

# Wireless Pull Station

**Model No.: NBG-12WL**

**Date: 2020-02-12**

**Report Prepared By:**

**Vinay Gujjar**

**EMC Test Report**



<b>Report Number</b>	EMC0421-1
<b>EUT Nomenclature</b>	Wireless Pull Station
<b>Sample Identification</b>	Model No : NBG-12WL
	SL. No : 104
	Software Version : 5.88
	Hardware Version : Rev 3
<b>Number of Samples</b>	1
<b>Date of receipt of Sample</b>	12-Nov-2019
<b>Condition of Sample on receipt</b>	Good
<b>Client name</b>	Honeywell International Inc
<b>Client Address</b>	System Sensor, 3825, Ohio Ave, St. Charles, IL, USA - 60174
<b>Testing Laboratory</b>	Honeywell Technology Solutions Lab Pvt Ltd
<b>Address</b>	RMZ ECOWORLD INFRASTRUCTURE PVT Ltd, (Formerly Adarsh Prime Projects Pvt Ltd., SEZ) Survey # 19/2, Devarabisanahalli Village, Varthur Hobli, Bangalore East Taluk, Bangalore - 560103
<b>Test Dates</b>	14-Dec-2019 to 06-Jan-2020
<b>Applicable Standard</b>	FCC Part 15 : 2010, ANSI C63.10:2013
<b>Test Results</b>	PASS

Prepared By: Test Engineer

Name : Vinay Gujjar

Signature:

Date : 12 Feb 2020

Reviewed By: Prasanna Kumar BT

(e-mail approval)

Authorized Signatory:

Name: Prasanna Kumar BT

Signature:

Date of Issue: 14 Feb 2020

*This Report relates to the above-mentioned test sample only. Without the approval of Lab manager, this report shall not be reproduced except in full.*

TEST SUMMARY					
Test Performed	Name	Specification	Test Method	Pass	Fail
<b>FHSS</b>					
<input type="checkbox"/>	20dB Bandwidth	FCC Part 15.247 :2010	DA 00-705	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Maximum Peak Output Power	FCC Part 15.247 :2010	DA 00-705	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Carrier Frequency Separation	FCC Part 15.247 :2010	DA 00-705	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Number of Hopping Frequencies	FCC Part 15.247 :2010	DA 00-705	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Band Edge compliance	FCC Part 15.247 :2010	DA 00-705	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Time of Occupancy (Dwell Time)	FCC Part 15.247 :2010	DA 00-705	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Spurious RF Conducted Emissions	FCC Part 15.247 :2010	DA 00-705	Refer Note 1	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Effective Isotropic Radiated Power	FCC Part 15.247: 2010 and 15.209: 2010	KDB 412172	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Spurious Radiated Emissions	FCC Part 15.247: 2010 and 15.209: 2010	DA 00-705 ANSI C63.10 - 2013	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>DTS</b>					
<input type="checkbox"/>	DTS 6dB Bandwidth	FCC Part 15.247: 2010	KDB 558074	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Maximum Peak Output Power	FCC Part 15.247: 2010	KDB 558074	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Maximum Power Spectral Density	FCC Part 15.247: 2010	KDB 558074	Refer Note 1	<input type="checkbox"/>
<input type="checkbox"/>	Band Edge Conducted Emissions	FCC Part 15.247: 2010	KDB 558074	Refer Note 1	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Effective Isotropic Radiated Power	FCC Part 15.247: 2010 and 15.209: 2010	KDB 412172	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Spurious Radiated Emissions	FCC Part 15.247: 2010 and 15.209: 2010	KDB 558074 ANSI C63.10 - 2013	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Note 1:</b> - As part of permissive change testing and recommended by TCB, Only Spurious Radiated Emissions and Effective Isotropic Radiated Power for both FHSS and DTS is performed as there is one RF Switch (Drop-in replacement) changed.					

MEASUREMENT UNCERTAINTY		
Where relevant, the following measurement uncertainty levels has been estimated for tests performed on the EUT as specified in CISPR 16-4		
The Expanded measurement uncertainty (K=2) is provided below		
#	Name	Value
1	Radiated Spurious Emission < 1GHz	4.3dB
2	Radiated Spurious Emission > 1GHz	5.5dB

Decision Rule Applied	
<input checked="" type="checkbox"/>	<i>Measurement Uncertainty is not accounted while reporting statement of conformity to specification / standard. (shared risk)</i>
<input type="checkbox"/>	<i>Measurement uncertainty is accounted and results reported as per ILAC-G8 guidelines</i>
<input type="checkbox"/>	

# 1 PRODUCT DETAILS

## PRODUCT OPERATION AND INTENDED USE

The Wireless Pull Station is powered by four CR123A batteries. The module has an LED to indicate the activation and trouble status. The Pull Station will occupy one module address.

## RATINGS AND SYSTEM DETAILS

<b>Operating Frequency</b>	902MHz to 928MHz
<b>Number of Channels</b>	DTS :6
	FHSS :55
<b>Channel Bandwidth (20dB)</b>	DTS :1MHz
	FHSS :320KHz
<b>Transmitted Power</b>	DTS :12dBm
	FHSS :17dBm
<b>Modulation Type</b>	FSK
<b>Data Rate</b>	DTS :300Kbps
	FHSS :150Kbps
<b>Antenna Type</b>	Inverted F Patch Antenna
<b>No. of Antenna</b>	3
<b>Antenna Gain</b>	ANT 1 :1.75dBi
	ANT 2 :0.08dBi
	ANT 3 :1.90dBi
<b>Supply Voltage and Current</b>	3.3V, 5mA
<b>Dimensions (Diameter x Height)</b>	10.72cm x 3.66cm x 14.62cm
<b>Environmental Conditions</b>	Operating Temperature :0°C to 49°C
	Storage Temperature: -10°C to 60°C
	Humidity :10% to 93% RH

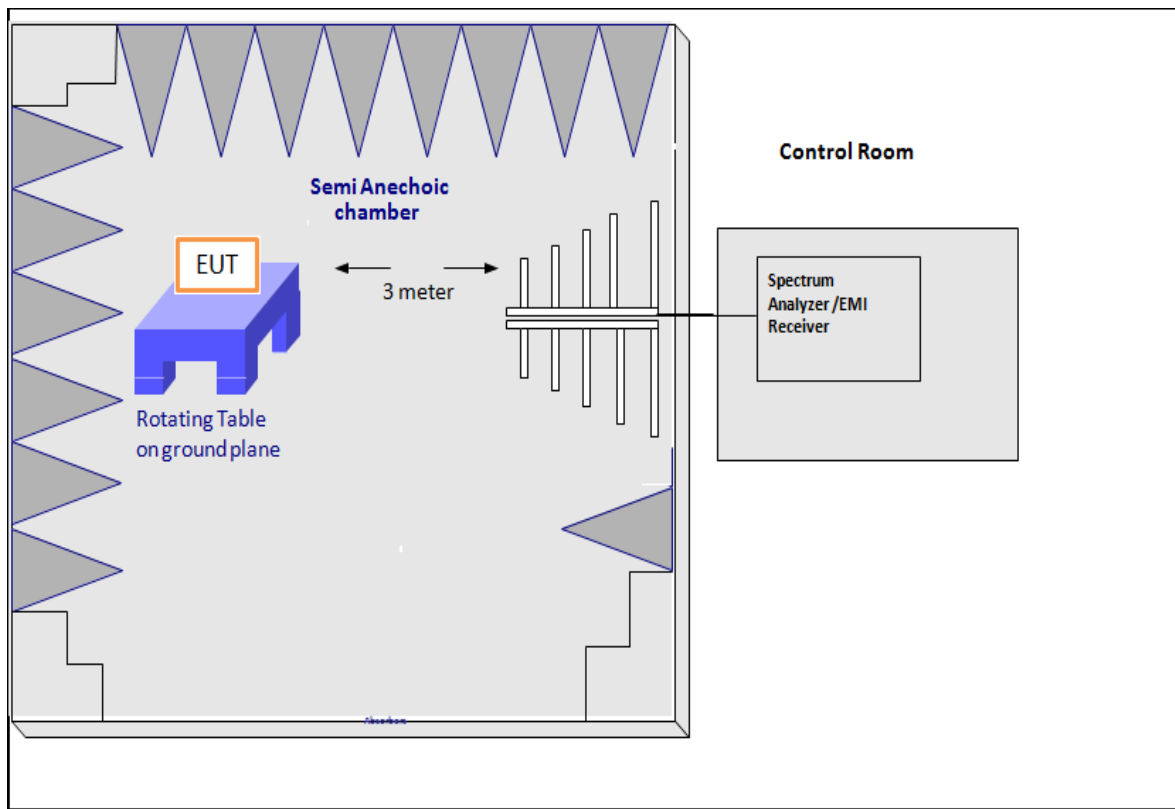
TEST CONFIGURATION	
Config #	Description
Radiated Test	EUT is Powered from Battery. EUT Debug port (UART) is connected to Laptop through USB to UART converter cable. EUT is configured to the respective operating mode through Hyper Terminal. Test is performed at Antenna 3(Transmitting Antenna) as this is high gain antenna.

OPERATING MODES	
Mode #	Description
DTS	Following DTS channels have been used for Conducted (Continuous Trans mission) and Radiated (Continuous Trans mission) Tests Channel 1: 902.875MHz Channel 4: 915.325MHz Channel 6: 927.125MHz
FHSS	Following FHSS channels have been used for Conducted (Continuous Trans mission) and Radiated (Continuous Trans mission) Tests Channel 1: 903.55MHz Channel 28: 916.00MHz Channel 55: 926.45MHz

INPUT AND OUTPUT CABLES					
Port #	Name	Port Type	Cable Length	Cable type Shielded/ Unshielded	Comments
	Nil				Nil
*Note : AC = AC Power Port DC = DC Power Port TP = Telecommunication Ports (E.g. Ethernet) DI / DO = Digital Input / Output N / E = Non Electrical AI / AO = Analog Input / Output					

SUPPORT EQUIPMENTS AND ACCESSORIES USED					
#	Item Description	Make	Model	Part No. / Sl. No	Cal Due Date
1	Laptop	DELL	Latitude 5490	5369273282	NA
2	USB to UART Cable	FTDI	TTL-232R-3V3	NA	NA

**CONNECTION DIAGRAM AND SETUP DIAGRAM**



Radiated Emission Test Setup

## 2 FHSS CHANNELS

### 2.1 SPURIOUS RADIATED EMISSIONS

<b>EUT Nomenclature</b>	Wireless Pull Station	<b>Test Report No.</b>	EMC0421-1
<b>Model No.</b>	NBG-12WL	<b>Serial No.</b>	104
<b>Test Start Date</b>	14-Dec-2019	<b>Temperature (°C)</b>	23 ± 2
<b>Test End Date</b>	06-JAN-2020	<b>Humidity RH (%)</b>	55 ± 3
<b>Tested By</b>	Vinay Gujjar	<b>Pressure (mbar)</b>	NR
<b>Input Voltage / Freq</b>	3.3V, 5mA		
<b>Operating Mode</b>	Refer Page 5 Operating Modes Table		
<b>Test configuration</b>	Refer Page 5 Test Configuration Table		
<b>Deviation from Std</b>	NA		
<b>Comment</b>	NA		
<b>TEST FREQUENCY RANGE</b>			
<b>Start Frequency</b>	9KHz	<b>Stop Frequency</b>	10GHz
<b>MAXIMUM OPERATING FREQUENCY</b>			
902MHz to 928MHz			
<b>TEST PARAMETERS</b>			
<b>Antenna Height</b>	1m to 4m	<b>Turntable Rotation</b>	0° to 360°
<b>Applicable standard</b>	FCC Part 15.247 & 15.209 :2010	<b>Test Method</b>	DA 00-705, ANSI C63.10 - 2013
<b>Equipment Class</b>	NA	<b>Measurement Distance</b>	3m

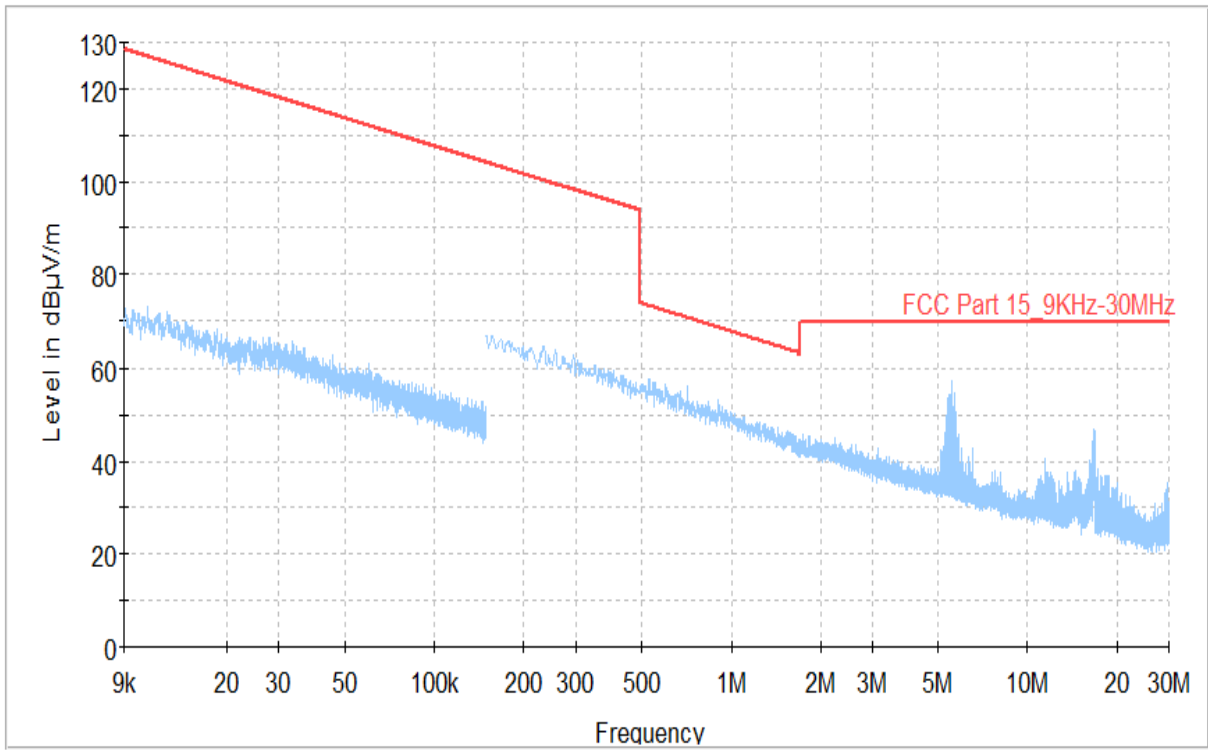
### TEST EQUIPMENT

Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100229	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Double Ridge Guide Horn Antenna	ETS Lindgren	3117	64055	1-Nov-21
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	Loop Antenna	ETS Lindgren	6507	103694	15-Nov-21
Y	RF cable (9KHz to 18GHz)	AH Systems	SAC-18G-06	RE-03	20-Feb-20
Y	Signal Conditioning unit	R&S	SCU-18	10178	5-Jun-20
Y	High Pass Filter	Wainwright	WHKX1.5/15G-12ST	1	24-Feb-20
Y	EMC32 Software	R&S	8.30.0	820-OT101248	NA

Note: Switch ON /OFF the Internal Preampifier based on carrier level and or noise floor without overloading the receiver

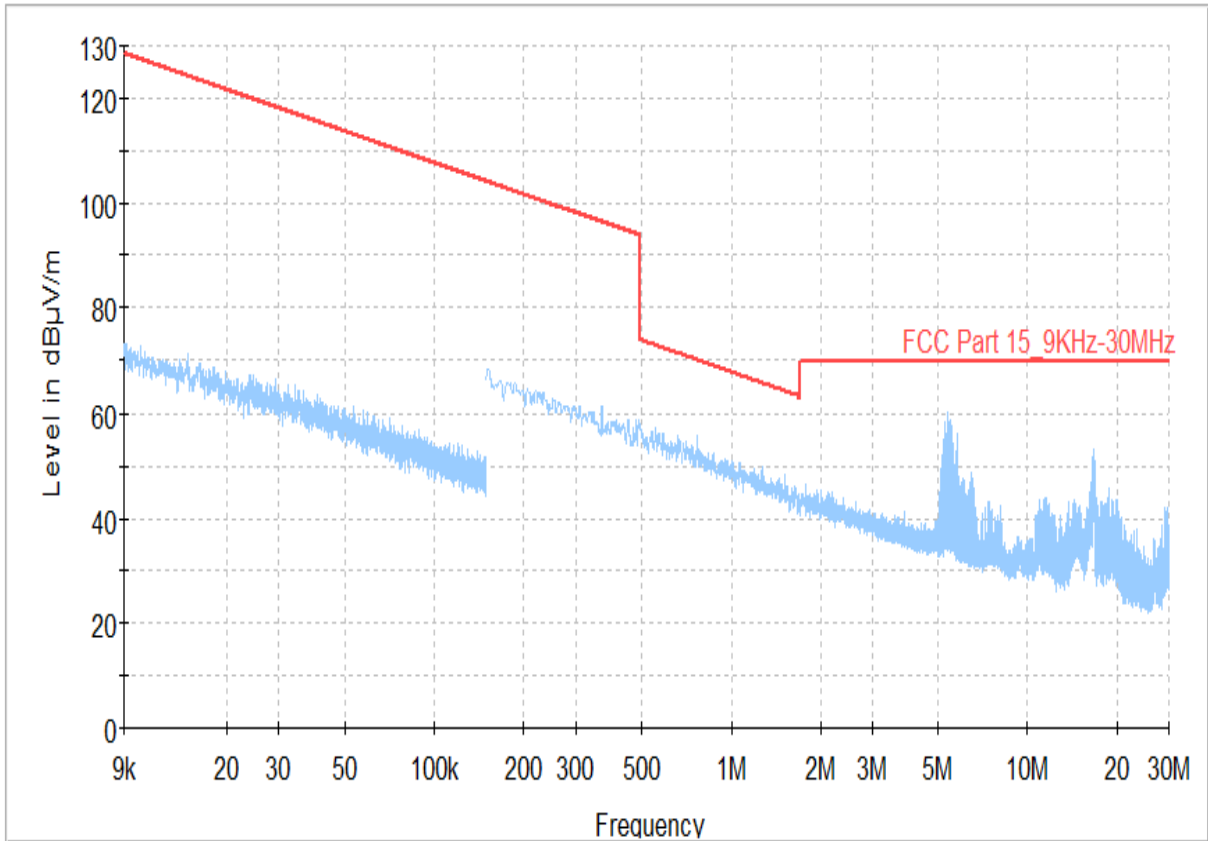


TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



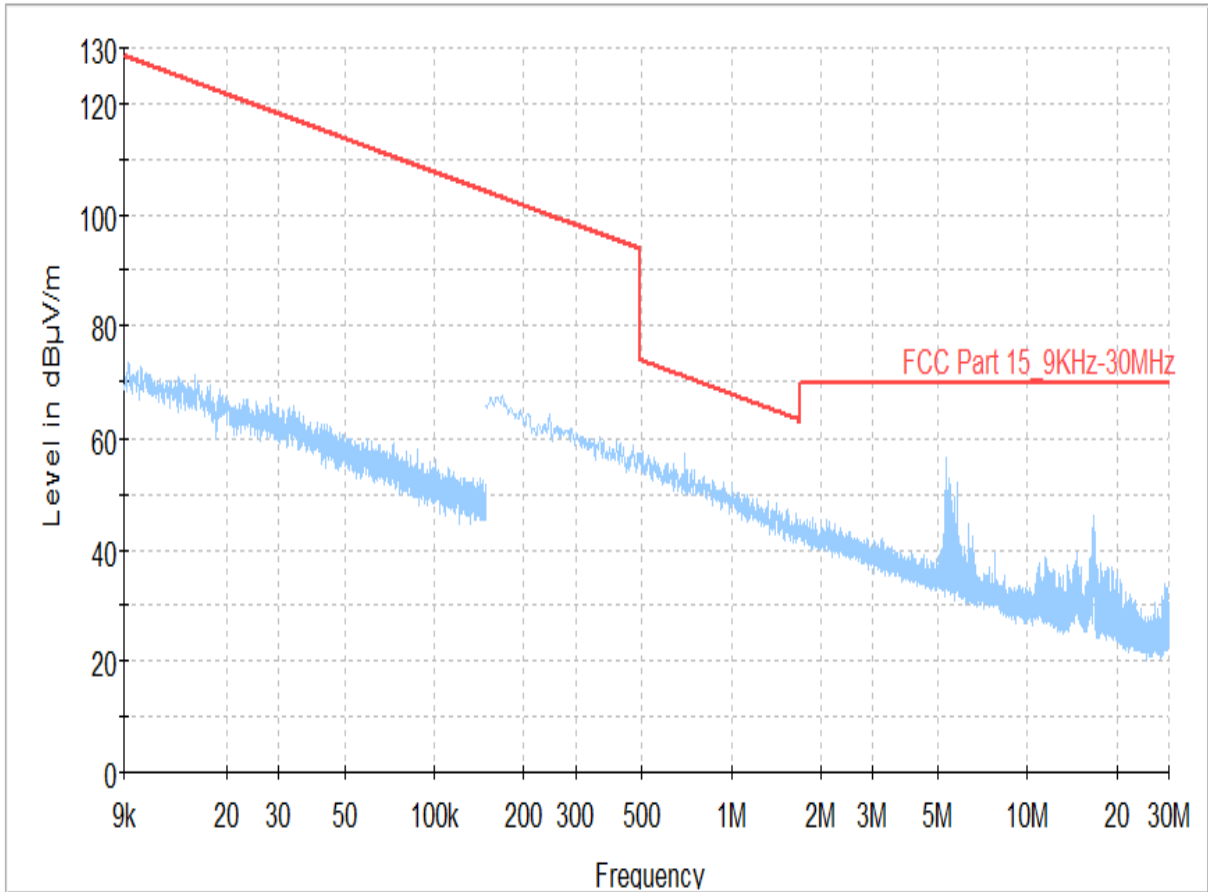
Channel 1 (903.55MHz) – Parallel

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)

