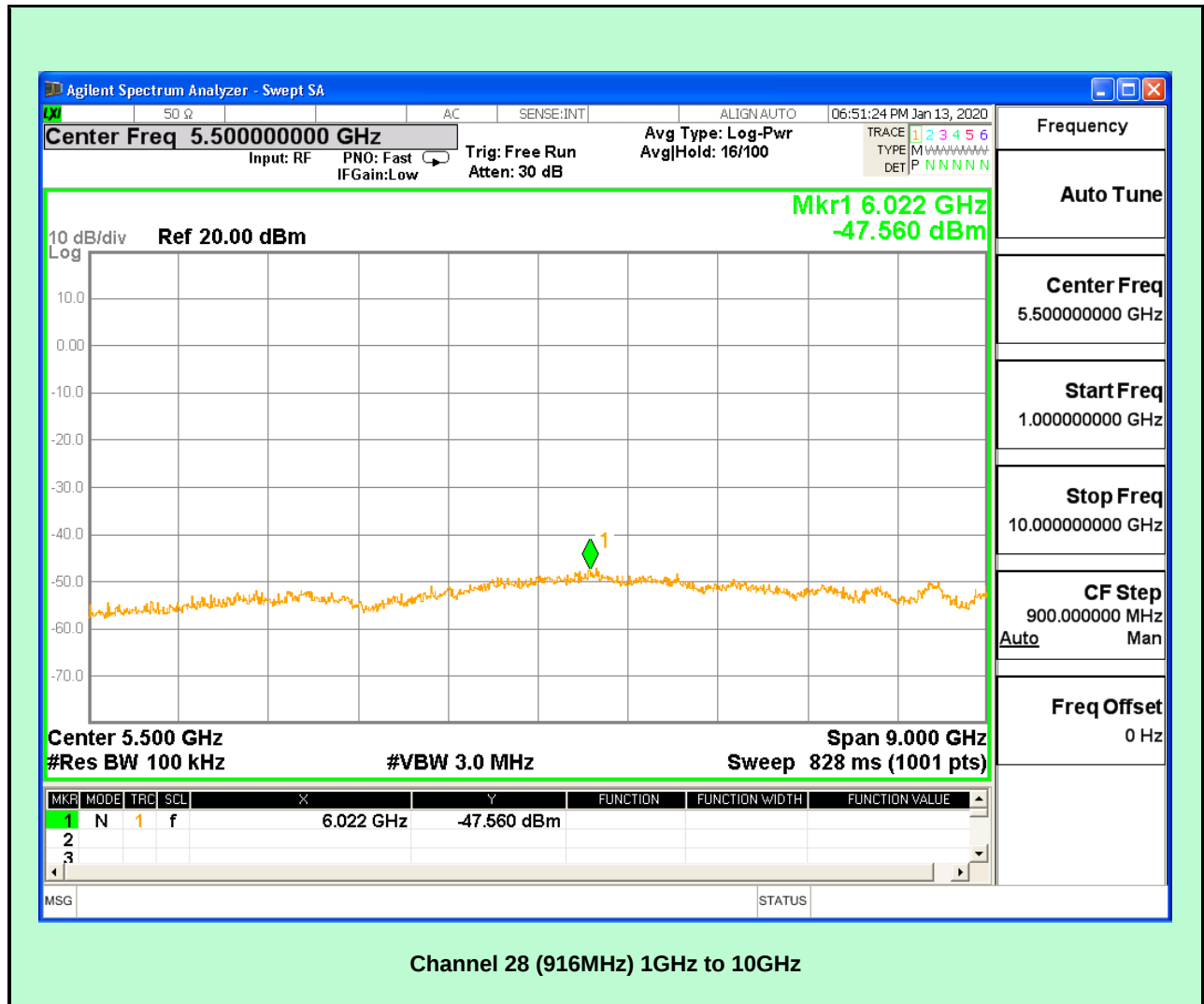
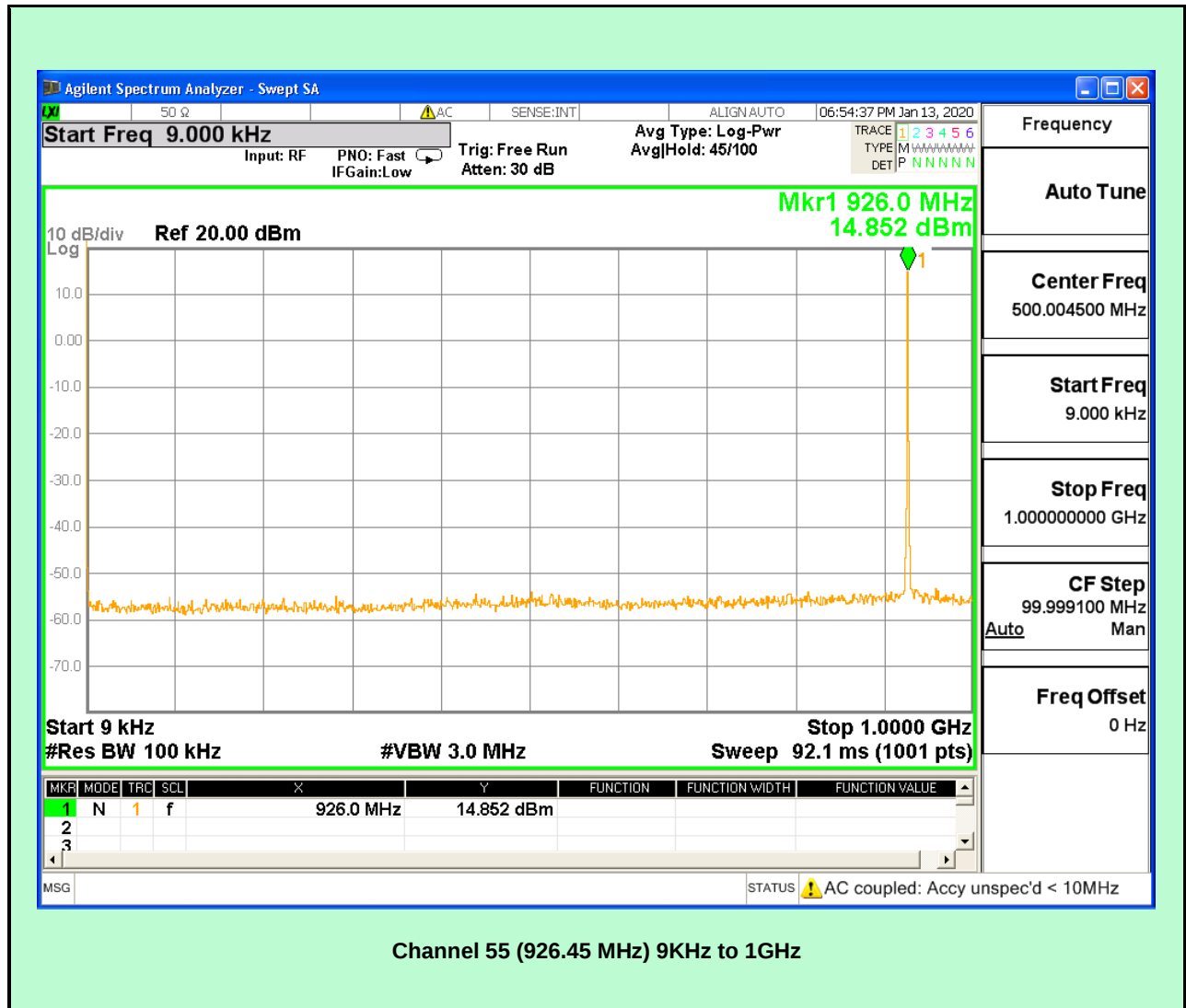
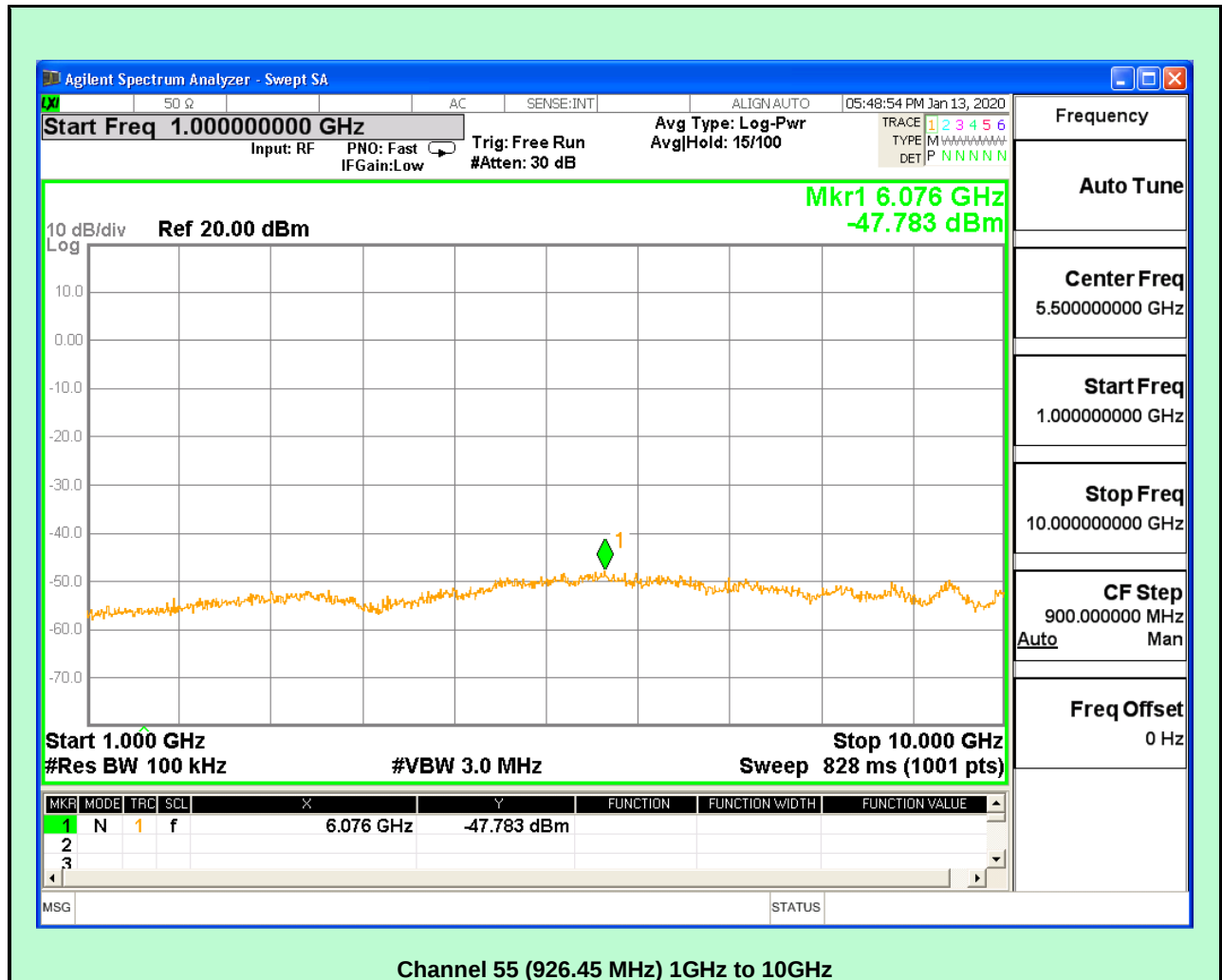








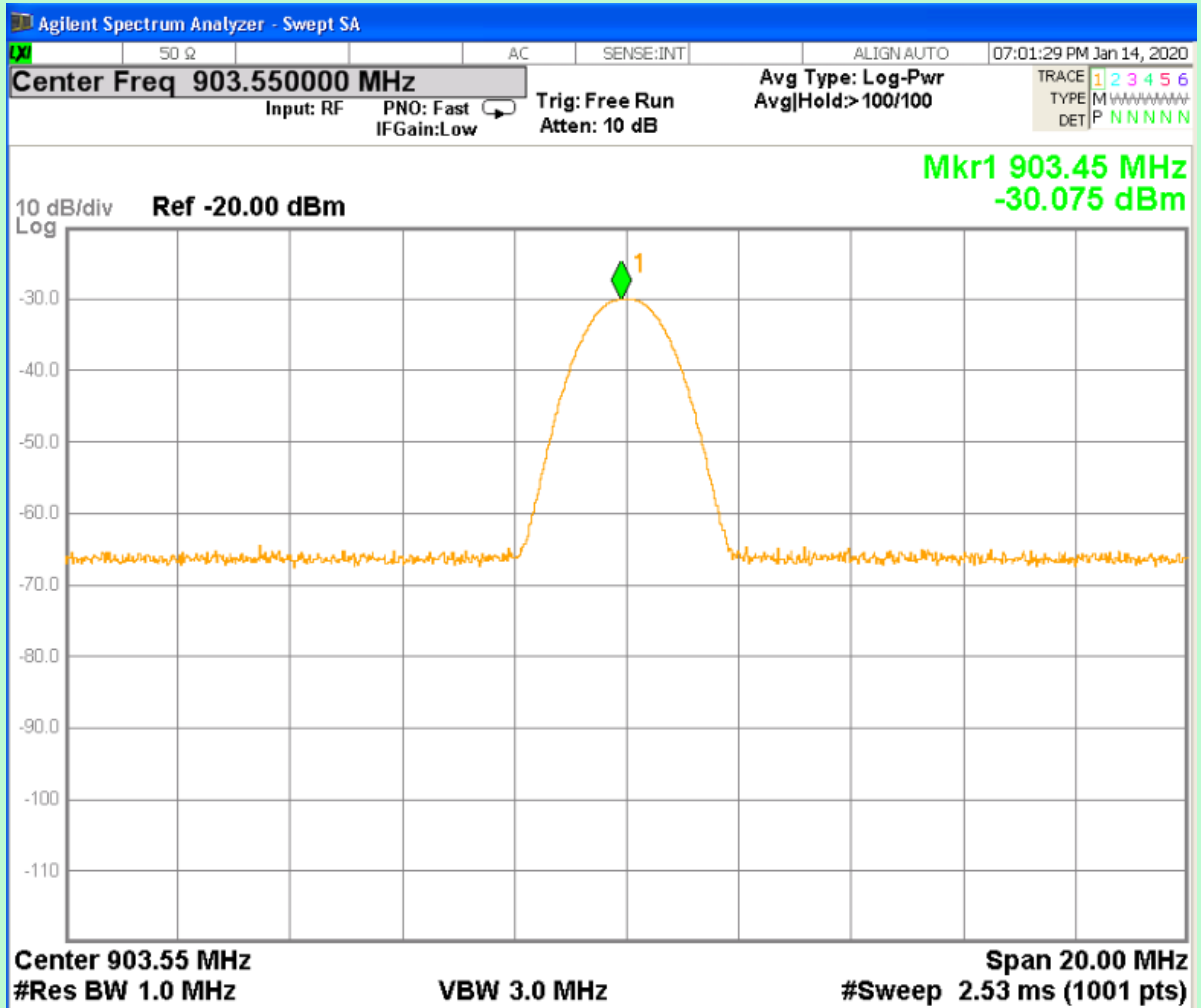
TEST RESULTS							
Channel	Frequency	Measured Parameters			Difference (B-A)	Limit	Test Results
#	MHz	Spurious Frequency (GHz)	Spurious Level (dBm)-(A)	Fundamental Level(dBm) – (B)	dBc	dBc	
1	903.55	6.04	-47.37	14.91	62.28	>20	PASS
28	916.00	6.02	-47.56	14.89	62.45	>20	PASS
55	926.45	6.07	-47.15	14.85	62.00	>20	PASS

TEST SETUP PHOTOGRAPH
Refer Annexure -1 Conducted RF Test setup

2.8 EFFECTIVE ISOTROPIC RADIATED POWER			
EUT Nomenclature	Wireless Relay Module	Test Request No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	23 ± 2
Test End Date	28-Feb-2020	Humidity RH (%)	55 ± 3
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage / Freq	3.3V, 21.5mA		
Operating Mode	Refer Page 6 for Operating Mode Table		
Test configuration	Refer Page 6 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	☒ Radiated		☐ Conducted
TEST PARAMETERS			
Antenna Height	1m to 4m	Turntable Rotation	0° to 360°
Equipment Class	NA	Measurement Distance	3m

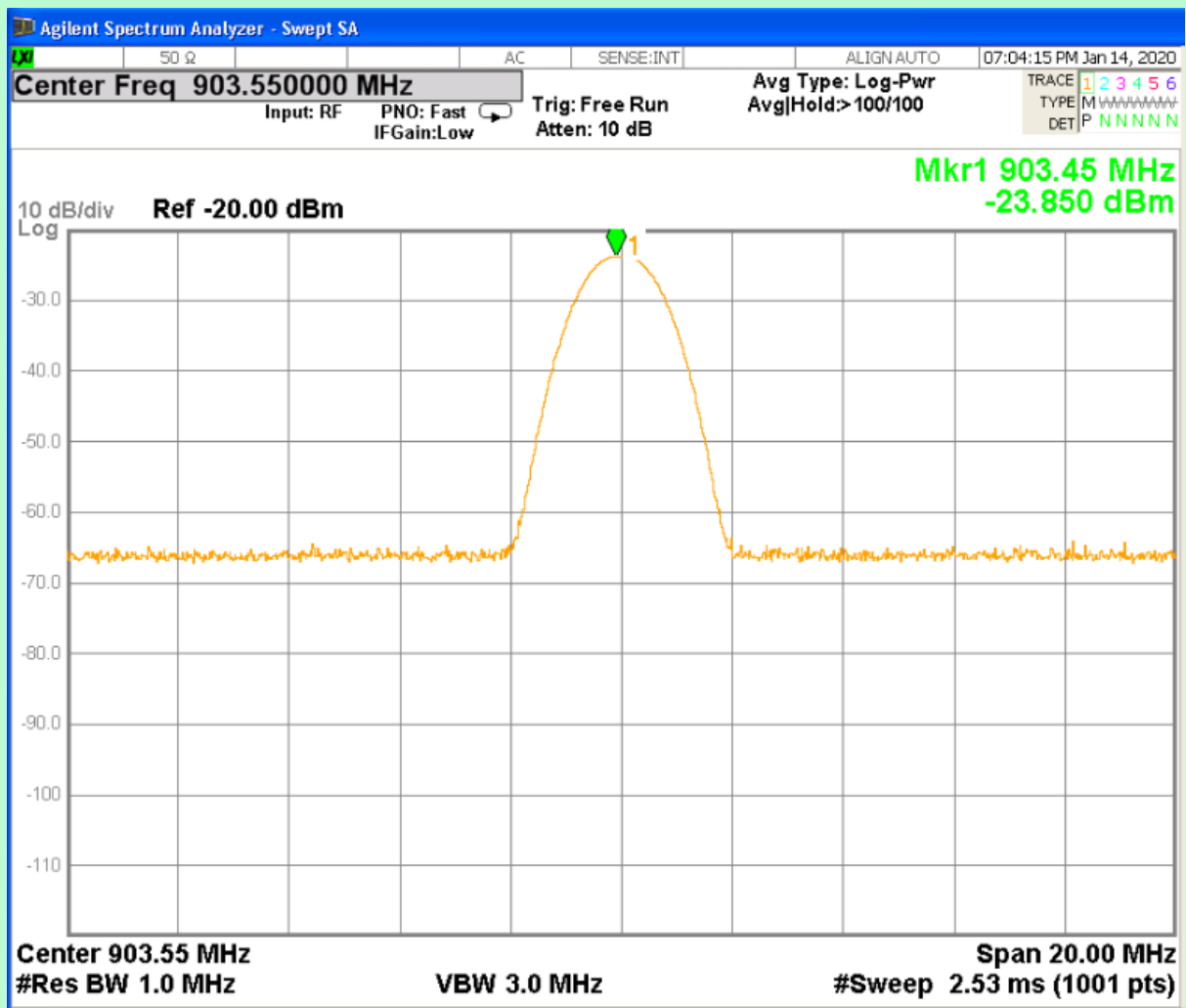
TEST EQUIPMENT					
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100525	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	RF cable (9KHz to 18GHz)	Huber + Schuner	Sucoflex100	515518/126E	04-Oct-21
Note: Switch ON /OFF the Internal Preamplifier based on carrier level and or noise floor without overloading the receiver					

