000000.00	-1.06
4699.736842	50.61	-44.65	-13	-31.65	311.00	1.35	Horizontal	1000000.00	0.37
4990	54.86	-40.40	-13	-27.40	341.00	1.90	Horizontal	100000.00	1.10

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Notes: The high peaks are the fundamental frequency signals.

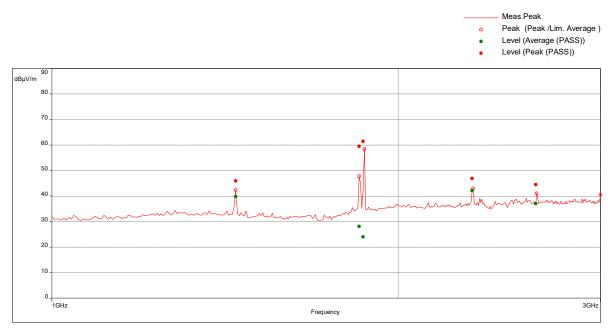
Intertek								
Report Number: 104723800BOX-001	Issued: 10/29/2021							
	Revised: 04/15/2022							

Lower Band: High Channel 24.36 GHz, 160 MHz Bandwidth, MCS0 Modulation, 1-3 GHz

Test Information:

Date and Time	7/2/2021 9:50:13 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Lower Band: High Channel 24.36 GHz, 160 MHz BW, MCSO, att0.5mixer27, BT Tx
	High CH 5GHz Tx CH157 80 MHz BW 1-3GHz Part 30

Graph:



Results:

Peak (PASS) (5)

Frequency	Level	EIRP Level	Limit	Margin	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction
(MHz)	(dBµV/m)	(dBm)	(dBm)	(dB)					(dB)
1443.684211	45.91	-49.35	-13	-36.35	357.00	1.55	Horizontal	100000.00	-7.57
1851.052632	59.45	-35.81	-13	-22.81	298.00	1.85	Horizontal	1000000.00	-4.73
1867.368421	61.47	-33.79	-13	-20.79	261.00	3.45	Vertical	100000.00	-4.72
2322.368421	46.87	-48.39	-13	-35.39	25.00	1.55	Horizontal	1000000.00	-3.96
2637.368421	44.49	-50.77	-13	-37.77	333.00	1.85	Horizontal	100000.00	-3.05

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

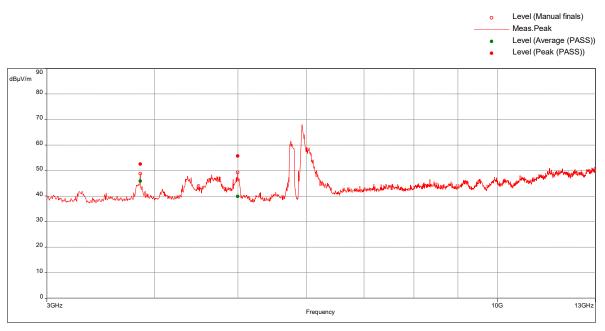
Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Lower Band: High Channel 24.36 GHz, 160 MHz Bandwidth, MCS0 Modulation, 3-18 GHz Test Information:

Date and Time	7/2/2021 9:10:25 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Lower Band: High Channel 24.36 GHz, 160 MHz BW, MCSO, att0.5mixer27, BT Tx
	High CH 5GHz Tx CH157 80 MHz BW 3-13GHz Part 30

Graph:



Results:

Peak (PASS) (2)

Frequency (MHz)	Level (dBµV/m)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3850	52.56	-42.7	-13	-29.70	0.00	1.75	Horizontal	100000.00	-1.06
4995.526316	55.74	-39.52	-13	-26.52	341.00	1.95	Horizontal	1000000.00	1.13

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Notes: The high peaks are the fundamental frequency signals.

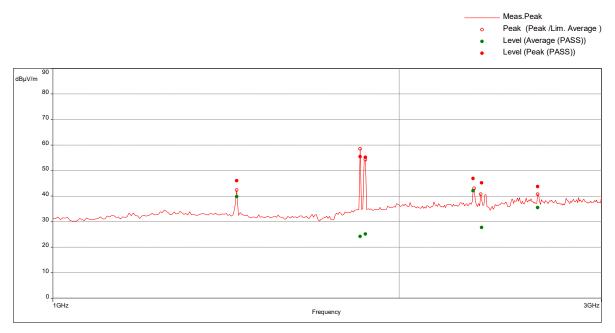
Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Upper Band: Low Channel 24.84 GHz, 160 MHz Bandwidth, MCS0 Modulation, 1-3 GHz

Test Information:

Date and Time	7/2/2021 8:22:32 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Upper Band: Low Channel 24.84 GHz, 160 MHz BW, MCSO, att0.75mixer25, BT Tx
	High CH 5GHz Tx CH157 80 MHz BW 1-3GHz Part 30

Graph:



Results:

Peak (PASS) (6)

1 cak (17135) (0)									
Frequency	Level	EIRP Level	Limit	Margin	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction
(MHz)	(dBµV/m)	(dBm)	(dBm)	(dB)					(dB)
1443.684211	46.05	-49.23	-13	-36.23	356.00	1.60	Horizontal	100000.00	-7.57
1850.789474	55.46	-39.80	-13	-26.80	46.00	1.40	Vertical	100000.00	-4.73
1868.421053	55.16	-40.10	-13	-27.10	47.00	1.00	Vertical	100000.00	-4.72
2322.368421	46.87	-48.39	-13	-35.39	25.00	1.60	Horizontal	1000000.00	-3.96
2358.684211	45.19	-50.07	-13	-37.07	33.00	1.75	Horizontal	1000000.00	-3.83
2642.368421	43.69	-51.57	-13	-38.57	340.00	1.35	Horizontal	100000.00	-3.02

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

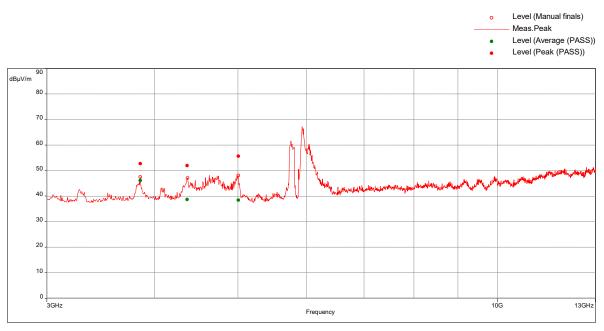
Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Inte	ertek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Upper Band: Low Channel 24.84 GHz, 160 MHz Bandwidth, MCS0 Modulation, 3-18 GHz Test Information:

Date and Time	7/2/2021 8:48:23 PM
	7/2/2021 8.48.23 FW
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Upper Band: Low Channel 24.84 GHz, 160 MHz BW, MCSO, att0.75mixer25, BT Tx
	High CH 5GHz Tx CH157 80 MHz BW 3-13GHz Part 30

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3850	52.70	-42.56	-13	-29.56	333.00	2.55	Horizontal	1000000.00	-1.06
4366.578947	51.91	-43.35	-13	-30.35	312.00	1.65	Horizontal	100000.00	-0.23
5003.421053	55.62	-39.64	-13	-26.64	342.00	1.90	Horizontal	100000.00	1.15

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Notes: The high peaks are the fundamental frequency signals.

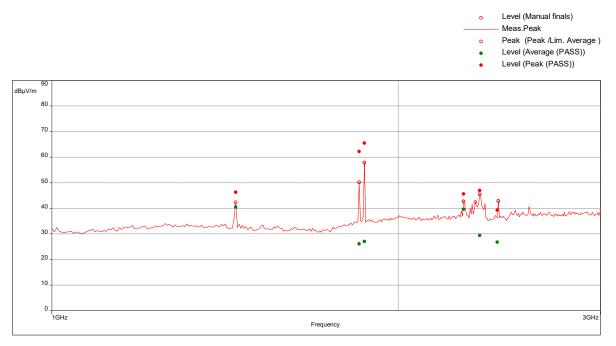
Intertek							
Report Number: 104723800BOX-001	Issued: 10/29/2021						
	Revised: 04/15/2022						

Upper Band: Mid Channel 25.04 GHz, 160 MHz Bandwidth, MCS0 Modulation, 1-3 GHz

Test Information:

Date and Time	7/2/2021 7:53:17 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Upper Band: Mid Channel 25.04 GHz, 160 MHz BW, MCSO, att0.5mixer24, BT Tx
	Mid CH_5GHz Tx CH157 80 MHz BW_1-3GHz Part 30

Graph:



Results:

Peak (PASS) (6)

Frequency	Level	EIRP Level	Limit	Margin	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction
(MHz)	(dBµV/m)	dBm)	(dBm)	(dB)					(dB)
1443.684211	46.33	-48.93	-13	-35.93	359.00	1.55	Horizontal	1000000.00	-7.57
1851.052632	62.18	-33.08	-13	-20.08	187.00	3.10	Horizontal	100000.00	-4.73
1868.947368	65.49	-29.77	-13	-16.77	259.00	1.65	Vertical	1000000.00	-4.72
2279.473684	45.61	-49.65	-13	-36.65	18.00	1.65	Horizontal	100000.00	-4.10
2354.210526	46.98	-48.28	-13	-35.28	25.00	1.75	Horizontal	100000.00	-3.85
2442.368421	39.26	-56.00	-13	-43.00	119.00	2.65	Vertical	100000.00	-3.34

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

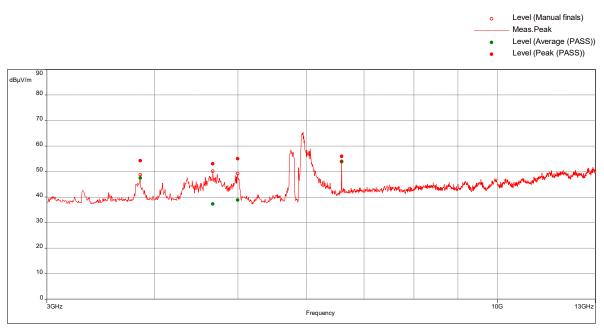
Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Upper Band: Mid Channel 25.04 GHz, 160 MHz Bandwidth, MCS0 Modulation, 3-18 GHz

|--|

Date and Time	7/2/2021 7:21:44 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Upper Band: Mid Channel 25.04 GHz, 160 MHz BW, MCSO, att0.5mixer24, BT Tx
	Mid CH_5GHz Tx CH157 80 MHz BW_3-13GHz Part 30

Graph:



Results:

Peak (PASS) (4)

Frequency	Level	EIRP Level	Limit	Margin	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction
(MHz)	(dBµV/m)	(dBm)	(dBm)	(dB)					(dB)
3850	54.26	-41.00	-13	-28.00	356.00	2.40	Horizontal	1000000.00	-1.06
4676.578947	53.04	-42.22	-13	-29.22	319.00	1.90	Horizontal	1000000.00	0.45
4997.105263	55.03	-40.23	-13	-27.23	335.00	2.10	Horizontal	1000000.00	1.14
6596.578947	55.99	-39,27	-13	-26.27	312.00	1.00	Vertical	100000.00	4.43

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Notes: The high peaks are the fundamental frequency signals.

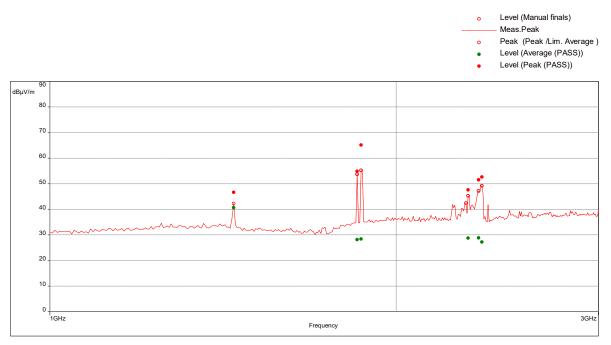
Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Upper Band: High Channel 25.16 GHz, 160 MHz Bandwidth, MCS0 Modulation, 1-3 GHz

Test Information:

Date and Time	7/2/2021 6:30:29 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Upper Band: High Channel 25.16 GHz, 160 MHz BW, MCSO, att0.5mixer24, BT Tx
	Low CH_5GHz Tx CH157 80 MHz BW_1-3GHz Part 30

Graph:



Results:

Peak (PASS) (6)

Frequency	Level	EIRP Level	Limit	Margin	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction
(MHz)	(dBµV/m)	(dBm)	(dBm)	(dB)					(dB)
1443.684211	46.61	-48.65	-13	-35.65	0.00	1.60	Horizontal	1000000.00	-7.57
1851.052632	54.87	-40.39	-13	-27.39	312.00	1.06	Vertical	1000000.00	-4.73
1866.578947	65.15	-30.11	-13	-17.11	135.00	1.00	Horizontal	100000.00	-4.72
2311.842105	47.56	-47.70	-13	-34.70	32.00	2.05	Horizontal	100000.00	-4.00
2361.052632	51.50	-43.76	-13	-30.76	24.00	1.95	Horizontal	100000.00	-3.82
2373.684211	52.64	-42.62	-13	-29.62	32.00	1.55	Horizontal	100000.00	-3.76

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

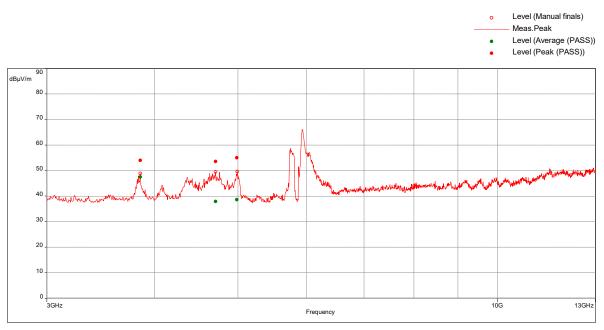
Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Upper Band: High Channel 25.16 GHz, 160 MHz Bandwidth, MCS0 Modulation, 3-18 GHz Test Information:

Date and Time	7/2/2021 7:00:15 PM
Client and Project Number	Starry
Engineer	Vathana Ven
Temperature	29 deg C
Humidity	41%
Atmospheric Pressure	1009mbar
Comments	Comet 24, Upper Band: High Channel 25.16 GHz, 160 MHz BW, MCSO, att0.5mixer24, BT Tx
	Low CH 5GHz Tx CH157 80 MHz BW 3-13GHz Part 30

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3850	53.99	-41.27	-13	-28.27	355.00	2.10	Horizontal	1000000.00	-1.06
4708.684211	53.58	-41.68	-13	-28.68	325.00	2.40	Horizontal	100000.00	0.38
4987.368421	54.99	-40.27	-13	-27.27	341.00	1.50	Horizontal	100000.00	1.09

EIRP (dBm) = E (dBuV/m) + 20 * Log (D) – 104.7, where D is the measurement distance (in the far field region) in meters.

Peak (EIRP) = Peak (dBuV/m) – 95.2, where D = 3 m.

Notes: The high peaks are the fundamental frequency signals.

Lower and Upper Bands at Low, Mid, and High channels: 160 MHz Bandwidth, MCS0 Modulation, 18-40 GHz

				S	Spurious E	missions						
									142			
Company: Starry Model #: Comet 24 Serial #: 2123000009 Engineers: Vathana Ven Location: 10 Project #: G104723800 Date(s): 08/12/21 Standard: FCC Part 30							Antenna	& Cables:	HF	Bands: N,	LF, HF, SHF	
Model #:	Comet 24	L			Antenna:	EMC04_3M-Vert	_01-28-2022.txt	EMC04_3M-Ho	01-28-2022.txt			
Serial #:	21230000	009					Cable(s):	CBLHF2012-5M-2_02-1	3-2022 cable factors.txt			
Engineers:	Vathana V	Ven			Location:	10m Ch.	Barometer:	DAV007		Filter:	NONE	
Project #:	G104723	800	Date(s):	08/12/21								
Standard:	FCC Part	30					Temp/Humid	lity/Pressure:	24 deg C	38%	1004mbar	
Receiver:	ROS005-	1_10-27-202	1	Limit Dis	tance (m):	3						
PreAmp:	PRE8 Data	11-25-2021.txt		Test Dis	tance (m):	3						
					requency:	P	DE	Freque	ncy Range:	: 18-40GHz		
Net	t = Readii	ng (dBuV/m) ·	+ Antenna	Factor (dB1	1/m) + Cab	le Loss (dE	B) - Preamp	Factor (di	3) - Distand	e Factor (dB)	
Peak: Ph	K Quasi-P	eak: QP Aver	rage: AVG	RMS: RMS	; NF = Nois	e Floor, RB	= Restricte	d Band; Ba	ndwidth der	noted as RI	BW/VBW	
1000	Ant.			Antenna	Cable	Pre-amp	Distance		12		12.1	
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth	
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(m)	dB(m)	dB		
		ower Band and U	Innor Band E	N/-160MH7	ACSO TY @1	ow Mid High	Ch. BT Ty at I	low Mid Hid	CH 5C radi	Ty on CH15	7	

Note: Manual scan was performed at a distance of <30cm. No emissions were detected above the measuring equipment noise floor.