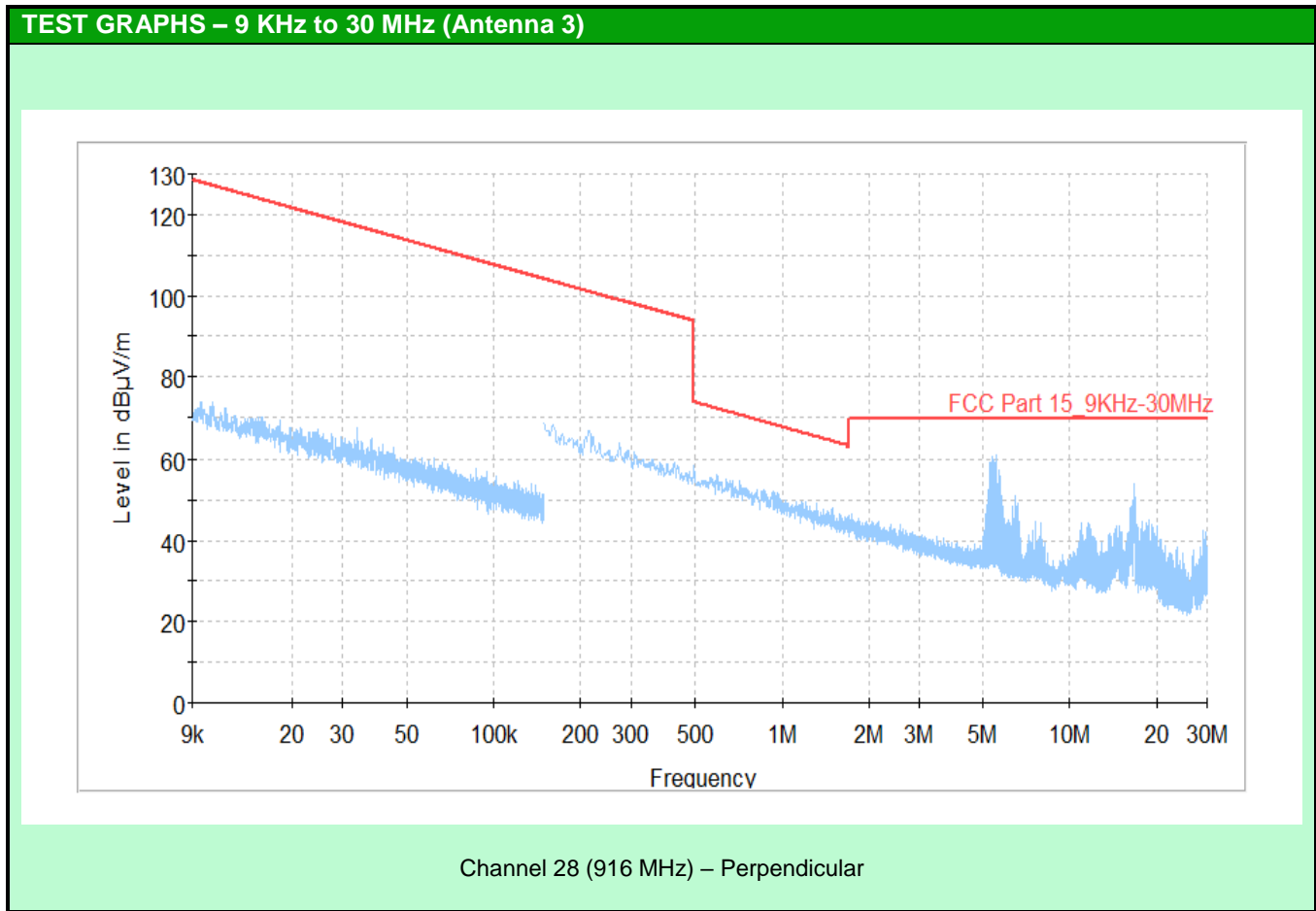


Channel 1 (903.55MHz) – Perpendicular

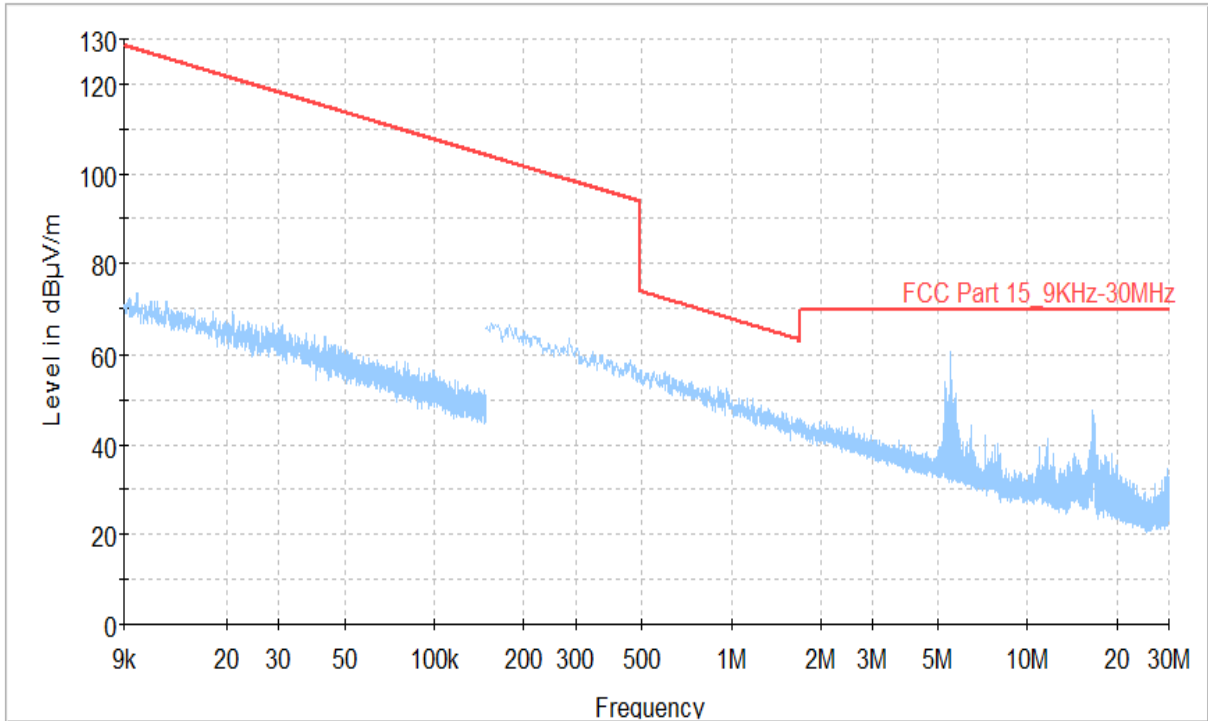
TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



Channel 28 (916 MHz) – Parallel

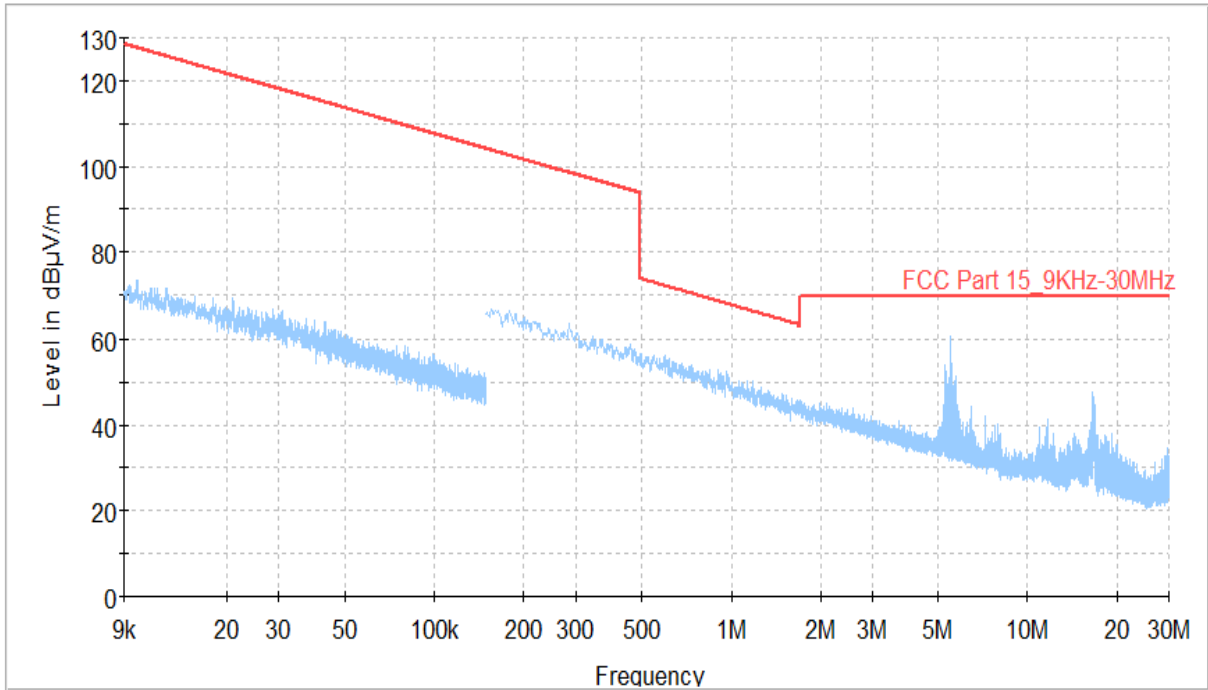


TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



Channel 55 (926.45MHz) – Parallel

**TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)**

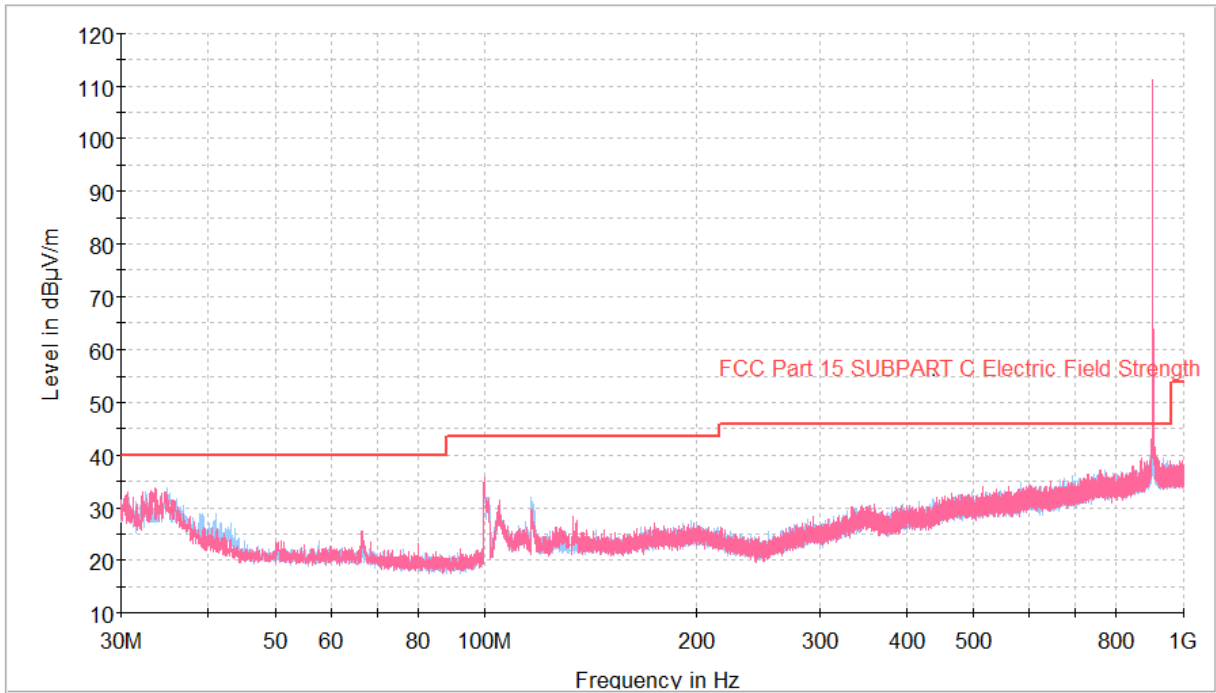


Channel 55 (926.45MHz) – Perpendicular

**TEST RESULT – 9 KHz to 30 MHz**

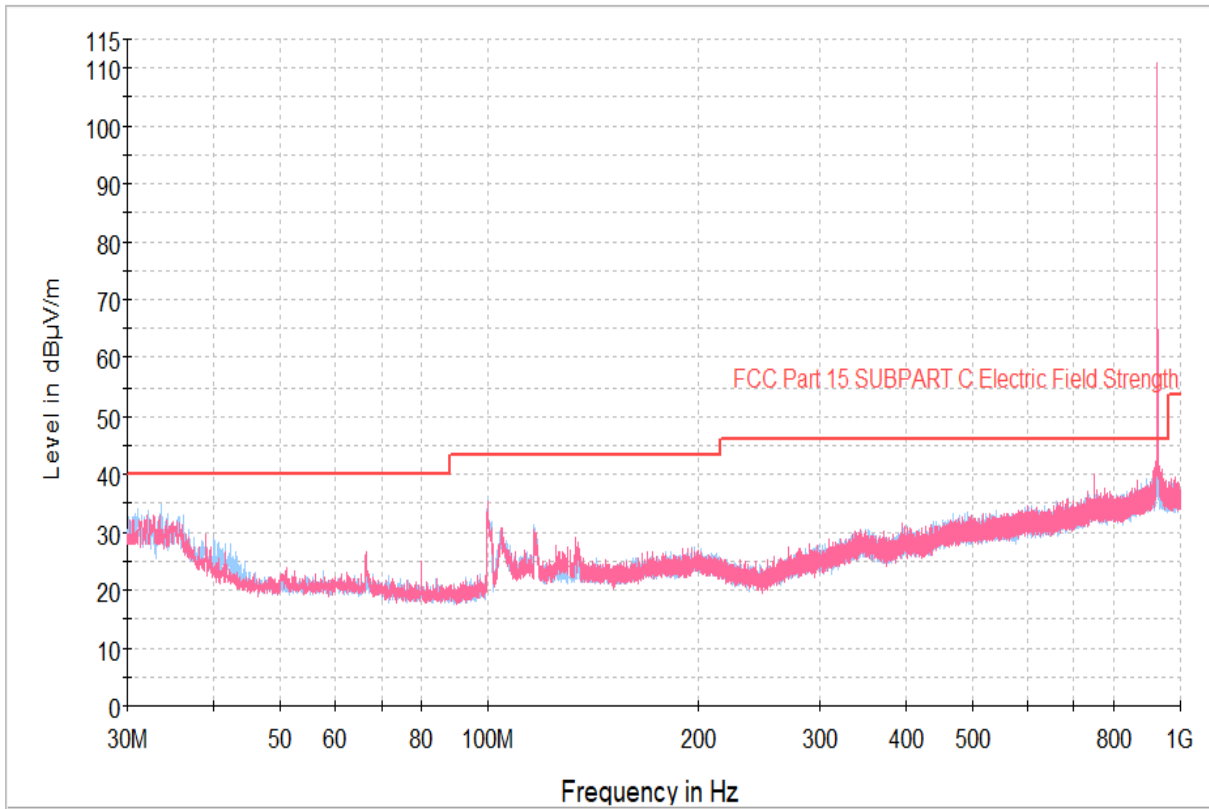
Channel	Channel Frequency	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	MHz	dBµV/m	cm	Parallel / Perpendicular	deg	dB	dBµV/m	
No emissions detected. Emissions shown in the plot are related to the chamber ambient									
NOTE: Measured Field Strength –dBuV/m (9 KHz to 1 GHz) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)									

TEST GRAPHS – 30MHz to 1GHz (Antenna 3)



Channel 1 (903.55MHz) – Antenna 3

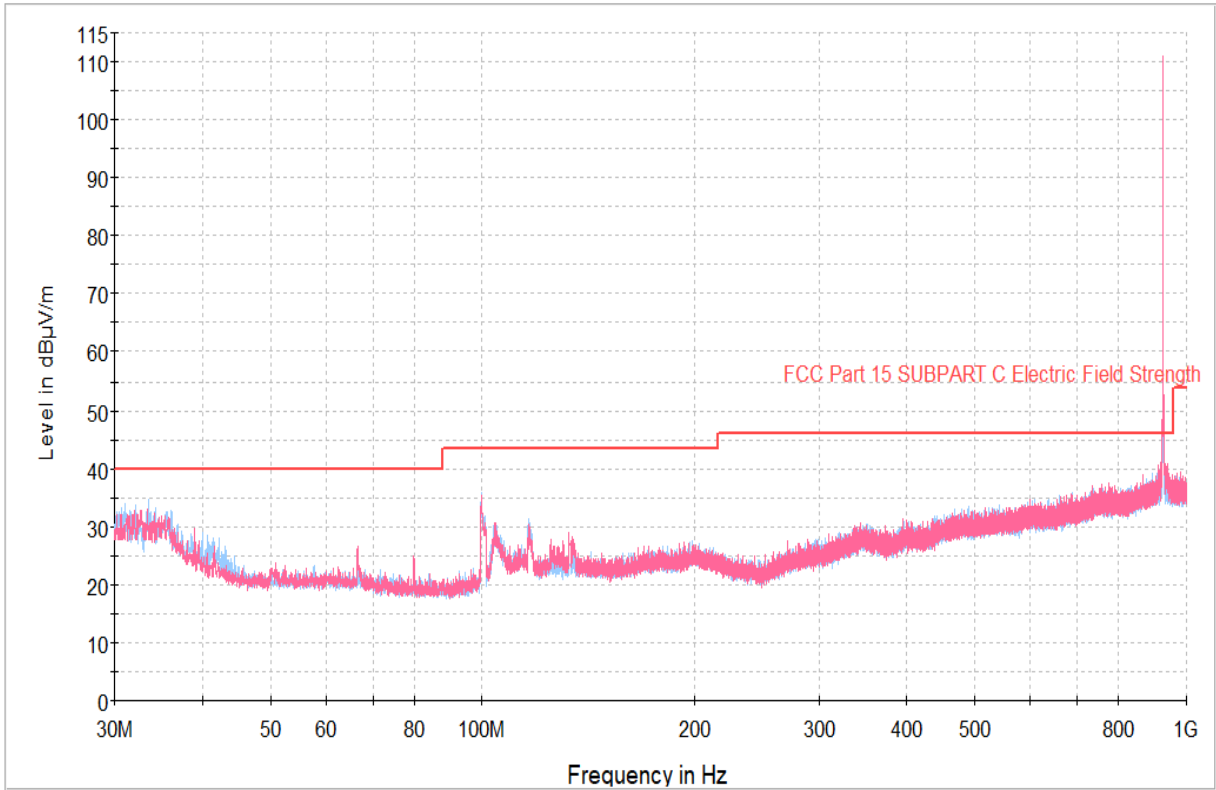
TEST GRAPHS – 30MHz to 1GHz (Antenna 3)