TEST GRAPHS – EIRP



Antenna-2, Channel 1 (903.55 MHz)

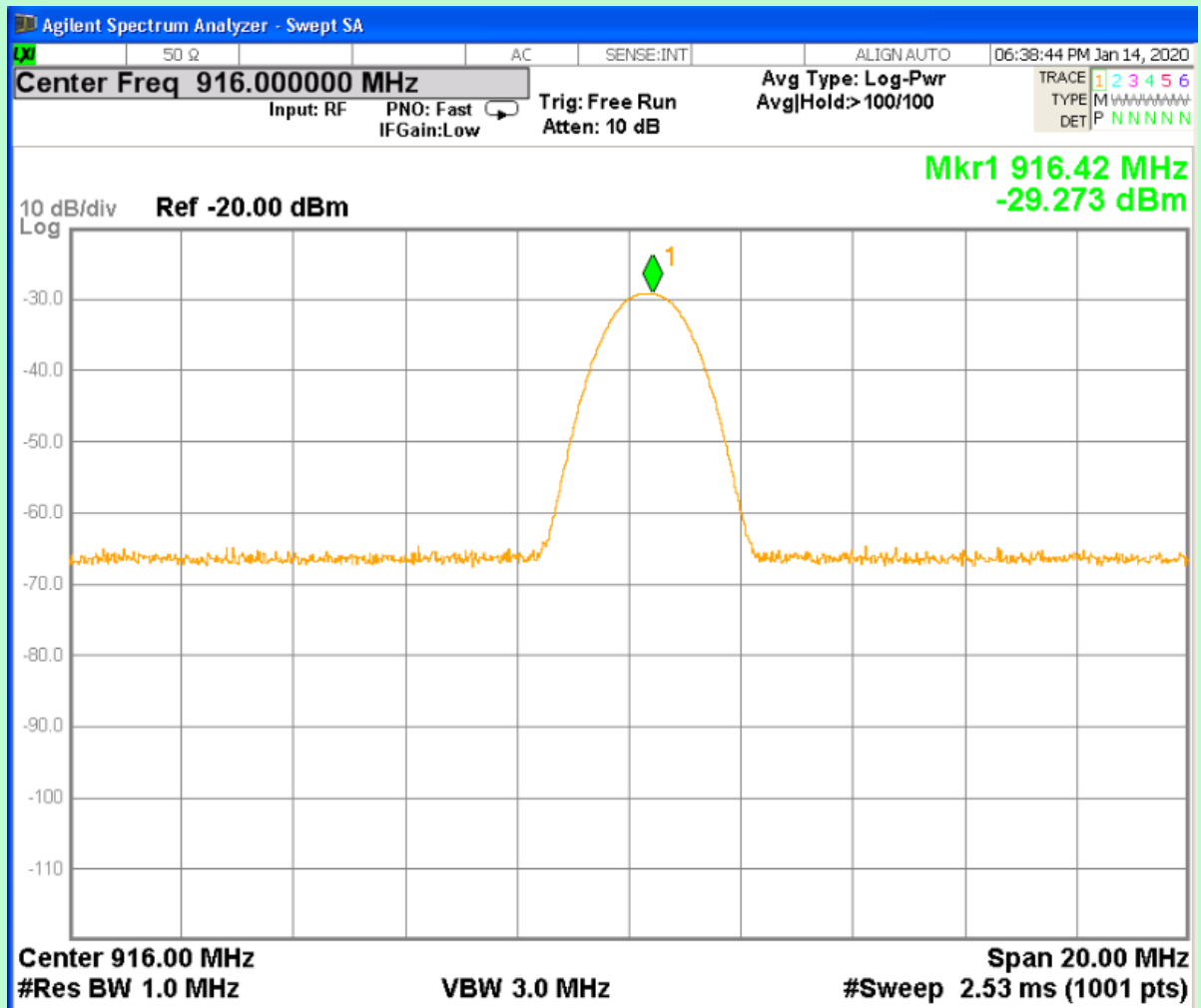
Note : Peak Graph - Horizontal polarization



Antenna-2, Channel 1 (903.55 MHz)

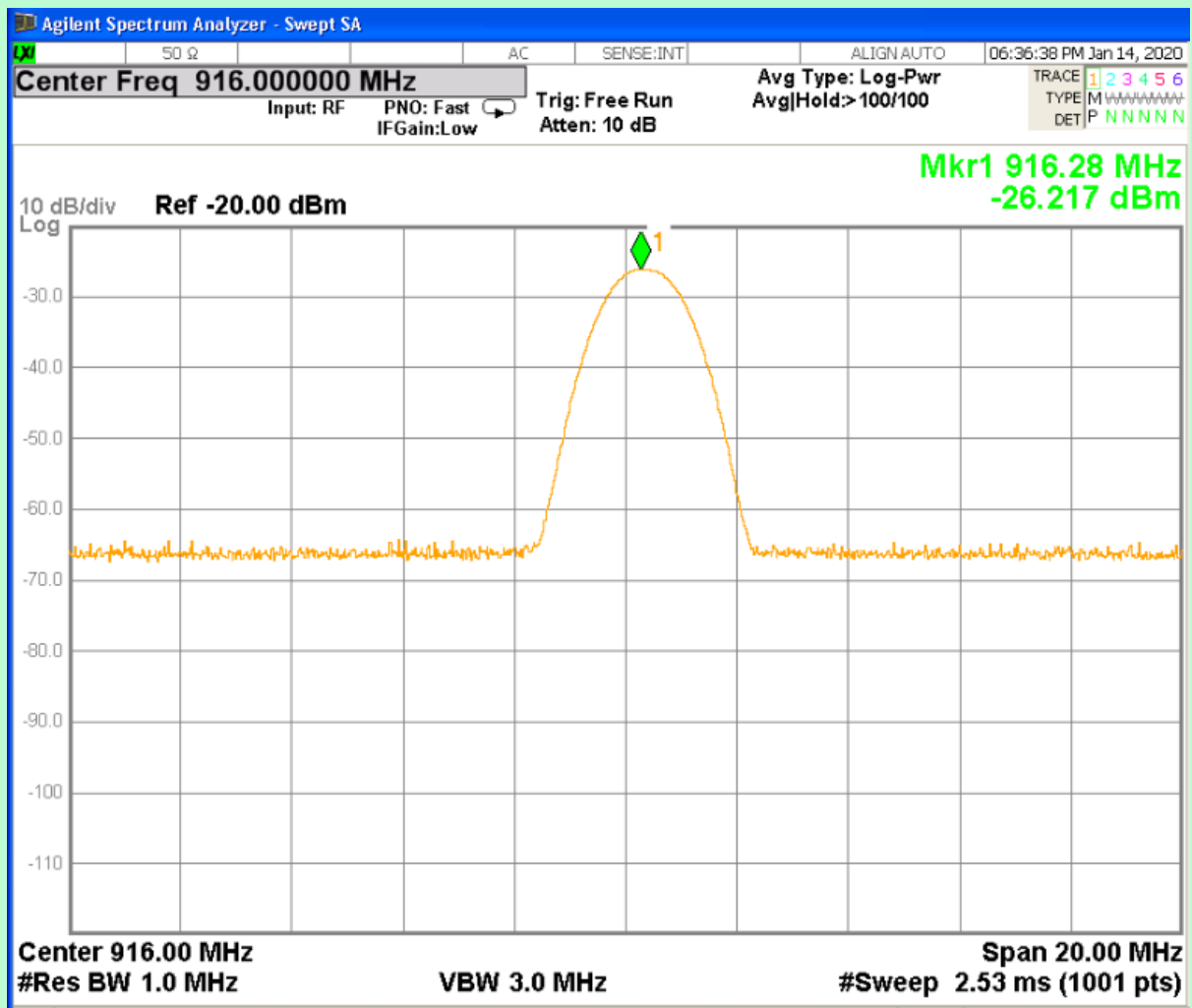
Note : Peak Graph - Vertical polarization

TEST GRAPHS – EIRP



Antenna-2, Channel 28 (916 MHz)

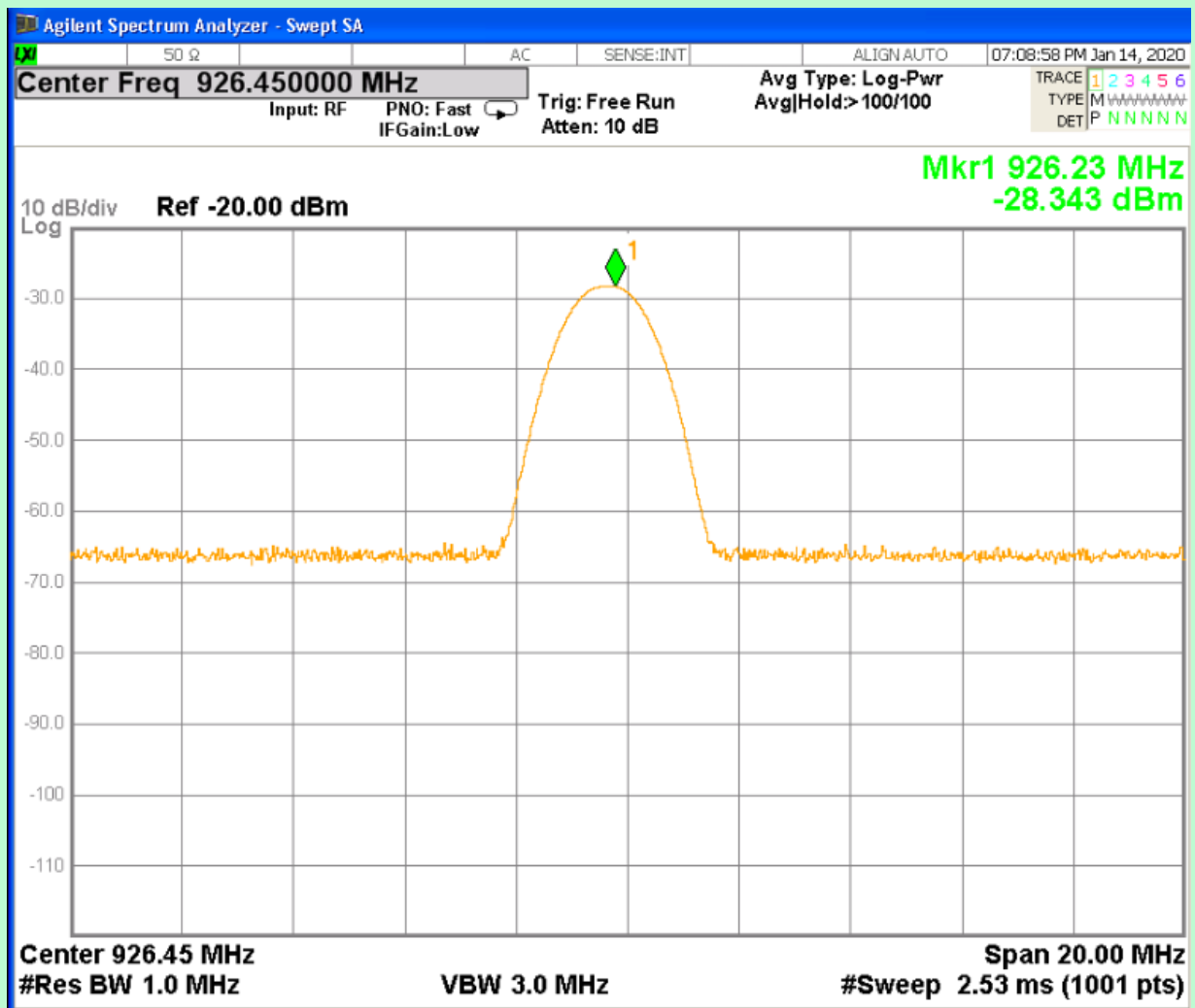
Note : Peak Graph - Horizontal polarization



Antenna-2, Channel 28 (916 MHz)

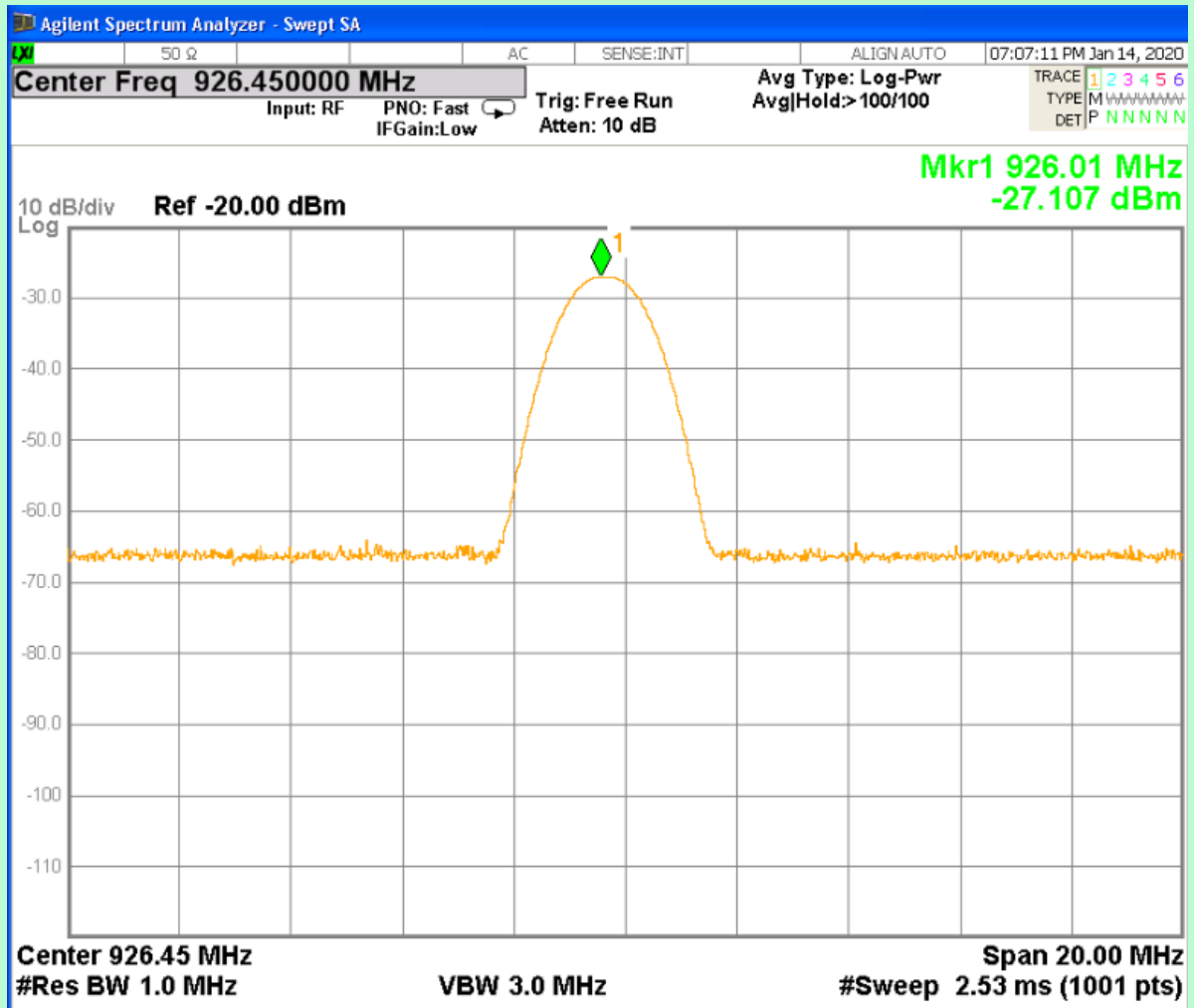
Note : Peak Graph - Vertical polarization

TEST GRAPHS – EIRP



Antenna-2, Channel 55 (926.45 MHz)

Note : Peak Graph - Horizontal polarization



Antenna-2, Channel 55 (926.45 MHz)

Note : Peak Graph - Vertical polarization

TEST RESULT – EIRP										
Channel	Channel	Rx	Rx	Measured Level	Cable Loss	External Att	Path loss @ 3m	Rx Antenna Gain	Calculated Rx Power	Calculated EIRP
	Freq	Antenna Height	Ant Pol							
#	MHz	cm	H/V	dBm	dB	dB	dB	dB	dBm	dBm
Antenna – 2 (FHSS Mode)										
CH-1	903.55	100	H	-30.07	2.91	6	41.21	6.3	-27.46	13.75
CH-1	903.55	260	V	-23.85	2.91	6	41.21	6.3	-21.24	19.97
CH-28	916	255	H	-29.27	2.91	6	41.21	6.3	-26.66	14.55
CH-28	916	100	V	-26.21	2.91	6	41.21	6.3	-23.6	17.61
CH-55	926.45	250	H	-28.34	2.91	6	41.21	6.3	-25.73	15.48
CH-55	926.45	175	V	-27.1	2.91	6	41.21	6.3	-24.49	16.72
Note: Effective Isotropic Radiated Power (dBm)= Pr(dBm) +Lp(dB) Pr = Pmeas(dBm)-Gr(dBi)+Lc(dB)+Latt(dB) Lp =20Log F+20LogD-27.5 Where: Pr =Calculated Received Power Level(dBm) Lp= Free Space Path Loss(dB) Pmeas= Measured Power Level(dBm) Gr = Receiver Antenna Gain(dBi) Lc = Cable Loss (dB) Latt= External Attenuator(dB) F = Frequency (MHz) D= Distance (m)										