Lower and Upper Bands at Low, Mid, and High channels: 160 MHz Bandwidth, MCS0 Modulation, 40-100 GHz

Intertek

				Radiat	ed Spuric	ous Emiss	sions					•
Company:	Starry						Antenna	& Cables:	N	Bands: N,	LF, HF, SHF	
Model #:	Comet 24						Antenna:	WR19, WI	R12, WR8			
	21230000						• • • •	CBLHF20	12-5M-2	NONE.		
	Vathana V G1047238		Date(s):	03/10/22	Location:	10m chamber	Barometer:	DAV007		Filter:	NONE	
	FCC Part 3		()				Temp/Humic	lity/Pressure:	26, 30 deg C	31, 39%	1003, 1005 mB	
Receiver:	ROS005-1	(10-27-2021)	Limit Dis	stance (m):	3						
PreAmp:					stance (m):							
		ed? (Y or N):			Frequency:		C 60Hz		ncy Range:		00GHz	
		ng (dBuV/m) ∙										
eak: PK		k: QP Avera	ge: AVG F					ed Band; Ba	andwidth d	enoted as	RBW/VBW	1
Detector	Ant.	Fraguanay	Deading	Antenna	Cable	Pre-amp		Niet	Linait	Morgin	Donduvidth	I
Detector	Pol. (V/H)	Frequency	Reading dB(uV/m)	Factor dB(1/m)	Loss dB	Factor dB	Factor dB	Net dB(uV/m)	Limit	Margin	Bandwidth	FCC
Туре		GHz 40-60 GHz ra										FUU
EIE		E (dBµV/m)									in m	
PK	V (UDIII) –	48680.000		41.43	2.96	0.00	0.00	-31.55	-13.00	-18.55	1/3 MHz	Noise floo
PK	Ĥ	48680.000	15.95	41.43	2.96	0.00	0.00	-34.82	-13.00	-21.82	1/3 MHz	Noise floo
110		40-60 GHz ra									1/0 1/11/2	140136 1100
EIF		$E (dB\mu V/m)$									in m	
PK	V	48700.000	18.59	41.43	2.96	0.00	0.00	-32.18	-13.00	-19.18	1/3 MHz	Noise flo
PK	H	48700.000	18.51	41.43	2.96	0.00	0.00	-32.26	-13.00	-19.26	1/3 MHz	Noise flo
		40-60 GHz ra										
EIF		E (dBµV/m)									in m	
PK	ν ´	48720.000	17.80	41.44	2.96	0.00	0.00	-32.96	-13.00	-19.96	1/3 MHz	Noise flo
PK	Н	48720.000	19.84	41.44	2.96	0.00	0.00	-30.92	-13.00	-17.92	1/3 MHz	Noise flo
	Note:	40-60 GHz ra	ange using	WR19, Tx	mode, Low	CH 24.840	GHz (Upper	band), MO	S0 160MH	Iz BW		
EIF		E (dBµV/m)									in m	
PK	V	49480.000	17.31	41.61	2.96	0.00	0.00	-33.28	-13.00	-20.28	1/3 MHz	Noise floo
PK	Н	49480.000	19.80	41.61	2.96	0.00	0.00	-30.79	-13.00	-17.79	1/3 MHz	Noise floo
	Note:	40-60 GHz ra	ange using	WR19, Tx	mode, Mid	CH 25.040	GHz (Uppe	r band), M0	CS0 160MF	Hz BW		
		E (dBµV/m)										
PK	V	50080.000	17.77	41.68	2.96	0.00	0.00	-32.75	-13.00	-19.75	1/3 MHz	Noise flo
PK	Н	50080.000	19.54	41.68	2.96	0.00	0.00	-30.98	-13.00	-17.98	1/3 MHz	Noise flo
		40-60 GHz ra										
		E (dBµV/m)										
PK	V	50320.000	17.34	41.72	2.96	0.00	0.00	-33.14	-13.00	-20.14	1/3 MHz	Noise flo
PK	Н	50320.000	18.33	41.72	2.96	0.00	0.00	-32.15	-13.00	-19.15	1/3 MHz	Noise flo
		0 GHz range										_
		E (dBµV/m)										
PK	V	73020.000	19.20	45.95	2.96	0.00	0.00	-27.04	-13.00	-14.04	1/3 MHz	Noise flo
PK	H	73020.000	24.12	45.95	2.96	0.00	0.00	-22.12	-13.00	-9.12	1/3 MHz	
		0 GHz range										
	V (abm) =	E (dBµV/m)			.7 ; where L 2.96							NI-: 6
PK PK	U V H	73050.000	20.91 22.52	45.96 45.96	2.96	0.00	0.00	-25.33	-13.00	-12.33	1/3 MHz	Noise flo
								-23.72	-13.00	-10.72	1/3 MHz	
		0 GHz range E (dBµV/m)										
	V (UDIII) –	73080.000	20.88	45.96	2.96		0.00	-25.36	-13.00	-12.36	1/3 MHz	Noico flo
PK	 H	73080.000	20.88	45.96	2.90	0.00	0.00	-22.75	-13.00	-9.75	1/3 MHz	
		0 GHz range				e. Low CH 2						
		E (dBµV/m)				, -			11			
PK	V (UDIII) –	74520.000	18.45	46.13	2.96	0.00	0.00	-27.62	-13.00	-14.62	1/3 MHz	Noise flo
PK	H	74520.000	21.93	46.13	2.96	0.00	0.00	-24.14	-13.00	-11.14	1/3 MHz	Noise flo
		0 GHz range				e, Mid CH 2						
		E (dBµV/m)										
PK	V (UDIII) –	75120.000	18.97	46.20	2.96	0.00	0.00	-27.03	-13.00	-14.03	1/3 MHz	Noise flo
PK	H	75120.000	21.93	46.20	2.96	0.00	0.00	-24.07	-13.00	-11.07	1/3 MHz	Noise flo
		0 GHz range										10.00
		E (dBµV/m)				. 0			<i></i>			1
												.
PK	V	75480.000	19.87	46.24	2.96	0.00	0.00	-26.09	-13.00	-13.09	1/3 MHz	Noise flo

Antenna factors were derived from: AF (dB) = $20*LOG(F_{GHz})$ + Antenna Gain (dBi) + 30.21. Test distance and conversion from field strength to EIRP are indicated in the data table above.

Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

MultiView	Spectrum				7
Ref Level -10	00 dBm SWT 60	 RBW 1 MHz Mode Auto 5 Mode Auto 5 	Sweep -		Count 100/100
Frequency S	Sweep			= 1Rm Avg SigID USB = 2R	m Ave SigID LSB
					-
-20 dBm					-
30 dam-					-
40 dbm-					
-50 d8m					
-50, dem					
-70 dsm					-
90 dBm					
-00 dB#					-
100 dBm					
40.0 GHz		10000 pts	2.0 GHz/		60.0 GH
	1			Measuring	10.03 2022

Lower Band, Tx at Low channel, 24.34GHz: 160 MHz Bandwidth. MCS0 Modulation. 40-60 GHz

10:02:58 10.03.2022

Intertek		n	te	ər	te	k
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Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

MultiView	Spectrum			
Ref Level -10	SWT 60 ms	RBW 1 MHz VBW 3 MHz Mode Auto Sweep		Count 100/100
Frequency S	weep			1Rm Avg SigID USB - 2Rm Avg SigID LSB
-20 dBm				
30 di-		_		
-40 dBm				
-50 dBm-				
-50, dem				
-70 dBm				
-90 dBm		_		
-90 dBm				
-100 dBm				
40.0 GHz		10000 pts	2.0 GHz/	60.0 GH
	1			Measuring 10:05:202 10:06:11

Intertek							
Report Number: 104723800BOX-001	Issued: 10/29/2021						
	Revised: 04/15/2022						

MultiView	Spectrum							T
Ref Level -10	0.00 dBm SWT 60	 RBW 1 MHz ms = VBW 3 MHz 	Mode Auto Sweet	D-				Count 100/100
I Frequency S	Sweep					=1Rm Avg S	IgID USB - 2RI	n Ave SigID LSB
						-		
-20 dBm			-		-	_		
-30 dam-			_		-	-		
-90 dBm								-
-50 dBm-								
-50 dem					-			
-70 dBm		_	-		_		-	
-30 dBm				_				
-90 dBm							-	-
-100 dBm					-			
40.0 GHz			10000 pts		2.0 GHz/			60.0 GHz
						Measuring	Second Second	10.03.2022 10:08:11

Lower Band, Tx at High channel, 24.36GHz: 160 MHz Bandwidth, MCS0 Modulation, 40-60 GHz

10:08:12 10.03.2022

Intertek							
Report Number: 104723800BOX-001	Issued: 10/29/2021						
	Revised: 04/15/2022						

MultiView	Spectrum	1				T
Ref Level -10.0	SWT BOY	BBW 1MHz ms VBW 3MHz N	lode Auto Sweep			Count 100/100
I Frequency Sv	veep				IRM Avg SigID USB	2Rm Avg SigID LSB
-20 dBm-			_			
-30 dbm			_			
-40 dBm						
-50 dBm-						
-50, d&m						
-70 dBm			_			_
-90 dBm			_			_
-90 dB#			-			
-100 dBm						
40.0 GHz		10	000 pts	2.0 GHz/		60.0 GHz
	1				Measuring	10.03.2022

Upper Band, Tx at Low channel, 24.84GHz: 160 MHz Bandwidth, MCS0 Modulation, 40-60 GHz

10:15:15 10.03.2022

Intertek							
Report Number: 104723800BOX-001	Issued: 10/29/2021						
	Revised: 04/15/2022						

MultiView	Spectrum						T
Ref Level -10.0	o dBm SWT 601	* RBW 1 MHz ms * VBW 3 MHz Mo	de Auto Sweep			5.0	Count 100/100
I Frequency Sw	veep	_			=1Rm Avg Si	1D USB - 2Rm	Ave SigID LSB
-20 dBm			-				
-30 dbm				_	-		-
-40 dBm					1 11		
-50 dBm-							
100				11/1			
-50, d6m							
-70 dBm							
-90 dBm							
-90 dB#							
-100 dBm							
40.0 GHz		1000	00 pts	2.0 GHz/			60.0 GHz
	1				Measuring	COLUMN ST	10.03.2022 10:22:94

Upper Band, Tx at Mid channel, 25.04GHz: 160 MHz Bandwidth, MCS0 Modulation, 40-60 GHz

Intertek								
Report Number: 104723800BOX-001	Issued: 10/29/2021							
	Revised: 04/15/2022							

MultiView	Spectrum								T		
Ref Level -10	SWT 60	ms WBW	i MHz 3 MHz - Mode Auto	o Sweep	Count 100/100						
I Frequency S	weep						=1Rm Avg S	gID USB - 2Rh	AVe SigID LSB		
-20 dBm		_			_	-					
-30 dbm		_	_		_		-		-		
-40 dBm									-		
-50 dBm					-				-		
-50 dam						-	-				
-70 dBm						-			-		
-90 dBm		_			_	-		-			
-90 dBM									-		
-100 dBm		_			-						
40.0 GHz			10000 pts		2	.0 GHz/			60.0 GHz		
							Measuring	Constant .	10.03.2022 10:25:32		

Upper Band, Tx at High channel, 25.16GHz: 160 MHz Bandwidth, MCS0 Modulation, 40-60 GHz

10:25:33 10.03.2022

Intertek								
Report Number: 104723800BOX-001		Issued: 10/29/2021						
		Revised: 04/15/2022						

Haddle Store	Spectrum	E 399	ctisani 2		(tree 3	(II) Spectrue		Spectres S	2	Spectrum &	(2)		. 7
	10.00 dBm	SWT 12	0 ms = V	BW 1 MHz	Mode	Auto Sweep						Count 10	00/100
TUF Ing: E			_		_		_	_		100000	IN THE STREET FROM	Contrast of the local division of the	the local division in the
I Frequen	cy Sweep									1800 A	vg SIgID USB	MI[1] -40	18 dBn 000 6H:
0. dBm		-					-	-	_			- connext	units carn
-10 db=	-	_		_	_			-					_
-20 dBm	1				_								
-30 dBm				_	_		-			_	_		
a dem		_			_	NU.			and the second		_		
-50 d8m							1						
-50 dBm			-		-	-							_
-70 dBm		-		-	-	-	1			-			
-80 dBm			-	-	_		-	-		-			_
60.0 GHz			_		10000 g	ots		3.0 G	Hz/				0.0 GHz
	- 1									Measuri	si Concernation	10	.03.2022 20:49:57

Lower Band, Tx at Low channel, 24.34GHz: 160 MHz Bandwidth, MCS0 Modulation, 60-90 GHz

20:49:58 10.03.2022

ridt(Wane	Spectrum	3 Asection 2	Spectres 3	(III) Spectrum 4	(R) Spectres 5	Spectrum &	7
Ref Level			VBW 3 MHz M	ode Auto Sweep			Count 100/100
Frequenc	y Sweep					JRm Avg Sig1	D USB 2Rm Avg SigtD LSB
	100						M1[1] -40.12 dBn 73.05000 GH
0. dBm							
-10 d8=	-						
-20 dBm	-			_			
-30 dBm	-	_		_		_	
-0.480	_	~		113			
-50 d8m							
-50 dBm			_				
-70 dBm	_	-					
-90 dBm							
60.0 GHz			100	00 pts	3.0 GHz/		90.0 GHz
	1		100	10.62	0.0 00 00 00	Measuring	Contraction of the second s

Lower Band, Tx at Mid channel, 24.35GHz: 160 MHz Bandwidth, MCS0 Modulation, 60-90 GHz

20:51:31 10.03.2022

Hidtoffen	Spectrum		Spectrum 2		ipeitres 3	(22.)	Spectrees 4	E.	Spectring S	2	Ipectruin A			7
Ref Leve	al 10.00 dBm		120 ms = 1	RBW 1 M		Auto 5	Weep							Count 100/100
I Frequer	ncy Sweep	_		_		-					1Rm A	vg SigID	USB 2Rm	AVe SigID LSB
1.5								1					WILL)	-40.21 (Bn 73.08000 6H
0. dBm	-					-			-		-			
-10 dB=	-	-		_		-			_		-	-		
-20 dBm	-			-	_	-			-	_	-	-		
-30 dBm	_			_		-		-	_		-	-		-
and dat		~				-	41 F	_			-	-	- tameline - 1 a	
-50 dBm-		_	-			-			-		-	-		-
-50 dBm		_								_				
-70 dBm-								-						
-80 dBm		_												
_						1-								
60.0 GHz	s	_			10000	pts		_	3.0 0	iHz/	_	-	_	90.0 GHz
											Measuri	6q 📲 🛙	A ROOM	10.63.2022 20:52:24

Lower Band, Tx at High channel, 24.36GHz: 160 MHz Bandwidth, MCS0 Modulation, 60-90 GHz

20:52:24 10.03.2022

iditition	10.00 dBm	Apartman 2	RBW 1 MHz	a a a Spectrue	i 📃 Spect		Spectrum 6	4	T
TOF Ins: E				Mode Auto Sweep					Count 100/100
Frequen	cy Sweep						1Rm Avg Sig	ID USB 2Rm	AVO SIGED LSB
1.1								WILL	-40,50 dBn 74.52000 6Ht
0. dBm			_		-	-			
-10 dB=	-		_			-			
-20 dBm	-		_	-	_	-			
-30 dBm	-	_		_	-		-		
ad de-	_				-				
-50 d8m	-					-	-		
-50 dBm		-	_	_	-	-			
-70 dBm			_						
-80 dBm	-	_	_			-			
60.0 GHz	1		10	000 pts	1	3.0 GHz/			90.0 GHz
	1						Measuring	Second Second	10.03.2022 20:53:32

Upper Band, Tx at Low channel, 24.84GHz: 160 MHz Bandwidth, MCS0 Modulation, 60-90 GHz

20:53:32 10.03.2022

RefLevel 10.00 d	SWT 120 ms =	RBW 1 MHz VBW 3 MHz Mode 4	uto Sweep			Count 100/100
TOF Ins: ExtMix E Frequency Swee	2p				IRM Avg SigID	USB 2Rm Ave SigtD LSB
(100					Mt[1] -40,32 dBr 75.12000 6H
) dBm						
10 db=		_		_	-	
-20 dBm-				-		
-3D dBm				_		
exa dia			-			
-50 d8m		-		-		
-50 dBm				-		
-70 dB#		_				
-80 d8m		-		_		
60.0 GHz		10000 p	s	3.0 GHz/		90.0 GH

Upper Band, Tx at Mid channel, 25.04GHz: 160 MHz Bandwidth, MCS0 Modulation, 60-90 GHz

20:54:42 10.03.2022

RefLevel	1 10.00 dBm SWT	120 ms # V	BW 1 MHz BW 3 MHz Mode	Auto Sween				Count 100/100
TOF Ing : E	E E	TEO ING - A	AN STREE PROOF	ndes smeet				
Frequen	icy Sweep						1Rm Avg Sigli	SUSB 2Rm AVG SIGID LSB
								Mt[1] -40.20 dB 75.48000 GF
dBm								
10 db=				-	-	-		
				-				
20 dBm		-		-	-	-		
30 dBm		-	-		-	-	-	
				-	BAT.			
and day					111 T			
			-					
50 d8m-	_				-	-		
-50 dBm				-		-		
70 dB#		-						
80 d8m								
ou upit								
0.0.00	1.00		10000			0.0.00		00.0.01
60.0 GHz			10000	pts		3.0 GHz/	Measuring	90.0 GH

Upper Band, Tx at Mid channel, 25.16GHz: 160 MHz Bandwidth, MCS0 Modulation, 60-90 GHz

20:56:01 10.03.2022

Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Pielt/Finer	Sportrus		ettani 2	Speit	1.00	(III) Spectrum &	E Spectra	** 🖾	Spectrum 6	22	T
	1 10.00 dBm	SWT 40		SW 1 MHZ SW 3 MHZ	Mode A	uto Sweep-					Count 100/100
TDF Ins: E	cy Sweep		-	_	_				1Rm Avg	SIGID USB 2Rn	AVG SIGID LSB
										MIL1]	-37.58 dBn 97,360000 6Ha
D. dBm					-			-			
10 d8=				_				-	_		
-20 dBm				-	_			-	-		
-30 dBm	-			_	-					-	
-	-one	-	~	-	- Ca-				me tour		Lawrence .
-40, dem											
-50 d8m		_		-	-			-			
-50 dBm	-			-	_	_	-	-	-		-
-70 dBm	-		_	_	-						-
-80 dBm	-	-	-						-		-
90.0 GHz	_	_			0000 p	s		.0 GHz/			100.0 GHz
	1								Measuring		10.03.2022 21:40:53

Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

	10.00 dBm	WT 40 ms = VE	W I MHZ W 3 MHZ Mode /	Nuto Sweep					Count 100/100
TDF Ins: E	cy Sweep						1Rm Avg Si	gID USB 2RI	n AVg SigID LSB
								Mi[1]	-36.53 dBm 97,400000 6Hz
0. dBm —	-	-	-						
15 d8=	-	_	_			-			-
-30 dBm									
-co opin-			-			1.1.1			
-30 dBm			1000		-		141	-	
-40, dam	-			show the			HI X		- and Chien
-50 d8m									
						1.1.1.1			
-50 dBm						1			
-70 dB#	-	_	-						-
-80 dBm		-						-	
90.0 GHz			10000	ots		1.0 GHz/			100.0 GHz
	1						Measuring	Strength -	10.03.2022

Lower Band, Tx at Mid channel, 24.35GHz: 160 MHz Bandwidth, MCS0 Modulation, 90-100 GHz

In	te	rte	k

Sauctours 2 (22) 12 Spectres 5 Spectrum 6 122 -Spectrum 25 Spectrum II Spectrum & 1 32 22 SWT 40 ms VBW 3 MHz Mode Auto Sweep RefLevel 10.00 dBm Count 100/100 TDF.Ing: EstMix F 2Rm AVg SigID LSB 1Rm Avg SigID USB M1[1] -37.62 (8) 97.440000 GH d dBr 10 dim -20 dBr 30 dBi AVI. 15 -40, de -50 d8n -50 dBr 70 dBs -80 dBm 10000 pts 1.0 GHz/ 90.0 GHz 100.0 GHz 10.03.2022 21:42:40 Measuring...