Channel 28 (916.0MHz) – Antenna 3



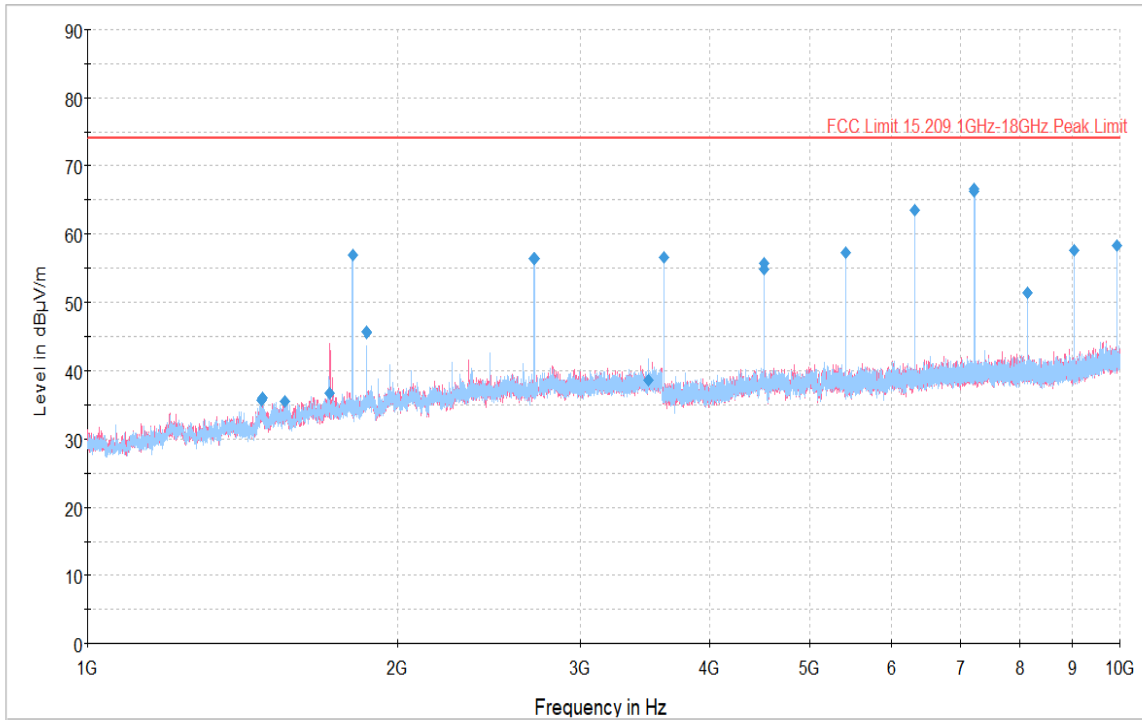
TEST GRAPHS – 30MHz to 1GHz (Antenna 3)



Channel 55 (926.45MHz) – Antenna 3

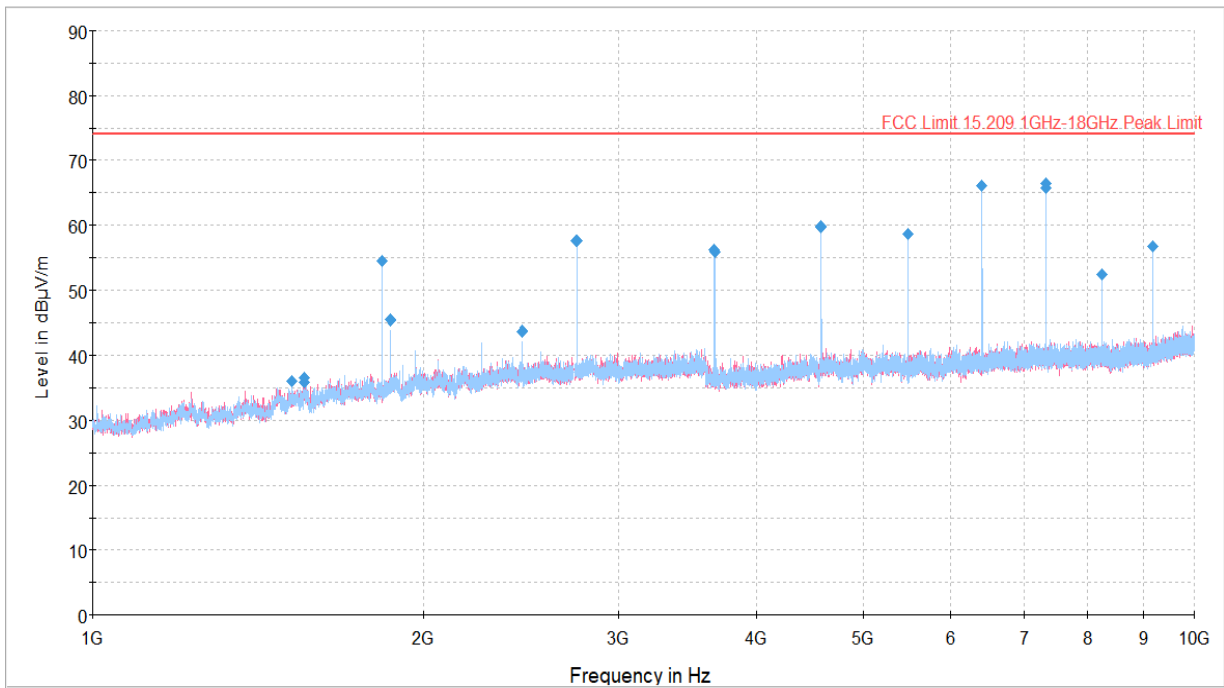
TEST RESULT – 30MHz to 1GHz								
Channel	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	dBµV/m	cm	H / V	deg	dB	dBµV/m	
Antenna – 3								
CH-1	507.24	31.33	100	V	33	14.67	46	Pass
CH-1	520.43	31.69	300	V	347	14.31	46	Pass
CH-1	520.82	31.74	100	H	19	14.26	46	Pass
CH-1	679.32	34.91	100	V	57	11.09	46	Pass
CH-1	682.23	35.01	200	V	69	10.99	46	Pass
CH-1	696.39	35.29	200	V	321	10.71	46	Pass
CH-1	736.16	36.31	200	H	192	9.69	46	Pass
CH-1	826.18	37.1	300	H	236	8.9	46	Pass
CH-1	903.55	111.11	100	V	94	-	-	Intended Frequency
CH-28	623.83	34.42	400	H	186	11.58	46	Pass
CH-28	687.27	35.24	400	H	110	10.76	46	Pass
CH-28	696.58	35.42	400	V	123	10.58	46	Pass
CH-28	750.13	40.06	300	V	71	5.94	46	Pass
CH-28	838.01	37.48	200	H	180	8.52	46	Pass
CH-28	838.59	37.46	200	H	236	8.54	46	Pass
CH-28	916.39	109.74	100	V	38	-	-	Intended Frequency
CH-55	685.53	35.11	400	H	226	10.89	46	Pass
CH-55	696.97	35.38	400	V	14	10.62	46	Pass
CH-55	699.49	35.57	200	H	290	10.43	46	Pass
CH-55	837.82	37.67	300	H	116	8.33	46	Pass
CH-55	838.59	37.64	100	V	19	8.36	46	Pass
CH-55	845.96	37.74	100	V	149	8.26	46	Pass
CH-55	926.45	110.93	100	V	116	-	-	Intended Frequency
NOTE: Measured Field Strength –dBµV/m (9 KHz to 1 GHz) = Receiver Readings (dBµV) + Antenna Factor (dB/m) + Cable loss (dB)								

TEST GRAPHS – 1GHz to 10GHz (Antenna 3)



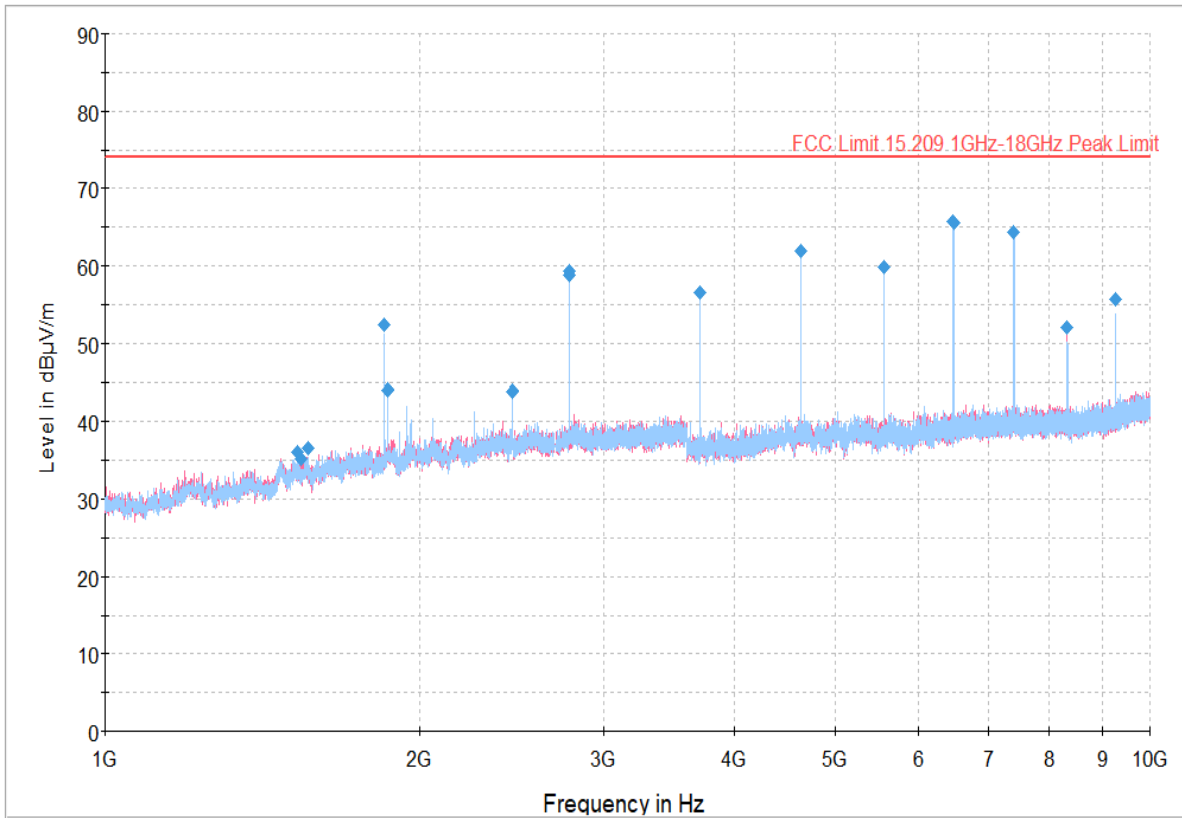
Channel 1 (903.55MHz) – Antenna 3

TEST GRAPHS – 1GHz to 10GHz (Antenna 3)



Channel 28 (916.0MHz) – Antenna 3

TEST GRAPHS – 1GHz to 10GHz (Antenna 3)



Channel 55 (926.45MHz) – Antenna 3

**TEST RESULT – 1 GHz to 10 GHz RESTRICTED BAND – PEAK & AVERAGE**

Channel	Frequency	Measured Field Strength Peak	Height	Ant Pol	Azimuth	Peak	Peak	Calculated Average Reading	Average Limit	Average Margin	Result
						Margin	Limit				
#	MHz	dBµV/m	cm	H/V	deg	dB	dBµV/m	dBµV/m	dBµV/m	dBµV/m	
Antenna – 3											
CH-1	2710.32	56.32	100	H	187	17.68	74	38.25	54	15.75	PASS
CH-1	3614.50	56.47	200	H	201	17.53	74	38.4	54	15.6	PASS
CH-1	4517.07	54.84	300	H	144	19.16	74	36.77	54	17.23	PASS
CH-1	4517.71	55.68	300	H	144	18.32	74	37.61	54	16.39	PASS
CH-1	5421.25	57.23	200	H	133	16.77	74	39.16	54	14.84	PASS
CH-1	8132.82	51.33	300	H	272	22.67	74	33.26	54	20.74	PASS
CH-1	9035.39	57.57	300	H	266	16.43	74	39.5	54	14.5	PASS
CH-28	2748.89	57.57	100	H	198	16.43	74	39.5	54	14.5	PASS
CH-28	3664.96	56.26	200	H	198	17.74	74	38.19	54	15.81	PASS
CH-28	3665.61	55.77	200	H	175	18.23	74	37.7	54	16.3	PASS
CH-28	4581.36	59.74	300	H	124	14.26	74	41.67	54	12.33	PASS
CH-28	4582.00	59.66	400	H	112	14.34	74	41.59	54	12.41	PASS
CH-28	7330.21	66.45	200	H	136	7.55	74	48.38	54	5.62	PASS
CH-28	7331.18	65.66	200	H	131	8.34	74	47.59	54	6.41	PASS
CH-28	8247.25	52.31	300	H	281	21.69	74	34.24	54	19.76	PASS
CH-28	9163.96	56.71	300	H	260	17.29	74	38.64	54	15.36	PASS
CH-55	2777.82	58.77	300	H	176	15.23	74	40.7	54	13.3	PASS
CH-55	2778.46	59.3	300	H	193	14.7	74	41.23	54	12.77	PASS
CH-55	3704.18	56.47	200	H	201	17.53	74	38.4	54	15.6	PASS
CH-55	4630.21	61.83	200	H	154	12.17	74	43.76	54	10.24	PASS
CH-55	4630.86	61.87	300	H	150	12.13	74	43.8	54	10.2	PASS
CH-55	7408.00	64.3	200	H	138	9.7	74	46.23	55	8.77	PASS
CH-55	8335.00	51.94	300	H	277	22.06	74	33.87	56	22.13	PASS
CH-55	9262.00	55.6	300	H	261	18.4	74	37.53	57	19.47	PASS

Note :

Measured Field Strength –Peak dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss – Ext. Pre amplifier Gain (dB)

Cal. Average Readings(dBuV/m) =Measured Peak(dBuV/m)-Duty Cycle Correction Factor(dB)

Duty Cycle Correction Factor is calculated using the guidelines provided in DA 00-705

Duty Cycle Factor =20\*log (Dwell time /100msec) , Number of Transmission for 100msec: 8, Dwell time per Transmission: 1.55msec  
 Duty Cycle correction Factor =20 log (1.55\*8/100) = -18.07dB

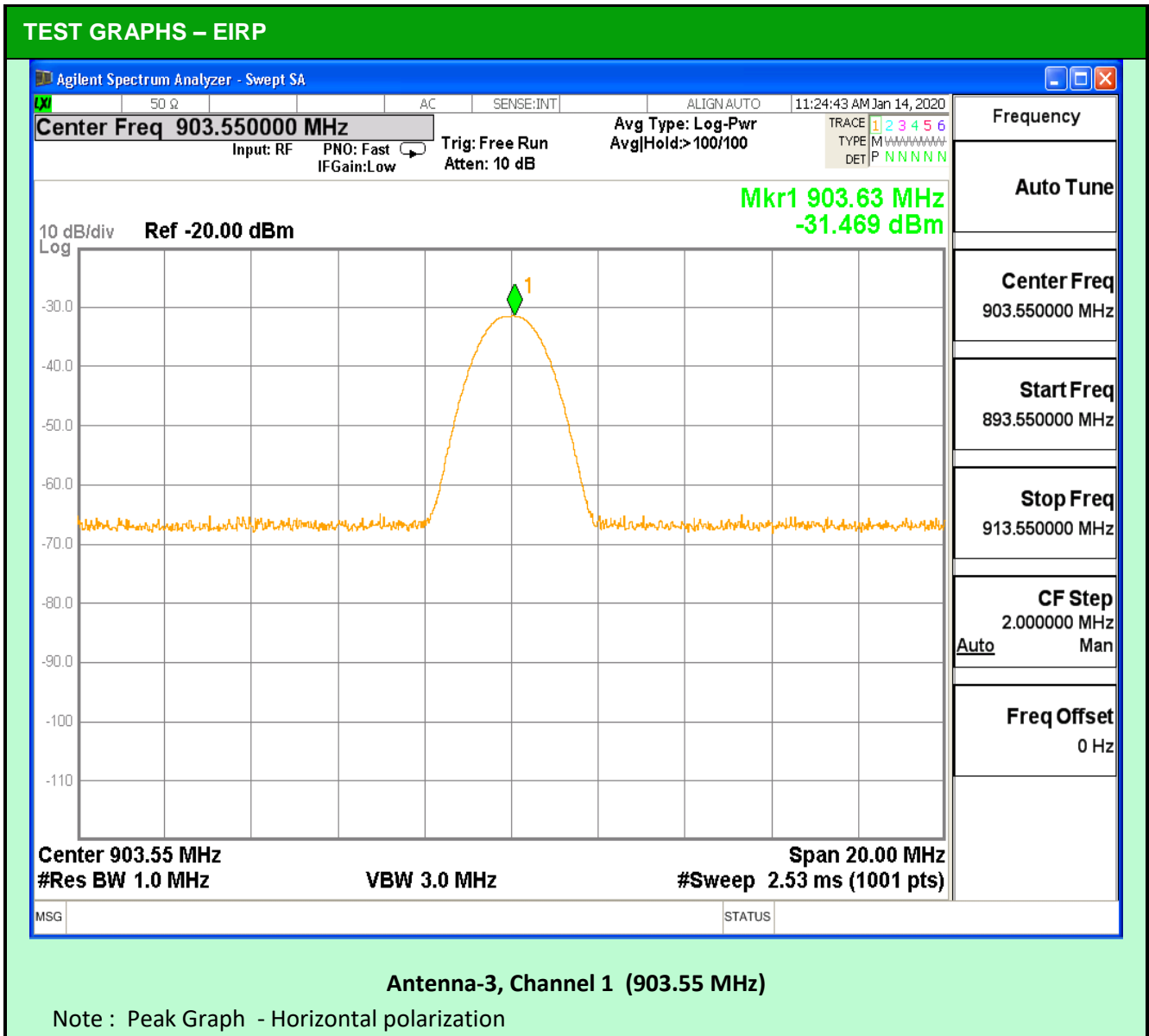
TEST RESULT – 1 GHz to 10 GHz							NON- RESTRICTED BAND - PEAK		
Channel	Measured Fundamental	Spurious Emission	Measured Harmonic	Height	Ant Pol	Azimuth	Limit	Margin	Results
							[Fundamental – 20 dB]		
#	dBµV/m	MHz	dBµV/m	cm	H / V	deg	dBuV/m	dB	
Antenna – 3									
CH-1	111.11	1806.79	56.81	100	H	208	91.11	34.3	PASS
CH-1	111.11	1865.29	45.55	400	H	223	91.11	45.56	PASS
CH-1	111.11	3488.82	38.6	400	H	8	91.11	52.51	PASS
CH-1	111.11	6325.43	63.55	200	H	117	91.11	27.56	PASS
CH-1	111.11	7227.68	66.66	200	H	127	91.11	24.45	PASS
CH-1	111.11	7228.32	66.29	300	H	113	91.11	24.82	PASS
CH-1	111.11	9939.89	58.33	400	H	266	91.11	32.78	PASS
CH-28	109.74	1832.50	54.5	200	H	190	89.74	35.24	PASS
CH-28	109.74	1865.61	45.39	400	H	122	89.74	44.35	PASS
CH-28	109.74	2454.14	43.74	400	H	224	89.74	46	PASS
CH-28	109.74	5498.07	58.6	200	H	141	89.74	31.14	PASS
CH-28	109.74	6415.11	65.99	200	H	126	89.74	23.75	PASS
CH-55	110.93	1852.11	52.29	200	H	201	90.93	38.64	PASS
CH-55	110.93	1864.96	44.06	400	H	255	90.93	46.87	PASS
CH-55	110.93	2454.79	43.83	400	H	180	90.93	47.1	PASS
CH-55	110.93	5556.89	59.86	200	H	150	90.93	31.07	PASS
CH-55	110.93	6481.96	65.72	200	H	133	90.93	25.21	PASS
CH-55	110.93	6482.93	65.62	200	H	117	90.93	25.31	PASS
<u>Note :</u>									
Measured Harmonic Field Strength (dBuV/m) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss - Pre amplifier Gain (dB)									