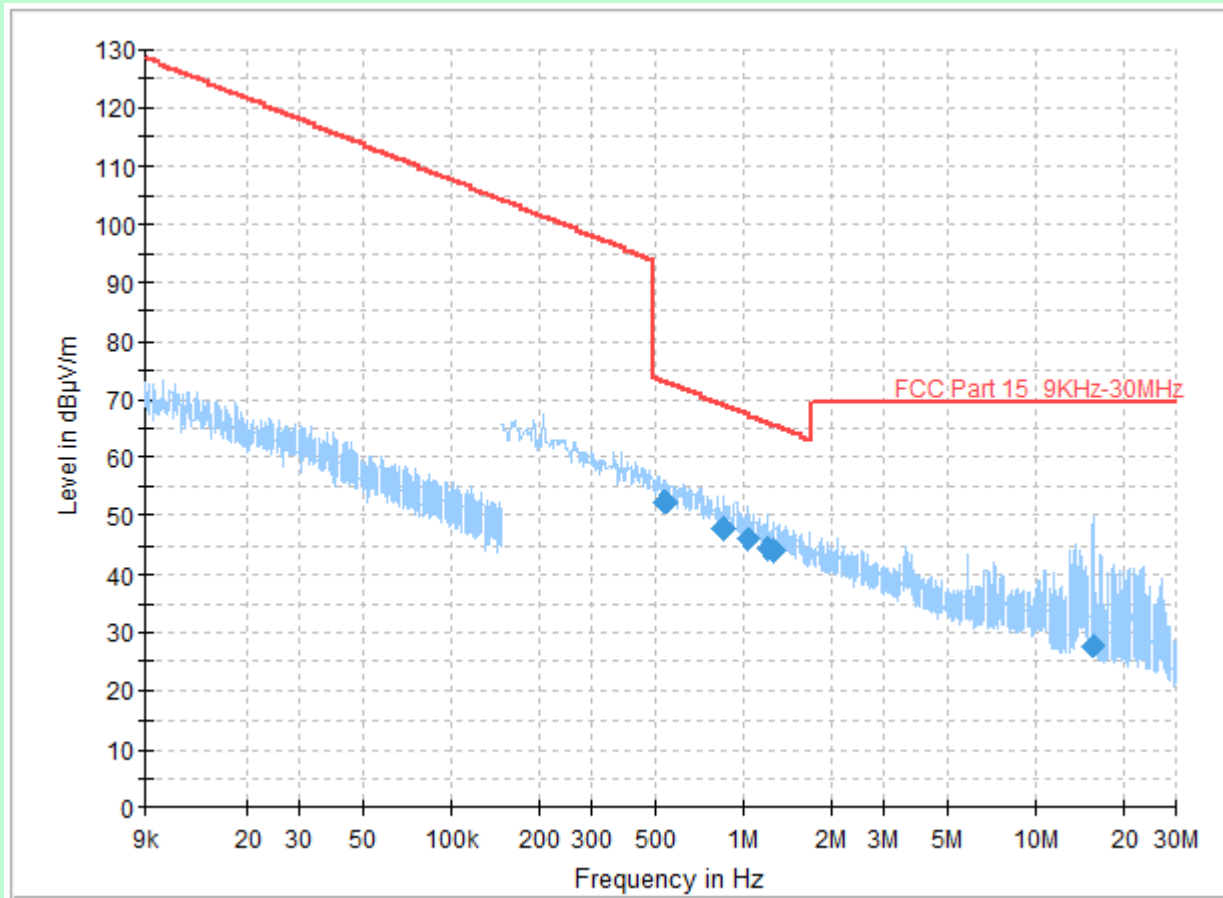
2.9 SPURIOUS RADIATED EMISSIONS

EUT Nomenclature	Wireless Relay Module	Test Report No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	23 ± 2
Test End Date	28-Feb-2020	Humidity RH (%)	55 ± 3
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage / Freq	3.3V, 21.5mA		
Operating Mode	Refer Page 6 Operating Modes Table		
Test configuration	Refer Page 6 Test Configuration Table		
Deviation from Std	NA		
Comment			
TEST FREQUENCY RANGE			
Start Frequency	9KHz	Stop Frequency	10GHz
MAXIMUM OPERATING FREQUENCY			
902MHz to 928MHz			
TEST PARAMETERS			
Antenna Height	1m to 4m	Turntable Rotation	0° to 360°
Applicable standard	FCC Part 15.247 & 15.209 :2010	Test Method	DA 00-705, ANSI C63.10 - 2013
Equipment Class	NA	Measurement Distance	3m

TEST EQUIPMENT

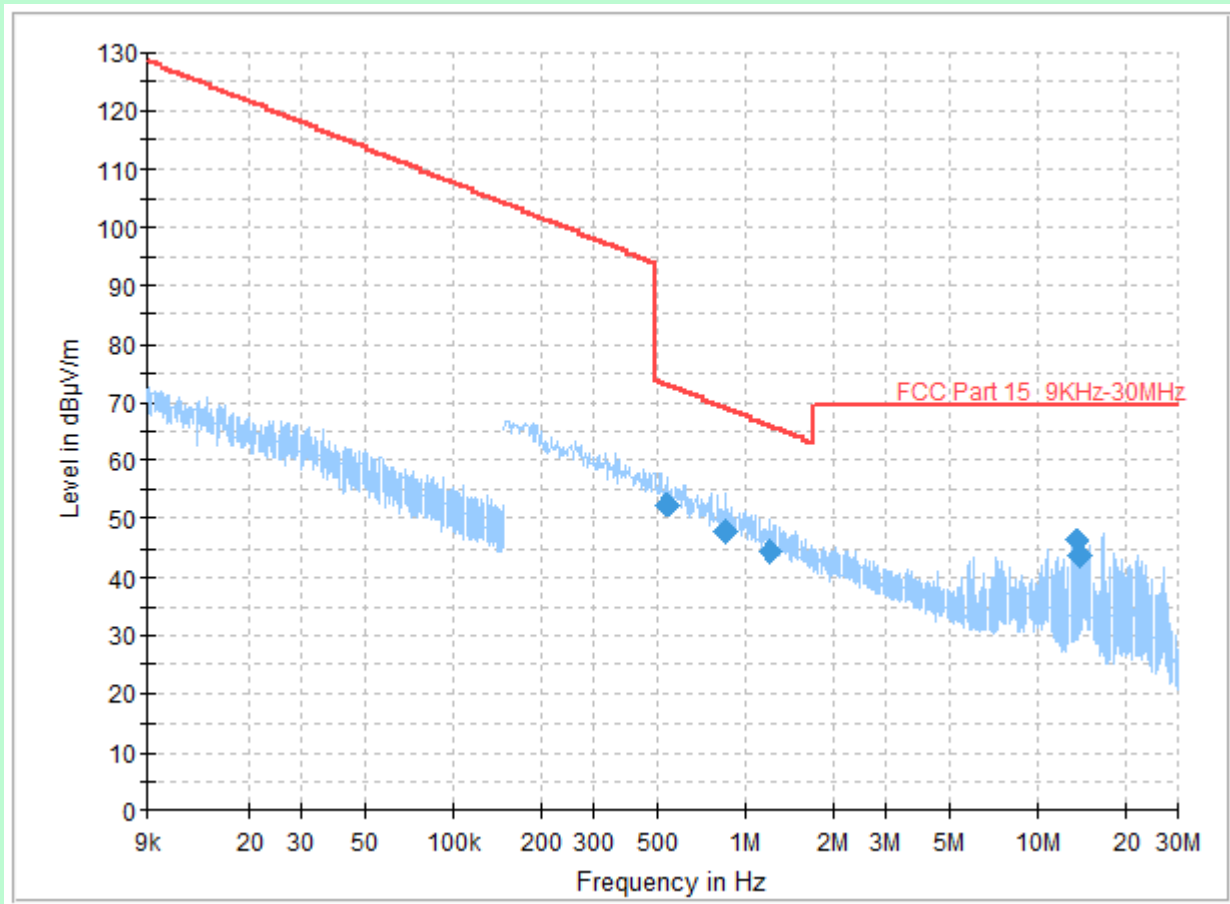
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100229	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Double Ridge Guide Horn Antenna	ETS Lindgren	3117	64055	1-Nov-21
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	Loop Antenna	ETS Lindgren	6507	103694	15-Nov-21
Y	RF cable (9KHz to 18GHz)	Huber + Schuner	Sucoflex100	515518/126E	04-Oct-21
Y	Signal Conditioning unit	R&S	SCU-18	10178	5-Jun-20
Y	High Pass Filter	Wainwright	WHKX1.5/15G-12ST	1	24-Feb-21
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 2)