Lower Band, Tx at High channel, 24.36GHz: 160 MHz Bandwidth, MCS0 Modulation, 90-100 GHz

21:42:40 10.03.2022

Note: Mixer conversion loss, cable factors, and antenna factors were internally compensated.

Inte	rtek

Haltfilme	Spectrum	Assetture 2	Spectree I	Spectrus &	Spectres S	12	Spectman 4		- T
TOF Ing : E	10.00 dBm	SWT 40 ms	RBW I MHZ VBW 3 MHZ Mode	Auto Sweep					Count 100/100
I Frequen	icy Sweep	_	_				1Rm Avg Sigi	D'USB 2RI	AVG SIGED LSB
	1							M1[1]	-38.02.d8n
0 dBm	-	-				_			
15 d8=	_							_	_
-30 dBm									
- 30 dBm	1		-		-	-			-
-40, dam	-com-ores		la	m			-	-	
-50 d8m									
-50 dBm									
-70 dBM	-			-					-
-80 dBm							-		
90.0 GHz			10000	pts	1.0	GHz/			100.0 GHz
	1						Measuring	and the second s	10.03.2022

Upper Band, Tx at Low channel, 24.84GHz: 160 MHz Bandwidth, MCS0 Modulation, 90-100 GHz

21:43:49 10.03.2022

Note: Mixer conversion loss, cable factors, and antenna factors were internally compensated.

Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Ref Level 10.00 dBm SWT 40 TDF.Ing.: ExtMix F	■ RBW 1 MHz 0 ms = VBW 3 MHz Mode 4	Nutci Siweep-				Count 100/100
I Frequency Sweep		-		1Rm Avg S	IgID USB 2RI	n Ave Sigto LSB
Constant Comments				· · · · · · · · · · · · · · · · · · ·	M1[1]	-37.85 dBn 99.368000 GH
D dBm						99.390000 66
15 d8=						-
					-	
-20 dBm-						
-30 dBm-				-	-	-
mana	an la	tor Ale	-	Amon		M1 2 ~
40 dam						Minister Contractor
-SO dBm				-		
-50 dBm-						
-70 dB#						
-80 dām-			_	-	-	-
90.0 GHz	10000 (ots	1.0 GHz/	-		100.0 GHz
1				Measuring	Concession -	10.03.2022

Upper Band, Tx at Mid channel, 25.04GHz: 160 MHz Bandwidth, MCS0 Modulation, 90-100 GHz

Int	ertek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

TDF Ing : E	al 10.00 dBm SW	T 40 ms = VBV	VIMHZ V 3 MHZ Mode A	uto Siweep-					Count 100/100
	ncy Sweep			_		_	1Rm Avg Sig1		AVg SigID LSB
								M1[1]	-37.86 dBm 99.360000 GHz
0. dBm —	-	-	-			-			
10 d8=			-	-		-			
-20 dBm			-					_	-
- 30 dBm	-	-	-		_				
-40 dam-	monorma	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man the	ma		mon	- town		a a to the case
						-			
-50 dBm						1.1.1			
-50 dBm	-	-	-			-			
-70 dBm	-	-	-		_				-
-80 d8m	_	-	-		-				
			10000 p			.0 GHz/			100.0 GHz

Upper Band, Tx at High channel, 25.16GHz: 160 MHz Bandwidth, MCS0 Modulation, 90-100 GHz

21:45:17 10.03.2022

Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

Test Personnel:	Vathana F. Ven VFV Kouma Sinn 1495	Test Date:	07/02/2021, 08/12/2021, 08/13/2021, _09/13/2021, 03/10/2022
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 47CFR Part 30 Subparts C	Limit Applied:	See Report Section 8.3
Input Voltage:	48 VDC Via External P/S		
Pretest Verification w/		Ambient Temperature:	29, 26, 30, 23, 22 ºC
BB Source:	Yes	Relative Humidity:	41, 31, 39, 39, 23%
		Atmospheric Pressure:	1009, 1003, 1005, 1007, 1010 mbars

Deviations, Additions, or Exclusions: None

9 Occupied Bandwidths

9.1 Requirements

FCC §2.1049 Measurements required: Occupied bandwidth

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.

9.2 Method

Tests are performed in accordance with FCC 47CFR Part 30 Subpart E, KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 April 20, 2021 Subclause 4.3, and ANSI C63.26-2015 Subclause 5.4. The measurement was made on the maximum field strength in the same worst-case orientation as in report Section 6.1 with the Spectrum Analyzer setting as specified in ANSI C63.26-2015 Subclause 5.4.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

9.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/28/2021	01/28/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CBLHF2012-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/19/2021	02/19/2022

Software Utilized:

Name	Manufacturer	Version
None		

9.4 Results:

The sample tested was found to Comply.

Limit – FCC 47CFR Part 30 Subparts E Section 30.403: The maximum bandwidth authorized per frequency to the stations under this part of the section is 200 MHz.

Frequency	Transmitting	Modulation	Bandwidth	Transmitting	Occupied Bandwidth
(GHz)	Polarity		(MHz)	Path	(MHz)
24.27	Vertical	MCS8	20	0	18.50
24.28	Vertical	MCS8	20	0	18.51
24.29	Vertical	MCS8	20	0	18.41
24.77	Vertical	MCS8	20	0	18.73
24.97	Vertical	MCS8	20	0	18.45
25.09	Vertical	MCS8	20	0	18.38
24.27	Horizontal	MCS8	20	0	18.44
24.28	Horizontal	MCS8	20	0	18.18
24.29	Horizontal	MCS8	20	0	18.34
24.77	Horizontal	MCS8	20	0	18.48
24.97	Horizontal	MCS8	20	0	18.64
25.09	Horizontal	MCS8	20	0	18.54
24.34	Vertical	MCS0	160	0	157.16
24.35	Vertical	MCS0	160	0	155.04
24.36	Vertical	MCS0	160	0	154.83
24.84	Vertical	MCS0	160	0	154.21
25.04	Vertical	MCS0	160	0	154.38
25.16	Vertical	MCS0	160	0	152.97
24.34	Horizontal	MCS0	160	0	157.57
24.35	Horizontal	MCS0	160	0	154.20
24.36	Horizontal	MCS0	160	0	154.67
24.84	Horizontal	MCS0	160	0	154.26
25.04	Horizontal	MCS0	160	0	153.97
25.16	Horizontal	MCS0	160	0	153.67

9.5 Setup Photographs:

Confidential – Photo not included in this report

9.6 Plots/Data:

Occupied Bandwidth (Vertical Polarity) – 24.27GHz_BW20M_MCS8_Path 0

Att I Occupien Ba	D de SW1	41.81 µs (#85		2NHz Mode A		_			1PC Max
								M1(1)	3,25 dlin 26 91000 GH
T) (\$947-		-					-	-	
1.1			lan M	5 00 00		in the	1000		
311-		11/	There	A		and and the second	F		
10 (8/)		Ť	-				X		
	-	1.1					1		
20 dBm		1		-			-	N	
	-1	1					-	1	
30 chro	J							1	4
and and								-	- super your
	-			-				-	
-FT cam-	-		-	-		-	-	-	-
-									
nii clim	-				-				1
-70 c8n		1							
te de la		-							
F 24.27 GHz			10000) pts	4	.0 MHz/		1	Span 40.0 MHz
Marker Tabl									
Type Ret MI	Tre	X-Value 24.264918	GHz	V-Value 3.35 dBm	Occ Bw	Function		Function R 18.4968418	
71 T2	1	24.26069172 24.27918856	2 GHz	-6.35 dBm -7.44 dBm	Occ Bw Cer Occ Bw Fre				40142 GH2 72754 kHz

21:33:51 23.06.2021

Occupied Bandwidth (Vertical Polarity) – 24.28GHz_BW20M_MCS8_Path 0

MultiView	Spectrum	n 🖾 Sp	ectrum 2	Spectra	um 3 🛛 🕮	1			
Ref Level 20. Att		et 45,8 41,91 µs (485	83 dE = RBW 5 5 ms) = VBW	2001.Hz 2011z Mode Au	uto FFT				
Occupied Bar	idwidth						1	743(13	1,61 dlb
		_							15 75 5 5 10 m
(\$917-				4					
9m				Saman	man	acada		-	
		Y			1		No.		1
d9.m-		1		-			1		
d9m-	_	1					-		
2011	1	V					1	Nr.	
cho-						_		1	
mon	P								Thereway
CIB-91	-	-							
C811-									
chm									
T									
dBm-									
24.28 GHz lanker Table			10000	ots	4,	0 MHz/			Span 40.0 MH
Npe Ref Mi T1 T2		X-Value 24.275658 24.27077358 24.28928231	GHz	Y-Value 1.61 dBm -5.91 dBm 6.98 dBm	Coor Bee Coor Bee Coor Bee Cen Coor Bee Free	Function troig	10		64 MHz 7945 GHz 31229 kPz
1.6.	1	27 2072020	NPE	0120 0011	Saw Part View	00301	Magazing		23.68.202
ultiView	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5		um 3 🛛 🖾		M_MCS8_	Path 0	(=
ultiView	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	Z Spectra	um 3 🛛 🖾		M_MCS8_	Path 0	15 dans 2,92 cills
ultiView tef Level 20.4 tt poorposielista	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	Spectro 100 liHz	um 3 🛛 🖾		M_MCS8_	M3(1)	
ultiView tef Level 20.4 Vit	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	III) Spectro IIII Spectro IIIII Mode Au	um 3 🛛 🖾		M_MCS8_	M3(1)	
ultiView - tef Level 20.4 att podyóżsi ista sm	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	Spectro iooliHz 2Mitz Mode Au	um 3 🛛 🖾		M_MCS8_	M3(1)	
ultiView tof Level 20.0 ott 200000361880 200	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	III) Spectro IIII Spectro IIIII Mode Au	um 3 🛛 🖾		M_MCS8_	M3(1)	
ultiView Ref Level 20.0 Att Spourgssister (Sin-	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	III) Spectro IIII Spectro IIIII Mode Au	um 3 🛛 🖾		M_MCS8_	M3(1)	
ultiView tef Level 20. et poorporse per poor poor en eller	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	III) Spectro IIII Spectro IIIII Mode Au	um 3 🛛 🖾		M_MCS8_	M3(1)	
ultiView tef Level 20. Vet Docuption Period (2009) 2009) 2009) 2009) 2009)	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	III) Spectro IIII Spectro IIIII Mode Au	um 3 🛛 🖾		M_MCS8_	M3(1)	
25:35 23.06 iultiView Perf Level 20. Att Dopunger Level Imm Dopunger L	Occu Spectrum	п (П) Sp et —5.5	ectrum 2 84 dE = RBW 5	III) Spectro IIII Spectro IIIII Mode Au	um 3 🛛 🖾		M_MCS8_	M3(1)	9 E0: 658 2.92 cllu 2:057000 ca

21:16:28 23.06.2021

10 cla

CF 24.29 GHz

2 Marker Table Type | Ref | Trc. | Mi i

71

Occupied Bandwidth (Vertical Polarity) – 24.77GHz_BW20M_MCS8_Path 0

10000 pts

V-Value 2.92 dBm -5.05 dBm -4.07 dBm 4.0 MHz/

Occ Bw Occ Bw Centrola Occ Bw Freq Offset

Function

1

Magazing ...

X-Value 24.288578 GHz

24.2807789 GHz 4 29918842 GHz Span 40.0 MHz

21:16:27

Function Result 18.409514245 MHz

24,289983659 GHz

MultiView	Spectrum	T Spe	ctrum 2	E Spect	um S I	32			1
Ref Level 19.	Didd SWI		di = RBW		ULSERT	-			
I Occupied Bar		AL 61 (51/80)	ISA/ VBO	2011 L MOUS A	963111				TPE Max
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S		-		_					11.00
CF 24.77 GHz			10000	0 pts	-	4.0 MHz/	-	-	Span 40.0 MH
2 Marker Table		and sain		and the second			~		
Type Ref	Tre	X-Value 24.763054 G	Hz	V-Value 6.29 dBm	OCC Ber	Function		Function R 18.72739	
71	i	24.76077537	GHz	-4 13 dBm	Oct Bw D			24.770	3907 GHz
12	1	24.77950277	0Hz	4.57 dBm	GCC BW F	req Offset		139.0704	74136 KHz
	1						Magsuring	Concession of the local division of the loca	25 08 2021

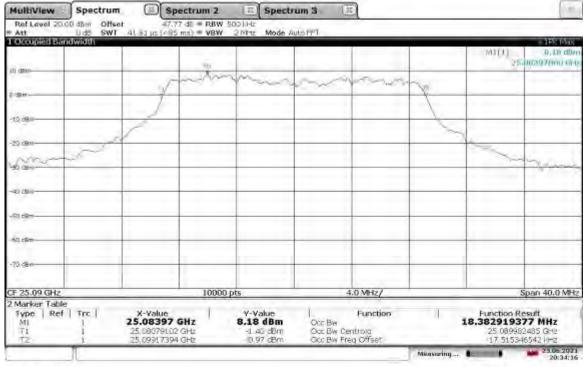
21:06:58 23.06.2021

Ref Level 19 Att	D d8 SWI	t 47.4 41.91 µs (78)	62 de = RBW 5 ms) = VBW		uto FFT	-			
Occupied Ba	ndwidth					-	78	(11)	6,25 cillo
tú dem	1					-101		=4	976×0200 GH
		r		man	con .	the	· · · · · ·	1.1.1	
den-		1	200		a series		1		
		1					1		
10 1811-		1	-				1		
		1					1		
20 HBm								1	
20 cPin	-			1912				1	
3)CBII		1.		11					and the set
41 c8m-		-		-					-
			-						
\$3 dBn					_				
						_			
69 CB n-	-			-					
			-	-					
70 cBtr-		1							
		-	1						
F 24.97 GHz Marker Tabl		_	10000) pts	4	.0 MHz/			Span 40.0 MH
Type Rei	Trc	X-Value	I	Y-Value	1	Function	1	Function R	
MI T1	1	24.975202 24.9606598		6.35 dBm -3.26 dBm	Occ Bw Occ Bw Cer			18,449601	84625 GHz
TZ	1	24.9791094		-3.20 dBm	Occ Bw Fre				05415 KHz

Occupied Bandwidth (Vertical Polarity) – 24.97GHz_BW20M_MCS8_Path 0

20:57:00 23.06.2021

Occupied Bandwidth (Vertical Polarity) – 25.09GHz_BW20M_MCS8_Path 0



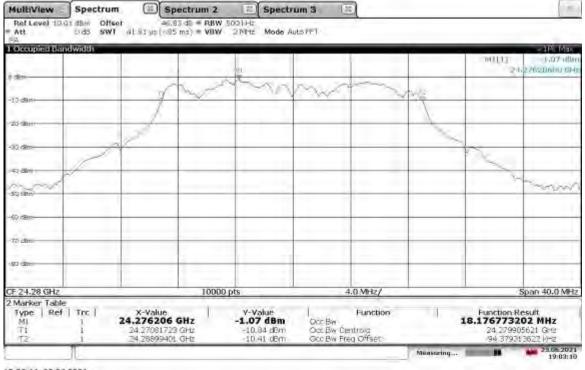
20:34:17 23.06.2021

Ref Level 13.96 Att Occurre Sant	D d8 SWI					and the second se			
	10 GP - 17 11 1	31.91 U+1.105	2 dB = RBW 5 ms) = VBW		IN FET				
	width	41-52 10 17-60	may = vbn	LITTLE MODE PA					- TPE Max
1.									-1.62 dllin 26561400 (24
iŭ dêm				-			-	- 1	CHUG LIGHT IN
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20 0Brit		34					100		
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nin dBm	1					-		~	
minul	ng l							-	mm
40 s0n				-					
-SD dBm+				1					
-60 dBm									
70 dBm				1					
						_			
F 24.27 GHz			10000	pts	1	4.0 MHz/	1		Span 40.0 MH
Marker Table		and said							
Type Ref	Tre	X-Value 4.265614	CH-	-1.62 dBm	Occ Be	Function		Function R 18.435868	
71	1	24.26079584		-11.92 dBm	Oct By Cr	pontine		24.27001	
T2 -	1	24 27923171	GHZ	-11.82 dBm	GCC BW F6	eq Offset		13.77456	
							Milasaring	and in case of the local division of the loc	18:46:16

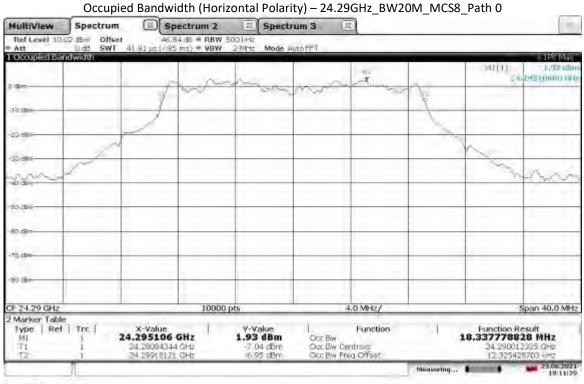
Occupied Bandwidth (Horizontal Polarity) – 24.27GHz_BW20M_MCS8_Path 0