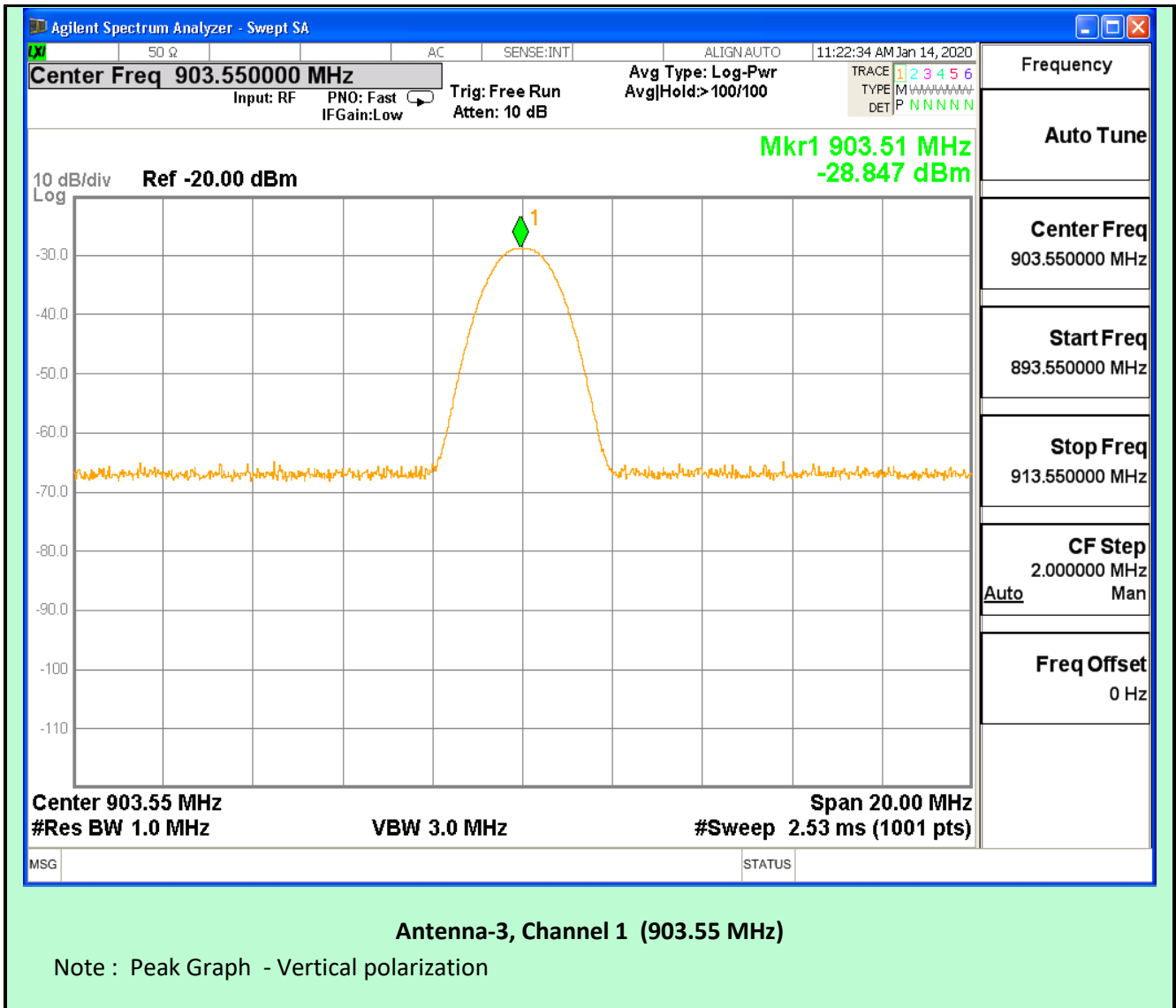
2.2 EFFECTIVE ISOTROPIC RADIATED POWER			
EUT Nomenclature	Wireless Pull Station	Test Request No.	EMC0421-1
Model No.	NBG-12WL	Serial No.	104
Test Start Date	14-Dec-2019	Temperature (°C)	23 ± 2
Test End Date	06-Jan-2020	Humidity RH (%)	55 ± 3
Tested By	Vinay Gujjar	Pressure (mbar)	NR
Input Voltage / Freq	3.3V, 5mA		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std	NA		
Applicable standard	FCC Part 15.247: 2010 & 15.209 :2010		
Test Method	KDB 412172		
Comment	NA		
TEST DETAILS			
Method	<input checked="" type="checkbox"/> Radiated		<input type="checkbox"/> Conducted
TEST PARAMETERS			
Antenna Height	1m to 4m	Turntable Rotation	0° to 360°
Equipment Class	NA	Measurement Distance	3m

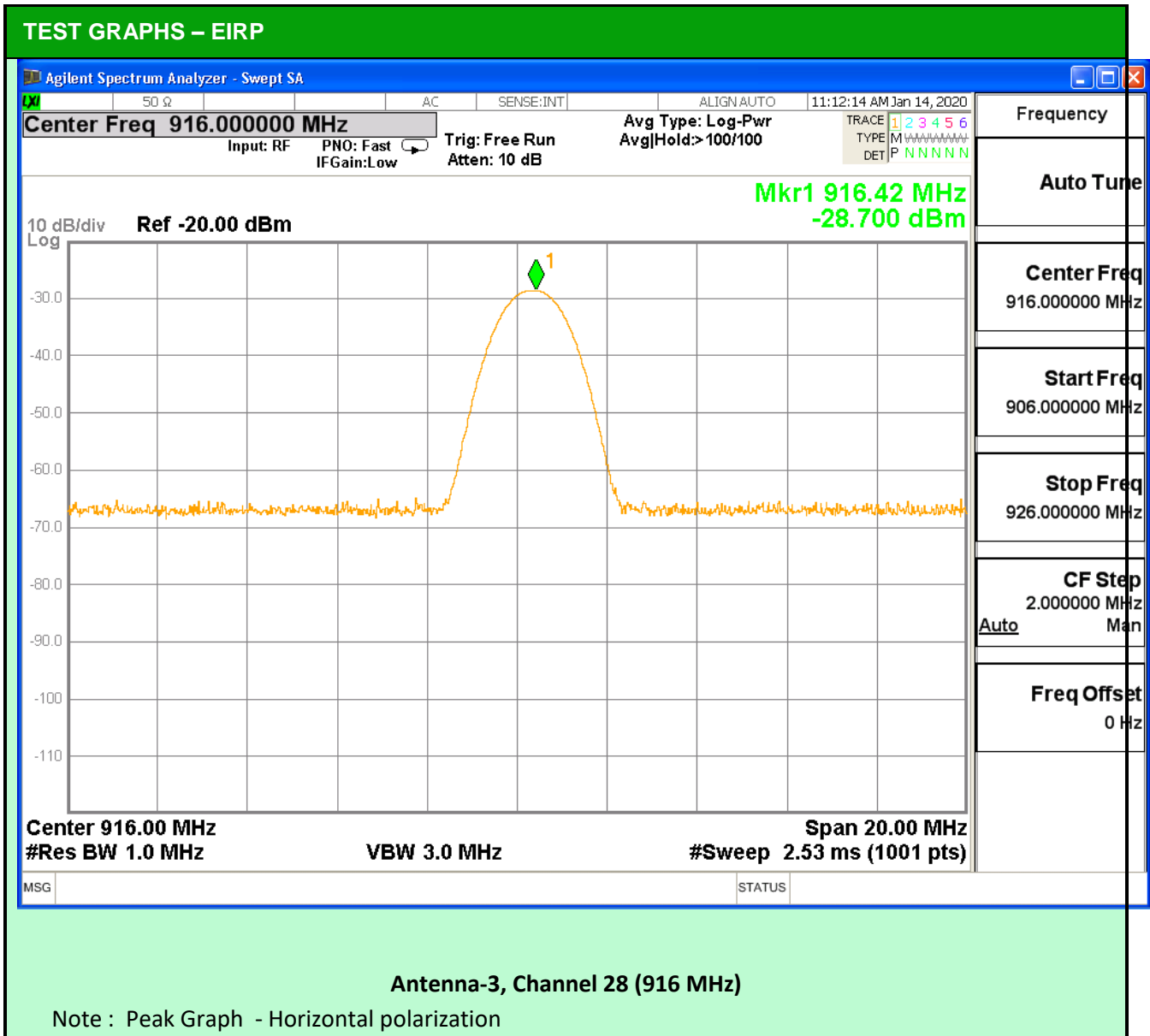
TEST EQUIPMENT					
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100525	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	RF cable (9KHz to 1GHz)	AH System	SAC-18G-06	RE-03	20-Feb-20

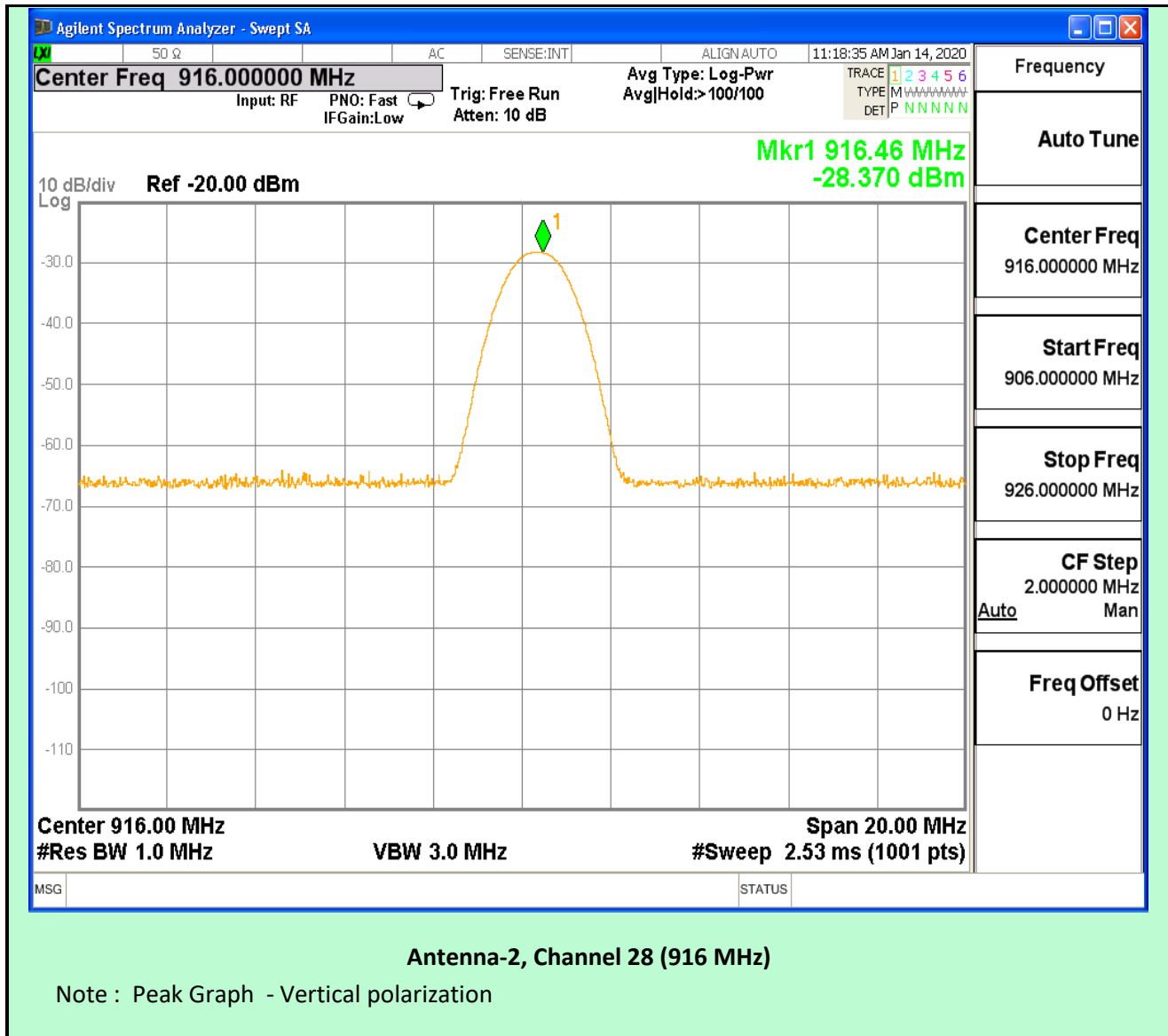
Note: Switch ON /OFF the Internal Preamplifier based on carrier level and or noise floor without overloading the receiver

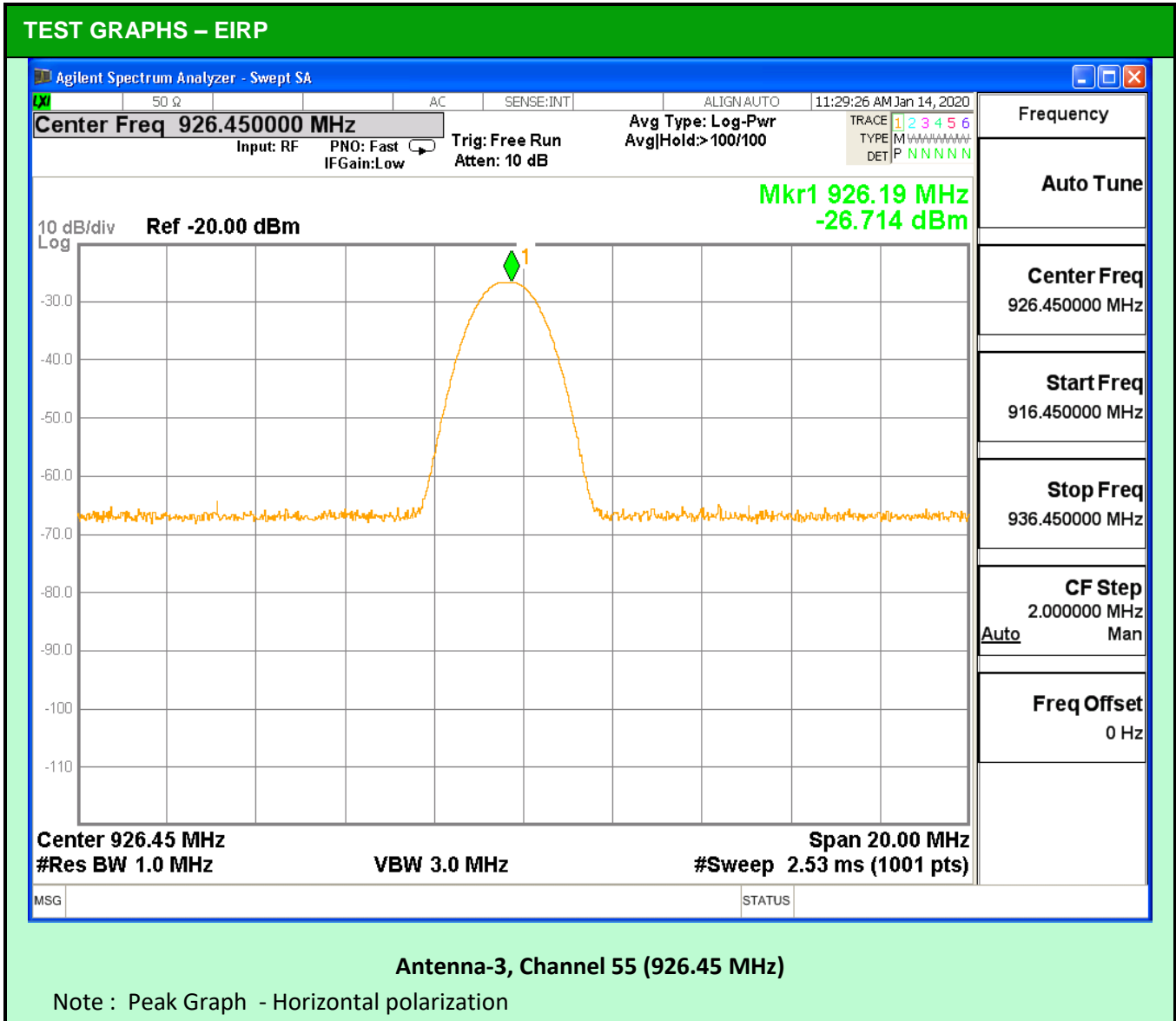


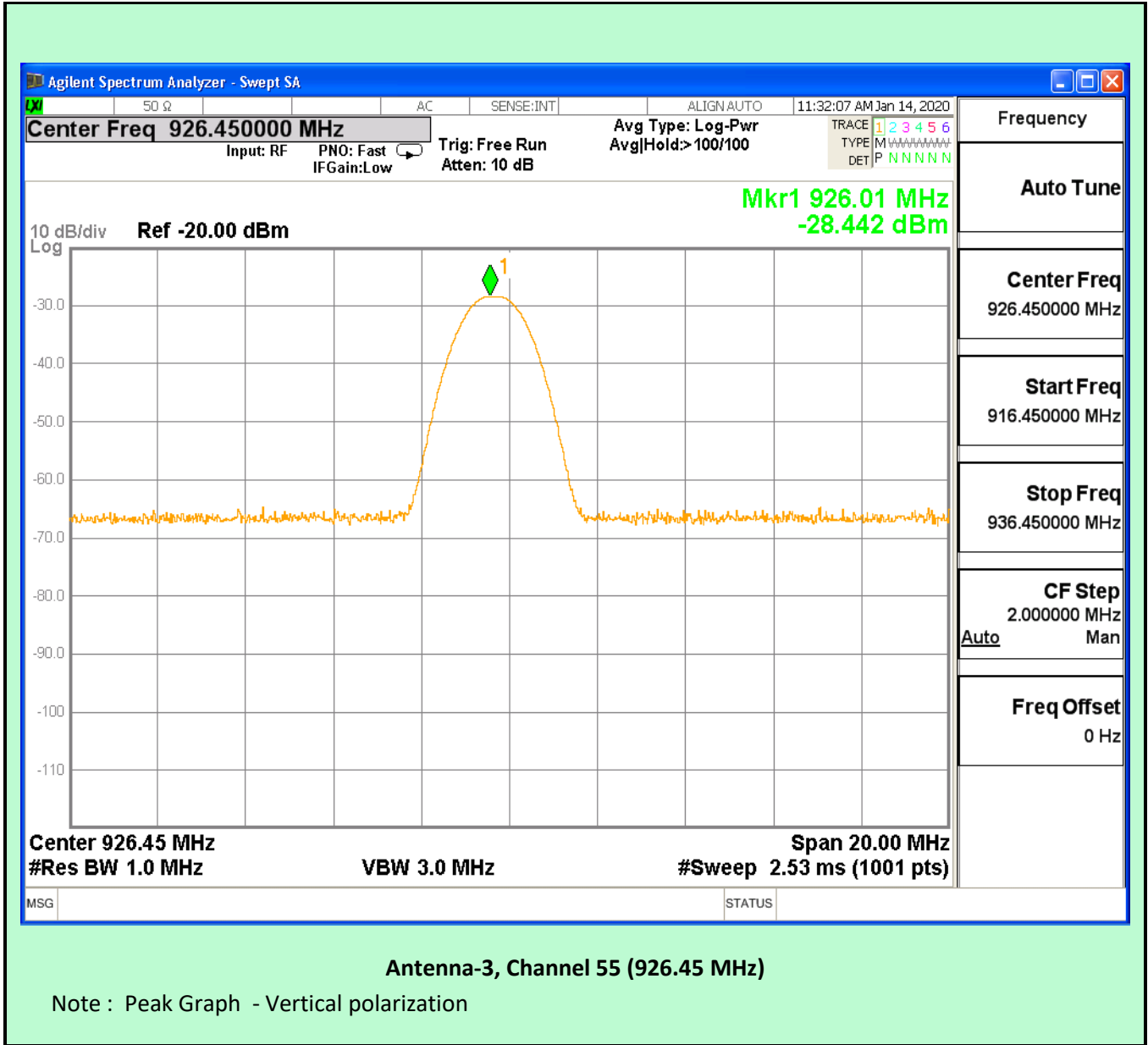












TEST RESULT – EIRP										
Channel	Channel Freq	Rx Antenna Height	Rx Ant Pol	Measured Level	Cable Loss	External Att	Path loss @ 3m	Rx Antenna Gain	Calculated Rx Power	Calculated EIRP
#	MHz	cm	H/V	dBm	dB	dB	dB	dBi	dBm	dBm
Antenna – 3 (FHSS Mode)										
CH-1	903.55	206	H	-31.46	2.91	6	41.21	6.3	-28.85	12.36
CH-1	903.55	221	V	-28.84	2.91	6	41.21	6.3	-26.23	14.98
CH-28	916	200	H	-28.7	2.91	6	41.21	6.3	-25.99	15.22
CH-28	916	360	V	-28.37	2.91	6	41.21	6.3	-25.76	15.45
CH-55	926.45	207	H	-26.71	2.91	6	41.21	6.3	-24.16	17.05
CH-55	926.45	214	V	-28.44	2.91	6	41.21	6.3	-25.83	15.38
<p><b>Note :</b> Effective Isotropic Radiated Power (dBm)= Pr(dBm) +Lp(dB)</p> <p>Pr = Pmeas(dBm)-Gr(dBi)+Lc(dB)+Latt(dB)</p> <p>Lp =20Log F+20LogD-27.5</p> <p>Where:</p> <p>Pr =Calculated Received Power Level(dBm)</p> <p>Lp= Free Space Path Loss(dB)</p> <p>Pmeas= Measured Power Level(dBm)</p> <p>Gr = Receiver Antenna Gain(dBi)</p> <p>Lc = Cable Loss (dB)</p> <p>Latt= External Attenuator(dB)</p> <p>F = Frequency (MHz)</p> <p>D= Distance (m)</p>										