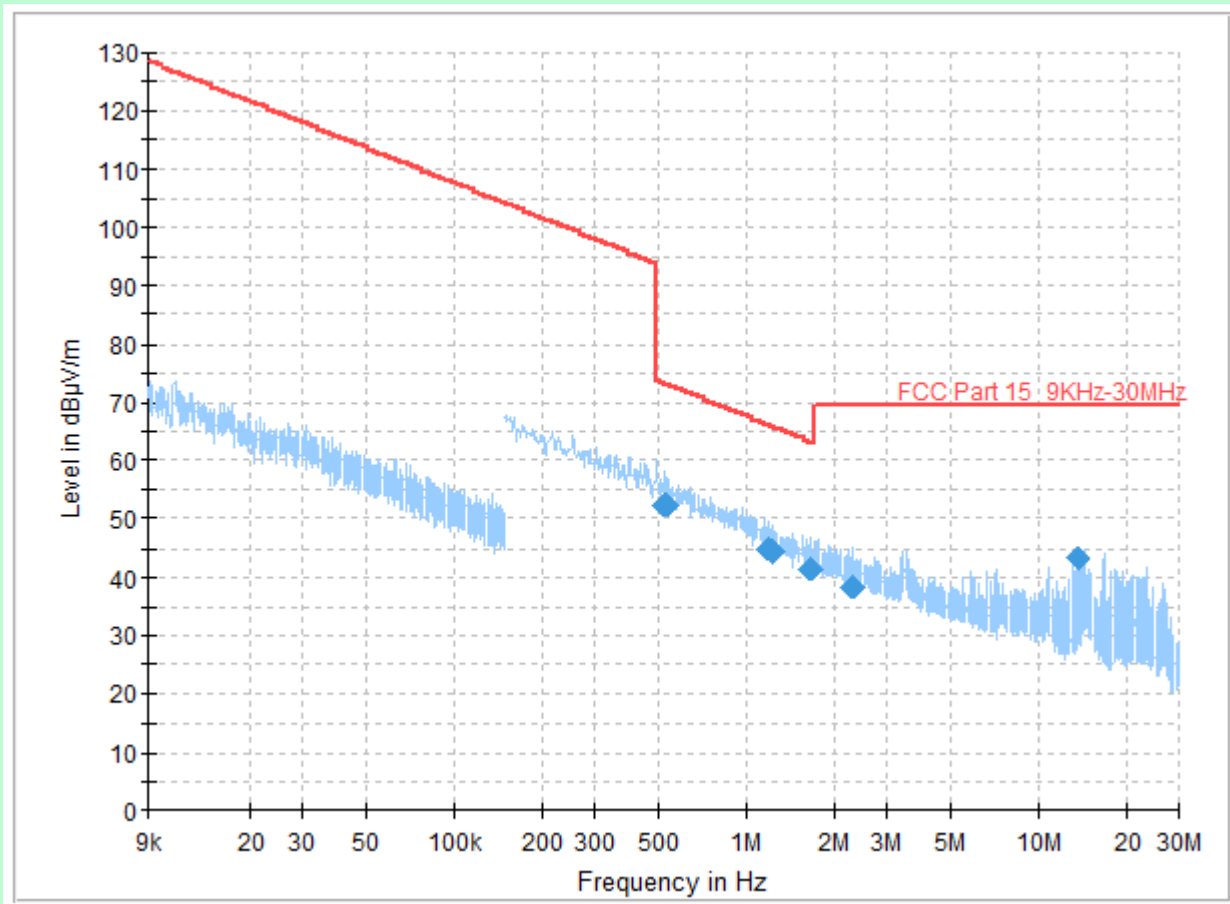
Channel 1 (903.55MHz) – Parallel

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



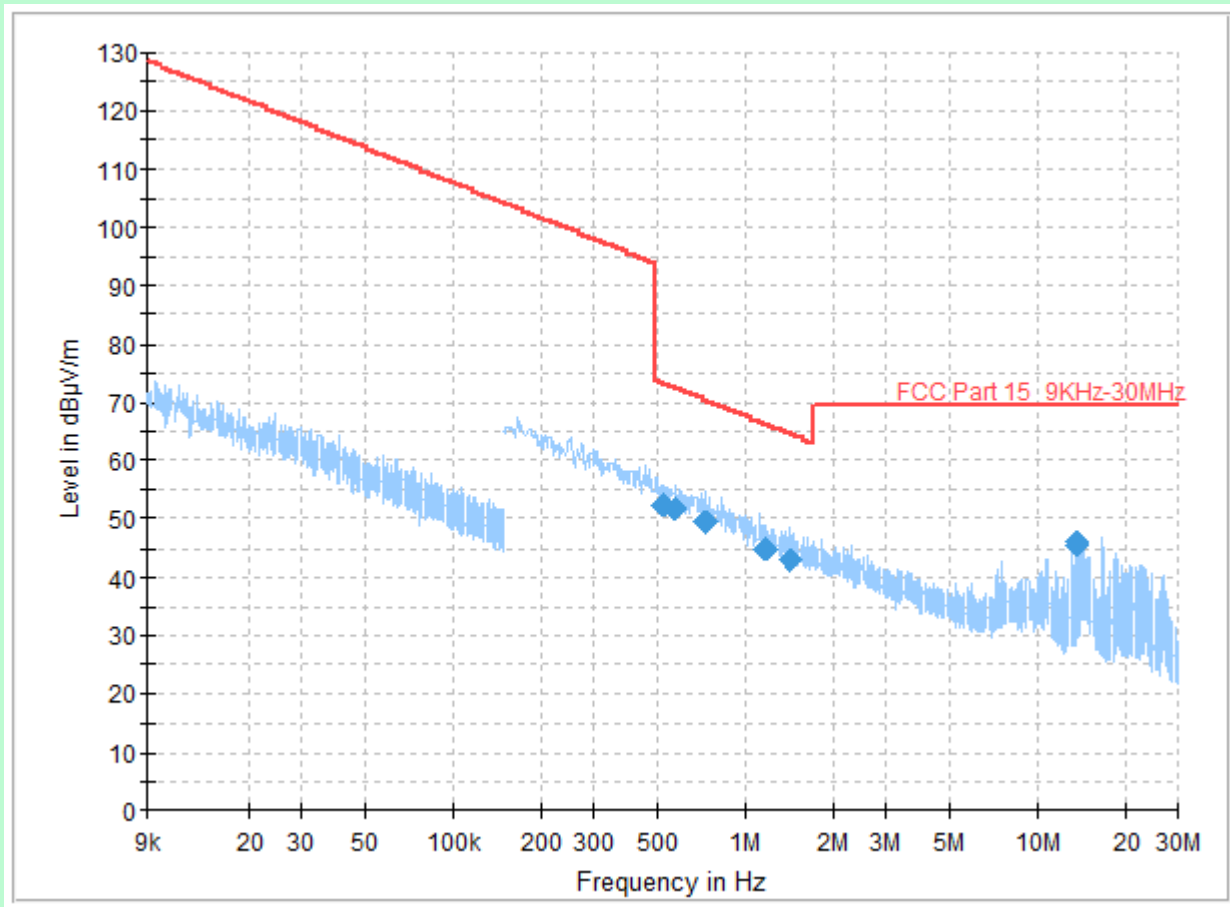
Channel 1 (903.55MHz) – Perpendicular

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



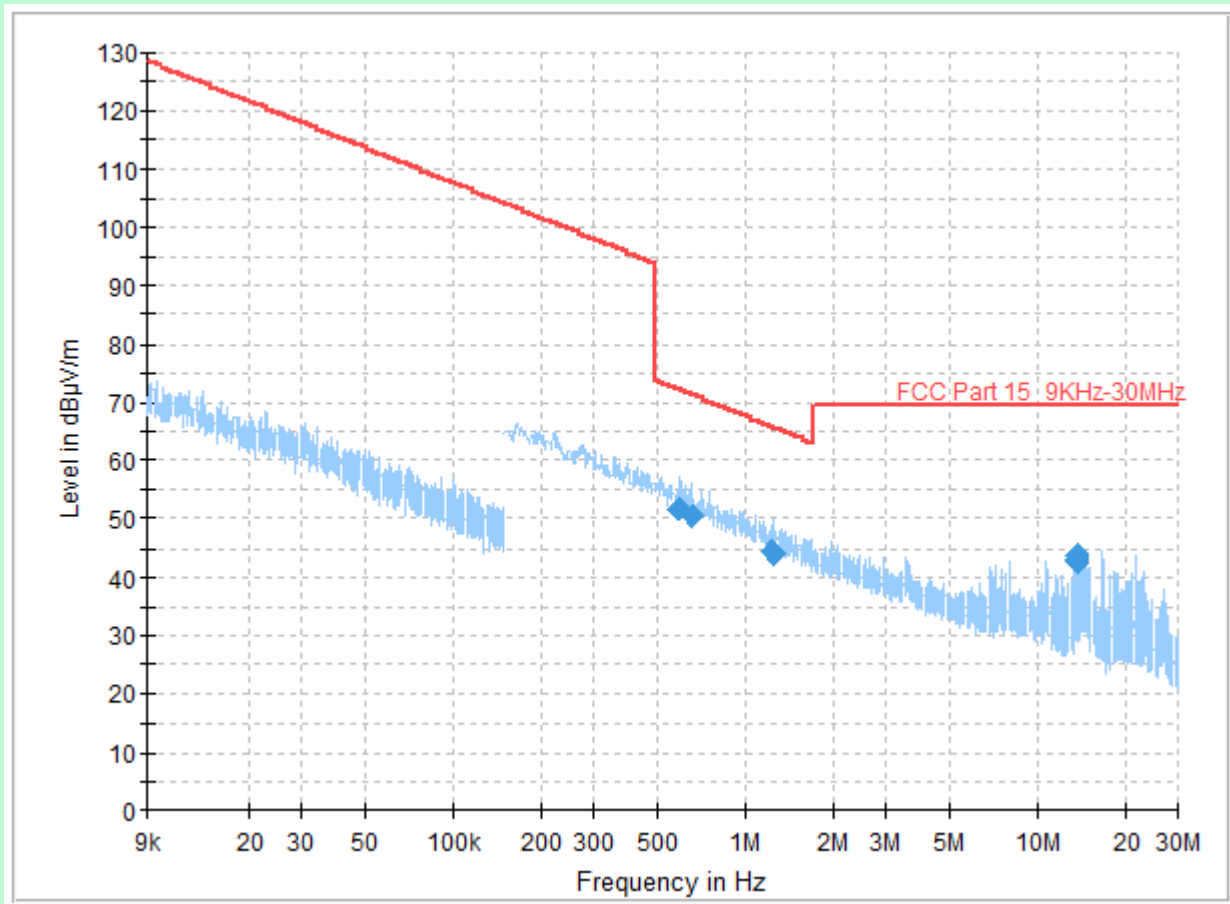
Channel 28 (916 MHz) – Parallel

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



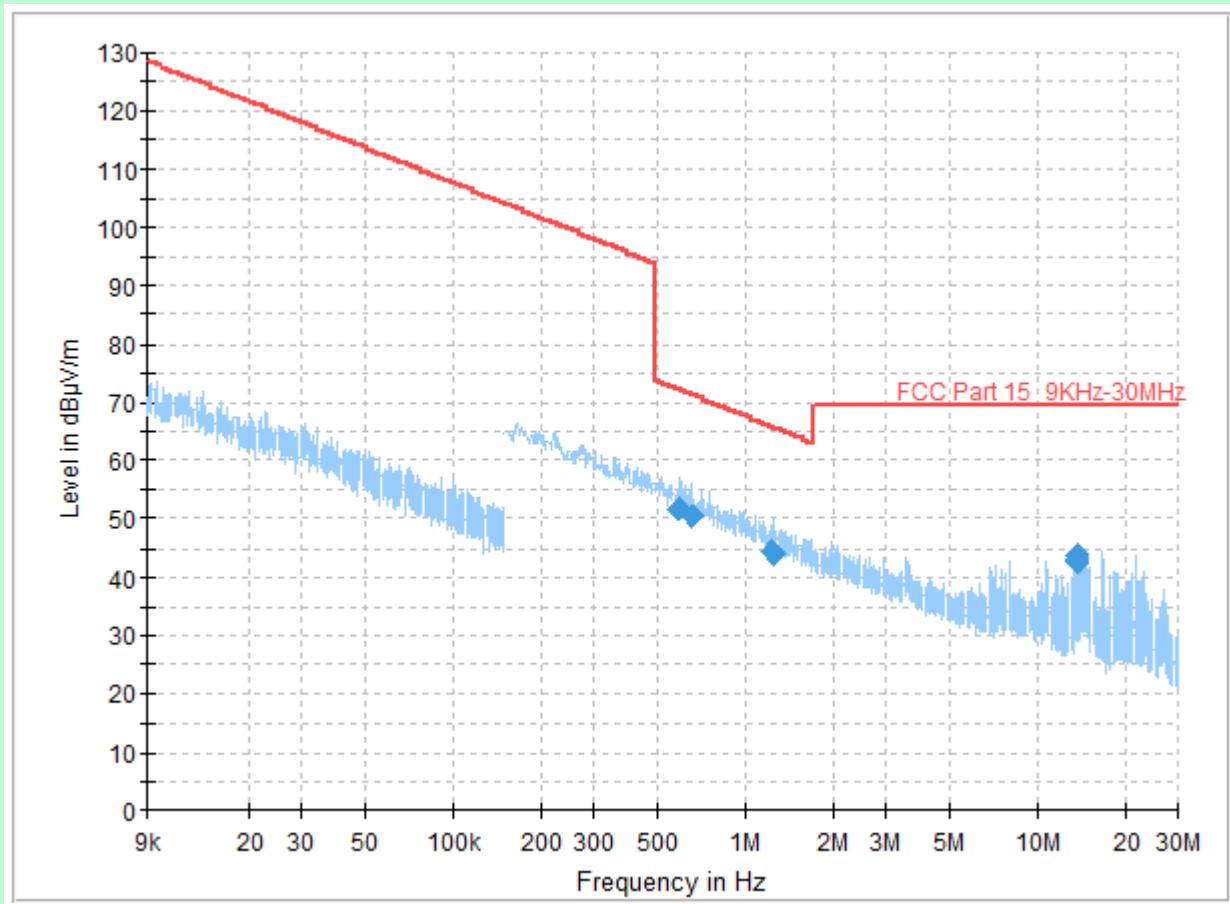
Channel 28 (916 MHz) – Perpendicular

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



Channel 55 (926.45MHz) – Parallel

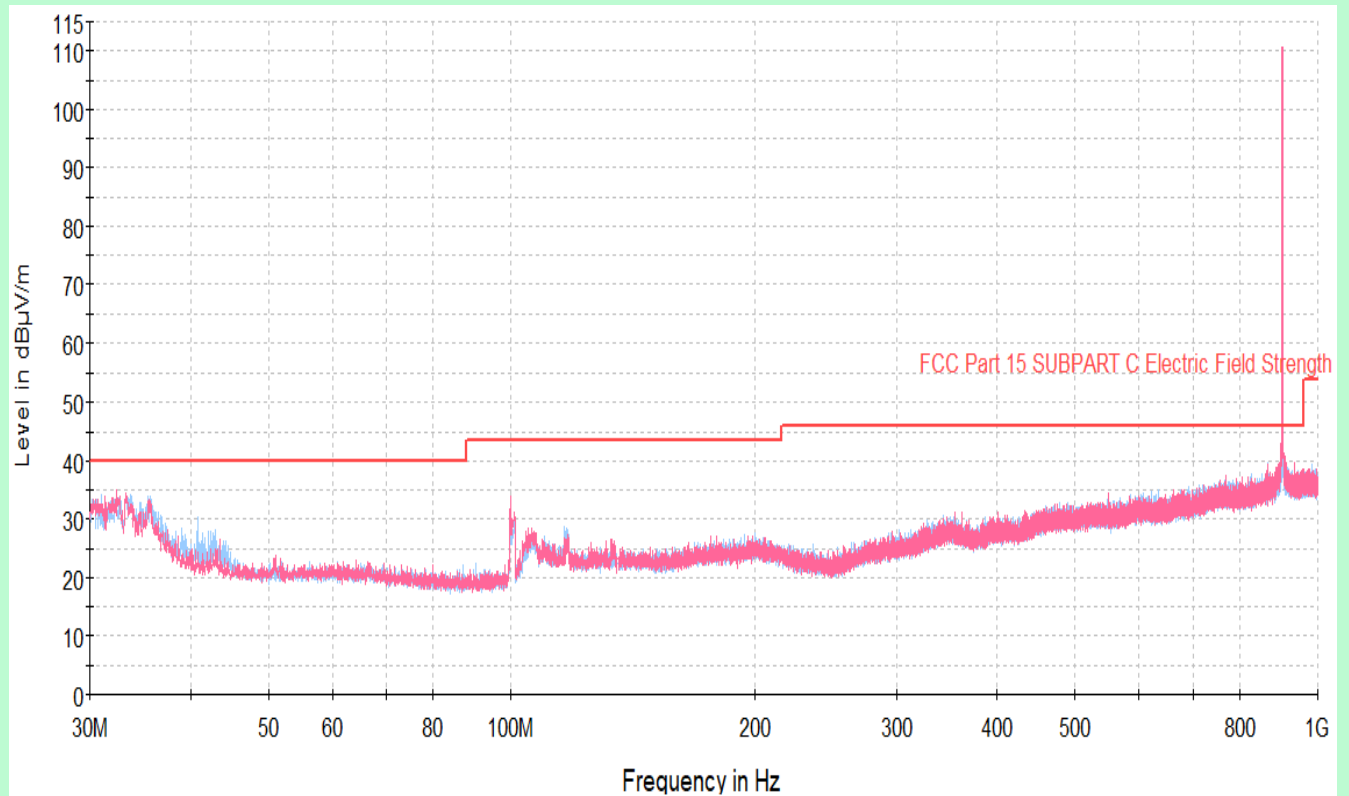
TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



Channel 55 (926.45MHz) – Perpendicular

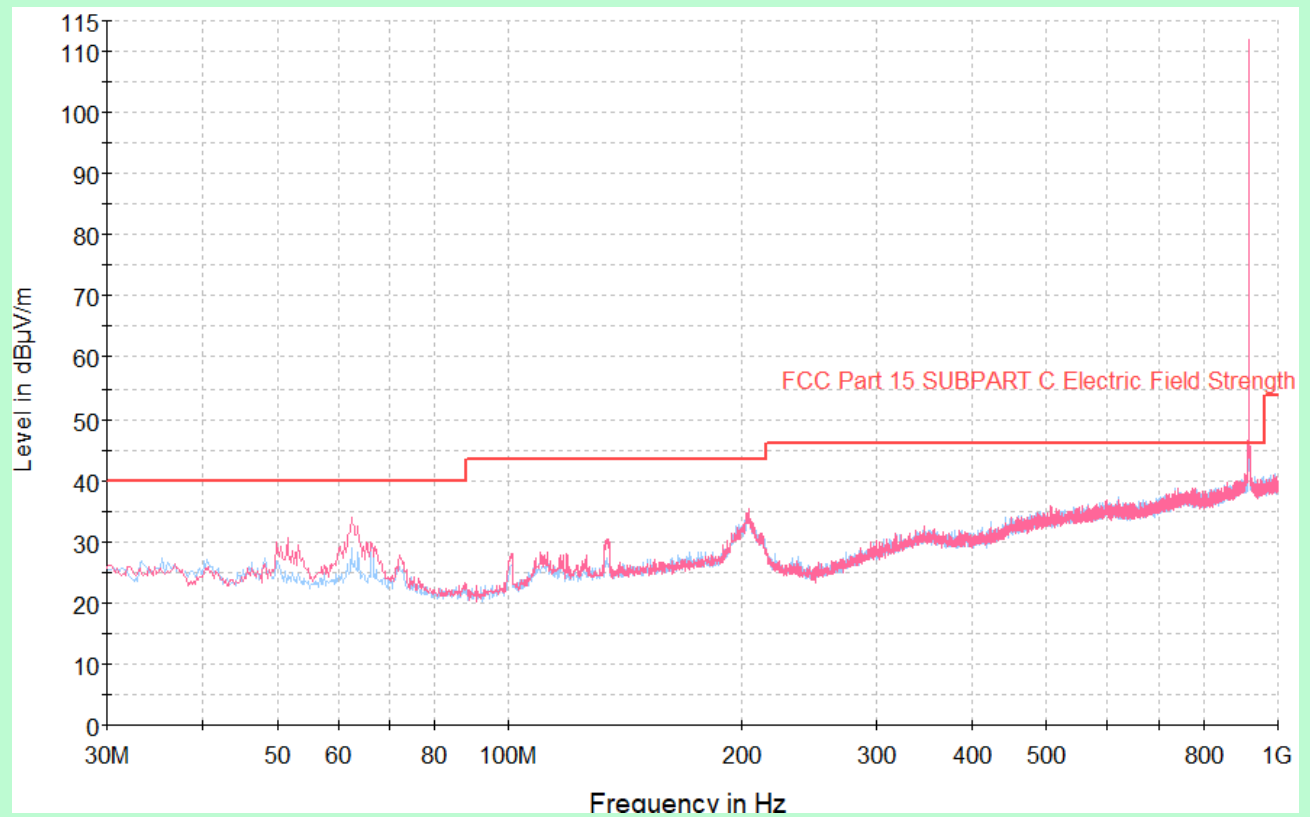
TEST RESULT – 9 KHz to 30 MHz									
Channel	Channel Frequency	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	MHz	dBµV/m	cm	Parallel / Perpendicular	deg	dB	dBµV/m	
No emissions detected that are a product of the transmitter. Emissions shown in the plot 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 2)



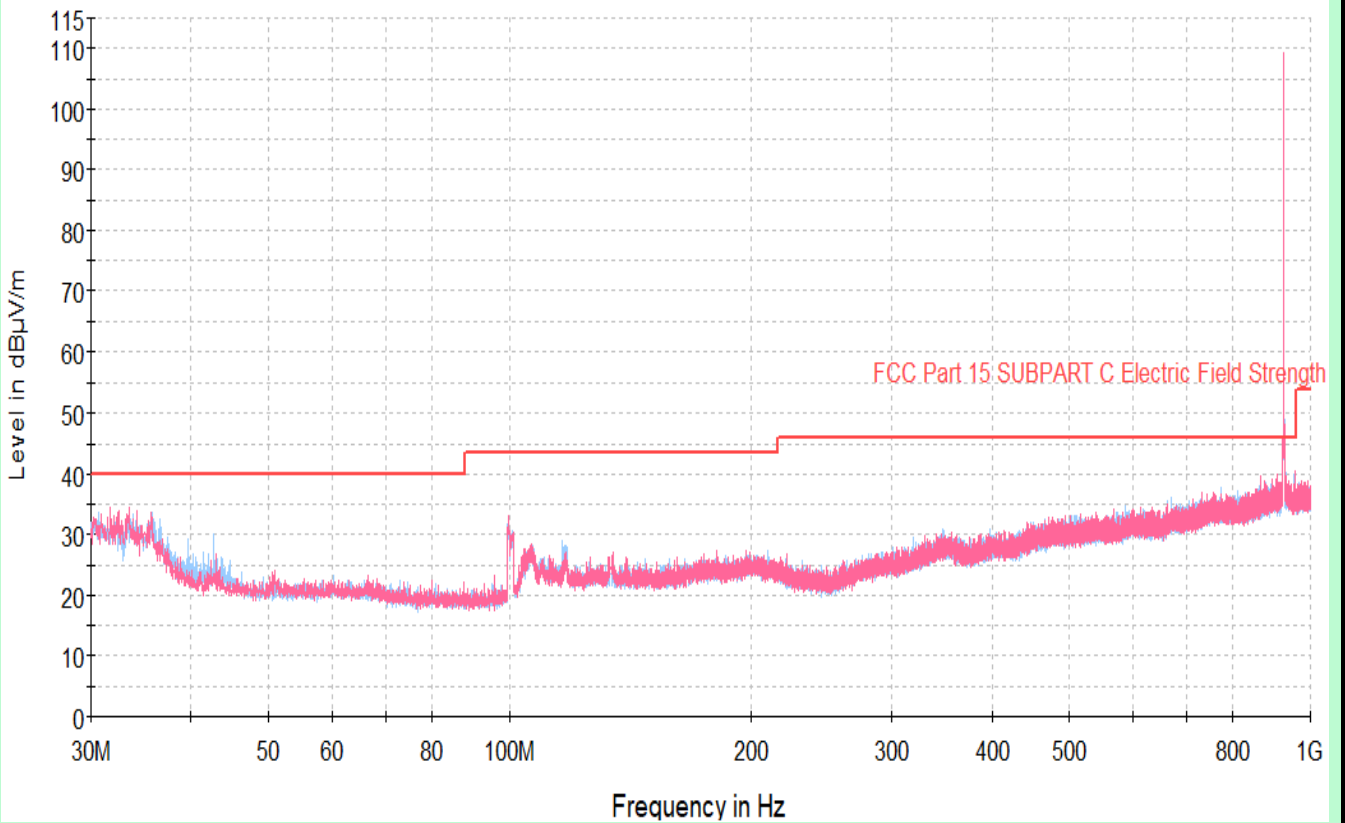
Channel 1 (903.55MHz) – Antenna 2

TEST GRAPHS – 30MHz to 1GHz (Antenna 2)



Channel 28 (916.0MHz) – Antenna 2

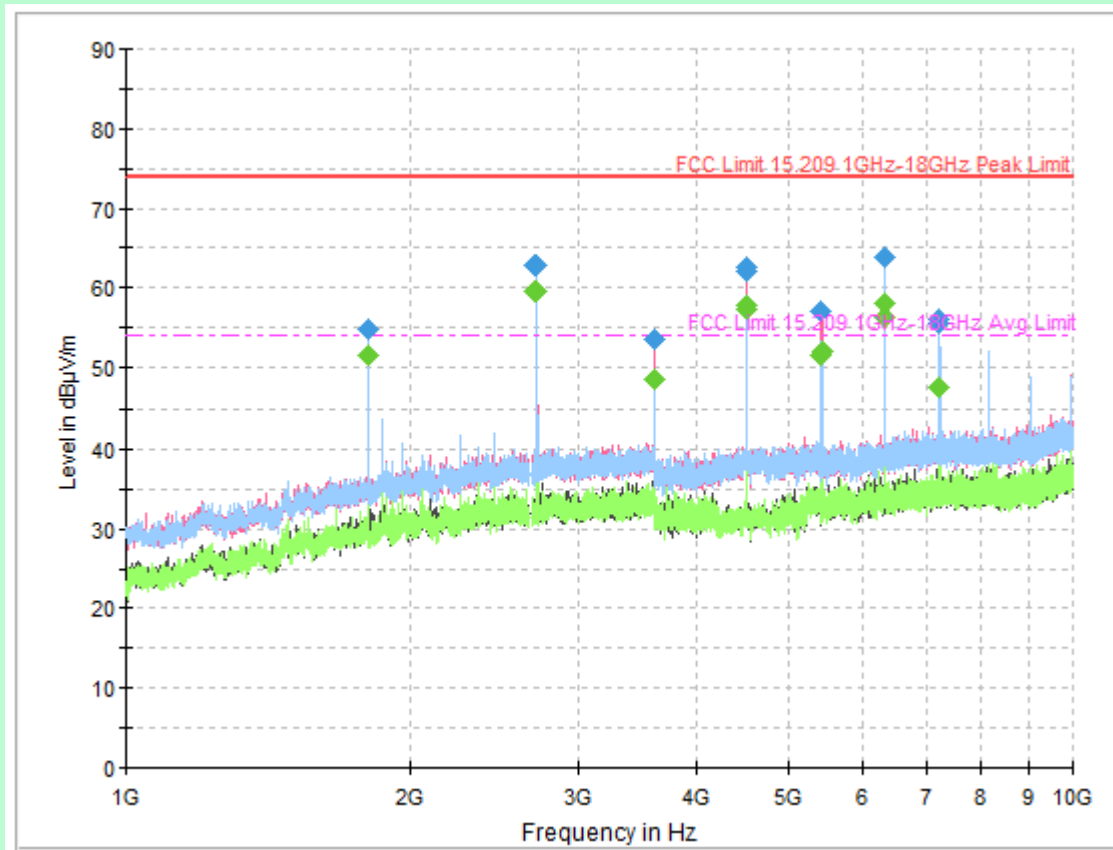
TEST GRAPHS – 30MHz to 1GHz (Antenna 2)



Channel 55 (926.45MHz) – Antenna 2

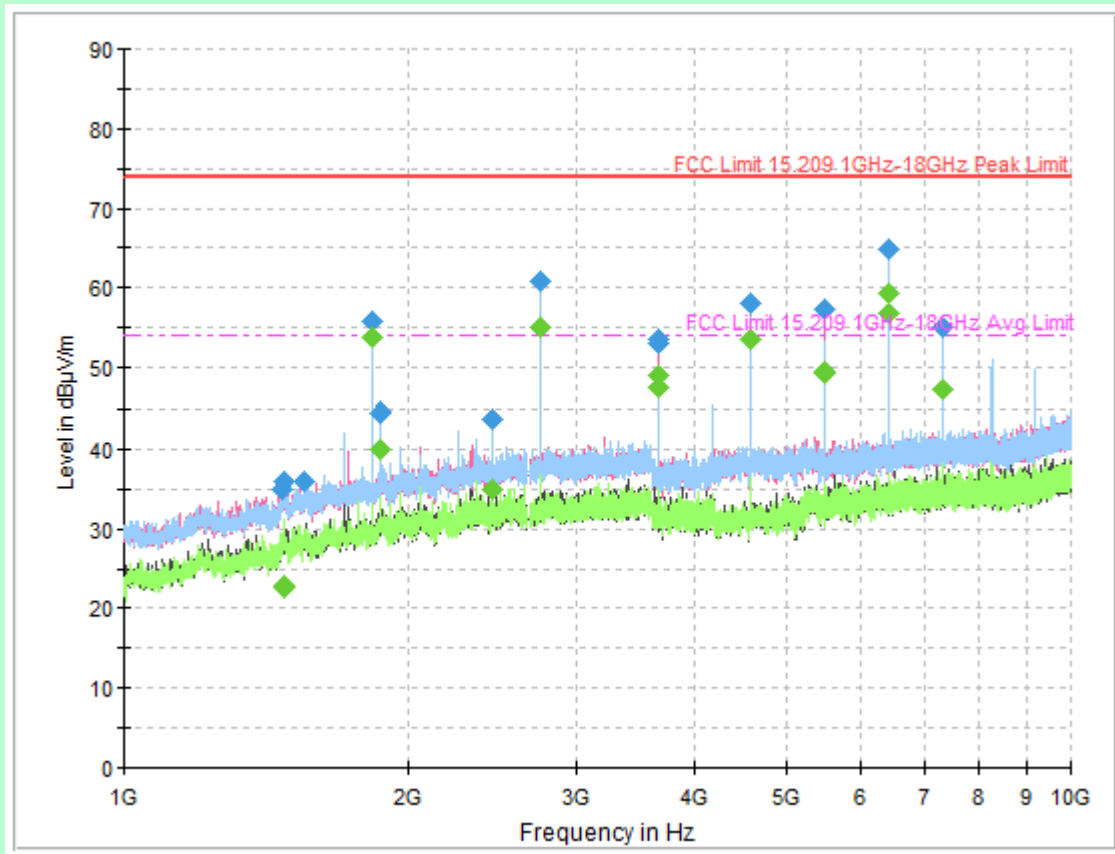
TEST RESULT – 30 MHz to 1 GHz								
Channel	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	dBμV/m	Cm	H / V	deg	dB	dBμV/m	
Antenna – 2								
CH-1	588.72	30.14	100	H	90	15.86	46	Pass
CH-1	681.84	30.65	400	H	177	15.35	46	Pass
CH-1	739.65	32.03	300	H	328	13.97	46	Pass
CH-1	835.68	32.73	200	V	138	13.27	46	Pass
CH-1	866.52	33.29	100	V	236	12.71	46	Pass
CH-1	903.52	111.66	200	V	200	-	-	Intended Frequency
CH-28	618.98	30.3	300	H	14	15.7	46	Pass
CH-28	734.02	31.74	100	H	225	14.26	46	Pass
CH-28	779.42	32.09	400	V	28	13.91	46	Pass
CH-28	836.45	32.69	300	H	351	13.31	46	Pass
CH-28	865.94	33.3	400	V	113	12.7	46	Pass
CH-28	899.89	34.53	100	V	185	11.47	46	Pass
CH-28	916.39	110.05	100	V	315	-	-	Intended Frequency
CH-55	687.27	30.96	100	H	182	15.04	46	Pass
CH-55	826.37	32.42	200	H	178	13.58	46	Pass
CH-55	829.08	32.49	200	V	0	13.51	46	Pass
CH-55	836.07	32.68	300	H	188	13.32	46	Pass
CH-55	867.3	33.34	200	V	54	12.66	46	Pass
CH-55	926.15	109.14	100	V	172	-	-	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 2)