18:46:17 23.06.2021

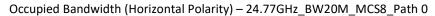




19:03:11 23.06.2021



19:11:30 23.06.2021



Ref Level 10. Att	D d8 SW	-	Dectrum 2 19 dE = RBW 5 ms) = VBW			(<u>n</u>)			
1 Occupied Ba	idwidth							-143(11)	D.29 dlin
					MC			M1(1)	1.77 ; smithu unit
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-90 cbm						-		-	21 212
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- and Carth				11 1 1 1 1 1 1 1		11.			
-75 cbm-		-				_	-		-
100									
-90 (9n		-		-				-	
CF 24.77 GHz		-	1000	0 pts		4.0 MHz/	-		Span 40.0 MHz
2 Marker Table		an instance	1	-	1	Providence.		Providence of	
Type Ref	Tre	X-Value 24.771366	GHz	-0.29 dBm	Occ Ber	Function		Function F 8.4789854	
71 T2	1	24.7608188		-7.31 dBm -11 23 dBm	Oct Bw	Centroia Freq Offset			58299 GH2 38249 kHz
1.6	1	24 1192911	SOLE	11 22 000	SAU DIA	ried conser	Measuring		25.08 2021

19:23:24 23.06.2021

MultiView	Spectrum	Sp Sp	pectrum 2	E Spectr	um 3 I	32			
Ref Level 10. Att	23.4Bm Offset		62 dE = RBW	2NHz Mode A	ALL FOR	-			
Occupied Bar	ndwidth	41:61 [151/103	S Bis / = VBW	219TTE MODE A	12111				= 1PE Max
							1	- (1) TMT	1,62 (10)
0 13910-				a noral		1.000	*	- 45	97797600 (B4
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no no	200							1	man
-40 c9m-									~~~
				-					
-90 cam-			-						
-60 cBm									
-70 dBm	-	_	-						
go case				_					
			-						
F 24.97 GHz		_	10000	ots	-	4.0 MHz/	-		pan 40.0 MH
2 Marker Table			10000	s baa		the second			part sons mes
Type Ref	Trc	X-Value	and I	Y-Value	diam'r	Function		Function Re	
MI 71	1 2	4.977978 24.9609238		-7.01 dBm	Occ Be Occ Be	Count and and		18.6391325	3436 GHz
T2	1	24.97956		-10.08 dBm	OCC BW F	reg Offset		243.43566	
	1						Magsuring	And in case of the local division of the loc	25.08 2021

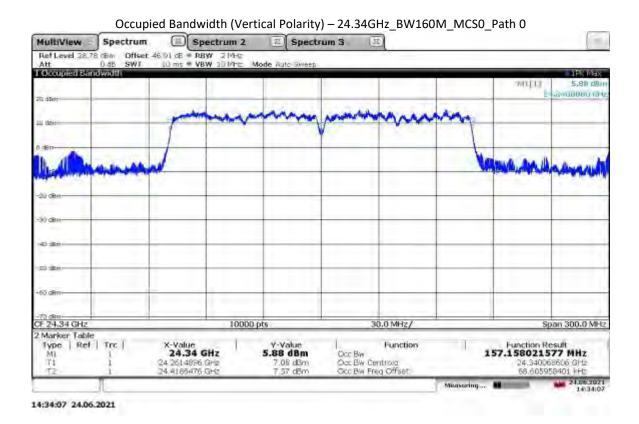
Occupied Bandwidth (Horizontal Polarity) – 24.97GHz_BW20M_MCS8_Path 0

20:11:47 23.06.2021

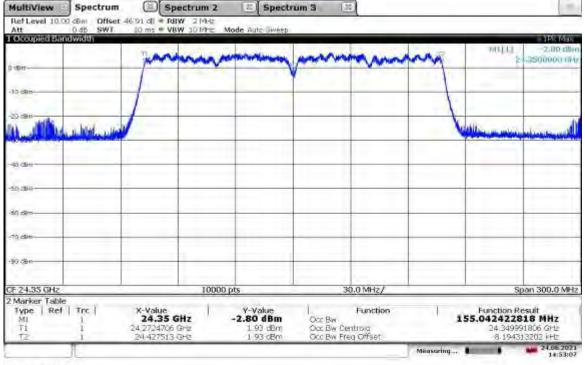
Occupied Bandwidth (Horizontal Polarity) – 25.09GHz_BW20M_MCS8_Path 0

MultiView	Spectrur	m 🖾 Spe	ectrum 2	Z Spectr	um S 🔅	E)			100
Ref Level 20.0			de = RBW		Dures.				
Att LOccupied Bar	D de SW	T 41.81 µ5 (485)	ms) = VBW	2 NHE Mode A	utorr1			_	E IPE Max
						-		M1(1)	8.67 dlin .08667 dlin (44
(1) (2017-		-	-	12				-	-
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10.00		2					1		
-10 08//		12					100		
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-40 CB-0		-		-					
-									
-123 CBm-									
-f0 clim-					_				
					-				
-70 -80				-		_			-
1212									
CF 25.09 GHz		1	1000	opts	-	4.0 MHz/	-		Span 40.0 MHz
2 Marker Table				and the second					
Type Ref	Trc	X-Value 25.086674 0	Hz	Y-Value 8.67 dBm	Occ Be	Function		Function R 18.539529	866 MH7
71	1	25.08058556	GHz	-3.62 dBm	Oct Bw Ce			25.0898	55324 GHz
T2	1	25,09912509	GHE	-1.89 dBm	Occ Bw Fr	eq Offset	1		796062 Hz
	1						Magazing		20:21:07

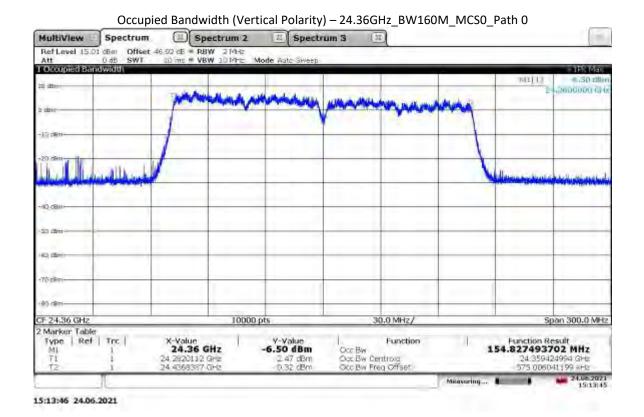
20:21:08 23.06.2021

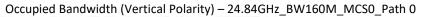


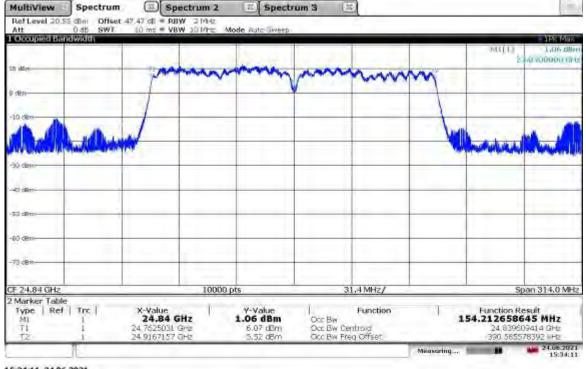
Occupied Bandwidth (Vertical Polarity) – 24.35GHz_BW160M_MCS0_Path 0



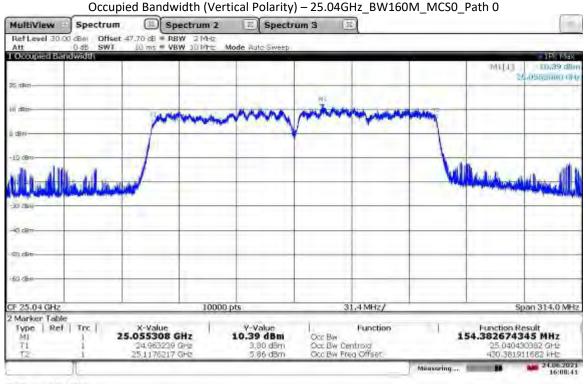
14:53:07 24.06.2021



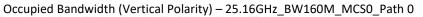


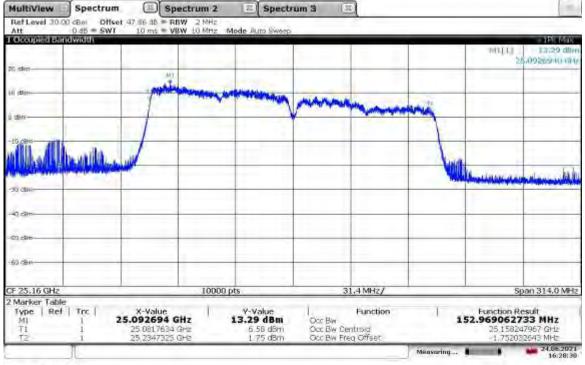


15:34:11 24.06.2021



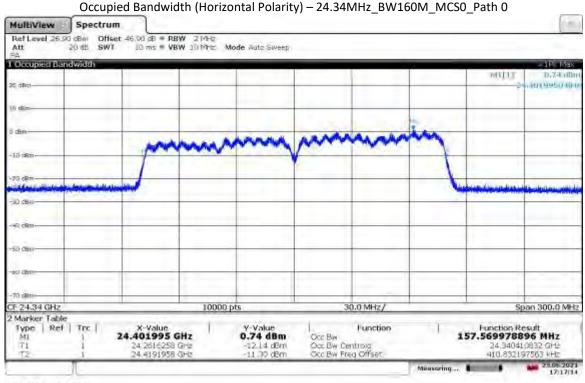
16:08:41 24.06.2021



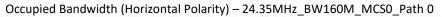


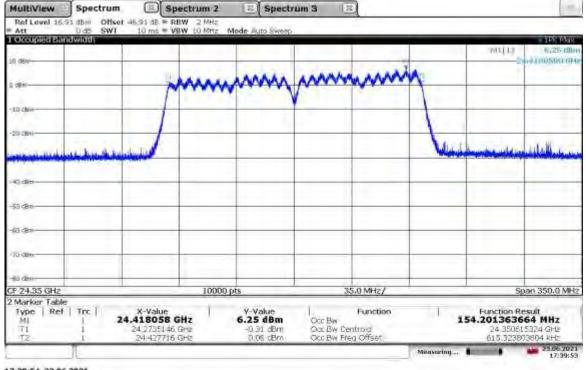
16:28:30 24.06.2021

Intertek



17:17:15 23.06.2021



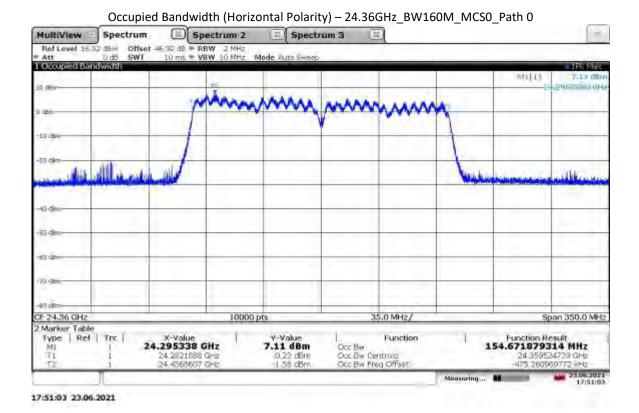


17:39:54 23.06.2021

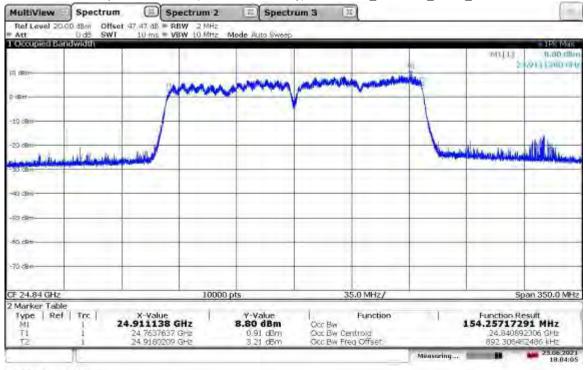
Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

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Occupied Bandwidth (Horizontal Polarity) – 24.84GHz_BW160M_MCS0_Path 0

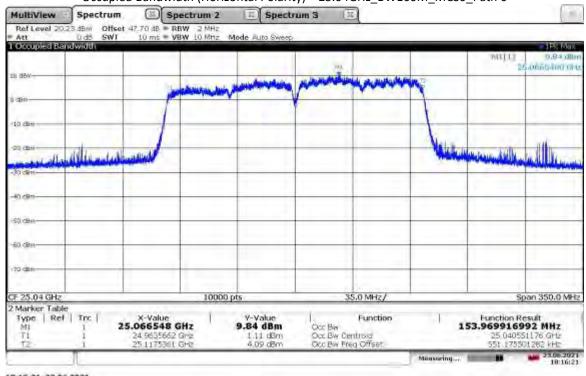


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Inte	rtek
Report Number: 104723800BOX-001	Issued: 10/29/2021
	Revised: 04/15/2022

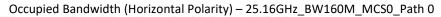
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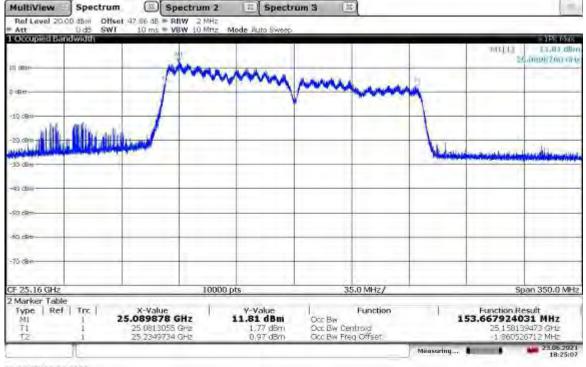
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Occupied Bandwidth (Horizontal Polarity) – 25.04GHz_BW160M_MCS0_Path 0

18:16:21 23.06.2021





18:25:07 23.06.2021

		Intertek	
Report Number: 104	4723800BOX-001		Issued: 10/29/2021
-			Revised: 04/15/2022
Test Personnel: Supervising/Reviewing Engineer: (Where Applicable)	Vathana Ven	Test Date:	06/23/2021, 06/24/2021
Product Standard:	FCC 47CFR Part 30 Subparts C	Limit Applied:	See Report Section 9.3
Input Voltage:	48 VDC Via External P/S	_	
Pretest Verification w/		Ambient Temperature:	27, 24 ºC
BB Source:	Yes	Relative Humidity:	31, 38 %
		Atmospheric Pressure:	1008, 1004 mbars

Deviations, Additions, or Exclusions: None

10 Frequency Stability

10.1 Requirements

FCC §2.1055 Measurements required: Frequency stability

The frequency stability shall be measured with variation of ambient temperature from -30° to $+50^{\circ}$ centigrade. The frequency stability shall be measured with variation of primary supply voltage from 85 to 115 percent of the nominal value.

10.2 Method

Tests are performed in accordance with FCC 47CFR Part 30 Subparts E Section 30.402, FCC 47CFR Part 2.1055, FCC 47CFR Part 2.1041, KDB 842590 D01 Upper Microwave Flexible Use Service v01r02 April 20, 2021 Subclause 4.5, and ANSI C63.26-2015 Subclause 5.6.

TEST SITE: Safety Lab

10.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
	Freezing Rain\Icing\Temp\Humidity\ -73deg C		CTH-(FR)64-6-			
SAF1153'	to +190deg C, 95% humidity, Ice Freezing Rain	Cincinnati Sub-Zero	6-SC/AC	12-CT15628	11/18/2020	11/18/2021
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/28/2021	01/28/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
SAF1312'	Multi-Meter	Fluke	87V	30840221	12/04/2020	12/04/2021
CBLHF2012-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/19/2021	02/19/2022

Software Utilized:

Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

10.4 Results:

The sample tested was found to Comply.