## 3 DTS CHANNELS

### 3.1 SPURIOUS RADIATED EMISSIONS

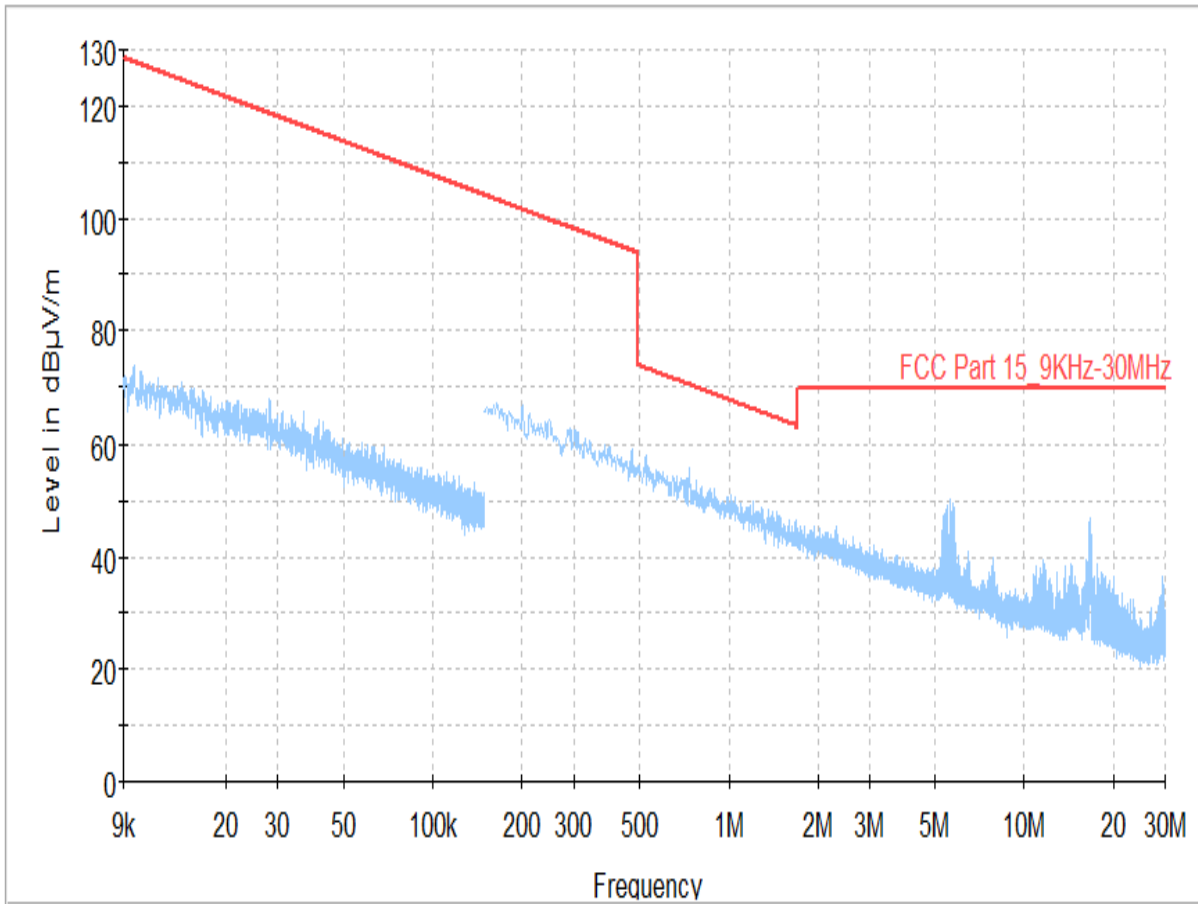
<b>EUT Nomenclature</b>	Wireless Pull Station	<b>Test Report No.</b>	EMC0421-1
<b>Model No.</b>	NBG-12WL	<b>Serial No.</b>	104
<b>Test Start Date</b>	14-Dec-2019	<b>Temperature (°C)</b>	23 ± 2
<b>Test End Date</b>	06-Jan-2020	<b>Humidity RH (%)</b>	55 ± 3
<b>Tested By</b>	Vinay Gujjar	<b>Pressure (mbar)</b>	NR
<b>Input Voltage / Freq</b>	3.3V, 5mA		
<b>Operating Mode</b>	Refer Page 5 Operating Modes Table		
<b>Test configuration</b>	Refer Page 5 Test Configuration Table		
<b>Deviation from Std</b>	NA		
<b>Comment</b>			
<b>TEST FREQUENCY RANGE</b>			
<b>Start Frequency</b>	9KHz	<b>Stop Frequency</b>	10GHz
<b>MAXIMUM OPERATING FREQUENCY</b>			
902MHz to 928MHz			
<b>TEST PARAMETERS</b>			
<b>Antenna Height</b>	1m to 4m	<b>Turntable Rotation</b>	0° to 360°
<b>Applicable standard</b>	FCC Part 15.209	<b>Test Method</b>	KDB 558074
<b>Equipment Class</b>	NA	<b>Measurement Distance</b>	3m

TEST EQUIPMENT					
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100229	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Double Ridge Guide Horn Antenna	ETS Lindgren	3117	64055	1-Nov-21
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	Loop Antenna	ETS Lindgren	6507	103694	15-Nov-21
Y	RF cable (9KHz to 18GHz)	AH Systems	SAC-18G-06	RE-03	20-Feb-20
Y	Signal Conditioning unit	R&S	SCU-18	10178	5-Jun-20
Y	High Pass Filter	Wainwright	WHKX1.5/15G-12ST	1	24-Feb-20
Y	EMC32 Software	R&S	8.30.0	820-OT101248	NA

Note: Switch ON /OFF the Internal Preamplifier based on carrier level and or noise floor without overloading the receiver