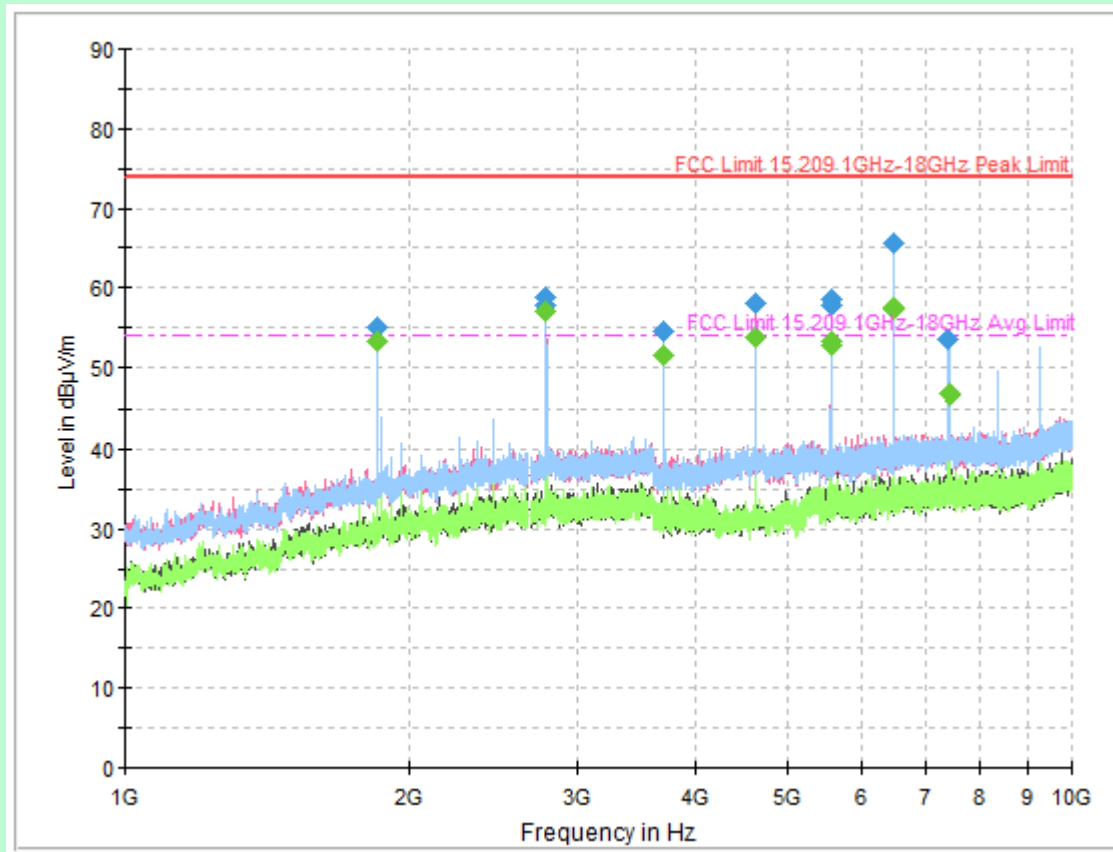
Channel 1 (903.55MHz) – Antenna 2

TEST GRAPHS – 1GHz to 10GHz (Antenna 2)



Channel 28 (916.0MHz) – Antenna 2

TEST GRAPHS – 1GHz to 10GHz (Antenna 2)



Channel 55 (926.45MHz) – Antenna 2

TEST RESULT – 1 GHz to 10 GHz					RESTRICTED BAND – PEAK			
Channel	Frequency	Measured Field Strength	Height	Ant Pol	Azimuth	Margin	Limit	Result
#	(MHz)	(dBµV/m)	(cm)	H / V	(deg)	(dB)	(dBµV/m)	
Antenna – 2								
CH-1	2710.32	62.87	300	V	0	11.13	74	PASS
CH-1	3613.85	53.67	300	V	343	20.33	74	PASS
CH-1	4517.39	62.51	300	V	348	11.49	74	PASS
CH-1	4518.35	62.18	300	V	353	11.82	74	PASS
CH-1	5420.6	57.08	300	V	343	16.92	74	PASS
CH-28	1466.71	34.95	200	V	159	39.05	74	PASS
CH-28	1476.03	35.94	400	H	159	38.06	74	PASS
CH-28	1549.96	35.98	100	V	226	38.02	74	PASS
CH-28	2748.89	60.96	200	H	344	13.04	74	PASS
CH-28	3664.96	53.58	400	V	327	20.42	74	PASS
CH-28	3665.6	53.01	400	V	322	20.99	74	PASS
CH-28	4581.67	58.1	200	V	12	15.9	74	PASS
CH-28	7330.21	55.06	200	H	33	18.94	74	PASS
CH-55	2777.82	57.89	200	V	0	16.11	74	PASS
CH-55	2778.46	58.79	200	V	0	15.21	74	PASS
CH-55	3704.5	54.54	100	V	0	19.46	74	PASS
CH-55	4630.85	58.14	300	V	27	15.86	74	PASS
CH-55	7408	53.44	200	H	0	20.56	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	Duty Cycle	Corrected Reading	Margin	Limit	Result
#	(MHz)	(dBµV/m)	(cm)	H / V	(deg)	(dB)	(dBuV/m)	(dB)	(dBµV/m)	
Antenna – 2										
CH-1	2710.32	59.51	300	V	1	12.53	46.98	7.02	54	PASS
CH-1	3613.86	48.58	300	V	343	12.53	36.05	17.95	54	PASS
CH-1	4517.39	57.41	200	V	1	12.53	44.88	9.12	54	PASS
CH-1	4518.04	57.85	300	V	343	12.53	45.32	8.68	54	PASS
CH-1	5420.93	51.53	300	V	348	12.53	39.00	15	54	PASS
CH-1	5421.57	52	300	V	343	12.53	39.47	14.53	54	PASS
CH-28	1474.43	22.84	200	H	27	12.53	10.31	43.69	54	PASS
CH-28	1476.04	22.84	400	H	159	12.53	10.31	43.69	54	PASS
CH-28	1479.25	22.69	100	V	27	12.53	10.16	43.84	54	PASS
CH-28	2748.57	55.13	200	H	333	12.53	42.60	11.4	54	PASS
CH-28	3664.96	47.57	400	V	327	12.53	35.04	18.96	54	PASS
CH-28	3665.61	48.96	400	V	322	12.53	36.43	17.57	54	PASS
CH-28	4581.36	53.42	200	V	339	12.53	40.89	13.11	54	PASS
CH-28	7330.21	47.27	200	H	33	12.53	34.74	19.26	54	PASS
CH-55	2778.14	56.95	200	V	357	12.53	44.42	9.58	54	PASS
CH-55	3704.50	51.46	100	V	0	12.53	38.93	15.07	54	PASS
CH-55	4630.21	53.68	300	V	32	12.53	41.15	12.85	54	PASS
CH-55	7409.29	46.76	200	H	309	12.53	34.23	19.77	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) Corrected Reading (dBuV/m) = Measured Average (dBuV/m) - Duty Cycle (dB)										

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 – 2									
CH-1	111.66	1806.78	54.82	100	H	333	91.66	36.84	PASS
CH-1	111.66	6324.46	63.93	300	V	323	91.66	27.73	PASS
CH-1	111.66	7228	55.56	200	H	0	91.66	36.1	PASS
CH-1	111.66	7228.64	55.96	200	H	312	91.66	35.7	PASS
CH-28	110.05	1832.5	55.84	100	V	0	90.05	34.21	PASS
CH-28	110.05	1864.96	44.48	400	H	21	90.05	45.57	PASS
CH-28	110.05	2454.14	43.81	400	H	286	90.05	46.24	PASS
CH-28	110.05	5497.42	57.41	400	V	334	90.05	32.64	PASS
CH-28	110.05	5498.39	57.32	200	V	352	90.05	32.73	PASS
CH-28	110.05	6414.14	64.93	400	H	128	90.05	25.12	PASS
CH-28	110.05	6414.78	64.93	400	H	128	90.05	25.12	PASS
CH-55	109.14	1852.1	55.03	100	V	8	89.14	34.11	PASS
CH-55	109.14	5556.25	58.48	300	V	347	89.14	30.66	PASS
CH-55	109.14	5556.89	57.8	300	V	357	89.14	31.34	PASS
CH-55	109.14	6481.96	65.53	200	H	314	89.14	23.61	PASS
CH-55	109.14	6482.92	65.61	200	H	314	89.14	23.53	PASS
Note :									
Measured Harmonic Field Strength (dBuV/m) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss - Pre amplifier Gain (dB)									

3 DTS CHANNELS

3.1 6dB BANDWIDTH

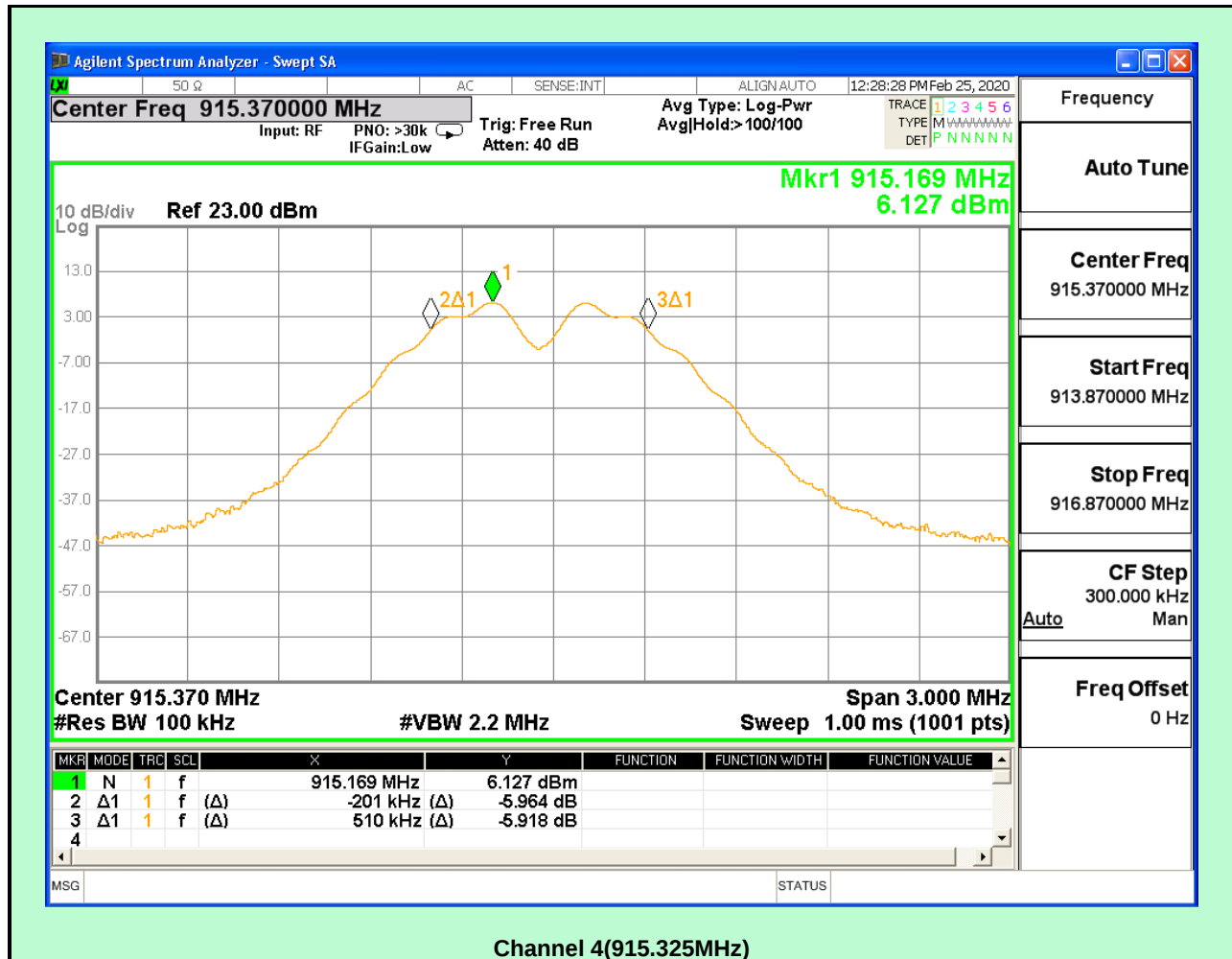
EUT Nomenclature	Wireless Relay Module	Test Request No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	24.6°C
Test End Date	28-Feb-2020	Humidity RH (%)	53.9%RH
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage /	3.3Vdc		
Operating Mode	Refer Page 6 for Operating Mode Table		
Test configuration	Refer Page 6 for Test Configuration Table		
Deviation from Std.	NA		
Applicable	FCC Part 15.247:2010		
Test Method	KDB 558074		
Comment	NA		
TEST DETAILS			
Method	Radiated ☐		Conducted ☒
TEST PARAMETERS			
Antenna Height	NA	Turntable Rotation	NA
Equipment Class	NA	Measurement Distance	NA

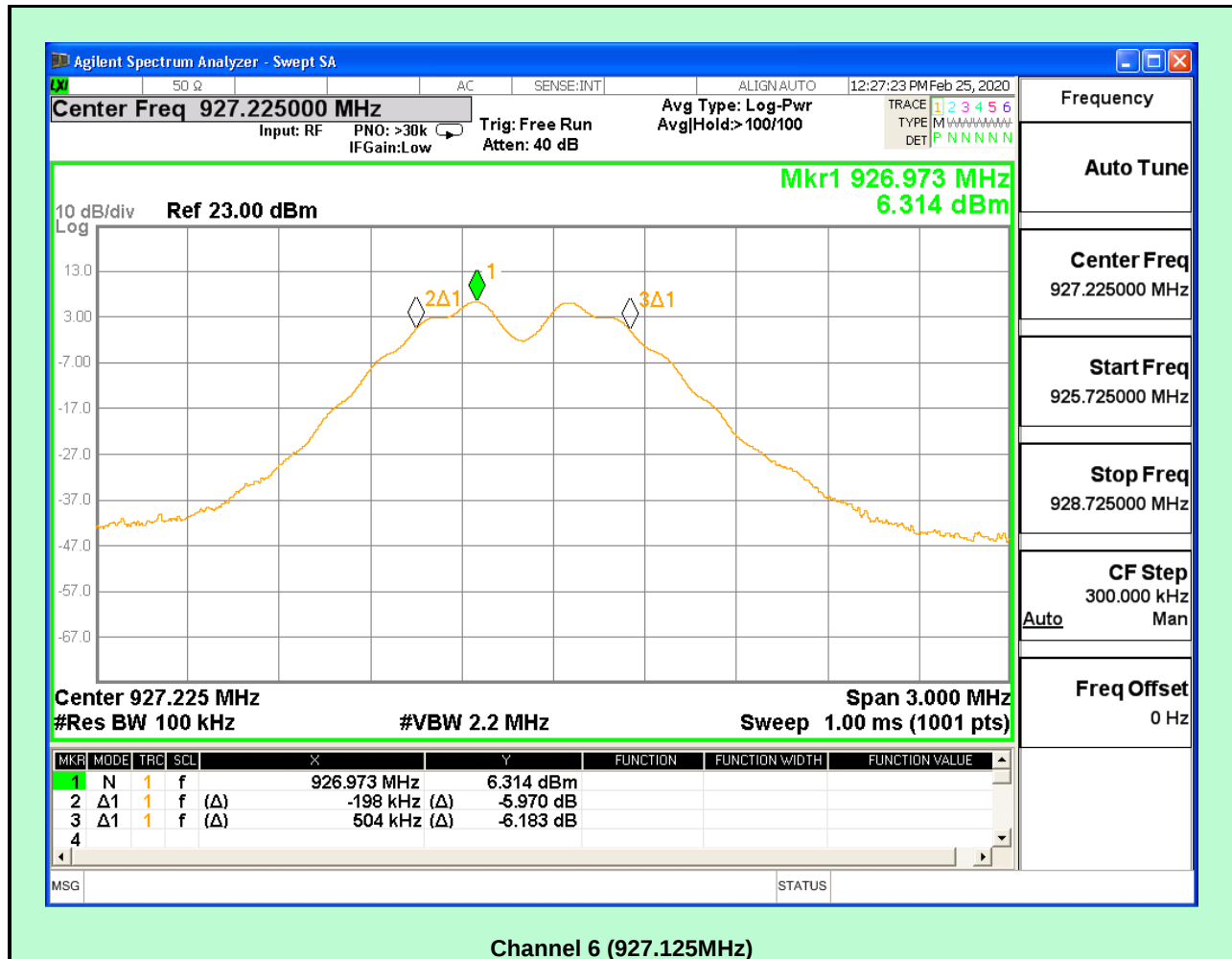
TEST EQUIPMENT					
Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	N9010A	MY48031005	27-Feb-2021
Y	RF Cable	Huber- Suhner	SF104/2X11PC3542/500	NA	NA

TEST GRAPHS



Channel 1 (902.875MHz)





TEST RESULT				
Channel	Frequency	Measured Bandwidth	Limit	Result
#	MHz	KHz	KHz	
1	902.875	705	>500	PASS
4	915.325	711	>500	PASS
6	927.125	702	>500	PASS

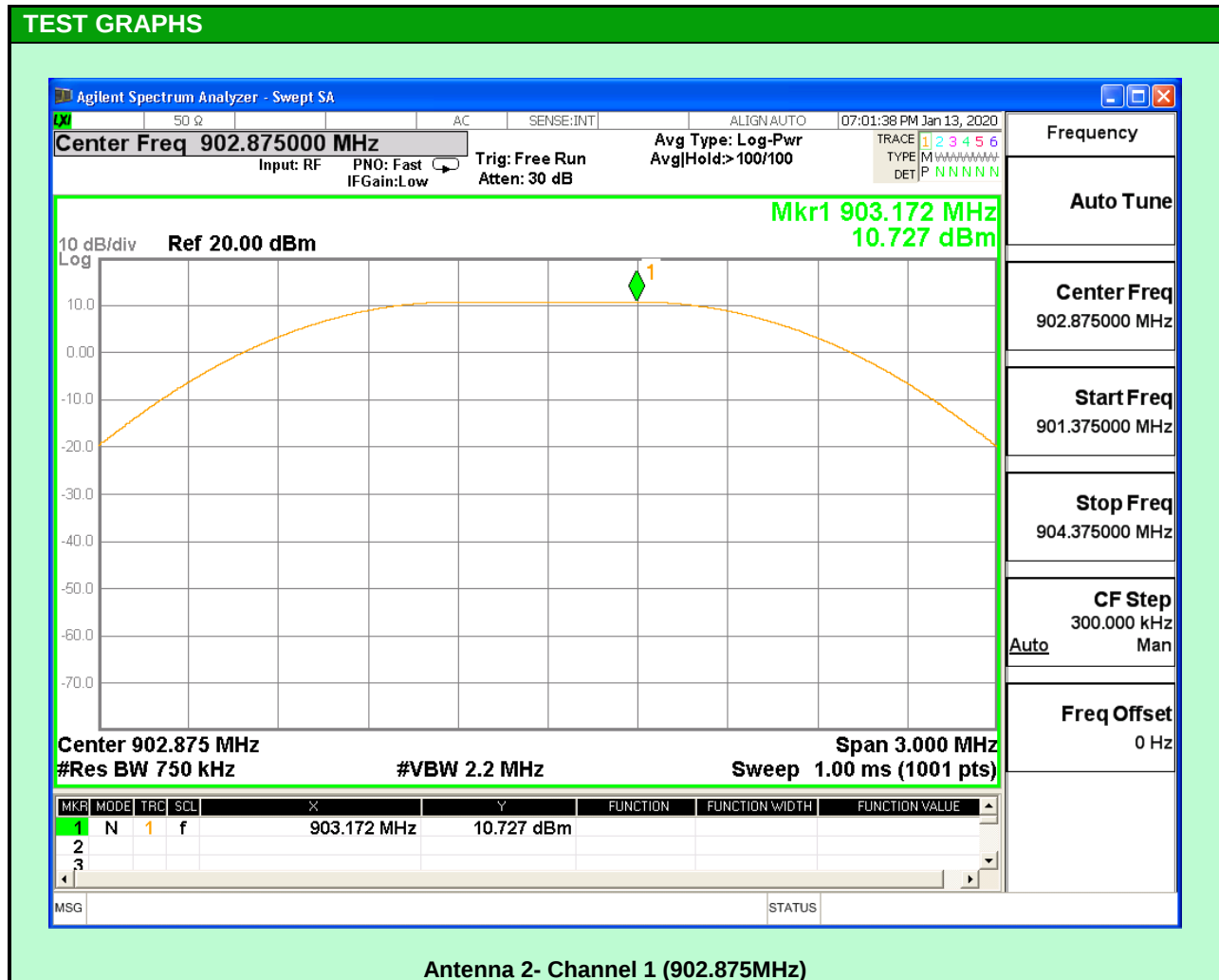
TEST SETUP PHOTOGRAPH	
Refer Annexure -1	
Conducted RF Test setup	