Frequency tolerance is not specified in FCC 47 CFR Part 30 Subpart C. Measurement was performed for reporting purpose. Limit in the data table is from FCC Part 30 Subpart E §30.402

10.5 Setup Photographs:

Confidential – Photo not included in this report

10.6 Test Data:

09 /en 300 30.402	Date(s):				Test Equip SAF1153	ment Used:			
'en 300 30.402	Date(s):								
'en 300 30.402	Date(s):				SAF1153	EN4CO4			
'en 300 30.402	Date(s):					EIVIC04	SAF784		
300 30.402	Date(s):				ROS005-1	SAF1312	DAV005		
30.402	Date(s):		Location:	Safety	CBLHF2012-5M-2		21 deg C	59%	1005 m
		07/16/21							
1									
Limit:	10	PPM	0.001%						
Nominal f:	24340	MHz			Voltage:	54	VDC		
Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz		Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz	
45.9	24339.992857000	-0.143	243.40		-30	24339.992607000	-0.393	243.40	
54	24339.993000000	0	243.40		-20	24339.992607000	-0.393	243.40	
62.1	24339.992507000	-0.493	243.40		-10	24340.001748000	8.748	243.40	
L. L. L	1000 B. 1000 B. 1000				0	24340.001449000	8.449	243.40	
					10	24339,999290000	6.29	243.40	
					20	24339,993000000	0	243.40	
					30	24339,992654000	-0.346	243,40	-
					40	24339,993204000	0.204	243.40	
					50	24339,993503000	0.503	243.40	
						30 40	30 24339.992654000 40 24339.993204000	30 24339.992654000 -0.346 40 24339.993204000 0.204	30 24339.992654000 -0.346 243.40 40 24339.993204000 0.204 243.40

24.35 GHz Frequency Stability

Company:	Starry						Test Equip	oment Used:			
	Comet 24						SAF1153	EMC04	SAF784		
Serial #:	21230000	009					ROS005-1	SAF1312	DAV005		
Engineer(s):	Vathana \	/en			Location:	Safety	CBLHF2012-5M-2		21 deg C	59%	1005 m
Project #:	G104723	800	Date(s):	07/16/21							
Standard:	FCC Part	30.402									
		Limit:	10	PPM	0.001%						
		Nominal f:	24350	MHz			Voltage:	54	VDC		
		Voltage		Deviation			Temp	A. 1. T	Deviation	1.000	
	%	Volts	Frequency MHz	kHz	Limit kHz		Celsius	Frequency MHz	kHz	Limit kHz	
	-15%	45.9	24349.993357000	-6.0036	243.50		-30	24349.993257000	-6.1036	243.50	
	+0%	54	24349.999360600	0	243.50		-20	24349.992657000	-6.7036	243.50	
	+15%	62.1	24350.001199000	1.8384	243.50		-10	24349.992957000	-6.4036	243.50	
							0	24349.992657000	-6.7036	243.50	
							10	24350.001700000	2.3394	243.50	
							20	24349,999360600	0	243.50	
							30	24350.000749000	1.3884	243.50	
							40	24349.993057000	-6.3036	243.50	
							50	24349.993706000	-5.6546	243.50	

				24	.36 GHz F	requenc	y Stability				
Company:	Starry						Test Equip	oment Used:			
Model #:	Comet 24						SAF1153	EMC04	SAF784		
Serial #:	21230000	009					ROS005-1	SAF1312	DAV005		
Engineer(s);	Vathana V	Ven			Location:	Safety	CBLHF2012-5M-2		21 deg C	59%	1005 mE
	G104723		Date(s):	07/16/21							
	FCC Part										
		Limit:	10	PPM	0.001%						
		Nominal f:	24360	MHz			Voltage:	54	VDC		
	1000	Voltage		Deviation			Temp		1.2.1.1.1.5.	1.2.1.	
	%	Volts	Frequency MHz	kHz	Limit kHz		Celsius	Frequency MHz	Deviation kHz	Limit kHz	
	-15%	45.9	24359.993357000	-5.9687	243.60		-30	24359.992957000	-6.369	243.60	
	+0%	54	24359.999325700	0	243.60		-20	24359.992458000	-6.868	243.60	
	+15%	62.1	24360.001299000	1.9733	243.60	1	-10	24359.992358000	-6.968	243.60	
							0	24359.992807000	-6.519	243.60	
							10	24359.993000000	-6.326	243.60	
							20	24359.999325700	0.000	243.60	
							30	24360.001499000	2.173	243.60	
							40	24359.992757000	-6.569	243.60	1
							50	24360.001698000	2.372	243.60	

				24.84	GHz Freq	uency S	tability				
Company:	Starry						Test Equir	oment Used:			
	Comet 24						SAF1153		SAF784		
Serial #:	21230000	009					ROS005-1	SAF1312	DAV005		
Engineer(s):	Vathana V	Ven			Location:	Safety	CBLHF2012-5M-2		21 deg C	59%	1005 mB
0 17	G104723		Date(s):	07/16/21							
	FCC Part										
		Limit:	10	PPM	0.001%						
		Nominal f:	24840	MHz			Voltage:	54	VDC		
	%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz		Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz	
	-15%	45.9	24840.001748000	0.1	248.40		-30	24839.992707000		248.40	
	+0%	54	24840.001648000	0	248.40		-20	24840.001698000		248.40	
	+15%	62.1	24839.993007000	-8.641	248.40		-10	24840.002148000	0.5	248.40	
							0	24839.992310000	-9.338	248.40	
							10	24839.993200000	-8.448	248.40	
							20	24840.001648000	0	248.40	
							30	24839.992657000	-8.991	248.40	
							40	24839.993357000	-8.291	248.40	
							50	24840.001848000	0.2	248.40	

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25.04 GHz Frequency Stability

Company:	Starry						Test Equip	oment Used:			
	Comet 24						SAF1153	EMC04	SAF784		
Serial #:	21230000	009					ROS005-1	SAF1312	DAV005		
Engineer(s):	Vathana \	/en			Location:	Safety	CBLHF2012-5M-2		21 deg C	59%	1005 ml
Project #:	G104723	800	Date(s):	07/16/21							
Standard:	FCC Part	30.402									
		Limit:	10	PPM	0.001%						
		Nominal f:	25040	MHz			Voltage:	54	VDC		
	%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz		Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz	
	-15%	45.9	25040.000949000	0.8391	250.40		-30	25039.992458000	-7.6519	250.40	
	+0%	54	25040.000109900	0	250.40		-20	25039.992308000	-7.8019	250.40	
	+15%	62.1	25039.991708000	-8.4019	250.40		-10	25040.001598000	1.4881	250.40	
		· · · · · · · · ·		1.1.1.1.1.1			0	25039.992557000	-7.5529	250.40	
							10	25039.993400000	-6.7099	250.40	
							20	25040.000109900	0	250.40	
							30	25039.993556000	-6.5539	250.40	
							40	25039.999270700	-0.8392	250.40	
							50	25039.993706000	-6.4039	250.40	

				20.10	GHz Freq	ucincy c	cubinty				
Company:	Starry						Test Equip	oment Used:			
	Comet 24						SAF1153		SAF784		
Serial #:	21230000	009					ROS005-1	SAF1312	DAV005		
Engineer(s):	Vathana V	Ven			Location:	Safety	CBLHF2012-5M-2		21 deg C	59%	1005 mB
Project #:	G104723	800	Date(s):	07/16/21							
Standard:	FCC Part	30.402									
		Limit:	10	PPM	0.001%						
		Nominal f:	25160	MHz			Voltage:	54	VDC		
	04	Voltage		Deviation	I San Li La	1	Temp	En anna Mila	Deviation	1	
	% -15%	Volts 45.9	Frequency MHz 25159.999270700	kHz 6.7137	Limit kHz 251.60		Celsius -30	Frequency MHz 25160.000649000	kHz 8.092	Limit kHz 251.60	-
	+0%	45.9	25159.999270700	0./13/	251.60		-30	25160.000649000		251.60	
	+15%	62.1	25159.992458000	-0.099	251.60		-20	25159.992408000	-0.149	251.60	
	1070	02.1	20100.002100000	0.000	201.00		0	25159.993357000	0.8	251.60	
							10	25159.993400000	0.843	251.60	
							20	25159.992557000	0	251.60	
							30	25159.993457000	0.9	251.60	1
							40	25160.001449000	8.892	251.60	
							50	25159.993357000	0.8	251.60	

Test Personnel:	Vathana Ven
Supervising/Reviewing Engineer:	
(Where Applicable)	N/A
Product Standard:	FCC 47CFR Part 30 Subpart C
Input Voltage:	48VDC Via External P/S
Pretest Verification w/ Signal generator:	N/A

Test Date: 07/16/2021

Limit Applied: See Report Section 10.3

Ambient Temperature: 21 deg C Relative Humidity: 59 % Atmospheric Pressure: 1005 mB

Deviations, Additions, or Exclusions: None

11 AC Main Conducted Emissions

11.1 Method

Tests are performed in accordance with FCC Part 15 Subpart B and ANSI C63.4.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	1.2 dB	3.4dB
Telco Port Emissions	150 kHz - 30 MHz	2.8 dB	5.0dB
AC Line Conducted Emissions	9 kHz - 150 MHz	2.2 dB	3.4 dB

As shown in the table above our conducted emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculations

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF Where NF = Net Reading in dBμV RF = Reading from receiver in dBμV LF = LISN or ISN Correction Factor in dB CF = Cable Correction Factor in dB AF = Attenuator Loss Factor in dB

To convert from dBµV to µV or mV the following was used:

UF = $10^{(NF/20)}$ where UF = Net Reading in μ V NF = Net Reading in dB μ V

Example:

$$\label{eq:NF} \begin{split} \mathsf{NF} &= \mathsf{RF} + \mathsf{LF} + \mathsf{CF} + \mathsf{AF} = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \ dB\mu V \\ \mathsf{UF} &= 10^{(49.1 \ dB\mu V \ / \ 20)} = 285.1 \ \mu V \ / m \end{split}$$

When BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes LISN Factor, Attenuator, and Cable Loss. These are already accounted for in the "Level" column.

11.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	06/22/2020	06/22/2021
DS23'	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS23	10/30/2020	10/30/2021
CBL042'	3ft BNC to BNC cable	Hosiwell	Coax RG-58	CBL042	06/08/2021	06/08/2022
147275'	Signal Generator	Rohde & Schwarz	SML01	100931	07/20/2020	07/20/2021
147239'	Digital Multimeter (Full Color)	Fluke	187	89300561	02/06/2021	02/06/2022
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022
LISN32'	LISN - CISPR16 Compliant 9kHz-30MHz	Com-Power	LI-215A	191955	05/11/2021	05/11/2022

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.20.0.21

11.3 Results:

The sample tested was found to Comply.

11.4 Setup Photographs:

Confidential – Photo not included in this report

11.5 Plots/Data:

Test Information:

Date and Time	7/16/2021 10:37:15 PM
Client and Project Number	Starry_G104723800_G104749253
Engineer	Vathana Ven
Temperature	21 deg C
Humidity	59%
Atmospheric Pressure	1005mbars
Comments	150kHz to 30 MHz_120VAC 60Hz

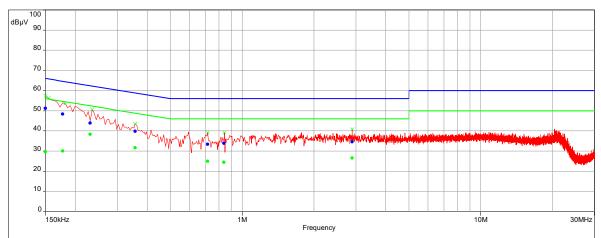
Graph:

Conducted Emissions Limit Lines/FCC Part 15 Subpart B CE Main Ports B - Average/ Conducted Emissions Limit Lines/FCC Part 15 Subpart B CE Main Ports B - QPeak/

- Peak (Manual finals) (RF Output Measure)
- Peak (RF Output Measure)
- AVG Level (Average(Pass)) (RF Output Measure) .
- QP Level (QuasiPeak(Pass)) (RF Output Measure)

Sub-range 1 Frequencies: 150 kHz - 30 MHz (Mode: Lin - Step: 4.5 kHz)

Settings: RBW: 9kHz, VBW: Auto, Sweep time: 5 ms/Pts, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: On Line:RF Output Measure



test name 150kHz to 30 MHz_120VAC 60Hz Time ate 16/7/2021 22:46

Results:

QuasiPeak(Pass) (7)								
Frequency (MHz)	SR	QP Level (dBµV)	QP Limit (dBuV)	QP Margin (dB)	Line	RBW	Meas.Time	Correction (dB)
0.1515	1	51.19	66.00	-14.81	Neutral	9k	0.01	20.28
0.1785	1	48.33	64.63	-16.29	Phase 1	9k	0.01	20.19
0.232	1	43.90	62.41	-18.51	Phase 1	9k	0.01	20.18
0.3565	1	39.84	58.80	-18.96	Neutral	9k	0.01	20.21
0.7165	1	33.37	56.00	-22.63	Neutral	9k	0.01	20.20
0.838	1	33.88	56.00	-22.12	Neutral	9k	0.01	20.21
2.8885	1	34.56	56.00	-21.44	Neutral	9k	0.01	20.30

			Avera	ge(Pass) (7)				
Frequency (MHz)	SR	AVG Level (dBµV)	AVG Limit (dBuV)	AVG Margin (dB)	Line	RBW	Meas.Time	Correction (dB)
0.1515	1	29.57	56.00	-26.43	Neutral	9k	0.01	20.28
0.1785	1	29.96	54.63	-24.67	Phase 1	9k	0.01	20.19
0.232	1	38.30	52.41	-14.12	Phase 1	9k	0.01	20.18
0.3565	1	31.59	48.80	-17.21	Neutral	9k	0.01	20.21
0.7165	1	24.89	46.00	-21.11	Neutral	9k	0.01	20.20
0.838	1	24.36	46.00	-21.64	Neutral	9k	0.01	20.21
2.8885	1	26.52	46.00	-19.48	Neutral	9k	0.01	20.30

Non-Specific Radio Report Shell Rev. August 2020 Client: Starry, Inc. - Model: Comet 24

Test Personnel:	Vathana F. Ven	Test Date:	07/16/2021
Supervising/Reviewing			
Engineer:			
(Where Applicable)	N/A		
Product Standard:	FCC Part 15 Subpart B	Limit Applied:	Class B
Input Voltage:	120VAC 60Hz		
Pretest Verification w/		Ambient Temperature:	21 ºC
Signal generator:	Yes	Relative Humidity:	59 %
		Atmospheric Pressure:	1005 mbars

Deviations, Additions, or Exclusions: None

12 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	10/29/2021	104723800BOX-001	VFV	KPS 4/5	Original Issue
1	11/08/2021	104723800BOX-001	VFV	KPS 413	Removed test setup photos
2	11/11/2021	104723800BOX-001	VFV ^V 5V	KPS 43	Fixed model # and product description on page 5. Fixed modulation type and antenna description on page 6
3	04/15/2022	104723800BOX-001	VFV ^V 5V	KPS 45	Added plots for above 40GHz scans in section 8.6, added accreditation scope with better resolution on page 144, added measurement of uncertainty for above 40GHz, added conical horn antenna inspection table on page 139, added notes and Antenna Factor equation on page 65

13 Appendix – Mixer Conversion Loss

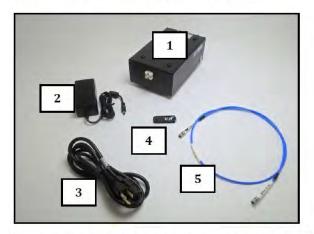
40-60 GHz Mixer Conversion Loss

WR19.0SAX-F

1 Product Overview

Product List (Quantity)	Serial Number(s)	Order No.	Date / Initials
WR19.0SAX-F (1)	SAX 835	21108A	03/26/2021 SAB

Product Description: This VDI product includes one WR19.0 Frequency Extender, intended for use with Rohde & Schwarz FSW spectrum analyzers. This user guide details the operation of the Frequency Extension Module.



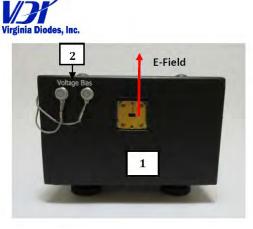
No.	Part Description
1	SAX 835
2	9V Power Supply
3	AC Power Cable
4	USB Drive
5	LO Cable (not included)

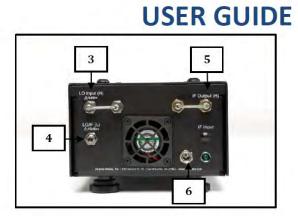
Figure 1: Photograph of typical configuration. All items may not be included. Note: Photographs and specifications of accessories (horns, waveguide straights, etc.) are not included in this user guide.

2 Warning and Caution Statements

WARNING AND CAUTION STATEMENTS						
WARNING	This product can be permanently damaged by Electrostatic Discharge (ESD). It is recommended that engineers and technicians wear a special grounded wrist strap when handling this component. In addition, the work environment around the component should be well grounded.					
WARNING	Opening the blocks, parts, or components will damage the internal components. VDI is not responsible for the warranty or guaranty of products damaged as a result of improper handling, testing, biasing, or use by customer.					
CAUTION	VDI assumes the customer is familiar with microwave, millimeter wave, and VDI products. The user and customer are expected to understand all safety guidelines, health hazards, and general advisories that may exist and are associated with the use of this device. VDI is not responsible for any human hazards that may exist or may occur while using this device.					

3 Product Specifications





De	scription	Specification	Connector	
DE la sut [1]	Frequency Range	40-60GHz	WR19.0	
RF Input [1]	Power (Optimal / Damage)	<-20dBm / -10dBm	UG-599/UM	
Voltage Bias Port [2]	External Component Bias Voltage	+9V Output 50mA Maximum	LEMO 00 (f)	
	Frequency Range	20-30GHz		
LO Input	Power (Typical [†] / Damage)	0dBm / 16dBm	2.9mm(f)	
High Freq. [3]	Multiplication Factor	2		
	Frequency Range	10-15GHz		
LO Input	Power (Typical [†] / Damage)	13dBm / 20dBm	2.9mm(f)	
Standard Freq. [4]*	Multiplication Factor	4		
IF Output Standard Freq. [4]*	Frequency Range	100MHz-2.5GHz	2.9mm(f)	
IF Output High Freq. [5]	Frequency Range	100MHz-6GHz	2.9mm(f)	
DC Input [6]	DC Power Connection	9V Output, 5A Maximum	2.1mm l.D. > 5.5mm O.D. : 9.5mm Male	
Intrinsic Mixer**	SSB Conversion Loss***	9dB		
Displayed Ave	rage Noise Level***	-152dBm/Hz		

 Table 1: General product specifications are shown.

⁺ System is operational within +/- 3dB of nominal input power.

*Standard Freq. LO and IF share the same port.

**Intrinsic mixer conversion loss is measured before any IF amplification and cannot be accessed by user.

***See Section 5 for actual performance.



Configuration	LO Frequency	IF Frequency
А	Standard	Standard
В	Standard	High
С	High	High

Figure 2: Configuration details of dual LO input and dual IF output frequency modes are shown.

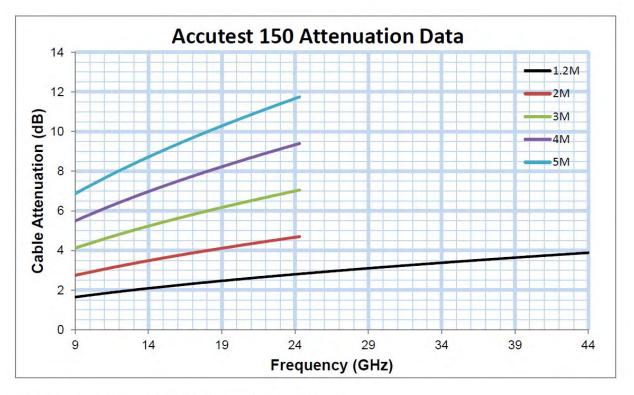


Figure 3: Insertion Loss of Accutest 150 (RF/LO Cable) with respect to frequency.



4 General Operating Procedures and Guidelines

VDI assumes the customer is familiar with VDI products, and VDI is not responsible for the warranty or guaranty of products damaged as a result of improper handling, testing, biasing, or use by customer. VDI offers the following general guidelines for using these products and recommends the customer contact VDI at (434) 297-3257 for assistance if needed. The following procedures are a quick guide for turning on and off the product. In each case the individual steps must be followed in the proper sequence to avoid damaging critical components.

4.1 Required Operating Procedures

- DO NOT exceed damage limits listed in Table 1.
- DO NOT apply any external biases to the system.
- Make proper RF connections depending on desired configuration (i.e. Standard/High LO and Standard/High IF operation). Refer to Figure 2A-C for more information.