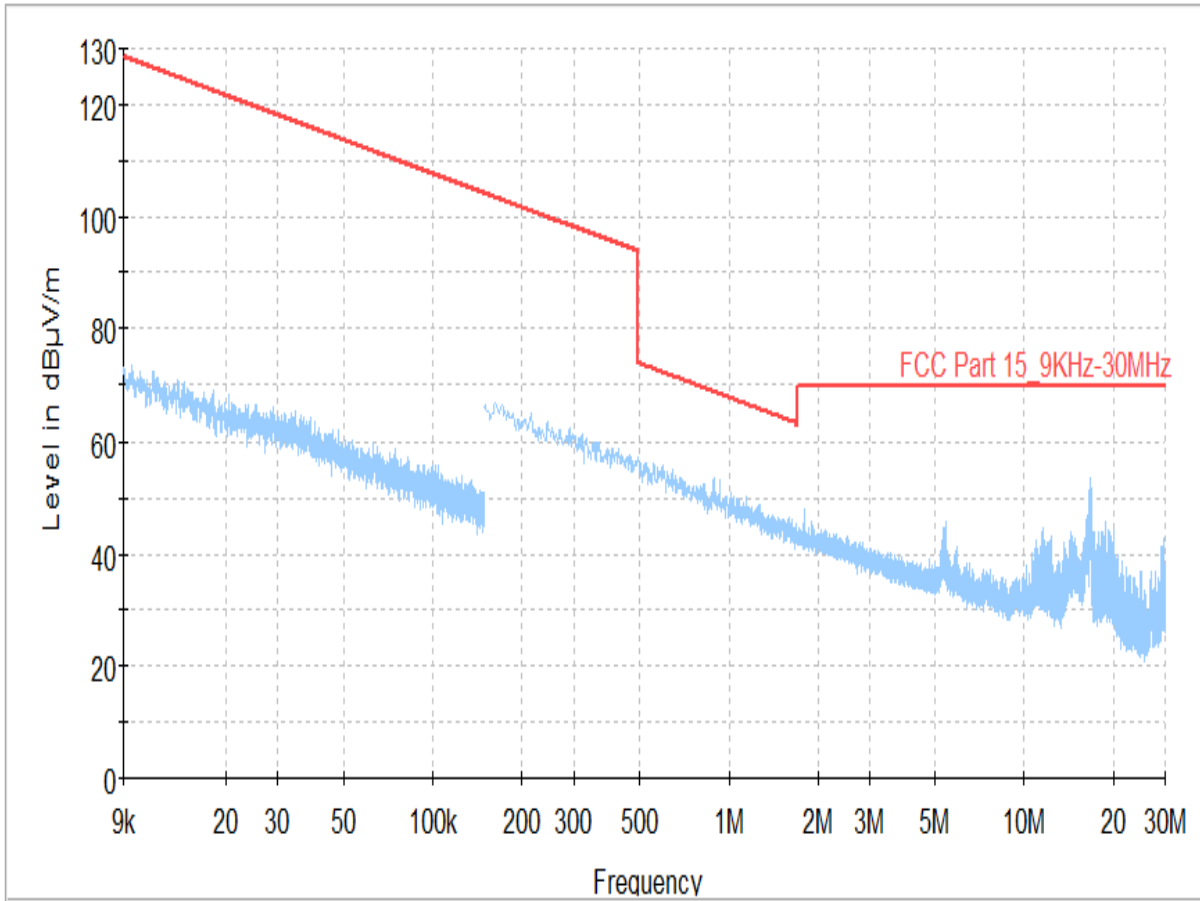


TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



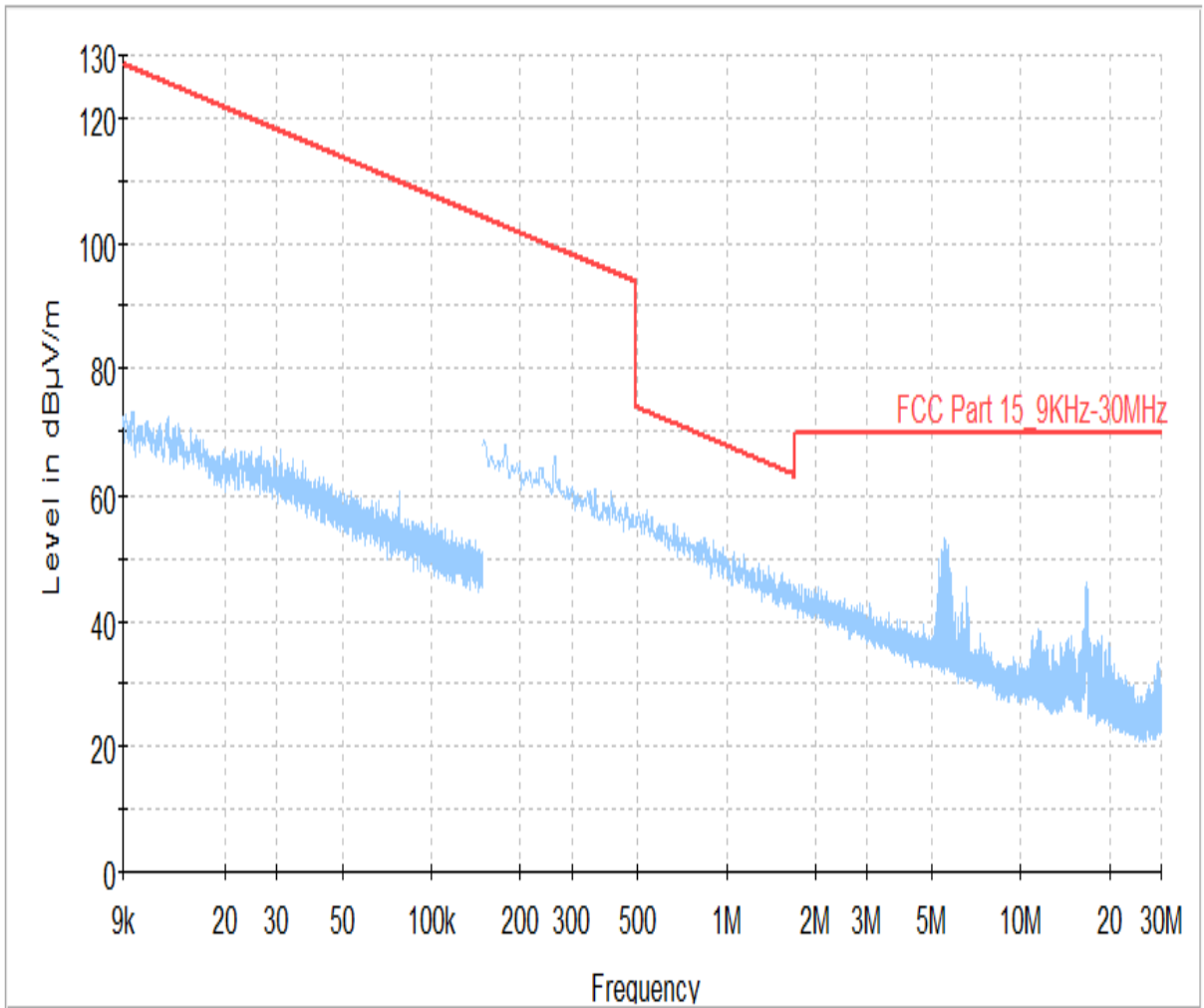
Channel 1 (902.875MHz) – Parallel

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



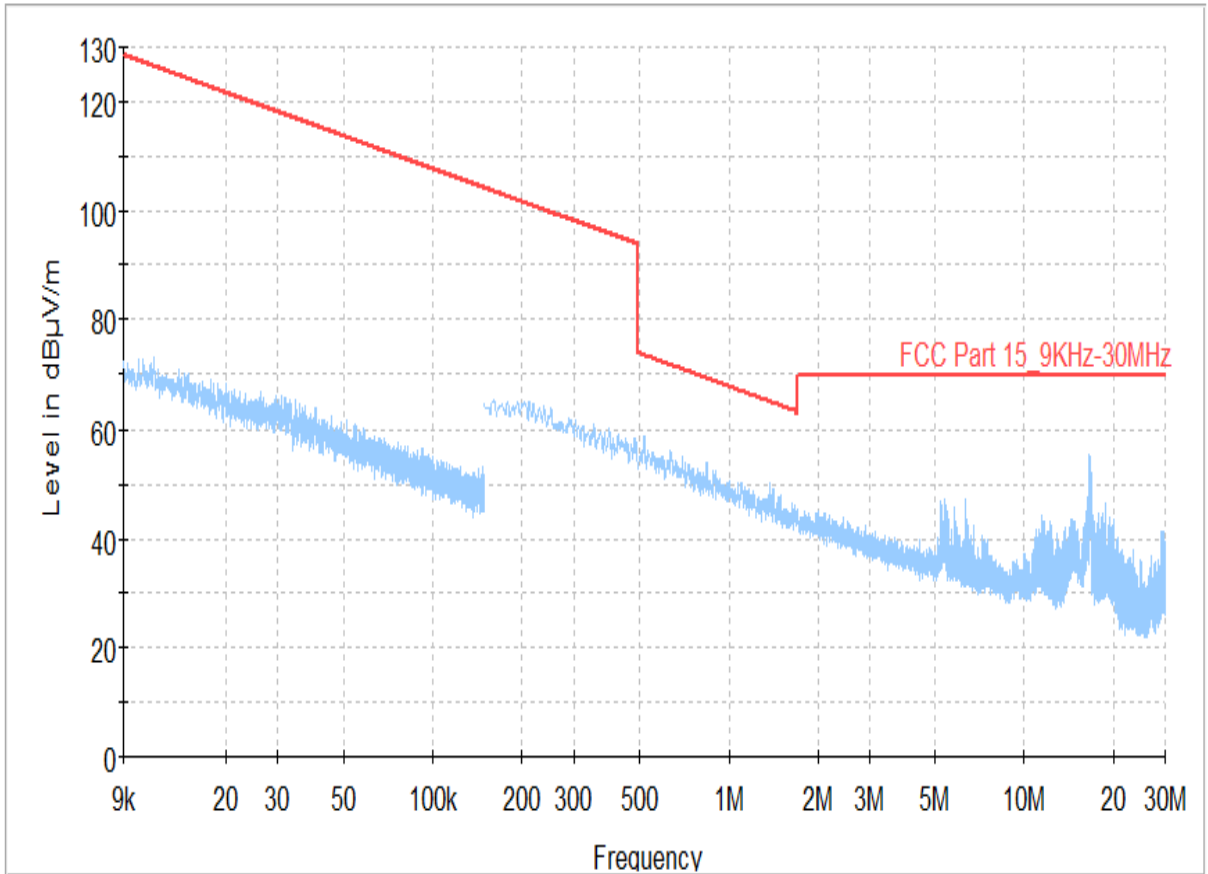
Channel 1 (902.875MHz) – Perpendicular

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



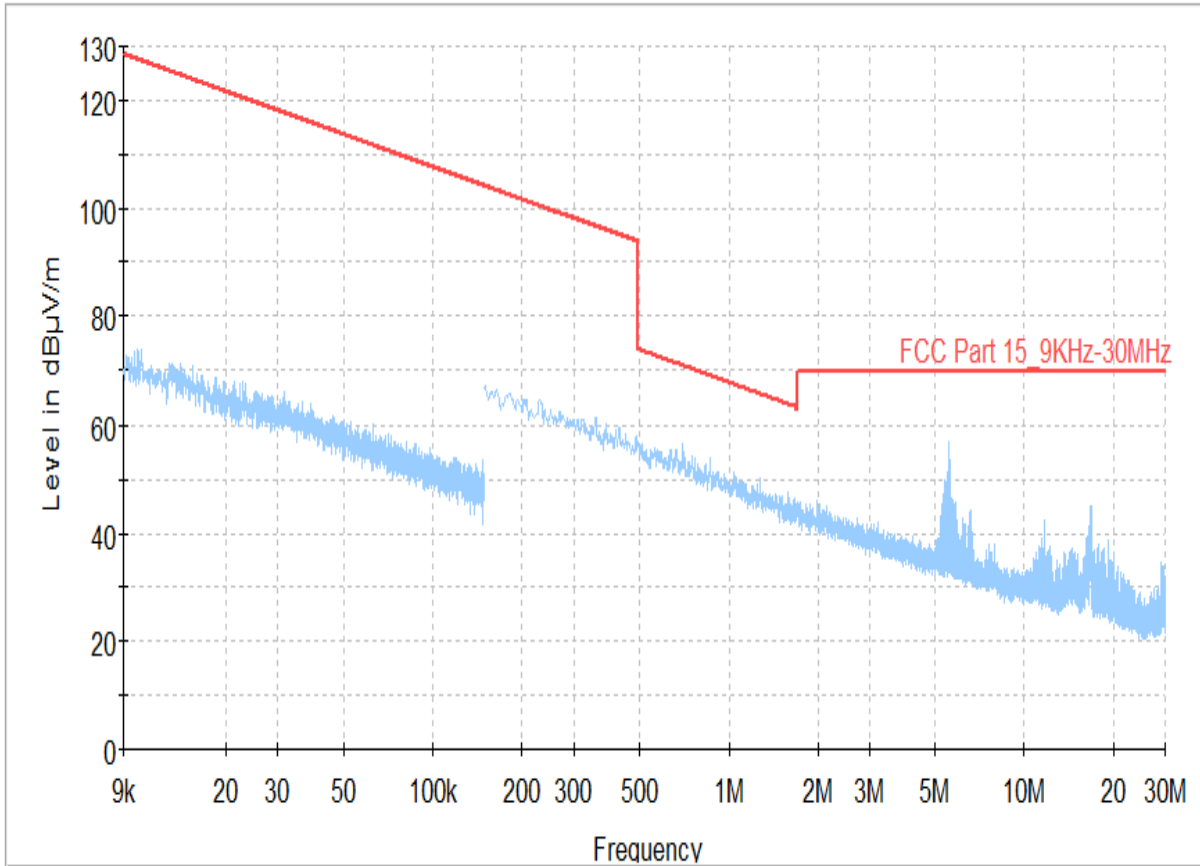
Channel 4 (915.325MHz) – Parallel

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



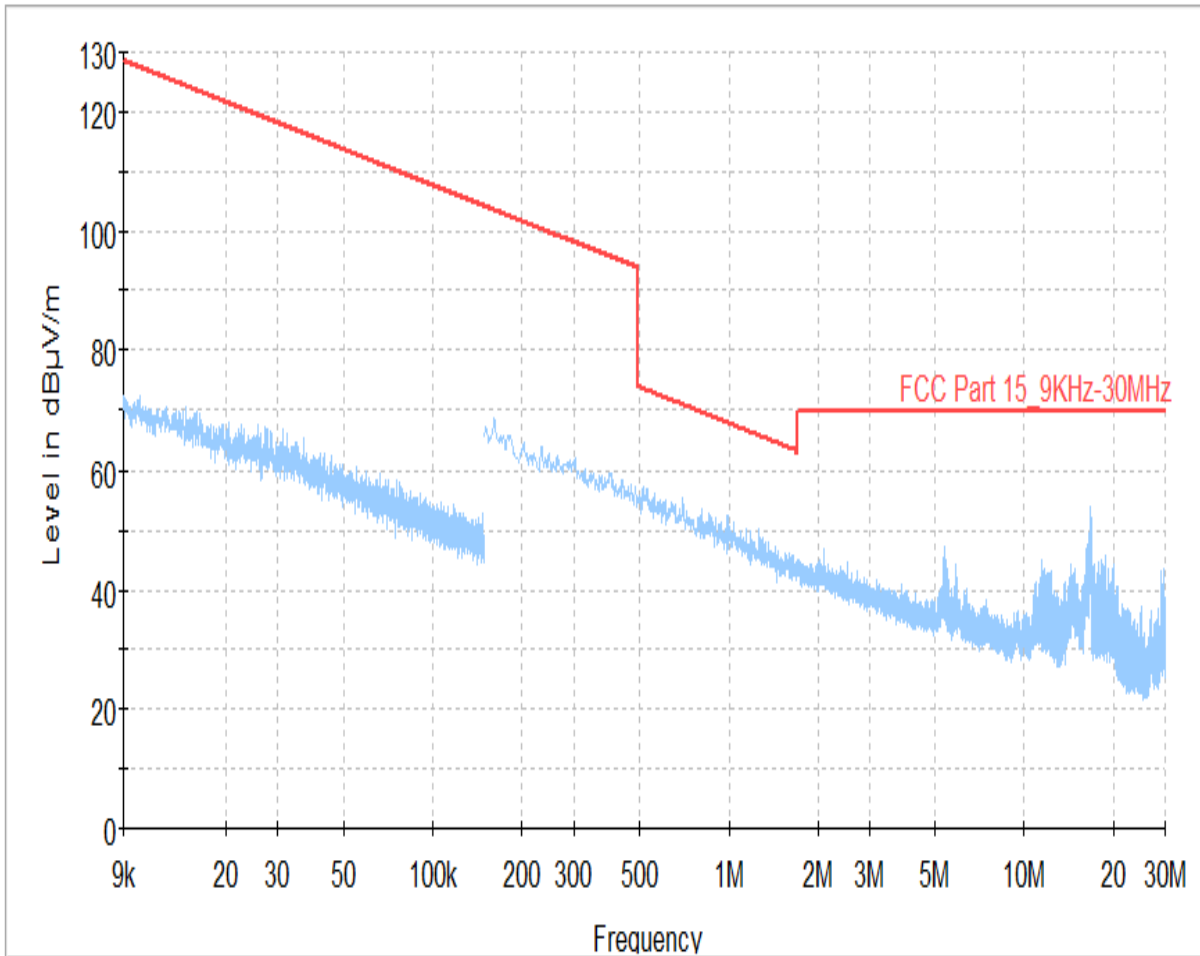
Channel 4 (915.325MHz) – Perpendicular

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



Channel 6 (927.125MHz) – Parallel

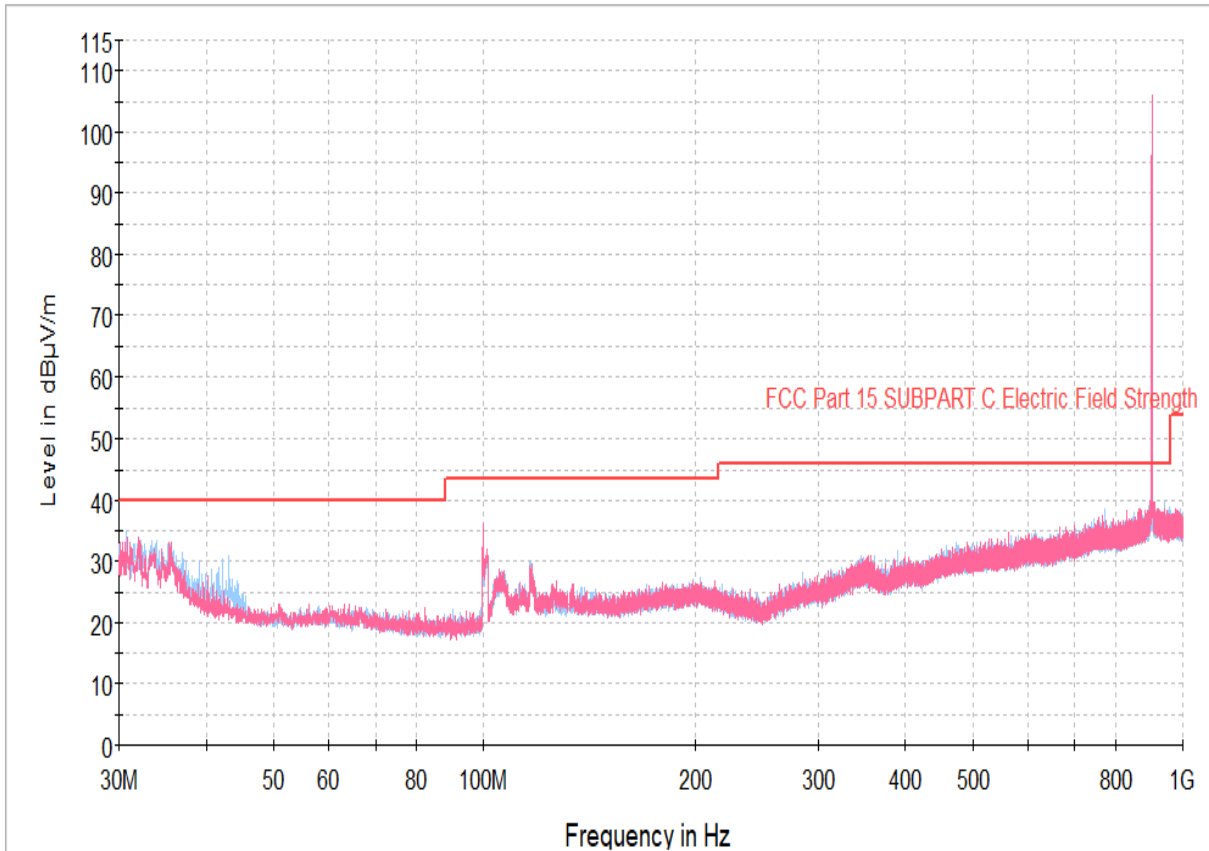
TEST GRAPHS – 9 KHz to 30 MHz (Antenna 3)



Channel 6 (927.125MHz) – Perpendicular

TEST RESULT – 9 KHz to 30 MHz									
Channel	Channel Frequency	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	MHz	dBµV/m	cm	Parallel / Perpendicular	deg	dB	dBµV/m	
No emissions detected. Emissions shown in the plot are related to the chamber ambient									
NOTE: Measured Field Strength –dBuV/m (9 KHz to 1 GHz) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)									

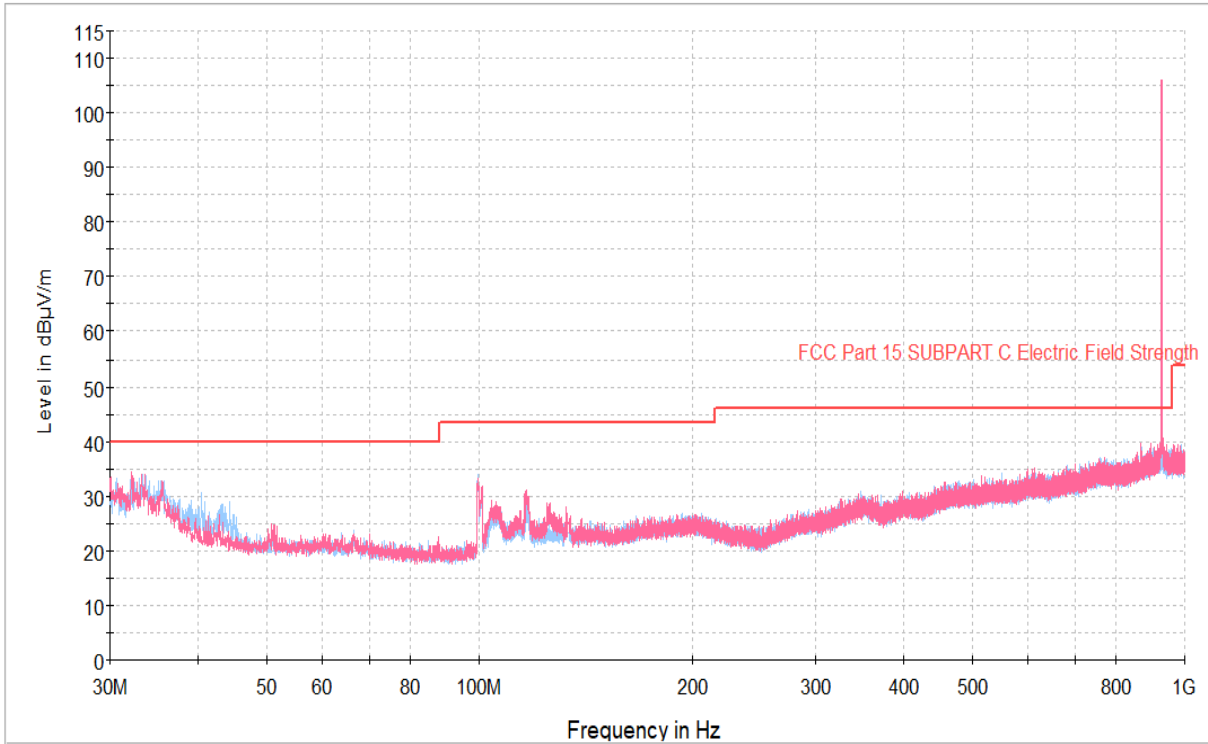
TEST GRAPHS – 30MHz to 1GHz (Antenna 3)



Channel 1 (902.875MHz) – Antenna 3

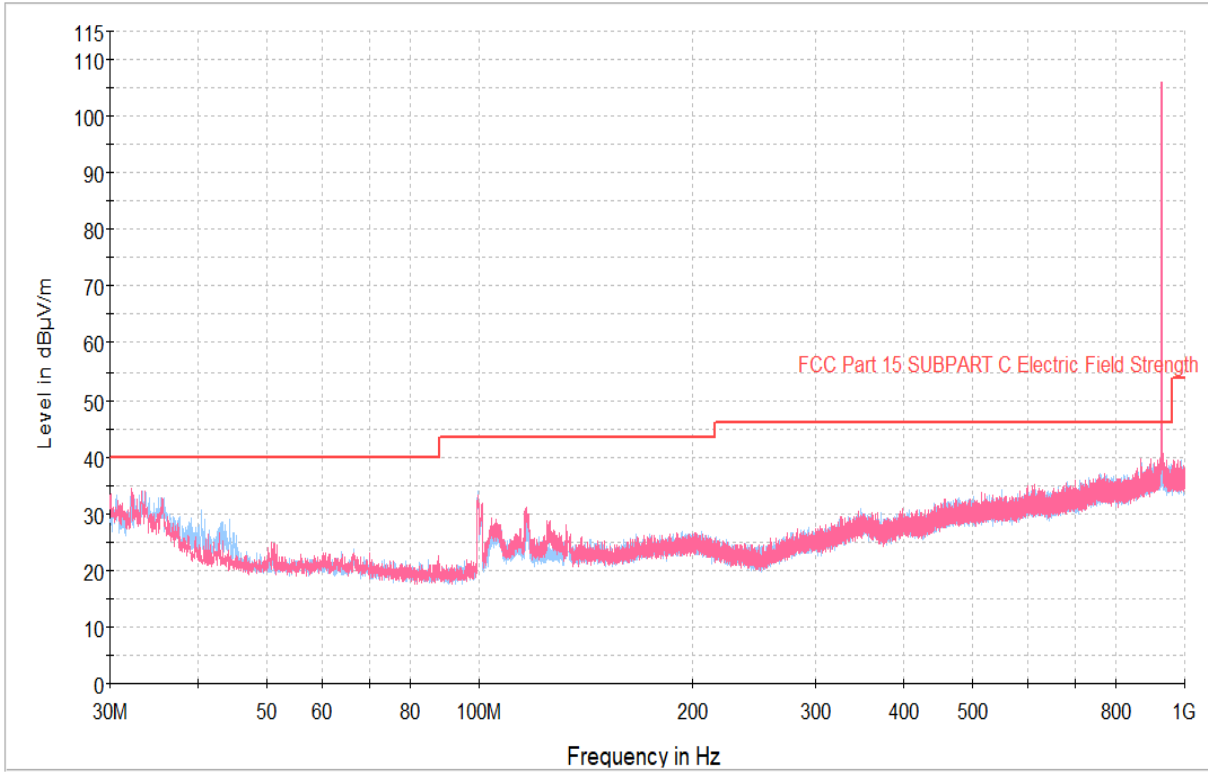


TEST GRAPHS – 30MHz to 1GHz (Antenna 3)



Channel 4 (915.325MHz) – Antenna 3

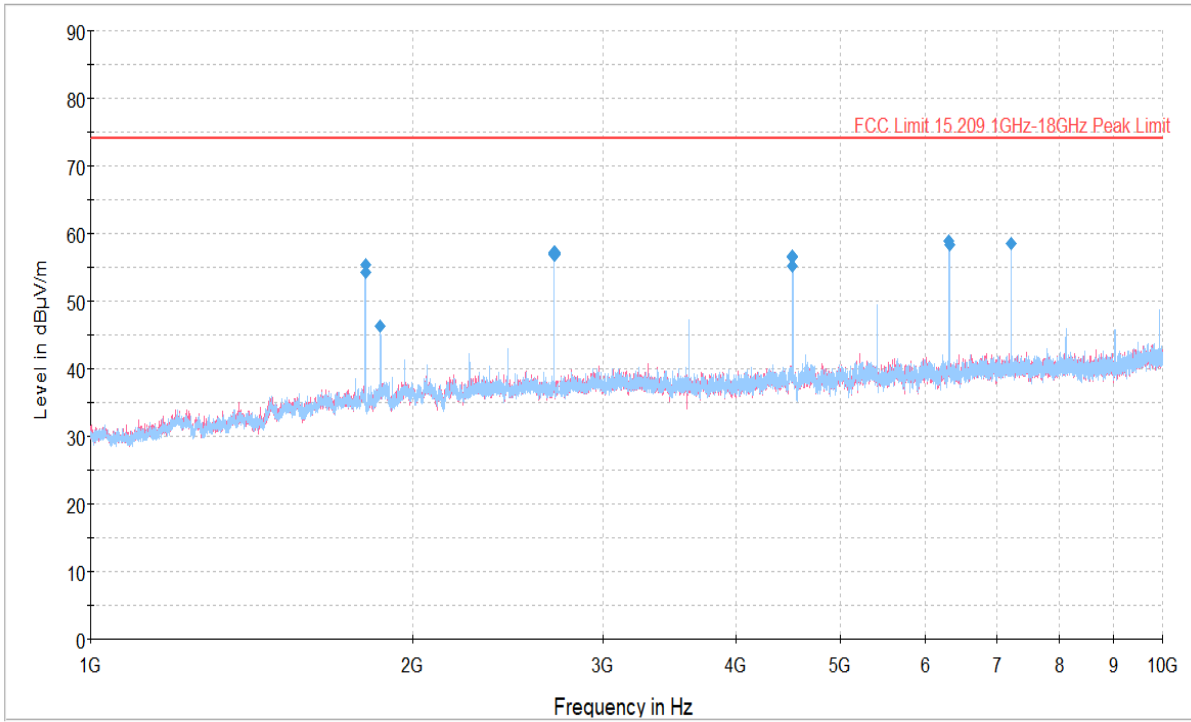
TEST GRAPHS – 30MHz to 1GHz (Antenna 3)



Channel 6 (927.125MHz) – Antenna 3

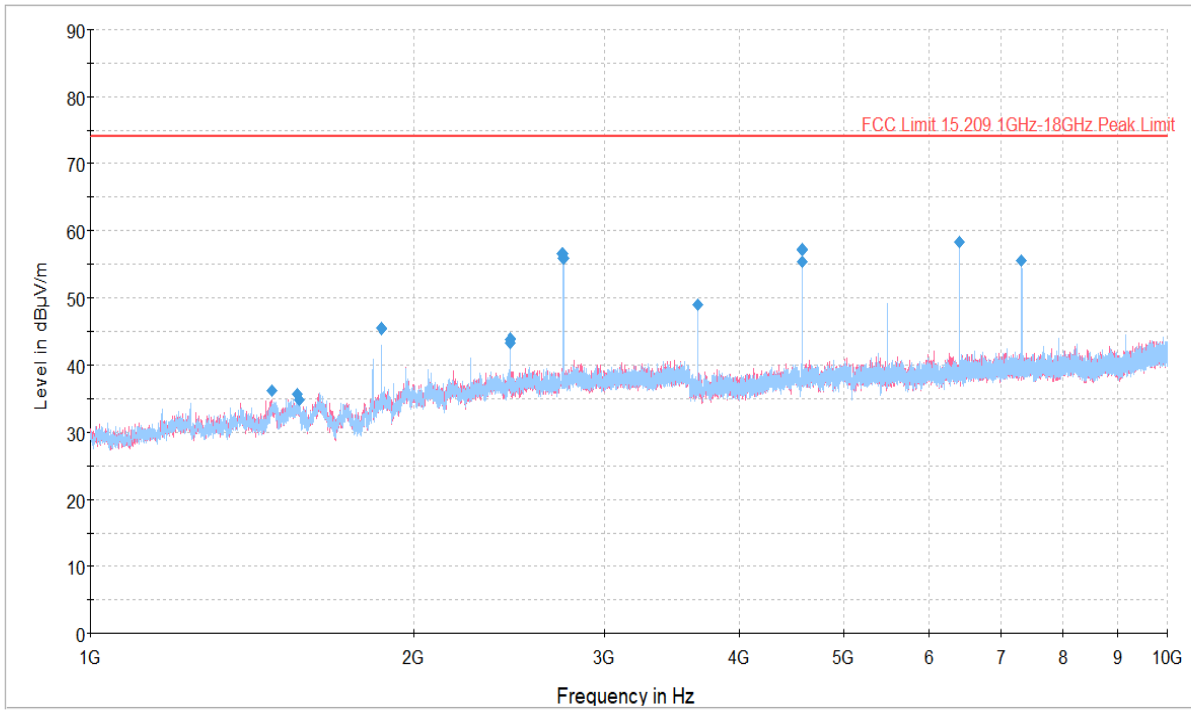
TEST RESULT – 30 MHz to 1 GHz								
Channel	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	dBµV/m	Cm	H / V	deg	dB	dBµV/m	
Antenna – 3								
CH-1	679.12	25.93	200	H	214	20.07	46	Pass
CH-1	688.24	26.15	300	H	312	19.85	46	Pass
CH-1	695.61	26.38	100	H	85	19.62	46	Pass
CH-1	823.07	27.88	400	V	130	18.12	46	Pass
CH-1	836.07	28.22	200	V	355	17.78	46	Pass
CH-1	838.20	28.33	100	V	334	17.67	46	Pass
CH-1	902.74	106.06	100	V	61	-	-	Intended Frequency
CH-4	663.41	25.48	300	H	148	20.52	46	Pass
CH-4	682.62	26.06	100	H	359	19.94	46	Pass
CH-4	691.35	26.24	300	V	272	19.76	46	Pass
CH-4	818.42	27.77	400	H	294	18.23	46	Pass
CH-4	824.82	27.9	300	H	278	18.1	46	Pass
CH-4	843.64	28.37	200	V	262	17.63	46	Pass
CH-4	915.22	102.45	100	V	39	-	-	Intended Frequency
CH-6	678.74	31.49	200	H	225	14.51	46	Pass
CH-6	689.02	31.82	100	H	198	14.18	46	Pass
CH-6	794.75	33.31	200	H	225	12.69	46	Pass
CH-6	836.07	34.03	400	V	63	11.97	46	Pass
CH-6	847.13	34.34	200	V	332	11.66	46	Pass
CH-6	926.99	106.06	100	V	41	-	-	Intended Frequency
NOTE: Measured Field Strength –dBuV/m (9 KHz to 1 GHz) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)								