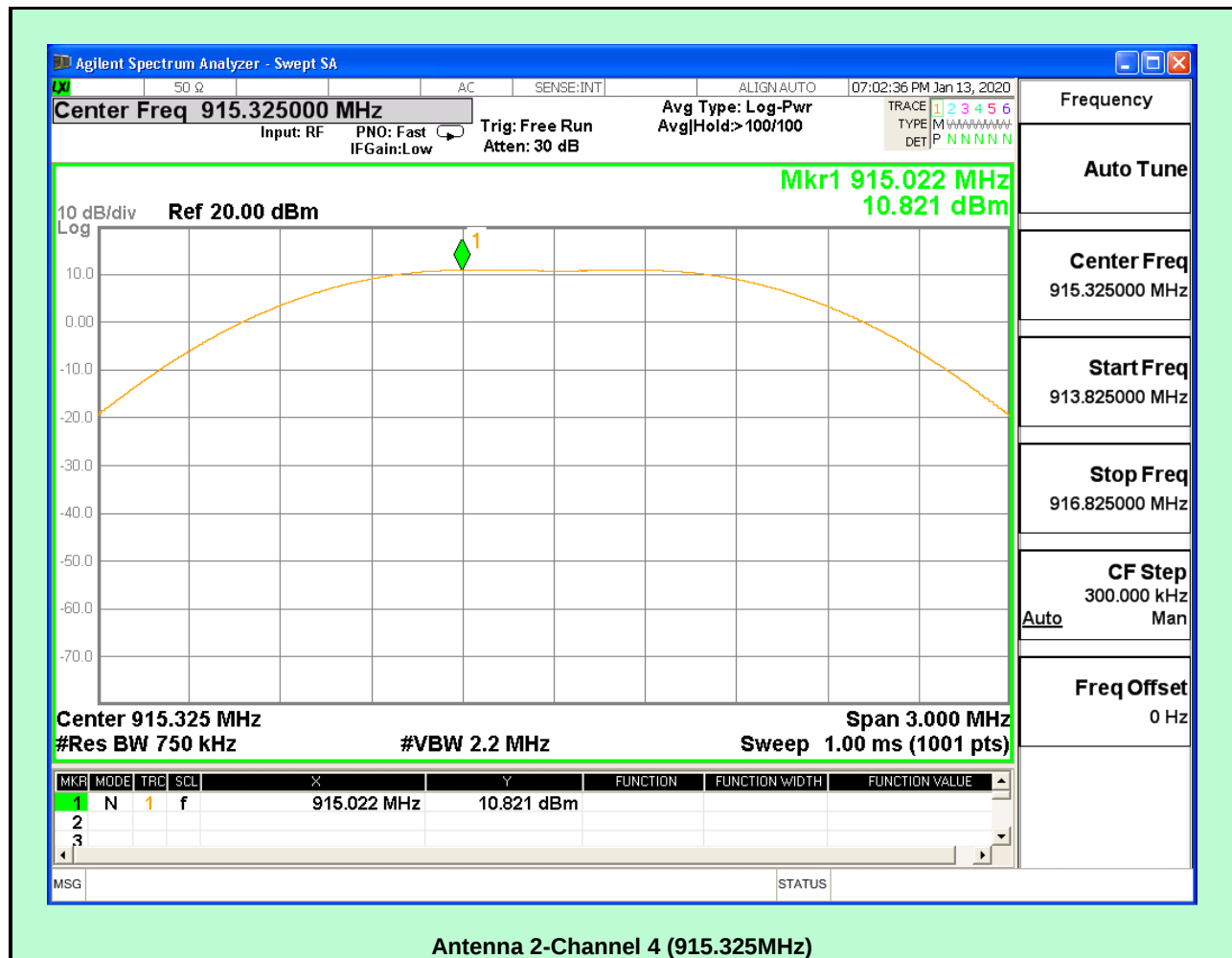
3.2 PEAK OUTPUT POWER LEVEL

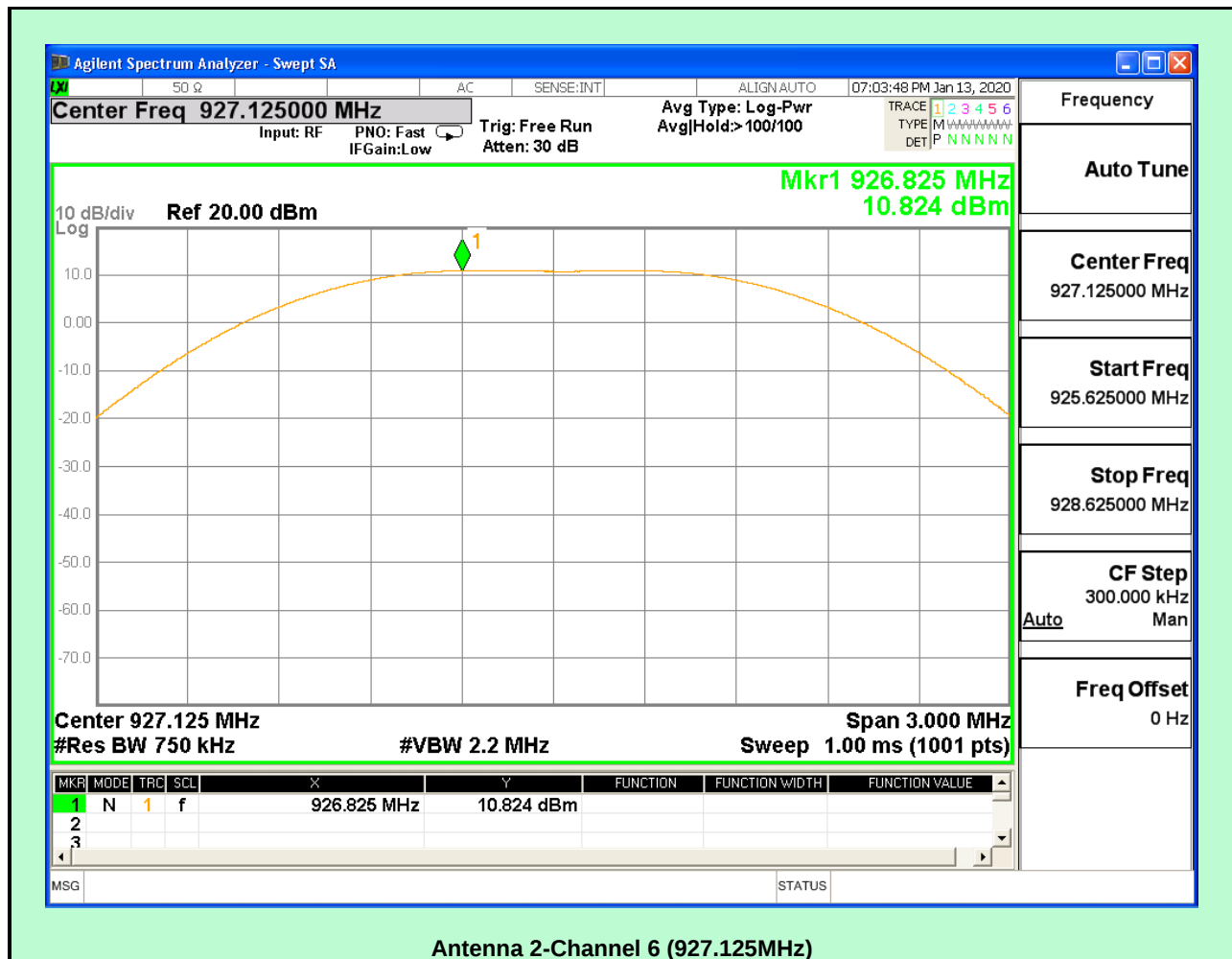
EUT Nomenclature	Wireless Relay Module	Test Request No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	23.6°C
Test End Date	28-Feb-2020	Humidity RH (%)	51.9%RH
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage /	3.3Vdc		
Operating Mode	Refer Page 6 for Operating Mode Table		
Test configuration	Refer Page 6 for Test Configuration Table		
Deviation from Std.	NA		
Applicable	FCC Part 15.247:2010		
Test Method	KDB 558074		
Comment	NA		
TEST DETAILS			
Method	Radiated ☐	Conducted ☒	
TEST PARAMETERS			
Antenna Height	NA	Turntable Rotation	NA
Equipment Class	NA	Measurement	NA

TEST EQUIPMENT					
Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	N9010A	MY48031005	27-Feb-2021
Y	RF Cable	Huber- Suhner	SF104/2X11PC3542/500	NA	NA

TEST GRAPHS







TEST RESULT

Channel #	Frequency MHz	Measured Power Level dBm	Cable Loss dB	Transmitter Power Level dBm	Limit dBm	Result
Antenna 2						
1	902.875	10.72	0.8	11.52	≤30	PASS
4	915.325	10.82	0.8	11.62	≤30	PASS
6	927.125	10.82	0.8	11.62	≤30	PASS

Note: Transmitter Output Power = Measured Level (dBm) + Cable Loss (dB)

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

3.3 MAXIMUM POWER SPECTRAL DENSITY

EUT Nomenclature	Wireless Relay Module	Test Request No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	23.6°C
Test End Date	28-Feb-2020	Humidity RH (%)	51.9%RH
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage /	3.3Vdc		
Operating Mode	Refer Page 6 for Operating Mode Table		
Test configuration	Refer Page 6 for Test Configuration Table		
Deviation from Std.	NA		
Applicable	FCC Part 15.247:2010		
Test Method	KDB 558074		
Comment	NA		

TEST DETAILS

Method	Radiated ☐	Conducted ☒
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TEST PARAMETERS

Antenna Height	NA	Turntable Rotation	NA
Equipment Class	NA	Measurement	NA

TEST EQUIPMENT

Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	N9010A	MY48031005	27-Feb-2021
Y	RF Cable	Huber- Suhner	SF104/2X11PC3542/500	NA	NA

Agilent Spectrum Analyzer - Swept SA

50 Ω AC SENSE:INT ALIGN AUTO 10:13:10 AM Feb 26, 2020

Center Freq 902.875000 MHz Input: RF PNO: >30k IFGain:Low Trig: Free Run Atten: 40 dB Avg Type: Log-Pwr Avg|Hold:>100/100

TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N

Mkr1 902.721 MHz
5.715 dBm

10 dB/div Ref 23.00 dBm Log

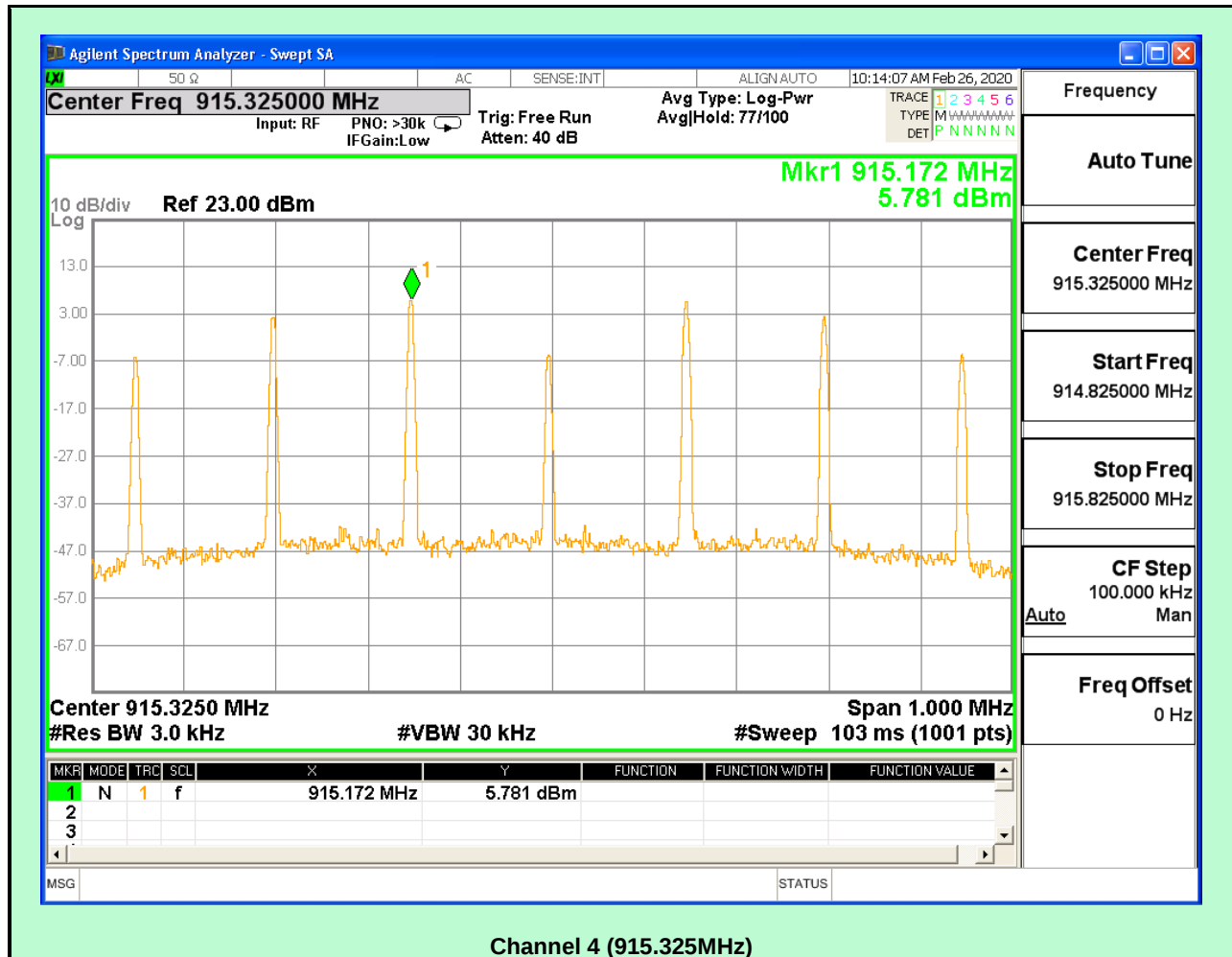
Center Freq 902.875000 MHz **Span 1.000 MHz**
#Res BW 3.0 kHz **#VBW 30 kHz** **#Sweep 103 ms (1001 pts)**

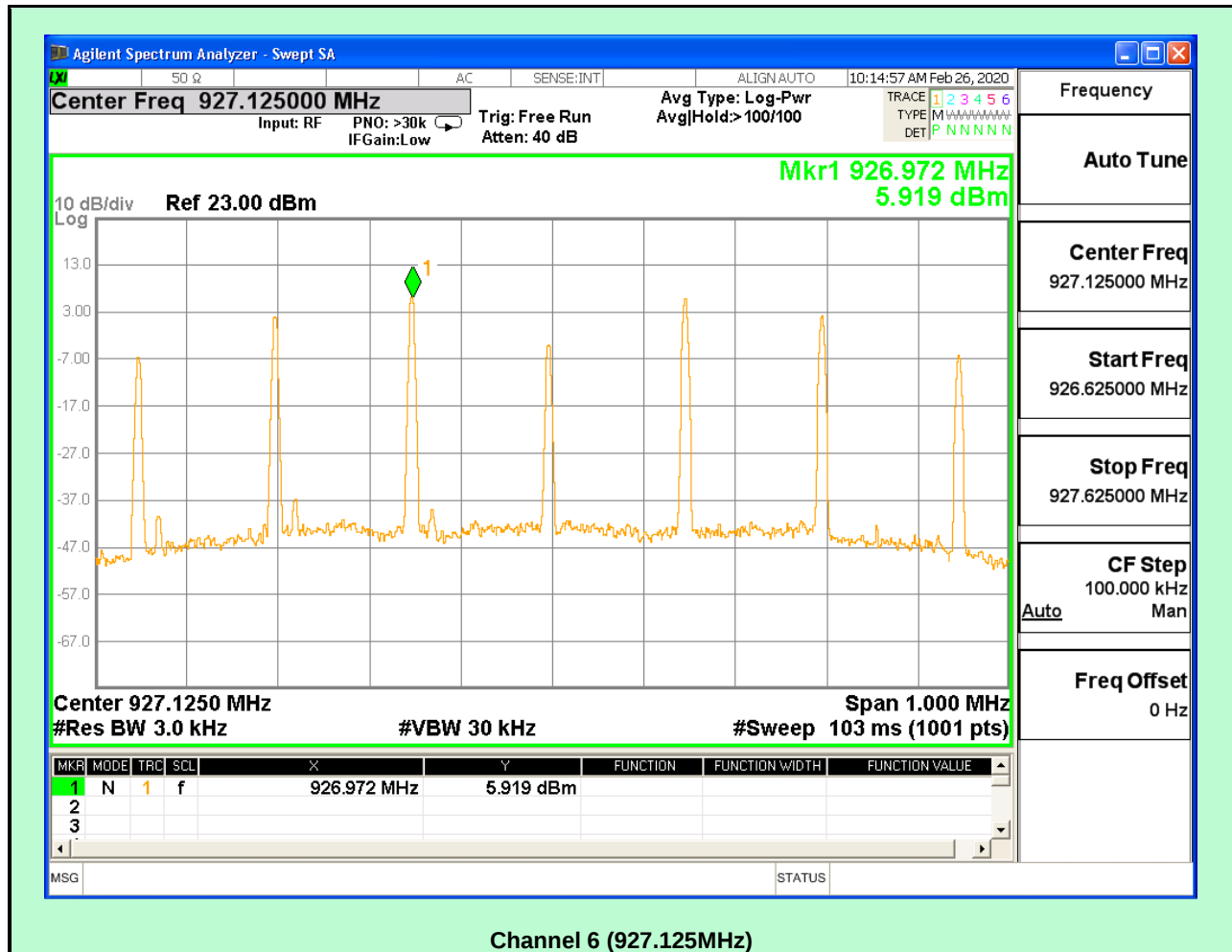
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	902.721 MHz	5.715 dBm			
2								
3								