Failure to follow these procedures will damage or destroy the device.

4.2 Additional Guidelines, Limitations, and Recommendations

• The SAX is shipped with a reusable dust cover attached. Remove dust cover before operation.

4.3 Turn-On Procedure

- 1. The user and test bench must be properly grounded and protected against ESD.
- 2. With the LO and RF input power turned off, make all necessary connections (i.e. LO cable, AC cable, DC cable). See Figure 2A-C for configuration details.
- 3. Turn on the LO input power.
- 4. Turn on the small signal RF input power and monitor the IF output.

4.4 Turn-Off Procedure

- 1. The user and test bench must be properly grounded and protected against ESD.
- 2. Turn off the RF input power.
- 3. Turn off the LO input power.
- 4. Disconnect the DC Power Supply.
- 5. After completing turn-off procedures described above, it is now safe to turn off all other equipment on user test bench.

Contact VDI with questions or concerns regarding operational procedures and limitations.



5 Product Performance

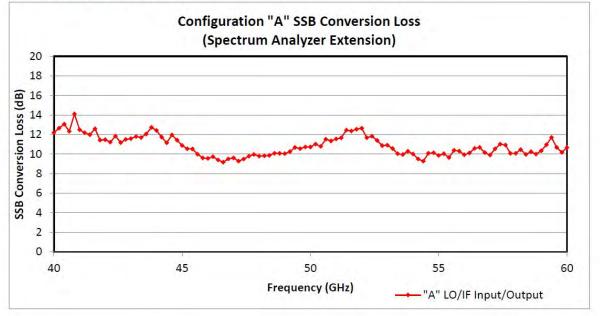


Figure 4: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation. IF power measured from "LO/IF" port with IF frequency fixed at 1.3GHz. CSV Data file included on USB Drive.

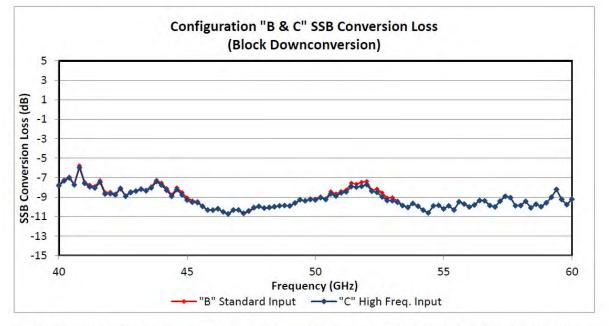


Figure 5: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation and LO input power of ~0dBm in High LO Frequency operation. IF power measured from "IF Output" port with IF frequency fixed at 1.3GHz. CSV Data file included on USB Drive.

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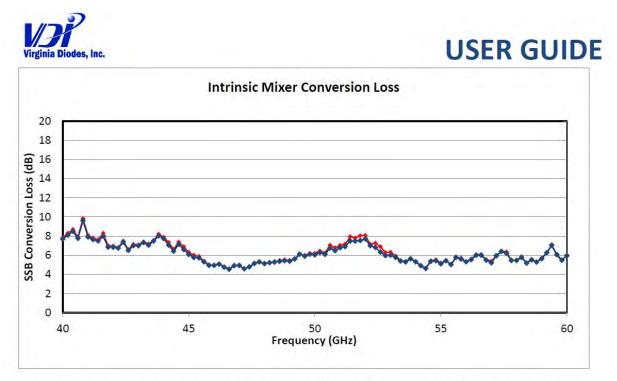


Figure 6: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation and LO input power of ~0dBm in High LO Frequency operation. IF power measured from mixer port with IF frequency fixed at 1.3GHz. Note: mixer port is not accessible for use by the user. CSV Data file included on USB Drive.

Measured Displayed Av	verage Noise Level (dBm/Hz)
Typical	-152.62
*Measured with a Keysight	N9030A PXA Spectrum Analyzer.

SAX 835 Conversion Loss

Note: Out of band data is not guaranteed to be accurate.

Freq(GHz)	"A" LO/IF Input/Output	"B" Standard Input	"C" High Freq. Input	High Freq. Intrinsic Mixer Loss	Standard Freq. Intrinsic Mixer Loss
40	12.18393	-7.73106531	-7.83106531	7.69093469	7.83793469
40.2	12.65257	-7.227428425	-7.346428425	8.089571575	8.295571575
40.4	13.04476	-6.935240346	-7.031240346	8.506759654	8.681759654
40.6	12.31643	-7.671565301	-7.756565301	7.763434699	7.913434699
40.8	14.09561	-5.784389207	-5.976389207	9.605610793	9.822610793
41	12.47222	-7.450776143	-7.586776143	7.911223857	8.075223857
41.2	12.17642	-7.766582166	-7.955582166	7.632417834	7.794417834
41.4	11.98468	-7.903316327	-8.068316327	7.491683673	7.628683673
41.6	12.58671	-7.300293808	-7.475293808	7.980706192	8.287706192
41.8	11.42126	-8.517743767	-8.682743767	6.840256233	6.992256233
42	11.46096	-8.504035139	-8.649035139	6.835964861	6.965964861
42.2	11.21847	-8.684527279	-8.781527279	6.735472721	6.799472721
42.4	11.83738	-8.055620485	-8.146620485	7.366379515	7.484379515
42.6	11.17569	-8.856309768	-8.917309768	6.502690232	6.599690232
42.8	11.49528	-8.435723496	-8.534723496	6.994276504	7.141276504
43	11.56904	-8.375963687	-8.395963687	6.987036313	7.103036313
43.2	11.79484	-8.120156119	-8.196156119	7.335843881	7.372843881
43.4	11.67951	-8.279490341	-8.364490341	7.050509659	7.176509659
43.6	12.05336	-7.943637944	-8.048637944	7.490362056	7.536362056
43.8	12.72018	-7.259817722	-7.400817722	8.024182278	8.205182278
44	12.40928	-7.555723107	-7.764723107	7.756276893	7.900276893
44.2	11.72591	-8.119091237	-8.296091237	7.052908763	7.335908763
44.4	11.15254	-8.774458098	-8.927458098	6.418541902	6.611541902
44.6	11.94911	-8.046893419	-8.235893419	7.146106581	7.381106581
44.8	11.41168	-8.535320915	-8.779320915	6.593679085	6.880679085
45	10.86545	-9.074546037	-9.315546037	6.077453963	6.296453963
45.2	10.52373	-9.371265586	-9.527265586	5.767734414	6.004734414
45.4	10.51426	-9.446741028	-9.563741028	5.714258972	5.882258972
45.6	9.986746	-9.939254477	-9.954254477	5.306745523	5.378745523
45.8	9.59202	-10.34998045	-10.33198045	4.939019546	4.994019546
46	9.54945	-10.34955021	-10.34255021	4.945449791	4.942449791
46.2	9.718601	-10.20139894	-10.20139894	5.06660106	5.08660106
46.4	9.4014	-10.51059989	-10.50859989	4.75540011	4.80640011
46.6	9.164813	-10.76618735	-10.72018735	4.525812655	4.559812655
46.8	9.49849	-10.37151002	-10.32451002	4.910489976	4.952489976
47	9.590663	-10.34933683	-10.32533683	4.919663167	4.930663167
47.2	9.264478	-10.73452184	-10.66252184	4.576478163	4.565478163

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47.4	9.487929	-10.49307072	-10.42707072	4.788929277	4.774929277
47.6	9.782794	-10.16320569	-10.07820569	5.142794307	5.116794307
47.8	9.95227	-9.987729761	-9.946729761	5.294270239	5.264270239
48	9.779821	-10.1941788	-10.1251788	5.128821195	5.129821195
48.2	9.817198	-10.11880169	-10.06180169	5.213198315	5.238198315
48.4	9.861049	-10.05895142	-9.99095142	5.29204858	5.22604858
48.6	10.07245	-9.889547923	-9.900547923	5.367452077	5.450452077
48.8	10.07077	-9.841233026	-9.876233026	5.424766974	5.527766974
49	10.02539	-9.862610661	-9.921610661	5.379389339	5.465389339
49.2	10.24586	-9.671136617	-9.615136617	5.606863383	5.561863383
49.4	10.6675	-9.289503278	-9.286503278	6.107496722	6.065496722
49.6	10.5412	-9.356800369	-9.393800369	5.891199631	5.991199631
49.8	10.71795	-9.170051536	-9.242051536	6.089948464	6.211948464
50	10.72015	-9.202846251	-9.294846251	6.036153749	6.207153749
50.2	11.01845	-8.967548981	-9.055548981	6.261451019	6.439451019
50.4	10.78694	-9.175059654	-9.246059654	6.097940346	6.231940346
50.6	11.51114	-8.446861426	-8.672861426	6.740138574	7.043138574
50.8	11.34446	-8.666536526	-8.891536526	6.471463474	6.789463474
51	11.54523	-8.420770486	-8.581770486	6.787229514	7.028229514
51.2	11.64424	-8.273764545	-8.461764545	6.912235455	7.159235455
51.4	12.45045	-7.554554578	-7.923554578	7.493445422	7.940445422
51.6	12.34762	-7.672378642	-7.986378642	7.465621358	7.783621358
51.8	12.53203	-7.48396897	-7.88396897	7.53103103	8.03103103
52	12.63471	-7.392294596	-7.710294596	7.710705404	8.068705404
52.2	11.66922	-8.296777367	-8.395777367	6.998222633	7.135222633
52.4	11.82163	-8.176370856	-8.512370856	6.820629144	7.266629144
52.6	11.38115	-8.567850502	-8.981850502	6.324149498	6.876149498
52.8	10.85834	-9.088660283	-9.362660283	5.949339717	6.282339717
53	10.90889	-9.054111321	-9.370111321	6.000888679	6.315888679
53.2	10.55653	-9.398471843	-9.553471843	5.768528157	5.922528157
53.4	10.02485	-9.857147743	-9.879147743	5.394852257	5.452852257
53.6	9.957231	-10.00976887	-10.05476887	5.300231127	5.343231127
53.8	10.28107	-9.656928444	-9.648928444	5.624071556	5.671071556
54	10.00557	-9.945426854	-9.944426854	5.313573147	5.316573147
54.2	9.483862	-10.38213777	-10.35113777	4.90986223	4.92486223
54.4	9.27475	-10.63425049	-10.62325049	4.602749509	4.658749509
54.6	10.07448	-9.899524203	-9.899524203	5.357475797	5.419475797
54.8	10.12309	-9.847914944	-9.861914944	5.428085056	5.530085056
55	9.843976	-10.19002385	-10.21402385	5.092976146	5.194976146
55.2	10.03561	-9.908389973	-9.910389973	5.416610027	5.438610027
55.4	9.643359	-10.31664094	-10.33464094	5.038359057	4.973359057
55.6	10.37222	-9.49677748	-9.48777748	5.76322252	5.79722252
55.8	10.30295	-9.680049143	-9.713049143	5.588950857	5.707950857

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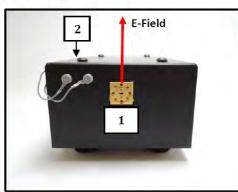
Intertex				
Report Number: 104723800BOX-001	Issued: 10/29/2021			
	Revised: 04/15/2022			

1	I.	1	l .	l .	
56	9.930571	-10.00042911	-10.01842911	5.310570886	5.301570886
56.2	10.10271	-9.786290637	-9.816290637	5.528709363	5.602709363
56.4	10.57445	-9.318550175	-9.357550175	6.002449825	6.064449825
56.6	10.66912	-9.349881086	-9.393881086	6.004118914	6.076118914
56.8	10.14375	-9.840248304	-9.875248304	5.478751696	5.545751696
57	9.894501	-9.992499215	-10.01649921	5.211500785	5.371500785
57.2	10.52904	-9.407962195	-9.419962195	5.934037805	5.908037805
57.4	11.01629	-8.88670661	-8.91570661	6.39329339	6.41629339
57.6	10.9171	-9.033897975	-9.064897975	6.195102025	6.348102025
57.8	10.05695	-9.8670484	-9.8830484	5.4619516	5.4749516
58	10.06586	-9.834143573	-9.880143573	5.457856427	5.450856427
58.2	10.45513	-9.422873675	-9.434873675	5.770126325	5.841126325
58.4	9.959582	-10.09041812	-10.10741812	5.165581881	5.204581881
58.6	10.23535	-9.720652896	-9.738652896	5.511347104	5.584347104
58.8	9.987653	-9.967346763	-9.989346763	5.289653237	5.282653237
59	10.32975	-9.594251231	-9.600251231	5.624748769	5.691748769
59.2	10.94742	-9.004582916	-9.007582916	6.263417084	6.266417084
59.4	11.69635	-8.21964914	-8.21264914	7.04235086	7.01935086
59.6	10.67157	-9.294432287	-9.235432287	6.069567713	6.001567713
59.8	10.16657	-9.771428462	-9.783428462	5.485571538	5.447571538
60	10.64813	-9.237874856	-9.223874856	5.947125144	6.016125144

USER GUIDE

60-90GHz Mixer Conversion Loss





3 5 6

Description		Specification	Connector	
DE 1+ [4]	Frequency Range	60-90GHz	WR12.0 UG-599/UM LEMO 00 (f)	
RF Input [1]	Power (Optimal / Damage)	<-20dBm / -10dBm		
Voltage Bias Port [2]	External Component Bias Voltage	+9V Output 50mA Maximum		
	Frequency Range	10-15GHz		
LO Input	Power (Typical [†] / Damage)	0dBm / 16dBm	2.9mm(f)	
High Freq. [3]	Multiplication Factor	onent +9V Output ge 50mA Maximum ange 10-15GHz Damage) 0dBm / 16dBm Factor 6 ange 10-15GHz Damage) 13dBm / 20dBm Factor 6 ange 100MHz-2.5GHz		
	Frequency Range	10-15GHz		
LO Input	Power (Typical [†] / Damage)	13dBm / 20dBm		
Standard Freq. [4]*	Multiplication Factor	6		
IF Output Standard Freq. <mark>[</mark> 4]*	Frequency Range	100MHz-2.5GHz	2.9mm(f)	
IF Output High Freq. [5]	Frequency Range	100MHz-9GHz	2.9mm(f)	
DC Input [6]	DC Power Connection	9V Output, 5A Maximum	2.1mm I.D. x 5.5mm O.D. > 9.5mm Male	
Intrinsic Mixer**	SSB Conversion Loss***	10dB	10 Sec. 10	
Displayed Average Noise Level***		-152dBm/Hz		

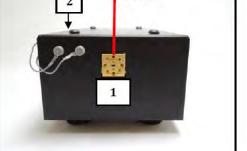
Table 1: General product specifications are shown.

+ System is operational within +/- 3dB of nominal input power.

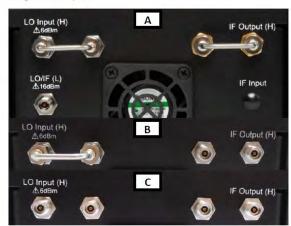
*Standard Freq. LO and IF share the same port.

**Intrinsic mixer conversion loss is measured before any IF amplification and cannot be accessed by user.

***See Section 5 for actual performance.







Configuration	LO Frequency	IF Frequency
A	Standard	Standard
В	Standard	High
С	High	High

Figure 2: Configuration details of dual LO input and dual IF output frequency modes are shown.

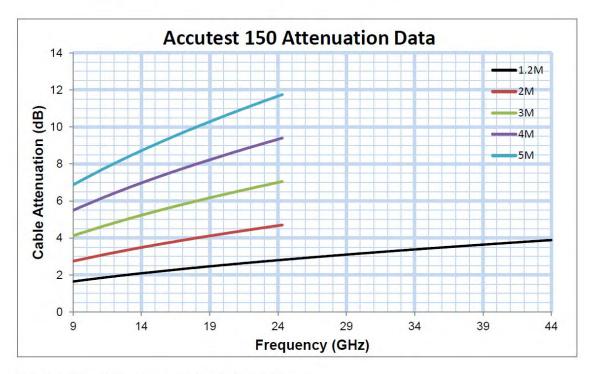


Figure 3: Insertion Loss of Accutest 150 (RF/LO Cable) with respect to frequency.



4 General Operating Procedures and Guidelines

VDI assumes the customer is familiar with VDI products, and VDI is not responsible for the warranty or guaranty of products damaged as a result of improper handling, testing, biasing, or use by customer. VDI offers the following general guidelines for using these products and recommends the customer contact VDI at (434) 297-3257 for assistance if needed. The following procedures are a quick guide for turning on and off the product. In each case the individual steps must be followed in the proper sequence to avoid damaging critical components.

4.1 Required Operating Procedures

- DO NOT exceed damage limits listed in Table 1.
- DO NOT apply any external biases to the system.
- Make proper RF connections depending on desired configuration (i.e. Standard/High LO and Standard/High IF operation). Refer to Figure 2A-C for more information.

Failure to follow these procedures will damage or destroy the device.

4.2 Additional Guidelines, Limitations, and Recommendations

• The SAX is shipped with a reusable dust cover attached. Remove dust cover before operation.

4.3 Turn-On Procedure

- 1. The user and test bench must be properly grounded and protected against ESD.
- 2. With the LO and RF input power turned off, make all necessary connections (i.e. LO cable, AC cable, DC cable). See Figure 2A-C for configuration details.
- 3. Turn on the LO input power.
- 4. Turn on the small signal RF input power and monitor the IF output.

4.4 Turn-Off Procedure

- 1. The user and test bench must be properly grounded and protected against ESD.
- 2. Turn off the RF input power.
- 3. Turn off the LO input power.
- 4. Disconnect the DC Power Supply.
- 5. After completing turn-off procedures described above, it is now safe to turn off all other equipment on user test bench.

Contact VDI with questions or concerns regarding operational procedures and limitations.