TEST GRAPHS – 1GHz to 10GHz (Antenna 3)



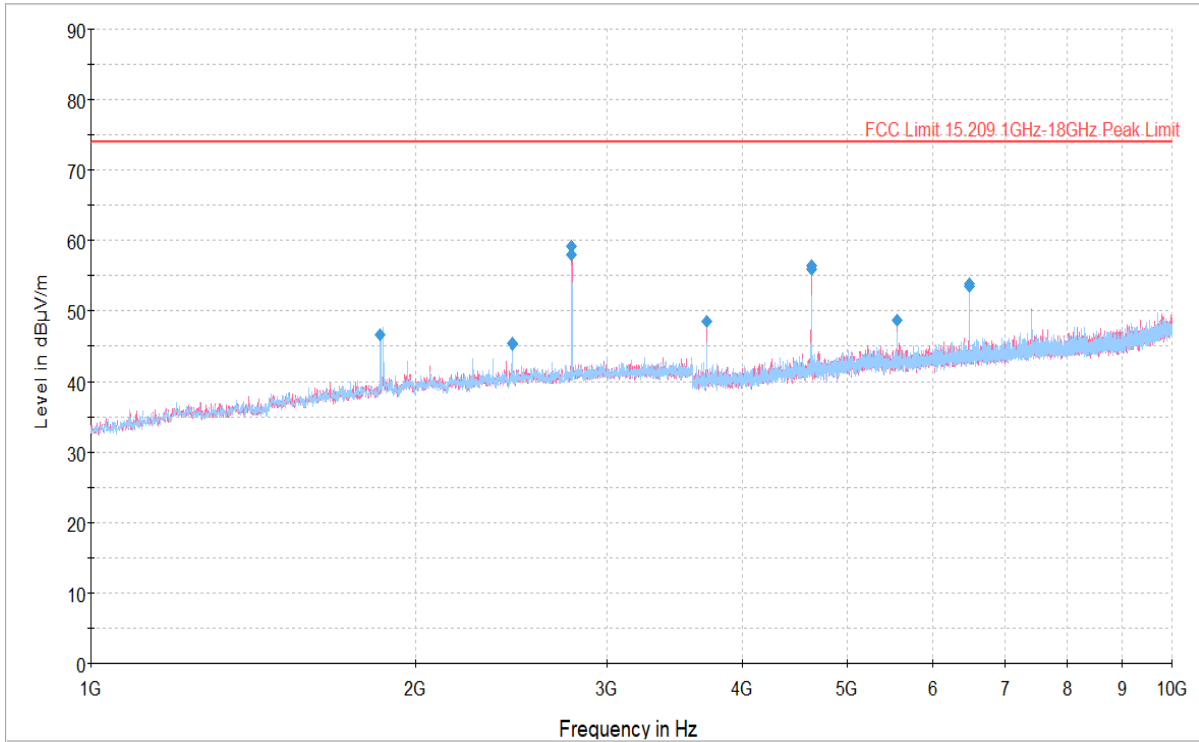
Channel 1 (902.875MHz) – Antenna 3

TEST GRAPHS – 1GHz to 10GHz (Antenna 3)



Channel 4 (915.325MHz) – Antenna 3

TEST GRAPHS – 1GHz to 10GHz (Antenna 3)



Channel 6 (927.125MHz) – Antenna 3

TEST RESULT – 1 GHz to 10 GHz						RESTRICTED BAND – PEAK		
Channel	Frequency	Measured MaxPeak	Height	Ant Pol	Azimuth	Margin	Limit	Result
#	(MHz)	(dBµV/m)	(cm)	H / V	(deg)	(dB)	(dBµV/m)	
Antenna – 3								
CH-1	2707.60	56.76	400	H	179	17.24	74	PASS
CH-1	2708.20	56.89	400	H	179	17.11	74	PASS
CH-1	2709.40	57.2	100	H	193	16.8	74	PASS
CH-1	4513.00	56.54	200	H	147	17.46	74	PASS
CH-1	4514.80	55.04	200	H	136	18.96	74	PASS
CH-1	4515.70	56.49	300	H	147	17.51	74	PASS
CH-4	2745.04	56.5	100	H	193	17.5	74	PASS
CH-4	2746.64	55.89	100	H	203	18.11	74	PASS
CH-4	3662.39	48.89	300	H	131	25.11	74	PASS
CH-4	4575.25	57.11	200	H	151	16.89	74	PASS
CH-4	4576.54	55.34	200	H	121	18.66	74	PASS
CH-4	4578.14	57.15	400	H	111	16.85	74	PASS
CH-4	7320.25	55.45	200	H	131	18.55	74	PASS
CH-6	2780.39	58.3	300	H	164	15.7	74	PASS
CH-6	2782.00	58.47	300	H	190	15.53	74	PASS
CH-6	3709.32	49.18	200	H	139	24.82	74	PASS
CH-6	4634.07	58.45	200	H	155	15.55	74	PASS
CH-6	4635.68	56.35	200	H	144	17.65	74	PASS
CH-6	4637.29	58.38	200	H	150	15.62	74	PASS
CH-6	7419.57	52.26	300	H	127	21.74	74	PASS
Note : Measured Field Strength (dBuV/m) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss - Pre amplifier Gain (dB)								

TEST RESULT – 1 GHz to 10 GHz						RESTRICTED BAND – AVERAGE		
Channel	Frequency	Measured Average	Height	Ant Pol	Azimuth	Margin	Limit	Result
#	(MHz)	(dBµV/m)	(cm)	H / V	(deg)	(dB)	(dBµV/m)	
Antenna – 3								
CH-1	2708.20	50.14	400	H	179	3.86	54	PASS
CH-1	2709.10	49.87	100	H	193	4.13	54	PASS
CH-1	4513.30	46.9	300	H	150	7.1	54	PASS
CH-1	4515.40	46.51	200	H	136	7.49	54	PASS
CH-4	2258.07	36.27	400	H	146	17.73	54	PASS
CH-4	2745.36	49.23	100	H	198	4.77	54	PASS
CH-4	2746.64	48.61	100	H	203	5.39	54	PASS
CH-4	3662.39	38.73	300	H	131	15.27	54	PASS
CH-4	4575.57	47.3	200	H	131	6.7	54	PASS
CH-4	4577.82	47.22	300	H	121	6.78	54	PASS
CH-6	2781.68	50.47	300	H	179	3.53	54	PASS
CH-6	3709.64	38.64	300	H	116	15.36	54	PASS
CH-6	4634.39	48.76	300	H	143	5.24	54	PASS
CH-6	4635.36	46.67	300	H	153	7.33	54	PASS
CH-6	4636.96	48.75	300	H	153	5.25	54	PASS
CH-6	7419.57	40.03	200	H	139	13.97	54	PASS
Note : Measured Field Strength (dBuV/m) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss - Pre amplifier Gain (dB)								



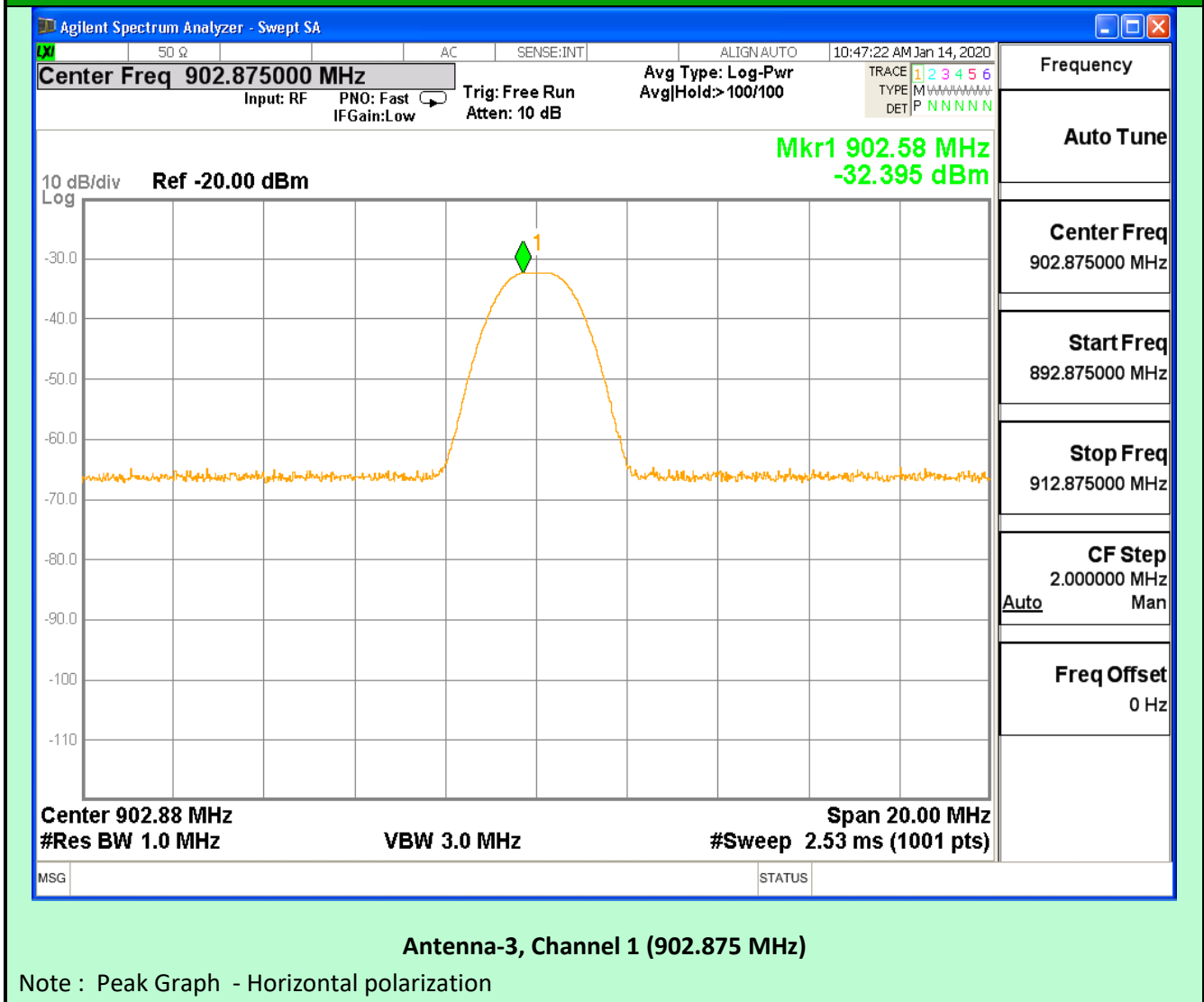
TEST RESULT – 1 GHz to 10 GHz							NON RESTRICTED BAND - PEAK		
Channel	Measured Fundamental	Frequency	Measured Peak field Strength	Height	Ant Pol	Azimuth	Peak Limit [Fundamental – 20 dB]	Margin	Results
#	dBµV/m	MHz	dBµV/m	cm	H / V	deg	dBuV/m	dB	
Antenna – 3									
CH-1	106.06	1804.9	54.26	100	H	204	86.06	31.8	PASS
CH-1	106.06	1806.1	55.38	100	H	204	86.06	30.68	PASS
CH-1	106.06	1865.2	46.17	400	H	326	86.06	39.89	PASS
CH-1	106.06	6318.1	58.88	200	H	114	86.06	27.18	PASS
CH-1	106.06	6322.3	58.28	200	H	114	86.06	27.78	PASS
CH-1	106.06	7225.3	58.44	300	H	118	86.06	27.62	PASS
CH-4	106.45	1865.2857	45.38	400	H	157	86.45	41.07	PASS
CH-4	106.45	2454.1429	43.34	400	H	292	86.45	43.11	PASS
CH-4	106.45	2454.7857	43.91	400	H	121	86.45	42.54	PASS
CH-4	106.45	6405.1429	58.29	200	H	121	86.45	28.16	PASS
CH-4	106.45	6409.3214	58.33	200	H	126	86.45	28.12	PASS
CH-6	106.06	1853.3929	49	200	H	202	86.06	37.06	PASS
CH-6	106.06	1854.0357	50.04	200	H	202	86.06	36.02	PASS
CH-6	106.06	1854.6786	50.36	200	H	202	86.06	35.7	PASS
CH-6	106.06	5560.75	50.89	200	H	144	86.06	35.17	PASS
CH-6	106.06	5561.3929	48.24	300	V	278	86.06	37.82	PASS
CH-6	106.06	6487.75	56.98	200	H	118	86.06	29.08	PASS
CH-6	106.06	6489.6786	53.48	200	H	144	86.06	32.58	PASS
CH-6	106.06	6491.9286	57.14	200	H	118	86.06	28.92	PASS
<u>Note :</u>									
Measured Harmonic Field Strength (dBuV/m) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss - Pre amplifier Gain (dB)									

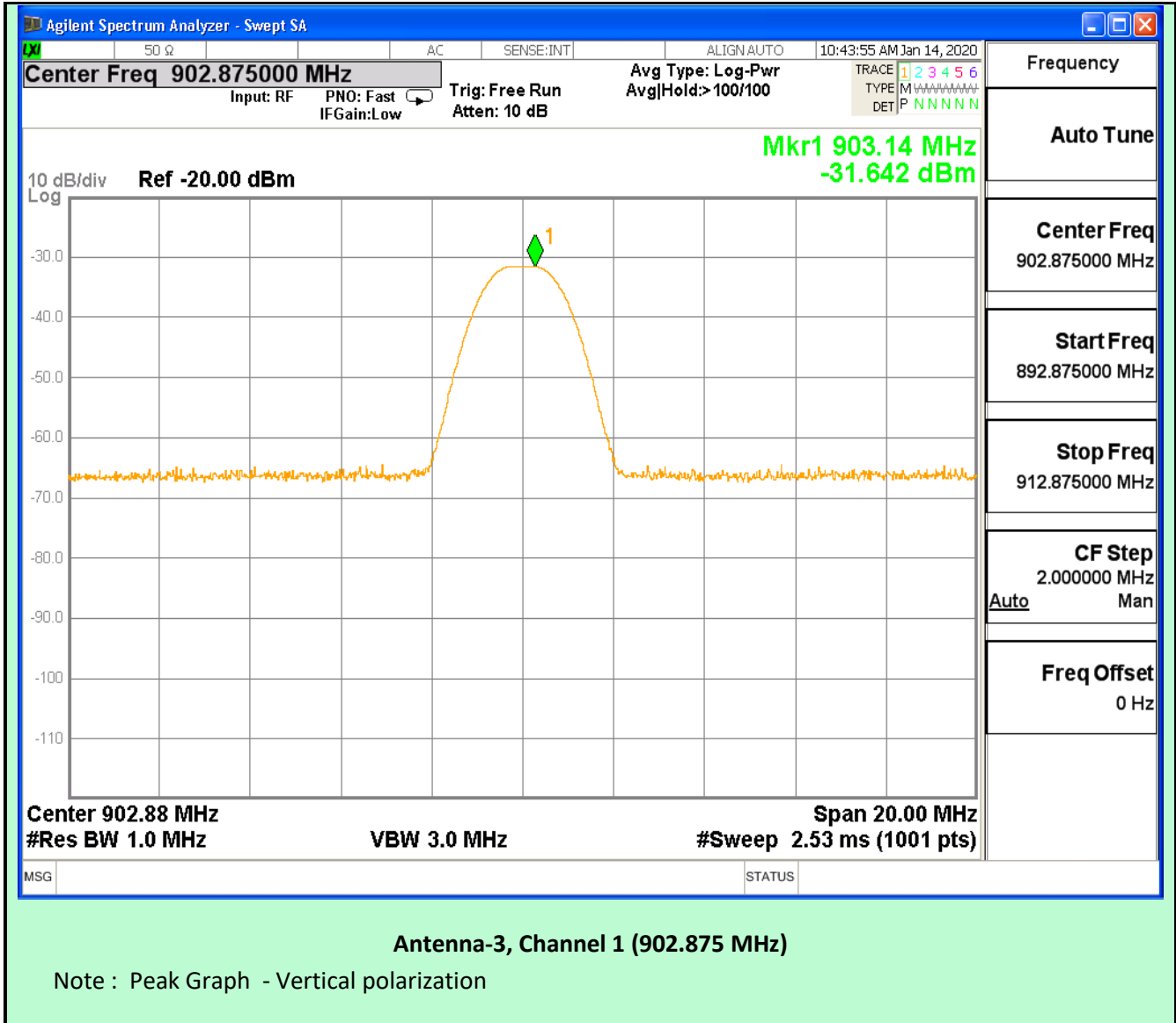
3.2 EFFECTIVE ISOTROPIC RADIATED POWER			
EUT Nomenclature	Wireless Pull Station	Test Request No.	EMC0421-1
Model No.	NBG-12WL	Serial No.	104
Test Start Date	14-Dec-2019	Temperature (°C)	23 ± 2
Test End Date	06-Jan-2020	Humidity RH (%)	55 ± 3
Tested By	Vinay Gujjar	Pressure (mbar)	NR
Input Voltage / Freq	3.3V, 5mA		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std	NA		
Applicable standard	FCC Part 15.247: 2010 & 15.209 :2010		
Test Method	KDB 412172		
Comment	NA		
TEST DETAILS			
Method	<input checked="" type="checkbox"/> Radiated		<input type="checkbox"/> Conducted
TEST PARAMETERS			
Antenna Height	1m to 4m	Turntable Rotation	0° to 360°
Equipment Class	NA	Measurement Distance	3m

TEST EQUIPMENT					
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100525	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	RF cable (9KHz to 1GHz)	AH System	SAC-18G-06	RE-03	20-Feb-20

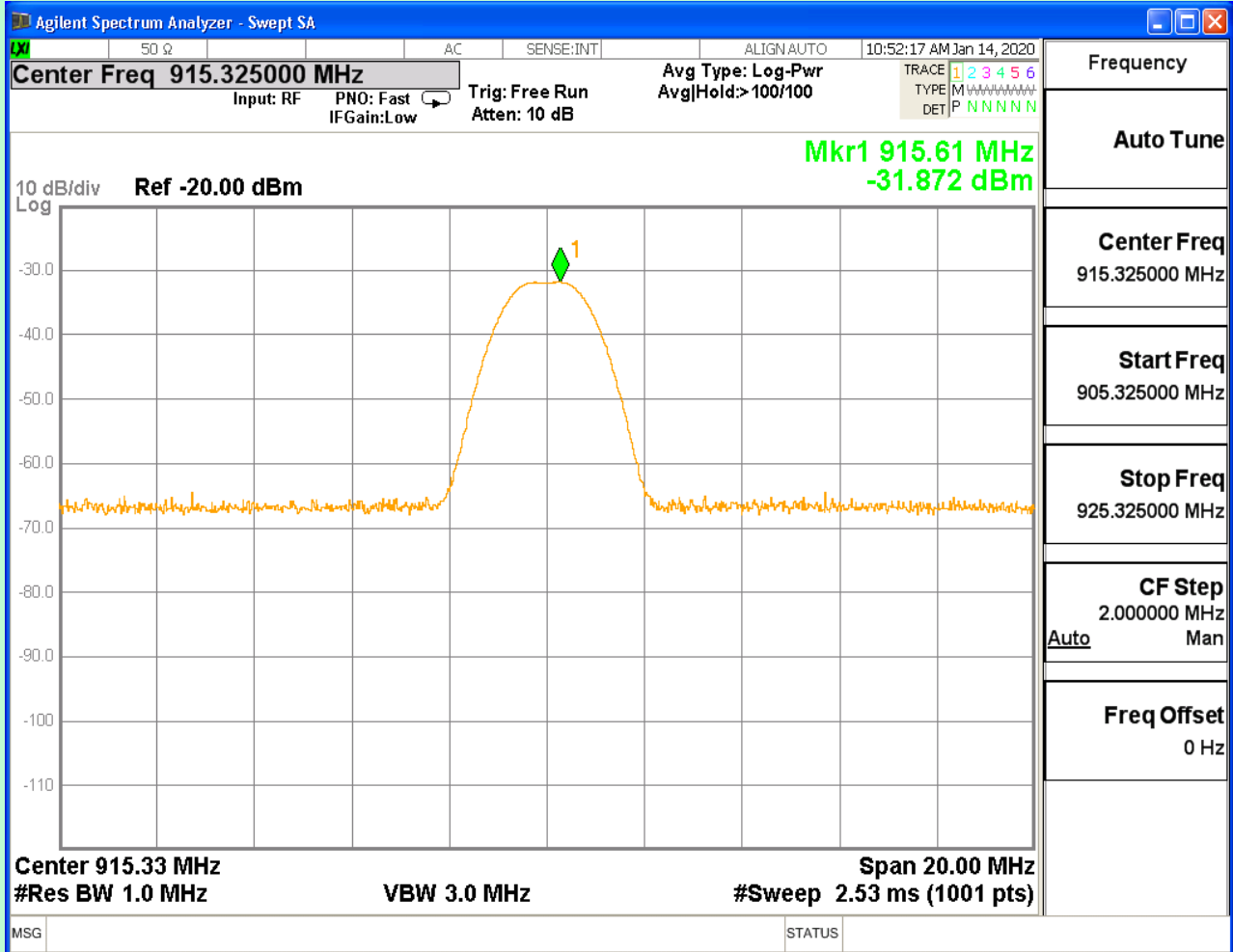
Note: Switch ON /OFF the Internal Preamplifier based on carrier level and or noise floor without overloading the receiver