Frequency Auto Tune Center Freq 902.875000 MHz Start Freq 902.375000 MHz Stop Freq 903.375000 MHz CF Step 100.000 kHz Man Auto Freq Offset 0 Hz

MSG STATUS

Channel 1 (902.875MHz)





TEST RESULT

Channel #	Frequency MHz	Measured Level dBm/3KHz	Limit dBm/3KHz	Result
1	902.875	5.71	<8	Pass
4	915.325	5.78	<8	Pass
6	927.125	5.91	<8	Pass

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

3.4 BAND EDGE COMPLIANCE

EUT Nomenclature	Wireless Relay Module	Test Request No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	23.6°C
Test End Date	28-Feb-2020	Humidity RH (%)	51.9%RH
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage /	3.3Vdc		
Operating Mode	Refer Page 6 for Operating Mode Table		
Test configuration	Refer Page 6 for Test Configuration Table		
Deviation from Std.	NA		
Applicable	FCC Part 15.247:2010		
Test Method	KDB 558074		
Comment	NA		

TEST DETAILS

Method	Radiated ☐	Conducted ☒
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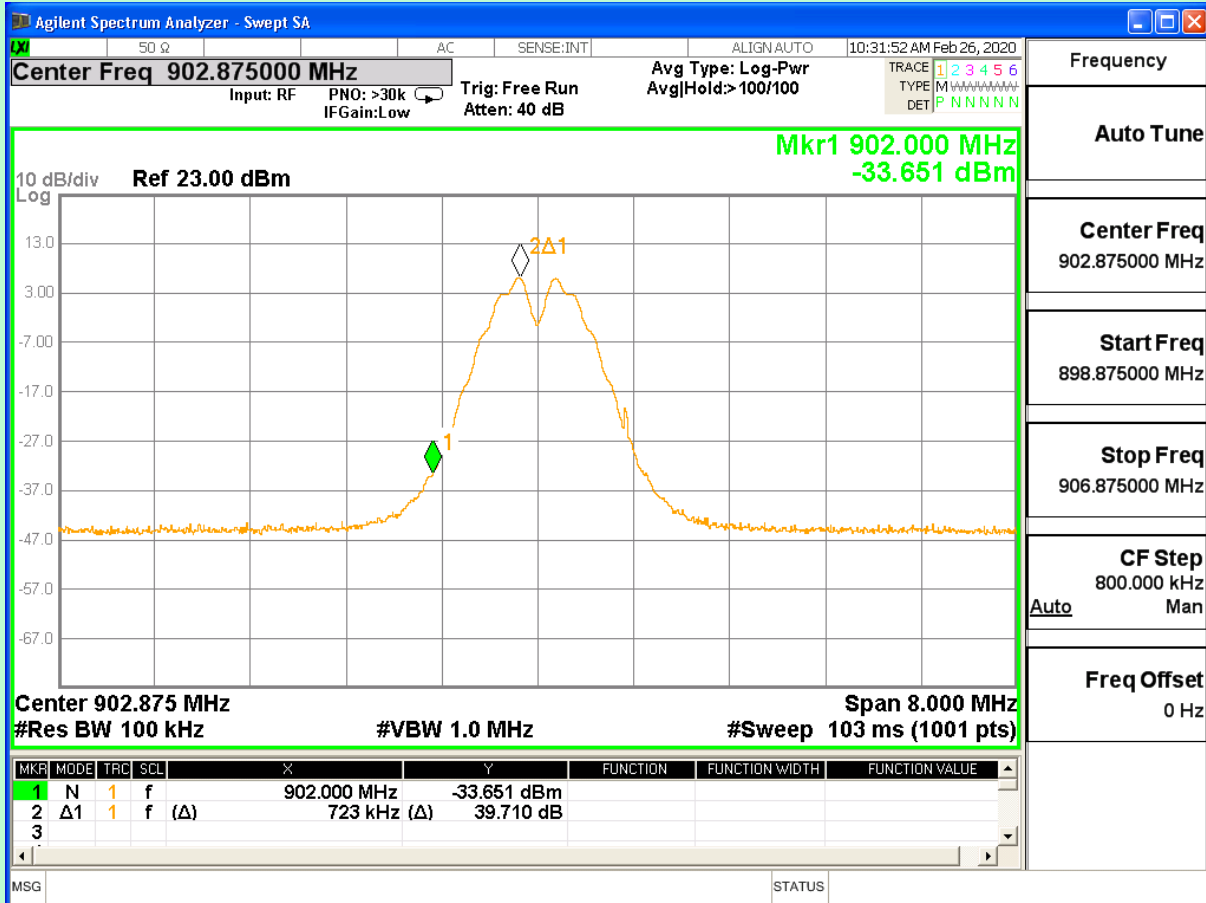
TEST PARAMETERS

Antenna Height	NA	Turntable Rotation	NA
Equipment Class	NA	Measurement	NA

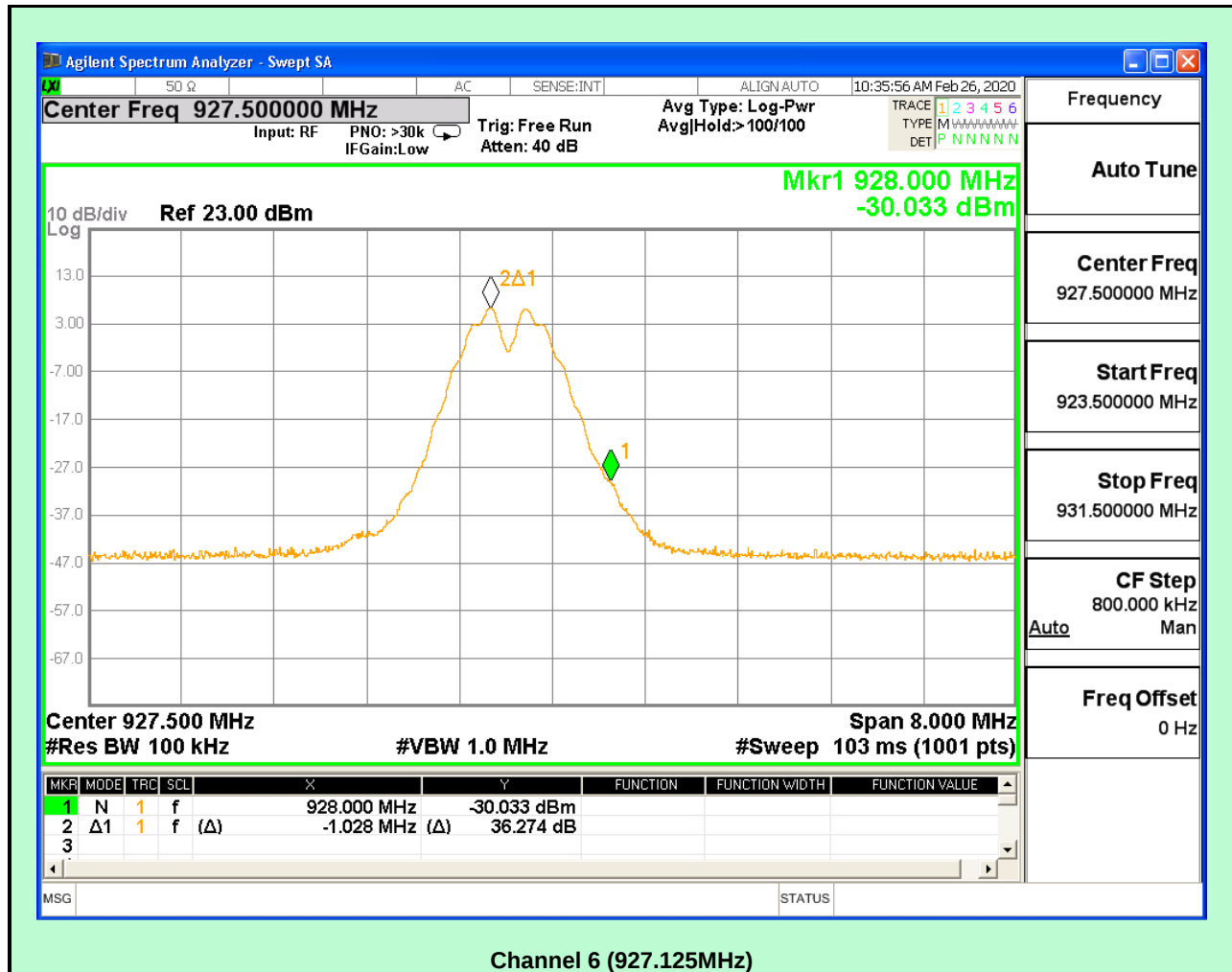
TEST EQUIPMENT

Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	N9010A	MY48031005	27-Feb-2021
Y	RF Cable	Huber- Suhner	SF104/2X11PC3542/500	NA	NA

TEST GRAPHS



Channel 1 (902.875MHz)



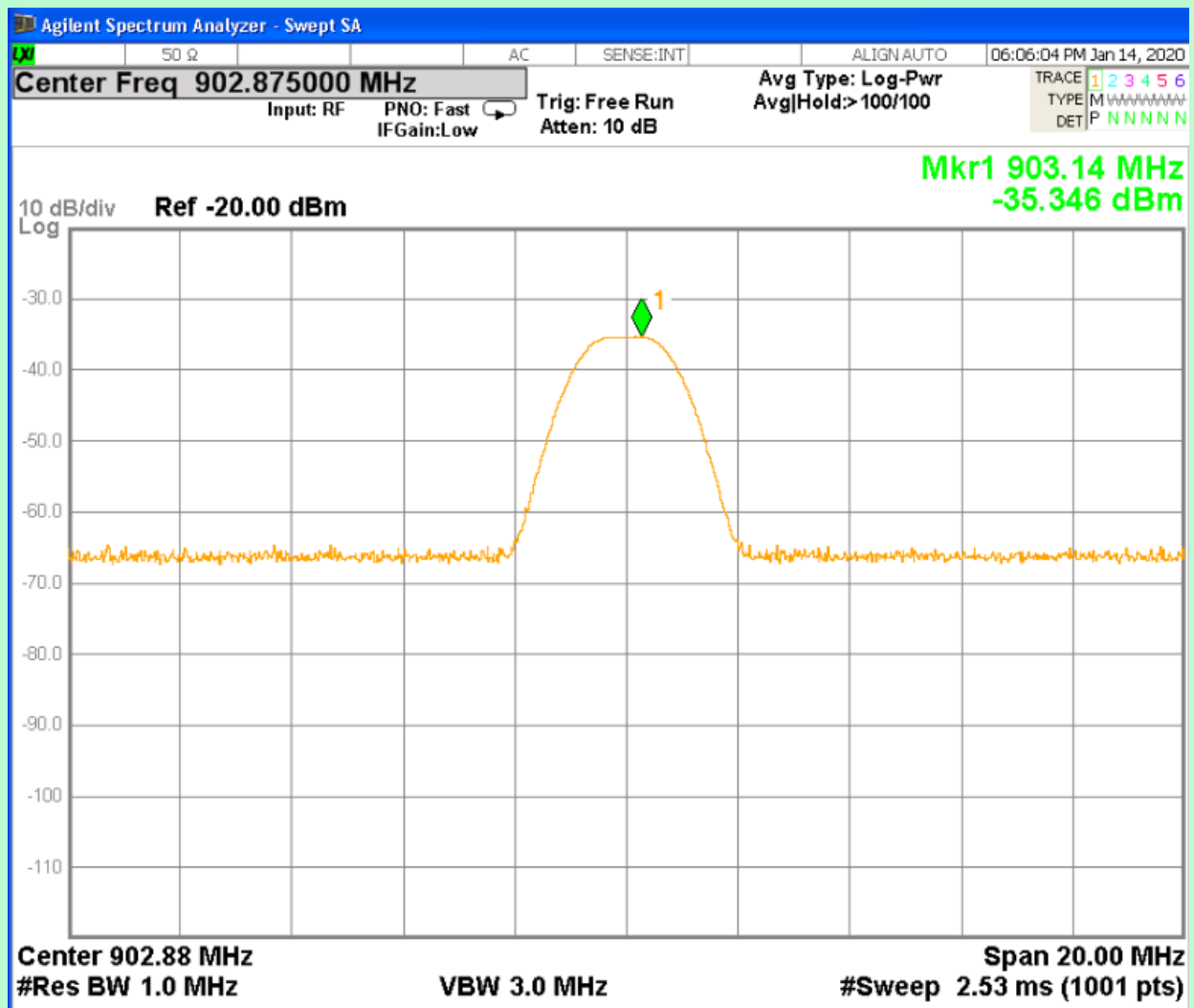
TEST RESULT				
Channel	Frequency	Measured Level	Limit	Result
#	MHz	dBm/3KHz	dBm/3KHz	
1	902.875	39.71	>20	PASS
6	927.125	36.27	>20	PASS

TEST SETUP PHOTOGRAPH	
Refer Annexure -1	
Conducted RF Test setup	

3.5 EFFECTIVE ISOTROPIC RADIATED POWER			
EUT Nomenclature	Wireless Relay Module	Test Request No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	23 ± 2
Test End Date	28-Feb-2020	Humidity RH (%)	55 ± 3
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage / Freq	3.3V, 21.5mA		
Operating Mode	Refer Page 6 for Operating Mode Table		
Test configuration	Refer Page 6 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	☒ Radiated		☐ Conducted
TEST PARAMETERS			
Antenna Height	1m to 4m	Turntable Rotation	0° to 360°
Equipment Class	NA	Measurement Distance	3m

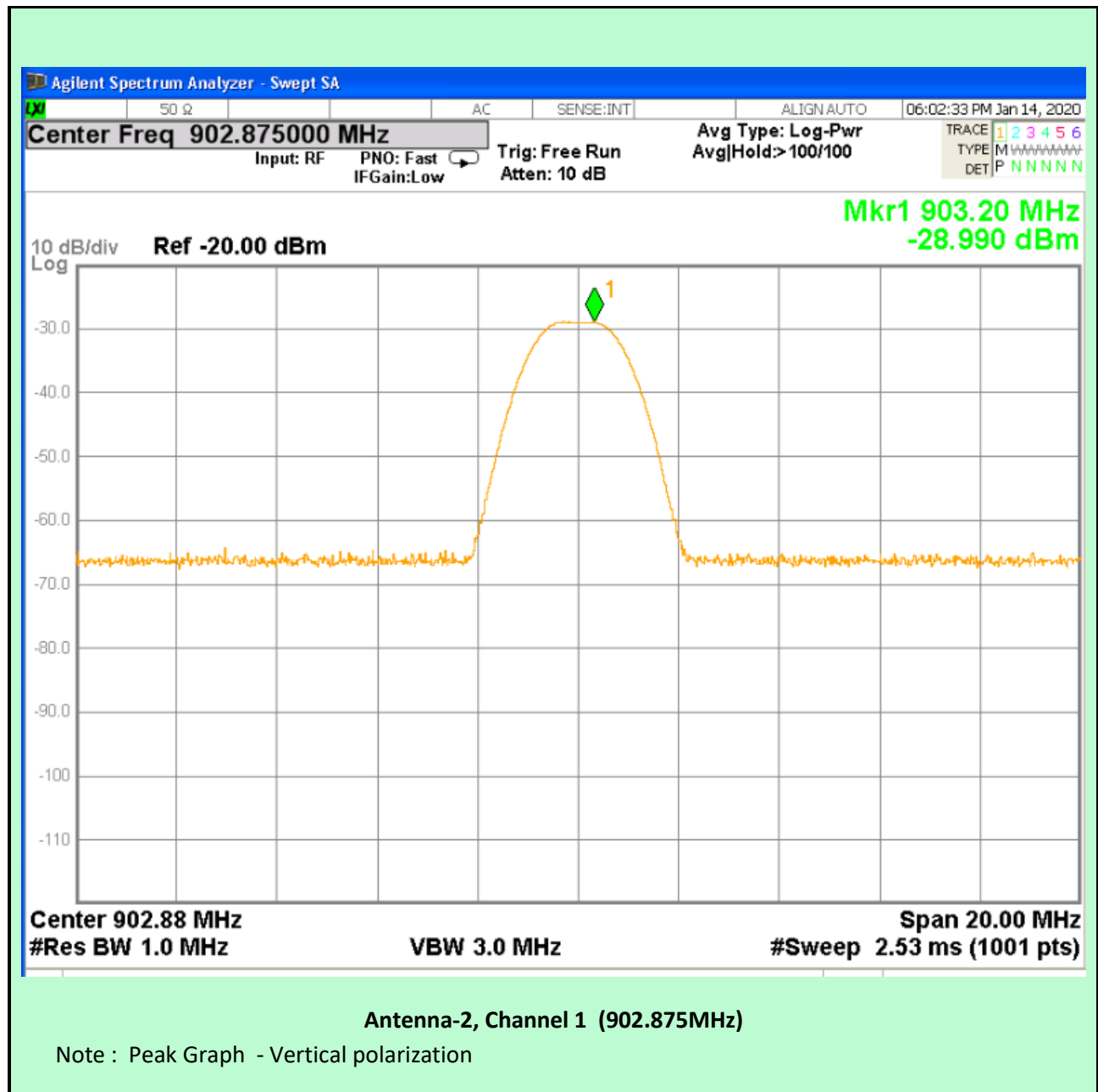
TEST EQUIPMENT					
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100525	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	RF cable (9KHz to 18GHz)	Huber + Schuner	Sucoflex100	515518/126E	04-Oct-21
Note: Switch ON /OFF the Internal Preamplifier based on carrier level and or noise floor without overloading the receiver					

TEST GRAPHS – EIRP

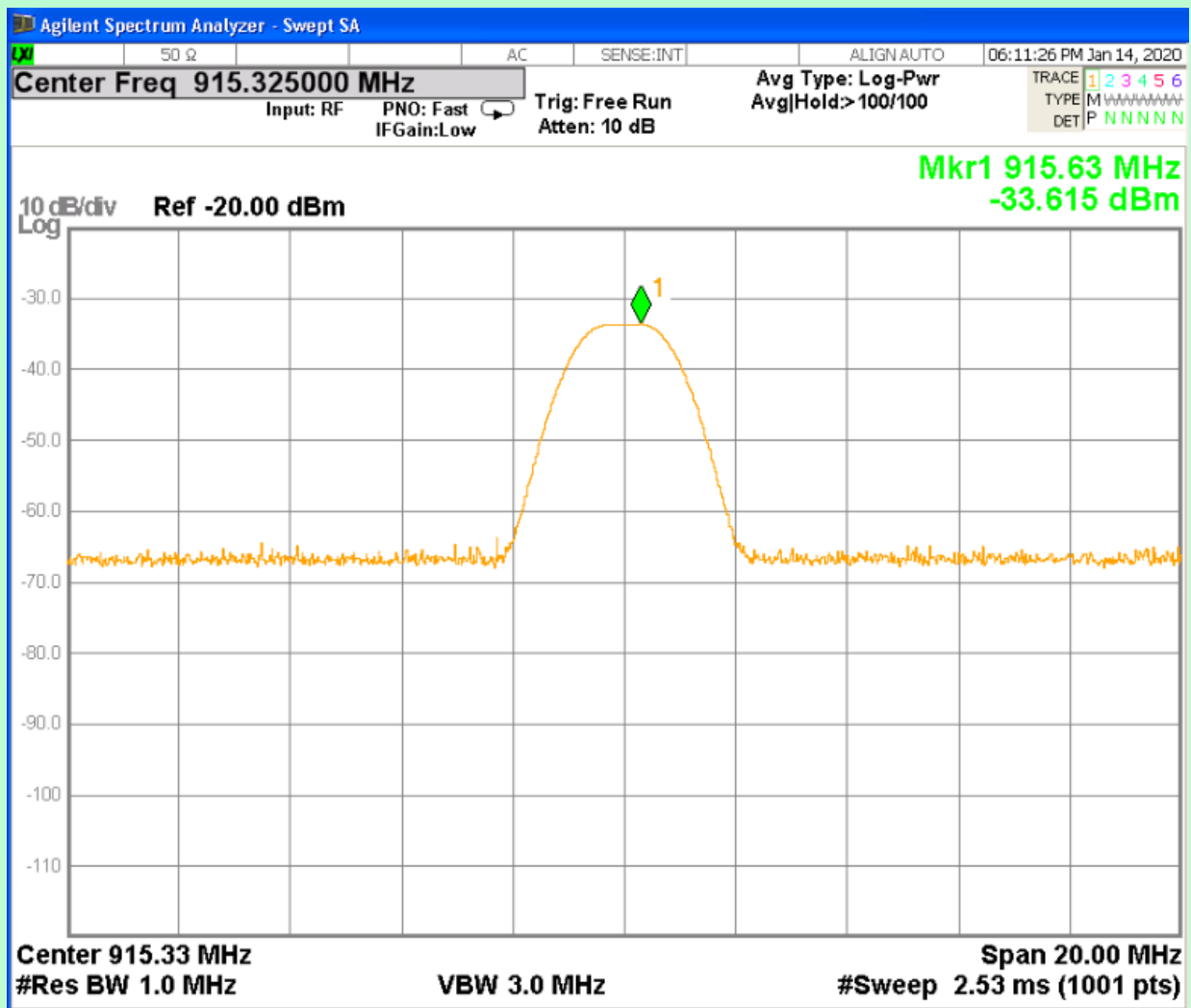


Antenna-2, Channel 1 (902.875MHz)