5 Product Performance

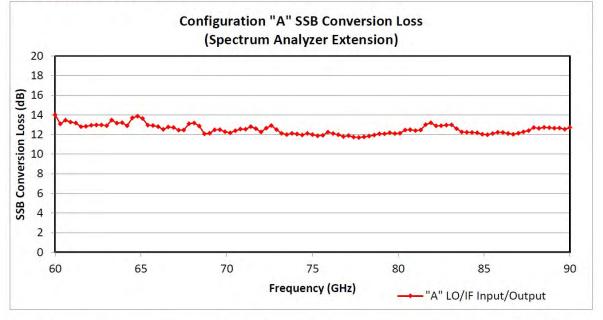


Figure 4: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation. IF power measured from "LO/IF" port with IF frequency fixed at 1.3GHz. CSV Data file included on USB Drive.

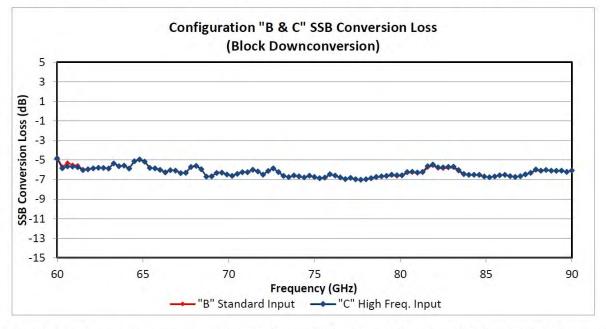


Figure 5: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation and LO input power of ~0dBm in High LO Frequency operation. IF power measured from "IF Output" port with IF frequency fixed at 1.3GHz. CSV Data file included on USB Drive.



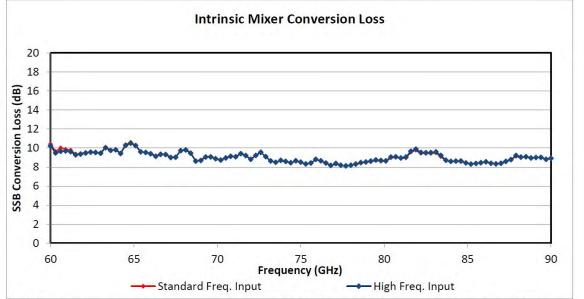


Figure 6: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation and LO input power of ~0dBm in High LO Frequency operation. IF power measured from mixer port with IF frequency fixed at 1.3GHz. Note: mixer port is not accessible for use by the user. CSV Data file included on USB Drive.

Measured Displayed Average Noise Level (dBm/Hz)				
Typical	-150.65			
*Measured with a Keysight N	9030A PXA Spectrum Analyzer.			

Non-Specific Radio Report Shell Rev. August 2020 Client: Starry, Inc. – Model: Comet 24

SAX 836 Conversion Loss Conversion Loss

	"A" LO/IF	"B" Standard	"C" High Freq.	High Freq. Intrinsic Mixer	Standard Freq. Intrinsic Mixer
Freq(GHz) 60	Input/Output 14.00809673	Input -4.74690327	Input -4.86490327	Loss 10.22409673	Loss 10.40709673
60.3	13.08177247	-5.686227526	-5.842227526	9.482772474	9.645772474
60.6	13.44988267	-5.300117334	-5.655117334	9.656882666	10.01088267
60.8	13.26543128				
	13.17933468	-5.497568718	-5.666568718	9.689431282	9.877431282
61.2		-5.566665317	-5.739665317	9.610334683	9.782334683
61.5	12.80009579	-5.949904212	-6.025904212	9.275095788	9.380095788
61.8	12.82914386	-5.919856141	-5.953856141	9.363143859	9.427143859
62.1	12.94303505	-5.816964953	-5.851964953	9.468035047	9.537035047
62.4	12.97887686	-5.769123137	-5.797123137	9.562876863	9.595876863
62.7	12.96847511	-5.790524891	-5.806524891	9.521475109	9.549475109
63	12.90047744	-5.846522559	-5.880522559	9.443477441	9.500477441
63.3	13.47453136	-5.305468637	-5.358468637	10.03153136	10.09053136
63.6	13.16719015	-5.597809855	-5.631809855	9.743190145	9.784190145
63.9	13.21223698	-5.54176302	-5.57776302	9.80323698	9.83423698
64.2	12.89882197	-5.858178027	-5.877178027	9.423821973	9.472821973
64.5	13.68621534	-5.074784662	-5.137784662	10.27721534	10.35121534
64.8	13.87468986	-4.891310145	-4.952310145	10.50468986	10.58768986
65.1	13.63537185	-5.11962815	-5.16362815	10.24337185	10.29937185
65.4	12.96383529	-5.779164713	-5.809164713	9.594835287	9.641835287
65.7	12.90818146	-5.823818544	-5.864818544	9.523181456	9.563181456
66	12.79905144	-5.948948563	-6.018948563	9.387051437	9.445051437
66.3	12.52625358	-6.224746423	-6.264746423	9.128253577	9.178253577
66.6	12.77501349	-6.002986511	-6.044986511	9.332013489	9.386013489
66.9	12.70577709	-6.056222906	-6.098222906	9.304777094	9.340777094
67.2	12.44844547	-6.298554532	-6.348554532	8.999445468	9.058445468
67.5	12.45771307	-6.27928693	-6.30628693	9.03571307	9.05871307
67.8	13.09446348	-5.662536517	-5.710536517	9.711463483	9.745463483
68.1	13.18159215	-5.574407845	-5.614407845	9.789592155	9.842592155
68.4	12.86269872	-5.889301275	-5.932301275	9.452698725	9.498698725
68.7	12.06465654	-6.679343461	-6.704343461	8.624656539	8.651656539
69	12.12697909	-6.634020906	-6.663020906	8.681979094	8.730979094
69.3	12.47379099	-6.275209006	-6.320209006	9.048790994	9.109790994
69.6	12.49635632	-6.266643679	-6.302643679	9.061356321	9.119356321
69.9	12.29461412	-6.451385875	-6.487385875	8.877614125	8.913614125
70.2	12.15951216	-6.599487841	-6.628487841	8.725512159	8.760512159
70.5	12.38334399	-6.369656014	-6.416656014	8.946343986	8.999343986
70.8	12.55179008	-6.206209925	-6.243209925	9.126790075	9.154790075

Note: Out of band data is not guaranteed to be accurate.

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71.1	12.53542905	-6.22657095	-6.25057095	9.07142905	9.11942905
71.4	12.80331874	-5.95168126	-6.00068126	9.40331874	9.41931874
71.7	12.59441785	-6.142582148	-6.177582148	9.194417852	9.228417852
72	12.26506093	-6.485939069	-6.497939069	8.817060931	8.831060931
72.3	12.6529332	-6.105066802	-6.130066802	9.223933198	9.253933198
72.6	12.91123601	-5.84176399	-5.85376399	9.54023601	9.55323601
72.9	12.50543192	-6.253568082	-6.234568082	9.097431918	9.095431918
73.2	12.12384684	-6.638153158	-6.616153158	8.645846842	8.647846842
73.5	11.99820018	-6.767799823	-6.748799823	8.497200177	8.484200177
73.8	12.11430193	-6.643698071	-6.582698071	8.701301929	8.647301929
74.1	12.05944184	-6.710558164	-6.669558164	8.594441836	8.540441836
74.4	11.94565033	-6.811349671	-6.778349671	8.456650329	8.429650329
74.7	12.11754896	-6.642451036	-6.607451036	8.659548964	8.623548964
75	11.99113212	-6.768867875	-6.733867875	8.506132125	8.483132125
75.3	11.86630909	-6.900690911	-6.860690911	8.333309089	8.310309089
75.6	11.91810032	-6.838899678	-6.798899678	8.423100322	8.401100322
75.9	12.24548213	-6.500517867	-6.451517867	8.808482133	8.772482133
76.2	12.10239893	-6.643601074	-6.590601074	8.650398926	8.617398926
76.5	11.98551471	-6.789485292	-6.773485292	8.417514708	8.412514708
76.8	11.79713504	-6.968864956	-6.945864956	8.175135044	8.189135044
77.1	11.88064822	-6.869351775	-6.824351775	8.367648225	8.314648225
77.4	11.7419614	-7.018038601	-6.974038601	8.182961399	8.171961399
77.7	11.70070307	-7.05529693	-7.02129693	8.12070307	8.12070307
78	11.75970185	-6.99429815	-6.96829815	8.18070185	8.17970185
78.3	11.84442873	-6.900571271	-6.854571271	8.310428729	8.287428729
78.6	11.95018765	-6.799812349	-6.734812349	8.461187651	8.414187651
78.9	12.06854076	-6.706459237	-6.665459237	8.532540763	8.518540763
79.2	12.07851172	-6.674488276	-6.618488276	8.626511724	8.567511724
79.5	12.18083903	-6.574160969	-6.495160969	8.753839031	8.672839031
79.8	12.10740792	-6.654592085	-6.567592085	8.682407915	8.602407915
80.1	12.12624941	-6.617750592	-6.567750592	8.650249408	8.586249408
80.4	12.45676064	-6.305239365	-6.226239365	9.050760635	8.968760635
80.7	12.49277424	-6.273225761	-6.198225761	9.072774239	9.015774239
81	12.39938675	-6.35061325	-6.28161325	8.95738675	8.90238675
81.3	12.46230193	-6.292698068	-6.222698068	9.038301932	8.952301932
81.6	13.00393377	-5.757066234	-5.633066234	9.655933766	9.553933766
81.9	13.1857019	-5.5832981	-5.4612981	9.8847019	9.7637019
82.2	12.87742475	-5.848575252	-5.743575252	9.531424748	9.429424748
82.5	12.89518705	-5.867812949	-5.763812949	9.519187051	9.423187051
82.8	12.95150506	-5.81749494	-5.70349494	9.52050506	9.42650506
83.1	12.98575567	-5.77524433	-5.68224433	9.59075567	9.47675567
83.4	12.59718822	-6.140811779	-6.029811779	9.215188221	9.091188221
83.7	12.25796009	-6.493039911	-6.419039911	8.712960089	8.670960089

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1	1	L	I	L	
84	12.23114021	-6.524859786	-6.506859786	8.586140214	8.569140214
84.3	12.20708834	-6.540911658	-6.506911658	8.629088342	8.584088342
84.6	12.18133493	-6.580665066	-6.515665066	8.645334934	8.565334934
84.9	12.01835551	-6.731644488	-6.691644488	8.437355512	8.409355512
85.2	11.97910956	-6.769890438	-6.757890438	8.310109562	8.331109562
85.5	12.09929486	-6.662705139	-6.685705139	8.368294861	8.384294861
85.8	12.22092835	-6.529071647	-6.559071647	8.449928353	8.487928353
86.1	12.21270567	-6.532294329	-6.513294329	8.549705671	8.545705671
86.4	12.10955656	-6.659443442	-6.661443442	8.391556558	8.413556558
86.7	12.01941635	-6.735583651	-6.734583651	8.320416349	8.351416349
87	12.12790597	-6.652094034	-6.659094034	8.388905966	8.431905966
87.3	12.2779043	-6.474095698	-6.469095698	8.598904302	8.628904302
87.6	12.39380025	-6.359199748	-6.316199748	8.776800252	8.773800252
87.9	12.70905543	-6.059944574	-5.963944574	9.212055426	9.121055426
88.2	12.63644451	-6.145555491	-6.093555491	9.051444509	8.987444509
88.5	12.72378687	-6.047213129	-6.017213129	9.075786871	9.078786871
88.8	12.69878056	-6.070219442	-6.093219442	8.943780558	8.993780558
89.1	12.64415049	-6.140849508	-6.113849508	8.990150492	8.997150492
89.4	12.66086495	-6.119135052	-6.096135052	9.011864948	9.040864948
89.7	12.54474949	-6.223250512	-6.212250512	8.804749488	8.861749488
90	12.70351072	-6.062489285	-6.075489285	8.899510715	8.976510715

90-140 GHz Mixer Conversion Loss



USER GUIDE

WR8.0SAX-F

1 Product Overview

Product List (Quantity)	Serial Number(s)	Order No.	Date / Initials
WR8.0SAX-F (1)	SAX 837	21108C	06/10/2021 DNS

Product Description: This VDI product includes one WR8.0 Frequency Extender, intended for use with Rohde & Schwarz FSW spectrum analyzers. This user guide details the operation of the Frequency Extension Module.

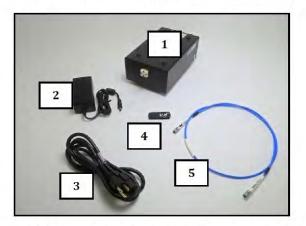


Figure 1: Photograph of typical configuration. All items may not be included. Note: Photographs and specifications of accessories (horns, waveguide straights, etc.) are not included in this user guide.

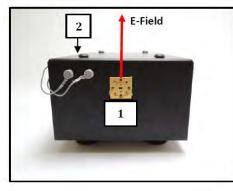
2 Warning and Caution Statements

WARNING AND CAUTION STATEMENTS				
WARNING	This product can be permanently damaged by Electrostatic Discharge (ESD). It is recommended that engineers and technicians wear a special grounded wrist strap when handling this component. In addition, the work environment around the component should be well grounded.			
WARNING	Opening the blocks, parts, or components will damage the internal components. VDI is not responsible for the warranty or guaranty of products damaged as a result of improper handling, testing, biasing, or use by customer.			
CAUTION	VDI assumes the customer is familiar with microwave, millimeter wave, and VDI products. The user and customer are expected to understand all safety guidelines, health hazards, and general advisories that may exist and are associated with the use of this device. VDI is not responsible for any human hazards that may exist or may occur while using this device.			

3 Product Specifications

No. Part Description			
1	L SAX 837		
2	9V Power Supply		
3	AC Power Cable		
4	USB Drive		
5	LO Cable (not included)		







Description		Specification	Connector	
DE lanut [1]	Frequency Range	90-140GHz	WR8.0 UG-599/UM	
RF Input [1]	Power (Optimal / Damage)	<-20dBm / -10dBm		
Voltage Bias Port [2]	Bias Port [2] External Component +9V Output Bias Voltage 50mA Maximum		LEMO 00 (f)	
	Frequency Range	30-46.67GHz		
LO Input	Power (Typical [†] / Damage)	0dBm / 6dBm	2.9mm(f)	
High Freq. [3]	Multiplication Factor	3		
	Frequency Range	10-15.56GHz		
LO Input	Power (Typical [†] / Damage)	13dBm / 20dBm	2.9mm(f)	
Standard Freq. [4]*	Multiplication Factor	9		
IF Output Standard Freq. [4]*Frequency Range100MHz-2.5GHzIF Output High Freq. [5]Frequency Range100MHz-14GHzDC Input [6]DC Power Connection9V Output, 5A Maximum		100MHz-2.5GHz	2.9mm(f)	
		100MHz-14GHz	2.9mm(f)	
			2.1mm I.D. x 5.5mm O.D. > 9.5mm Male	
Intrinsic Mixer**	SSB Conversion Loss***	10dB		
Displayed Average Noise Level***		-150dBm/Hz		

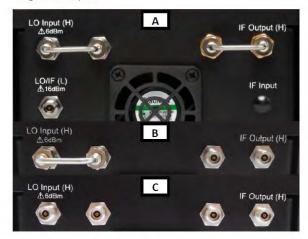
Table 1: General product specifications are shown.

⁺ System is operational within +/- 3dB of nominal input power.

*Standard Freq. LO and IF share the same port.

Intrinsic mixer conversion loss is measured before any IF amplification and cannot be accessed by user. *See Section 5 for actual performance.





Configuration	LO Frequency	IF Frequency
А	Standard	Standard
В	Standard	High
С	High	High

Figure 2: Configuration details of dual LO input and dual IF output frequency modes are shown.

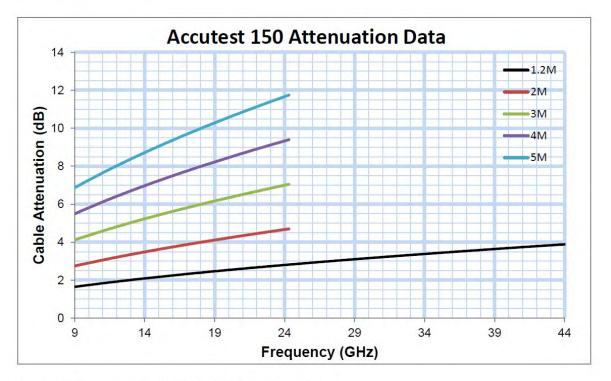


Figure 3: Insertion Loss of Accutest 150 (RF/LO Cable) with respect to frequency.



4 General Operating Procedures and Guidelines

VDI assumes the customer is familiar with VDI products, and VDI is not responsible for the warranty or guaranty of products damaged as a result of improper handling, testing, biasing, or use by customer. VDI offers the following general guidelines for using these products and recommends the customer contact VDI at (434) 297-3257 for assistance if needed. The following procedures are a quick guide for turning on and off the product. In each case the individual steps must be followed in the proper sequence to avoid damaging critical components.

4.1 Required Operating Procedures

- DO NOT exceed damage limits listed in Table 1.
- DO NOT apply any external biases to the system.
- Make proper RF connections depending on desired configuration (i.e. Standard/High LO and Standard/High IF operation). Refer to Figure 2A-C for more information.

Failure to follow these procedures will damage or destroy the device.

4.2 Additional Guidelines, Limitations, and Recommendations

• The SAX is shipped with a reusable dust cover attached. Remove dust cover before operation.

4.3 Turn-On Procedure

- 1. The user and test bench must be properly grounded and protected against ESD.
- 2. With the LO and RF input power turned off, make all necessary connections (i.e. LO cable, AC cable, DC cable). See Figure 2A-C for configuration details.
- 3. Turn on the LO input power.
- 4. Turn on the small signal RF input power and monitor the IF output.

4.4 Turn-Off Procedure

- 1. The user and test bench must be properly grounded and protected against ESD.
- 2. Turn off the RF input power.
- 3. Turn off the LO input power.
- 4. Disconnect the DC Power Supply.
- 5. After completing turn-off procedures described above, it is now safe to turn off all other equipment on user test bench.

Contact VDI with questions or concerns regarding operational procedures and limitations.