TEST GRAPHS – EIRP



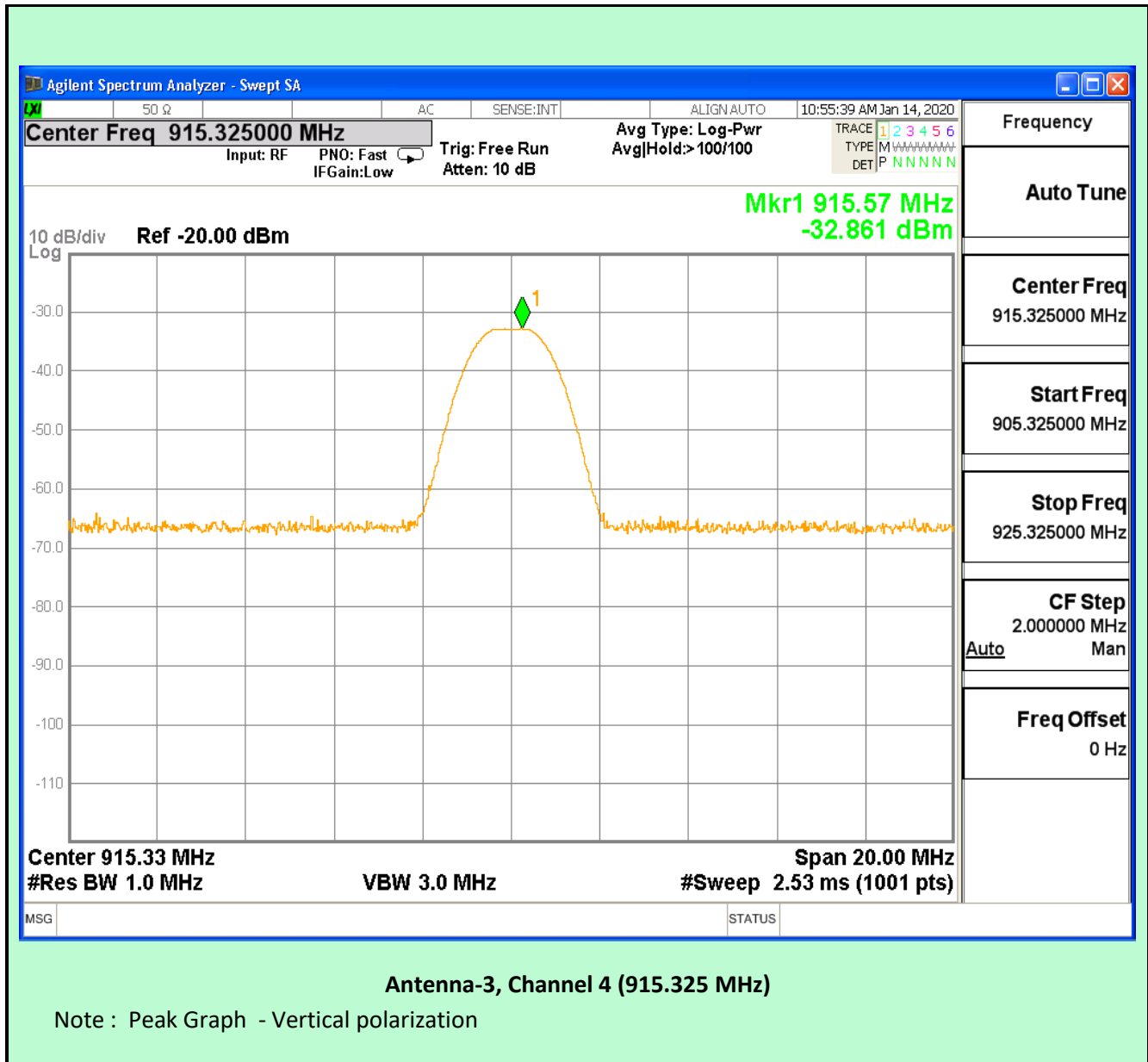


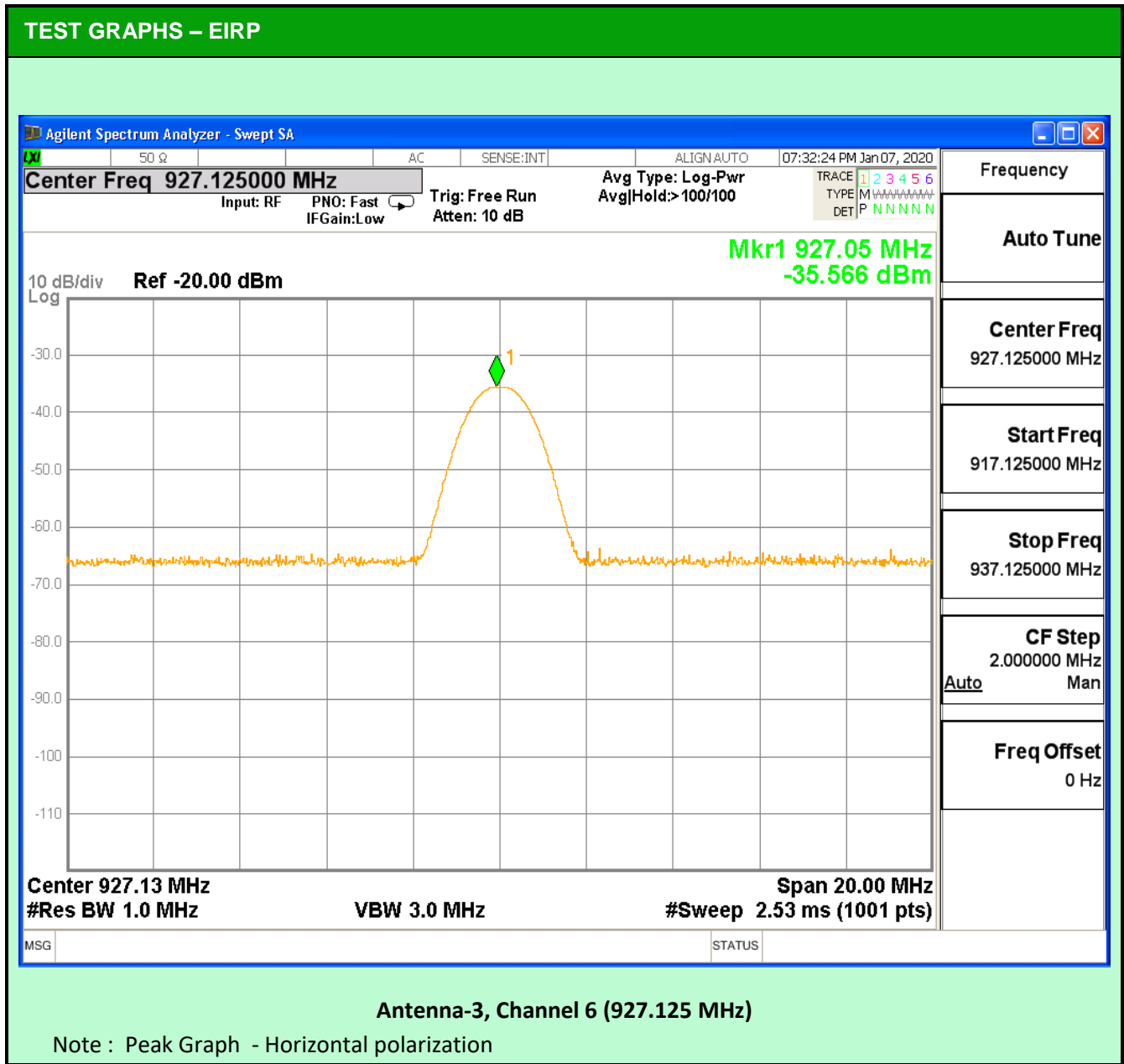
TEST GRAPHS – EIRP

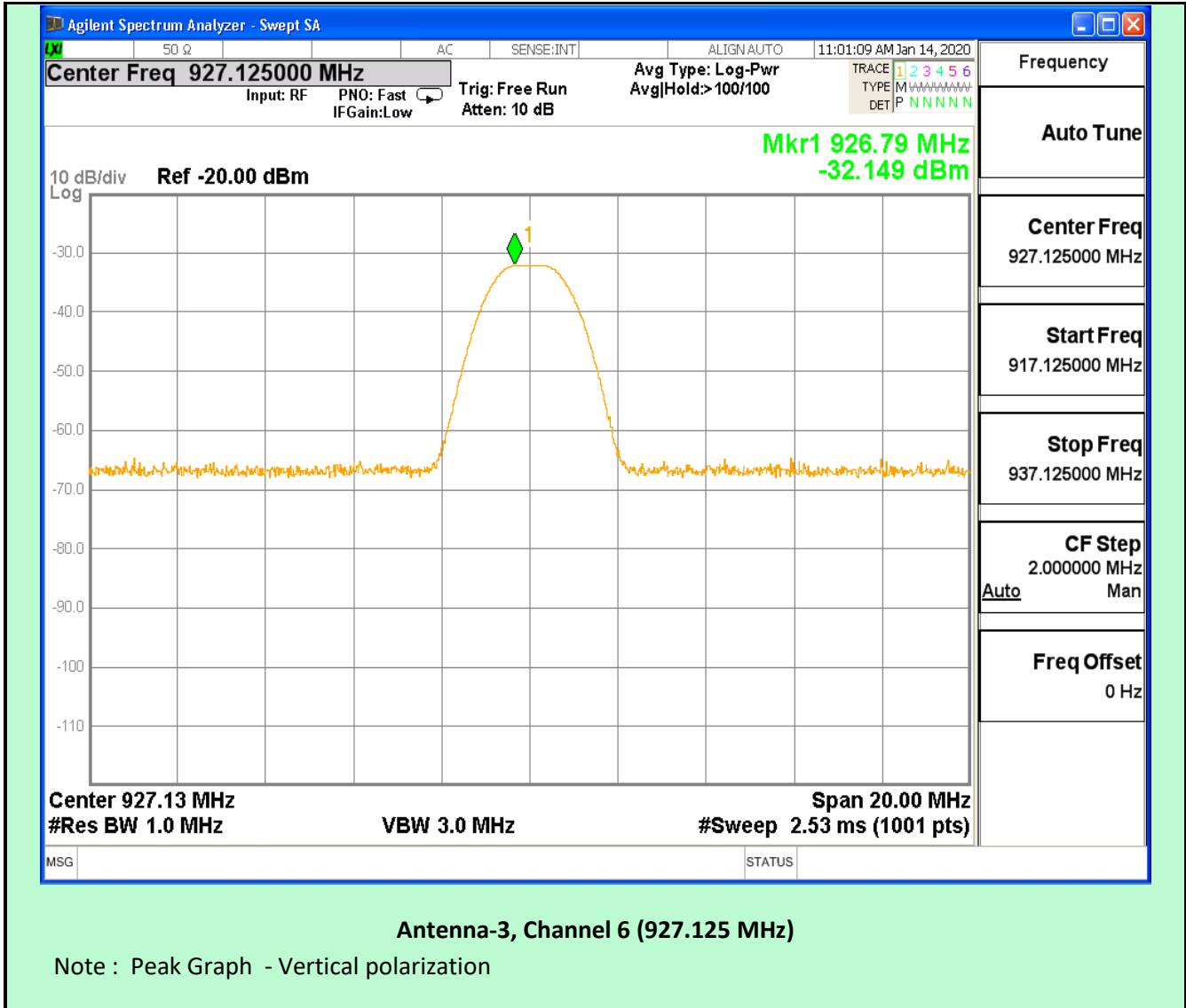


Antenna-3, Channel 4 (915.325 MHz)

Note : Peak Graph - Horizontal polarization









TEST RESULT – EIRP										
Channel	Channel Freq	Rx Antenna Height	Rx Ant Pol	Measured Level	Cable Loss	External Att	Path loss @ 3m	Rx Antenna Gain	Calculated Rx Power	Calculated EIRP
#	MHz	cm	H/V	dBm	dB	dB	dB	dBi	dBm	dBm
Antenna – 3 (DTS Mode)										
CH-1	902.875	274	H	-32.39	2.91	6	41.21	6.3	-29.78	11.43
CH-1	902.875	220	V	-31.64	2.91	6	41.21	6.3	-29.03	12.18
CH-4	915.325	382	H	-31.87	2.91	6	41.21	6.3	-29.26	11.95
CH-4	915.325	210	V	-32.86	2.91	6	41.21	6.3	-30.25	10.96
CH-6	927.125	156	H	-35.56	2.91	6	41.21	6.3	-32.95	8.26
CH-6	927.125	371	V	-32.14	2.91	6	41.21	6.3	-29.52	11.69
<p><b>Note :</b> Effective Isotropic Radiated Power (dBm)= Pr(dBm) +Lp(dB)</p> <p>Pr = Pmeas(dBm)-Gr(dBi)+Lc(dB)+Latt(dB)</p> <p>Lp =20Log F+20LogD-27.5</p> <p>Where:</p> <p>Pr =Calculated Received Power Level(dBm)</p> <p>Lp= Free Space Path Loss(dB)</p> <p>Pmeas= Measured Power Level(dBm)</p> <p>Gr = Receiver Antenna Gain(dBi)</p> <p>Lc = Cable Loss (dB)</p> <p>Latt= External Attenuator(dB)</p> <p>F = Frequency (MHz)</p> <p>D= Distance (m)</p>										

# Annexure – 1

**RADIATED EMISSION SETUP**



**Radiated Emission Setup – 9 KHz to 30 MHz [ Parallel ]**



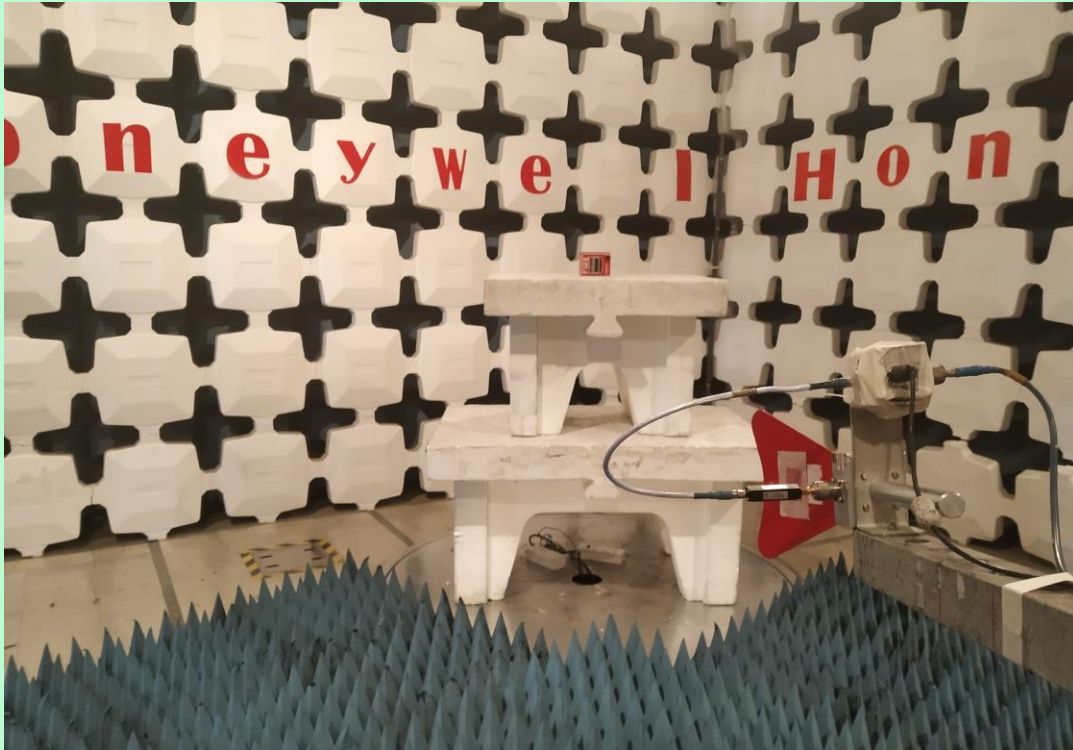
**Radiated Emission Setup – 9 KHz to 30 MHz [ Perpendicular ]**



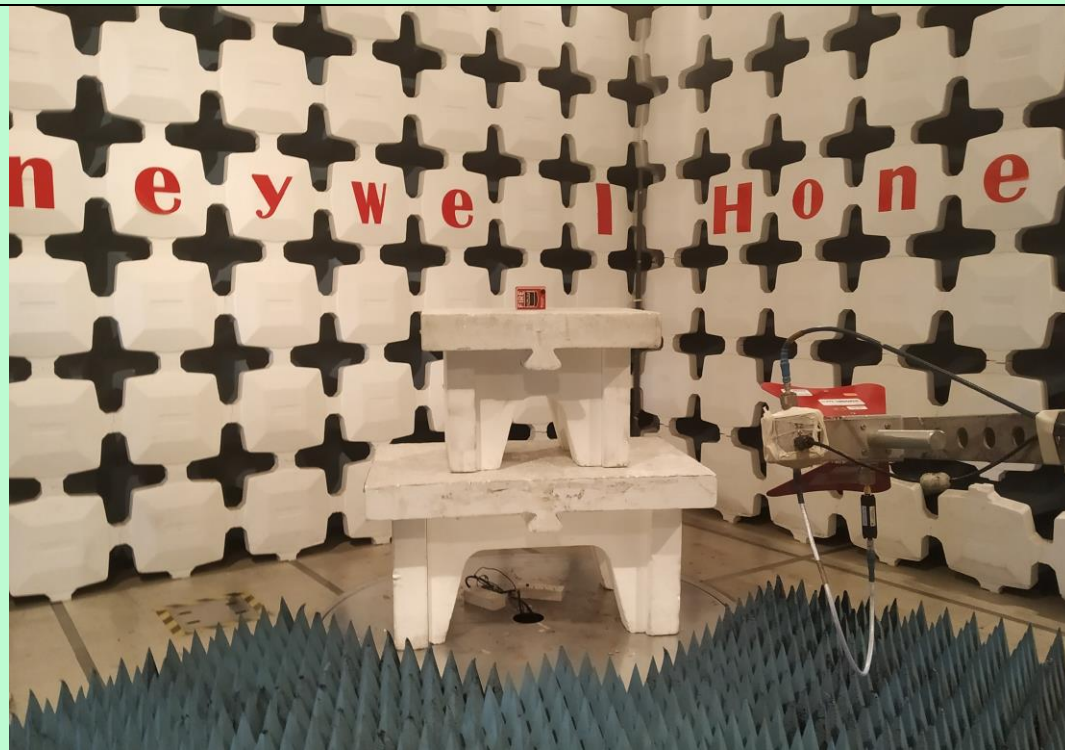
Radiated Emission Setup -30 MHz to 1 GHz [ Horizontal Polarization]



Radiated Emission Setup -30 MHz to 1 GHz [ Vertical Polarization]



Radiated Emission Setup -1 GHz to 10 GHz [Horizontal Polarization ]



Radiated Emission Setup -1 GHz to 10 GHz [Vertical Polarization ]