5 Product Performance

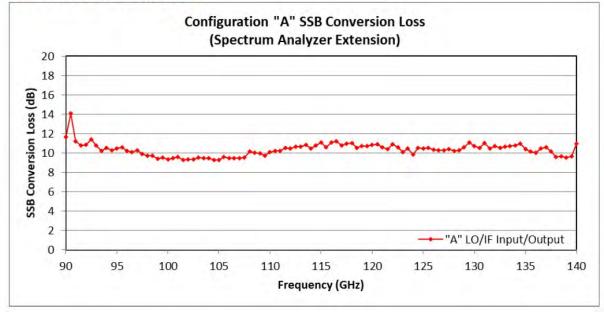


Figure 4: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation. IF power measured from "LO/IF" port with IF frequency fixed at 1.3GHz. CSV Data file included on USB Drive.

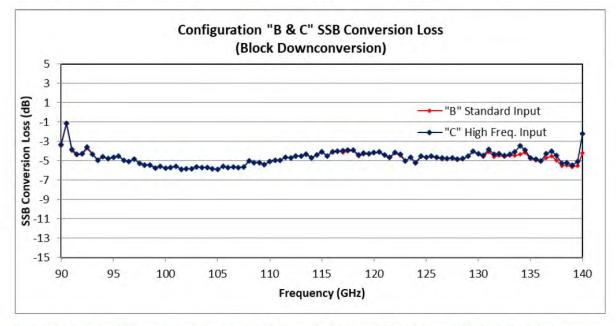


Figure 5: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation and LO input power of ~0dBm in High LO Frequency operation. IF power measured from "IF Output" port with IF frequency fixed at 1.3GHz. CSV Data file included on USB Drive.



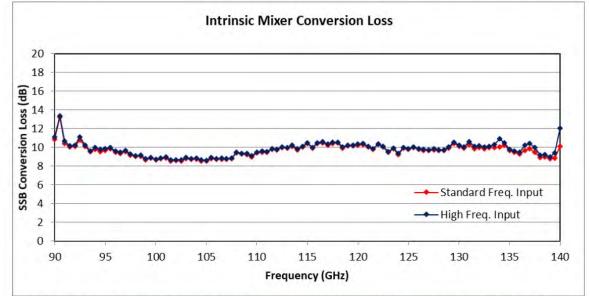


Figure 6: The product performance (SSB conversion loss vs. RF frequency) is shown for an LO input power of ~15dBm in Standard LO Frequency operation and LO input power of ~0dBm in High LO Frequency operation. IF power measured from mixer port with IF frequency fixed at 1.3GHz. Note: mixer port is not accessible for use by the user. CSV Data file included on USB Drive.

Measured Displayed Ave	Measured Displayed Average Noise Level (dBm/Hz)		
Typical	-149.5		
*Measured with a Keysight	N9030A PXA Spectrum Analyzer		

SAX 837 Conversion Loss Conversion Loss

- (011)	"A" LO/IF	"B" Standard	"C" High Freq.	High Freq. Intrinsic Mixer	Standard Freq. Intrinsic Mixer
Freq(GHz)	Input/Output	Input	Input	Loss	Loss
90	11.67514724	-3.451852763	-3.337852763	11.13014724	10.85114724
90.5	14.10568478	-1.079315219	-1.162315219	13.39768478	13.21768478
91	11.19284379	-3.952156213	-3.831156213	10.66284379	10.43484379
91.5	10.77353378	-4.372466216	-4.345466216	10.19653378	10.03853378
92	10.8156319	-4.3273681	-4.2933681	10.2776319	10.0966319
92.5	11.40549847	-3.724501532	-3.574501532	11.09249847	10.79149847
93	10.79724258	-4.331757419	-4.317757419	10.24124258	10.10624258
93.5	10.21914168	-4.91885832	-4.95285832	9.63014168	9.54914168
94	10.55024142	-4.587758581	-4.565758581	9.996241419	9.821241419
94.5	10.29788363	-4.822116373	-4.753116373	9.778883628	9.588883628
95	10.4741589	-4.669841103	-4.660841103	9.843158897	9.695158897
95.5	10.60265733	-4.50734267	-4.51534267	9.99665733	9.89265733
96	10.1907898	-4.953210203	-4.985210203	9.625789797	9.505789797
96.5	10.083555	-5.061445003	-5.079445003	9.479554997	9.372554997
97	10.30032929	-4.847670708	-4.859670708	9.661329292	9.553329292
97.5	9.894886965	-5.239113035	-5.255113035	9.296886965	9.162886965
98	9.696380637	-5.421619363	-5.441619363	9.135380637	9.034380637
98.5	9.728739538	-5.401260462	-5.427260462	9.168739538	9.038739538
99	9.401152675	-5.731847325	-5.746847325	8.803152675	8.707152675
99.5	9.542871349	-5.586128651	-5.600128651	8.951871349	8.840871349
100	9.367058164	-5.769941836	-5.782941836	8.777058164	8.658058164
100.5	9.496118475	-5.651881525	-5.678881525	8.901118475	8.787118475
101	9.563891248	-5.561108752	-5.575108752	8.981891248	8.875891248
101.5	9.294818879	-5.847181121	-5.869181121	8.686818879	8.578818879
102	9.32353949	-5.80946051	-5.83646051	8.70453949	8.60753949
102.5	9.312544107	-5.835455893	-5.854455893	8.691544107	8.586544107
103	9.538372928	-5.604627072	-5.619627072	8.933372928	8.824372928
103.5	9.440667741	-5.698332259	-5.705332259	8.834667741	8.727667741
104	9.473096285	-5.666903715	-5.678903715	8.866096285	8.770096285
104.5	9.295835708	-5.846164292	-5.856164292	8.670835708	8.571835708
105	9.26675987	-5.86924013	-5.87924013	8.63275987	8.53575987
105.5	9.587719809	-5.566280191	-5.585280191	8.920719809	8.823719809
106	9.447107698	-5.688892302	-5.696892302	8.806107698	8.722107698
106.5	9.47817723	-5.65582277	-5.66782277	8.86217723	8.77317723
107	9.445819292	-5.693180709	-5.715180709	8.831819292	8.718819292
107.5	9.506835045	-5.627164955	-5.646164955	8.896835045	8.804835045
108	10.15543137	-4.980568633	-5.021568633	9.515431367	9.429431367

Note: Out of band data is not guaranteed to be accurate.

Report Number: 104	4723800BOX-001
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Issued:	10/29/2021
Revised [.]	04/15/2022

108.5	10.01501141	-5.139988586	-5.184988586	9.375011414	9.292011414
109	9.986943402	-5.163056598	-5.180056598	9.359943402	9.259943402
109.5	9.700311379	-5.427688621	-5.415688621	9.090311379	9.007311379
110	10.11440377	-5.034596231	-5.068596231	9.480403769	9.435403769
110.5	10.23931625	-4.896683751	-4.935683751	9.593316249	9.506316249
111	10.19914709	-4.941852911	-4.978852911	9.567147089	9.514147089
111.5	10.51961626	-4.630383737	-4.666383737	9.887616263	9.822616263
112	10.45156748	-4.687432519	-4.685432519	9.837567481	9.740567481
112.5	10.66102657	-4.482973427	-4.488973427	10.07402657	9.973026573
113	10.62316393	-4.517836074	-4.541836074	10.01716393	9.943163926
113.5	10.84547099	-4.287529014	-4.341529014	10.22647099	10.14647099
114	10.46605969	-4.667940312	-4.688940312	9.862059688	9.774059688
114.5	10.76937147	-4.369628526	-4.376628526	10.14637147	10.05437147
115	11.11837657	-4.04062343	-4.05262343	10.48737657	10.40737657
115.5	10.59959028	-4.534409721	-4.539409721	10.02759028	9.940590279
116	11.08255473	-4.042445266	-4.056445266	10.50855473	10.41955473
116.5	11.23473017	-3.950269828	-4.014269828	10.59973017	10.49673017
117	10.75491026	-4.152089736	-3.939089736	10.36291026	10.26991026
117.5	10.96623836	-4.013761637	-3.885761637	10.55123836	10.44823836
118	11.04450356	-3.973496442	-3.878496442	10.56050356	10.48550356
118.5	10.52617331	-4.502826691	-4.414826691	10.04817331	9.940173309
119	10.71214465	-4.310855347	-4.229855347	10.27714465	10.18914465
119.5	10.73550138	-4.318498616	-4.257498616	10.26750138	10.16450138
120	10.83361073	-4.226389267	-4.143389267	10.35961073	10.27661073
120.5	10.88819078	-4.15980922	-4.09380922	10.41419078	10.33619078
121	10.61391575	-4.435084247	-4.384084247	10.13691575	10.06591575
121.5	10.37585906	-4.697140936	-4.630140936	9.876859064	9.825859064
122	10.92118158	-4.177818422	-4.117818422	10.38918158	10.35018158
122.5	10.59706531	-4.452934691	-4.359934691	10.13506531	10.05606531
123	10.06564904	-5.02435096	-4.99135096	9.55564904	9.48764904
123.5	10.43854116	-4.643458841	-4.628458841	9.936541159	9.847541159
124	9.860132081	-5.249867919	-5.203867919	9.352132081	9.265132081
124.5	10.50591325	-4.589086747	-4.518086747	10.00491325	9.903913253
125	10.4479865	-4.673013497	-4.657013497	9.882986503	9.791986503
125.5	10.54246455	-4.560535451	-4.549535451	10.03846455	9.965464549
126	10.350356	-4.721644004	-4.674644004	9.874355996	9.804355996
126.5	10.27868628	-4.807313723	-4.735313723	9.805686277	9.713686277
127	10.26573962	-4.837260384	-4.798260384	9.773739616	9.685739616
127.5	10.39357186	-4.74042814	-4.71242814	9.85857186	9.76757186
128	10.2407497	-4.876250305	-4.819250305	9.737749695	9.661749695
128.5	10.27302715	-4.815972854	-4.774972854	9.753027146	9.666027146
129	10.57790721	-4.539092789	-4.493092789	10.04490721	9.944907211
129.5	11.06294687	-4.055053128	-4.017053128	10.52894687	10.44894687

Non-Specific Radio Report Shell Rev. August 2020 Client: Starry, Inc. – Model: Comet 24 Page 137 of 144

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	Revised: 04/15/2022		

1	1	L	I.	L	
130	10.74665017	-4.351349831	-4.264349831	10.25565017	10.14965017
130.5	10.54234128	-4.571658716	-4.477658716	10.04334128	9.919341284
131	10.99784288	-4.095157118	-3.820157118	10.59784288	10.32284288
131.5	10.48624586	-4.582754137	-4.311754137	10.14424586	9.843245863
132	10.71127934	-4.428720663	-4.285720663	10.18227934	10.02627934
132.5	10.54574278	-4.587257219	-4.439257219	10.07174278	9.893742781
133	10.64369663	-4.477303375	-4.340303375	10.14769663	9.976696625
133.5	10.68664451	-4.43135549	-4.10535549	10.33764451	9.99364451
134	10.78700975	-4.313990247	-3.460990247	10.93500975	10.07700975
134.5	10.95997375	-4.161026252	-3.916026252	10.52797375	10.25597375
135	10.37279947	-4.751200533	-4.707200533	9.788799467	9.689799467
135.5	10.1724832	-4.934516804	-4.843516804	9.642483196	9.511483196
136	10.044754	-5.108245999	-4.999245999	9.512754001	9.332754001
136.5	10.45312533	-4.676874665	-4.252874665	10.25012533	9.695125335
137	10.61386016	-4.518139838	-3.994139838	10.42886016	9.852860162
137.5	10.14375506	-4.948244935	-4.476244935	9.965755065	9.481755065
138	9.604980629	-5.520019371	-5.270019371	9.185980629	8.939980629
138.5	9.663838852	-5.432161148	-5.190161148	9.272838852	9.004838852
139	9.512629562	-5.615370438	-5.452370438	9.013629562	8.813629562
139.5	9.644409056	-5.524590944	-5.063590944	9.413409056	8.893409056
140	10.95996759	-4.22003241	-2.22503241	12.05596759	10.15096759

Notes: The test equipment was provided by Starry, Inc. The vendor does not provide a calibration certificate.

Standard gain horn antenna inspection

Intertek

Equipment visual inspection

Equipment	Frequency (GHz)	Date	Initial
WR-19	40-60	3/10/2022	VFV
WR-12	60-90	3/10/2022	VFV
WR-8.0	90-140	3/10/2022	VFV

The Conical horn antennas were visually spected for damage prior to testing. No damaged was observed.

Appendix B - Mixer Verification Certificates

VDIWR19.0SAX-F (40-60 GHz)

//J	Diod	les, Inc.	Virginia Diodes, Inc 979 2nd St. SE Suite 309 Charlottesville, VA 22902 Phone: 434-297-3257 Fax: 434-297-3258		
			Certificate of Conformance		
: Starry,	Inc.		From: Virginia Diodes, Inc		
38 Chauncy Street 2nd Floor Boston, MA 02111		reet	979 2nd St. SE Suite 309		
	States		Charlottesville, VA 22902		
United					
		List No: 211085	Today's Date: 03/31/21		
	Packing	List No: 211085 ng Date: 03/30/21	Today's Date: 03/31/21 PO Number: PO20183		
	Packing		PO Number: PO20183		
	Packing				
Quantity	Packing Shippi	ng Date: 03/30/21	PO Number: PO20183 Order-Job Number		

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

Authorized Signature

Virginia Diodes, Inc

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VDIWR12.0SAX-F (60-90 GHz)

Virginia	Dio	Ch P	ginia Diodes, Inc 979 2nd St. SE Suite 309 arlottesville, VA 22902 hone: 434-297-3257 Fax: 434-297-3258	
		Certif	icate of Conformance	
2nd Fl Bostor	auncy S		From: Virginia Diodes, Inc 979 2nd St. SE Suite 309 Charlottesville, VA 2290	12
		List No: 211211 ng Date: 04/08/21	Today's Date: 04/12/21 PO Number: PO20183	
Quantity <u>Shipped</u> 1	<u>Unit</u> EA	<u>Description</u> VDIWR12.0SAX-F S/N: SAX	836	<u>Order-Job</u> <u>Number</u> 21108B-01
1	EA	RCHO12RL Conical Horn Ant		21108B-02

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

Authorized Sig ature Virginia Diodes, Inc

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VDIWR8.0SAX-F (90-140 GHz)

irginia	Diod	Cr	rginia Diodes, Inc 979 2nd St. SE Suite 309 narlottesville, VA 22902 Phone: 434-297-3257 Fax: 434-297-3258	
		Certi	ficate of Conformance	
2nd Flo	uncy St or , MA 02		From: Virginia Diodes, Inc 979 2nd St. SE Suite 309 Charlottesville, VA 22902	
,	10000	List No: 212029 ng Date: 06/11/21	Today's Date: 06/11/21 PO Number: PO20183	
Quantity Shipped 1	<u>Unit</u> EA	<u>Description</u> VDIWR8.0SAX-F WR8.0SAX-F / SN: SAX 837		<u>Order-Job</u> Number 21108C-01
1	EA	RCHO8RL WR8.0CH - Conical Horn Ant		21108C-02

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

Authorized Signature Virginia Diodes, Inc

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VDIWR5.1SAX-F (140-220 GHz)

Irginia	Dioc) les, Inc.	Virginia Diodes, Inc 979 2nd St. SE Suite 309 Charlottesville, VA 22902 Phone: 434-297-3257 Fax: 434-297-3258	
			Certificate of Conformance	
To: Starry, Inc. 38 Chauncy Street 2nd Floor Boston, MA 02111 United States			From: Virginia Diodes, Inc 979 2nd St. SE Suite 309 Charlottesville, VA 22902	
		List No: 211604 ng Date: 05/11/21	Today's Date: 05/11/21 PO Number: PO20183	
Quantity	Unit	Description	Order-J	
<u>Smpped</u> 1	EA	VDIWR5.1SAX-F WR5.1SAX-F / SN: S	Number 21108D AX 838	
1	EA	RCHO5RL WR5.1CH / SN: RCH	O5RL 21108D	-02

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

Authorized Signature Virginia Diodes, Inc Page 1 of 1

14 Appendix C – Test Laboratory Accreditation Scope

OET Accredited Test firm scope List Test Firm: Intertek Testing Services NA Inc.

Scope	FCC Rule Parts	Maximum Assessed Frequency in Mhz	Status Expiration Date	Recognition Date
Unintentional Radiators	FCC Part15, Subpart B	260000.00	Approved06-30-2022	09-29-2017
Industrial, Scientific, and Medical Equipment	FCC Part 18	260000.00	Approved06-30-2022	09-29-2017
Intentional Radiators	FCC Part 15 Subpart C	260000.00	Approved06-30-2022	09-29-2017
UPCS	FCC Part 15, Subpart D	260000.00	Approved06-30-2022	09-29-2017
U-NII without DFS Intentional Radiators	FCC Part 15, Subpart E	260000.00	Approved06-30-2022	09-29-2017
U-NII with DFS Intentional Radiators	FCC Part 15, Subpart E	260000.00	Approved06-30-2022	09-29-2017
UWB Intentional Radiators	FCC Part 15, Subpart F	260000.00	Approved06-30-2022	09-29-2017
BPL Intentional Radiators	FCC Part 15, Subpart G	260000.00	Approved06-30-2022	09-29-2017
White Space Device Intentional Radiators	FCC Part 15, Subpart H	260000.00	Approved06-30-2022	09-29-2017
Commercial Mobile Services	Part 22 (cellular), Part 24, Part 25 (below 3 GHz), Part 27	260000.00	Approved06-30-2022	09-29-2017
General Mobile Radio Services	Part 22 (non-cellular), Part 90 (below 3 GHz), Part 95 (below 3 GHz), Part 97 (below 3 GHz), Part 101 (below 3 GHz)	260000.00	Approved06-30-2022	09-29-2017
Maritime and Aviation Radio Services	Part 80, Part 87	260000.00	Approved06-30-2022	09-29-2017
Microwave and Millimeter Bands Radio Services	Part 25 (above 3 GHz), Part 30, Part 74, Part 90 (above 3 GHz), Part 95 (above 3 GHz), Part 97 (above 3 GHz) Part 101	260000.00	Approved06-30-2022	09-29-2017
Broadcast Radio Services	Part 73, Part 74 (below 3 GHz)	260000.00	Approved06-30-2022	09-29-2017
Signal Boosters	Part 20, Part 90.219	260000.00	Approved06-30-2022	09-29-2017