Note : Peak Graph - Horizontal polarization

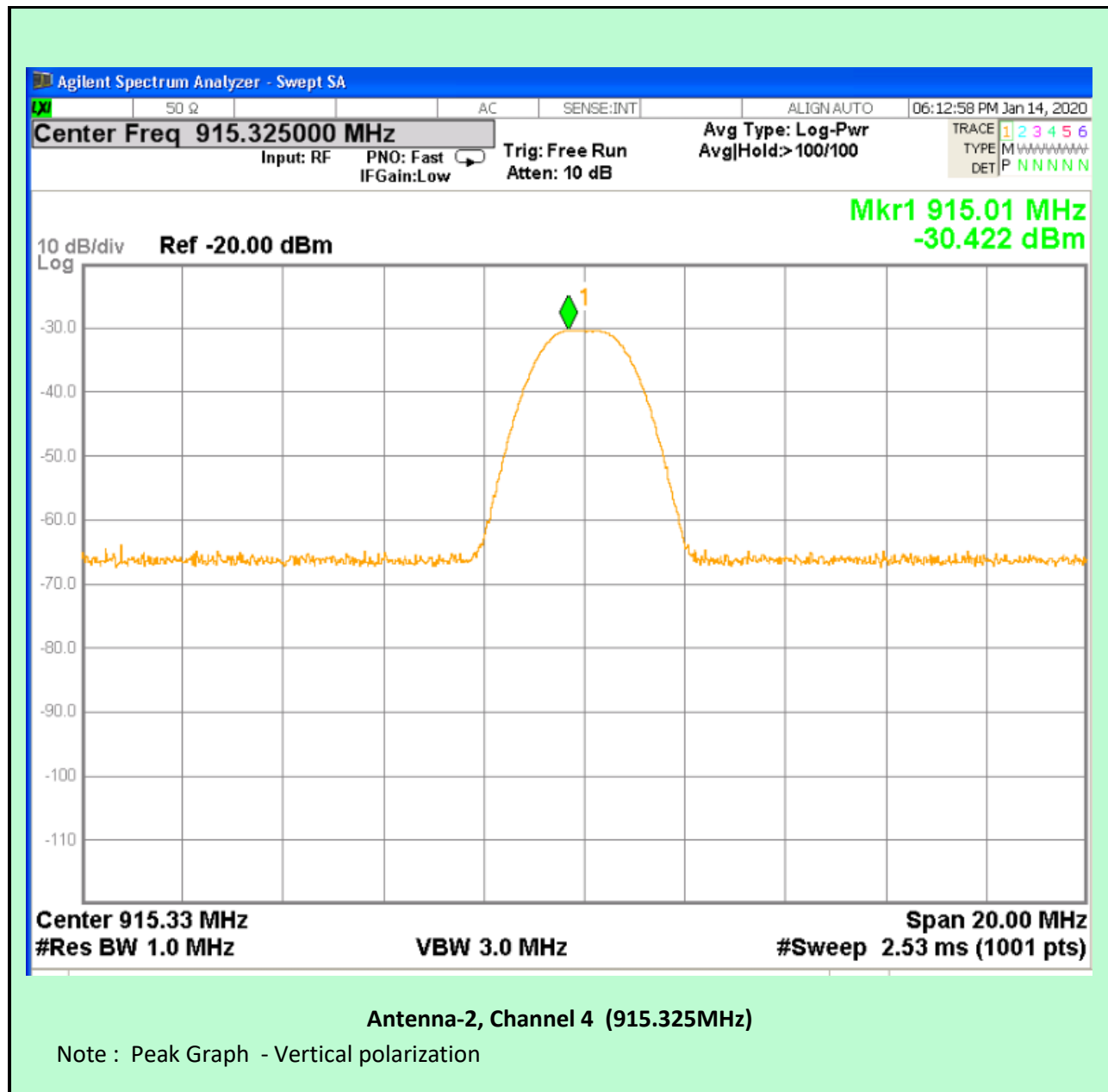


TEST GRAPHS – EIRP

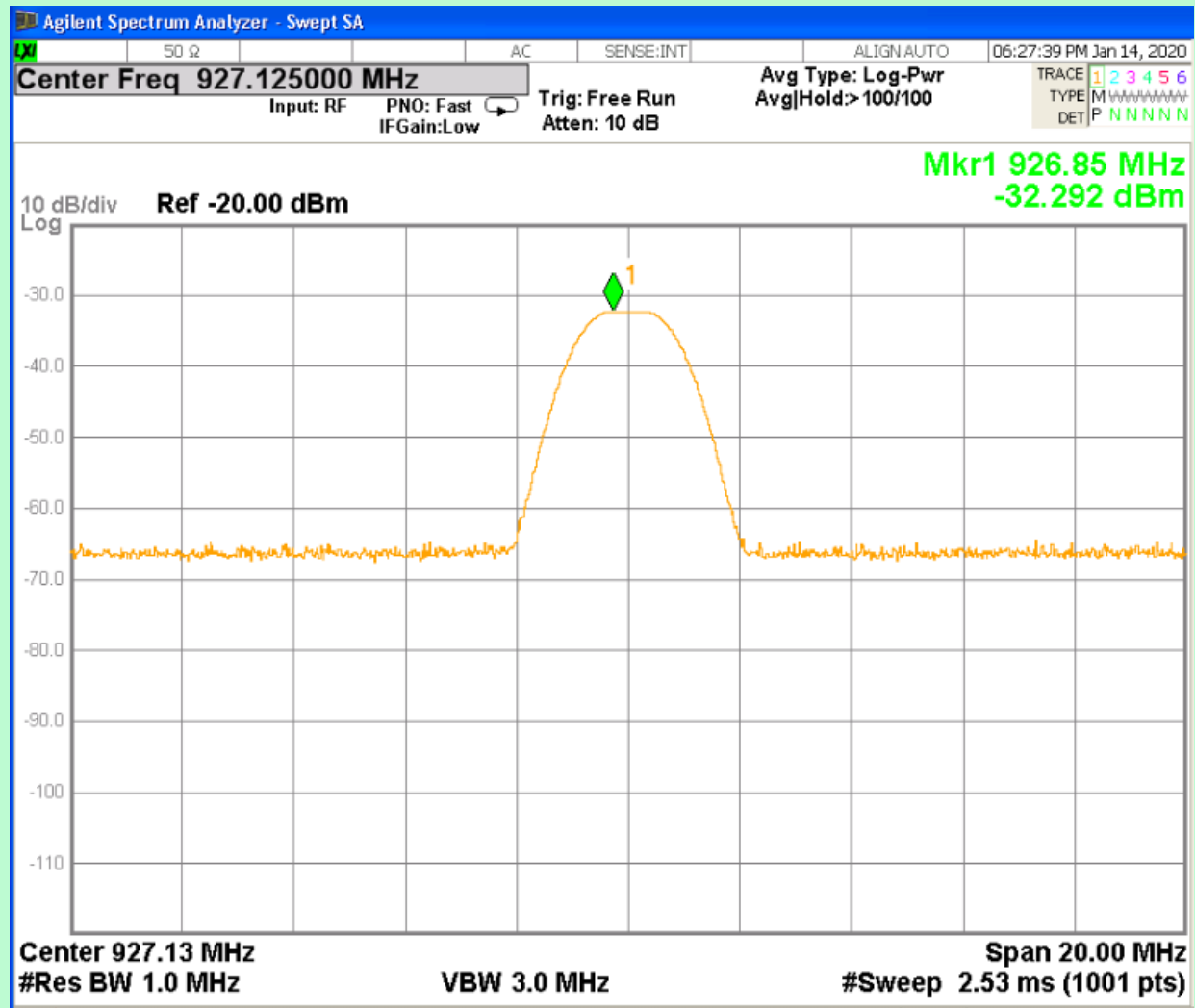


Antenna-2, Channel 4 (915.325MHz)

Note : Peak Graph - Horizontal polarization

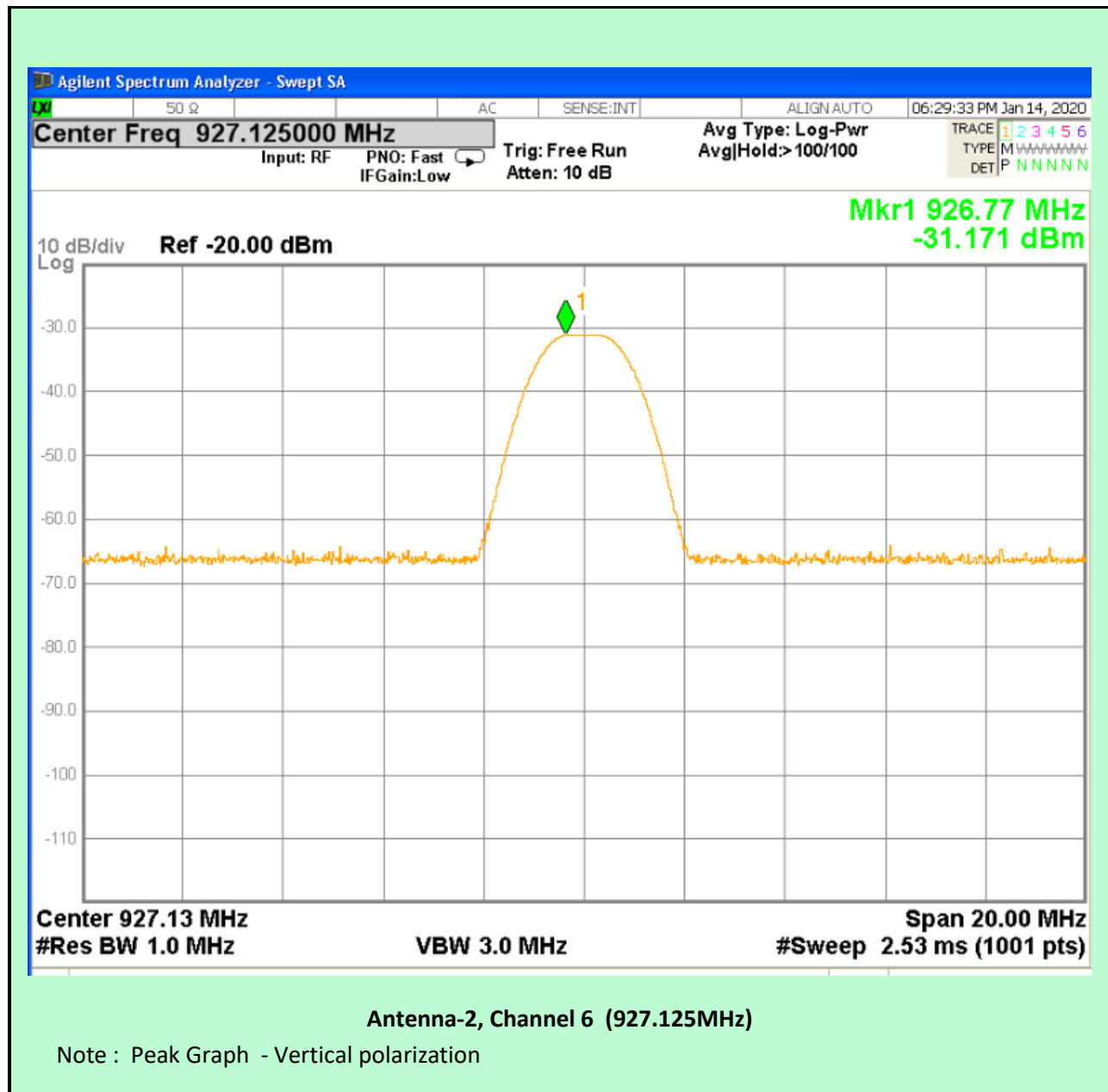


TEST GRAPHS – EIRP



Antenna-2, Channel 6 (927.125MHz)

Note : Peak Graph - Horizontal polarization



TEST RESULT – EIRP										
Channel	Channel	Rx	Rx	Measured Level	Cable Loss	External Att	Path loss @ 3m	Rx Antenna Gain	Calculated Rx Power	Calculated EIRP
	Freq	Antenna Height	Ant Pol							
#	MHz	cm	H/V	dBm	dB	dB	dB	dB	dBm	dBm
Antenna – 2 (DTS Mode)										
CH-1	902.875	205	H	-35.34	2.91	6	41.21	6.3	-32.73	8.48
CH-1	902.875	100	V	-28.99	2.91	6	41.21	6.3	-26.38	14.83
CH-4	915.325	200	H	-33.61	2.91	6	41.21	6.3	-31	10.21
CH-4	915.325	100	V	-30.42	2.91	6	41.21	6.3	-27.81	13.4
CH-6	927.125	250	H	-32.29	2.91	6	41.21	6.3	-29.68	11.53
CH-6	927.125	175	V	-31.17	2.91	6	41.21	6.3	-28.56	12.65
Note: Effective Isotropic Radiated Power (dBm)= Pr(dBm) +Lp(dB) $Pr = P_{meas}(dBm) - Gr(dBi) + Lc(dB) + Latt(dB)$ $Lp = 20 \log F + 20 \log D - 27.5$ Where: Pr = Calculated Received Power Level(dBm) Lp= Free Space Path Loss(dB) Pmeas= Measured Power Level(dBm) Gr = Receiver Antenna Gain(dBi) Lc = Cable Loss (dB) Latt= External Attenuator(dB) F = Frequency (MHz) D= Distance (m)										

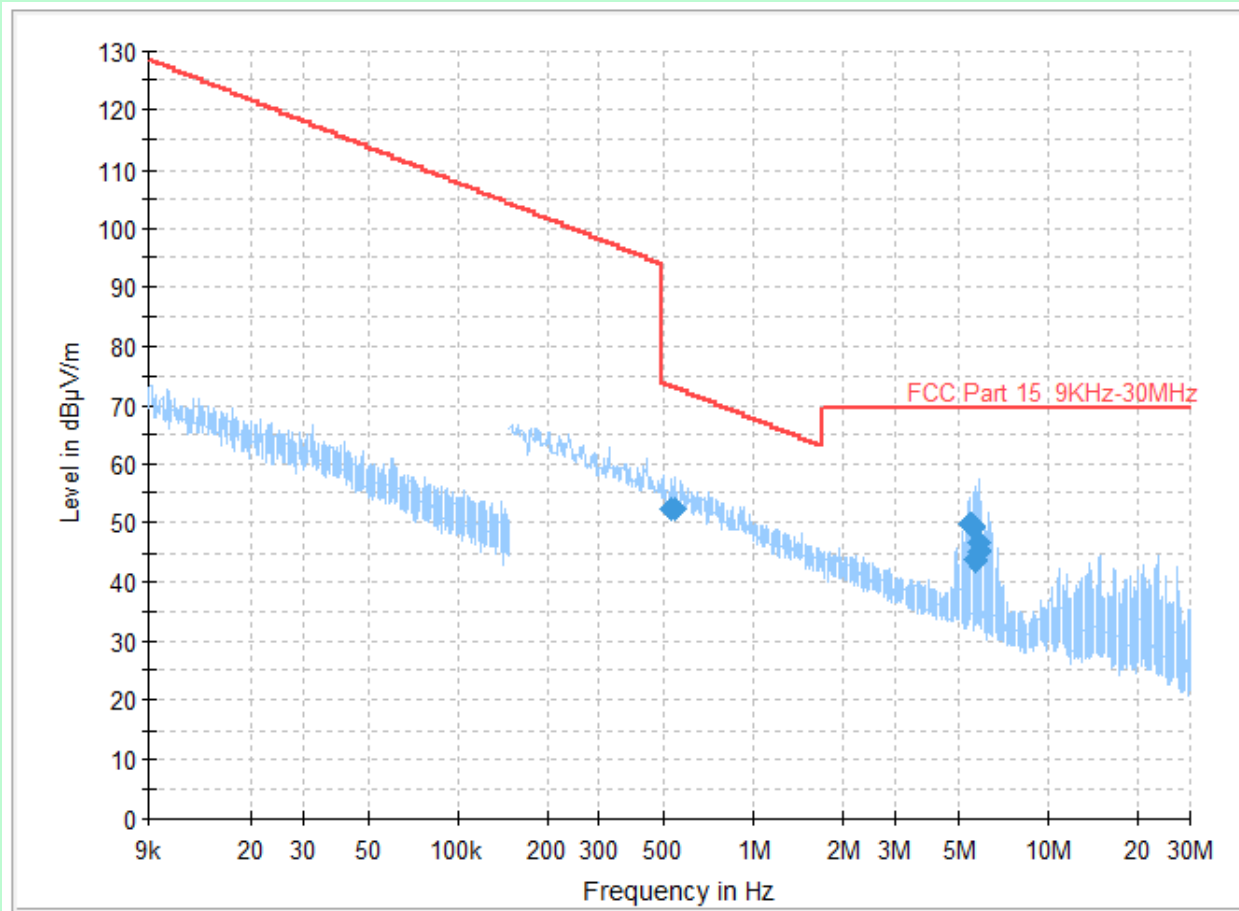
3.6 SPURIOUS RADIATED EMISSIONS

EUT Nomenclature	Wireless Relay Module	Test Report No.	EMC0419-1
Model No.	FW-RM	Serial No.	107
Test Start Date	14-Dec-2019	Temperature (°C)	23 ± 2
Test End Date	28-Feb-2020	Humidity RH (%)	55 ± 3
Tested By	Shaithanya C	Pressure (mbar)	NR
Input Voltage / Freq	3.3V, 21.5mA		
Operating Mode	Refer Page 6 Operating Modes Table		
Test configuration	Refer Page 6 Test Configuration Table		
Deviation from Std	NA		
Comment			
TEST FREQUENCY RANGE			
Start Frequency	9KHz	Stop Frequency	10GHz
MAXIMUM OPERATING FREQUENCY			
902MHz to 928MHz			
TEST PARAMETERS			
Antenna Height	1m to 4m	Turntable Rotation	0° to 360°
Applicable standard	FCC Part 15.209	Test Method	KDB 558074
Equipment Class	NA	Measurement Distance	3m

TEST EQUIPMENT

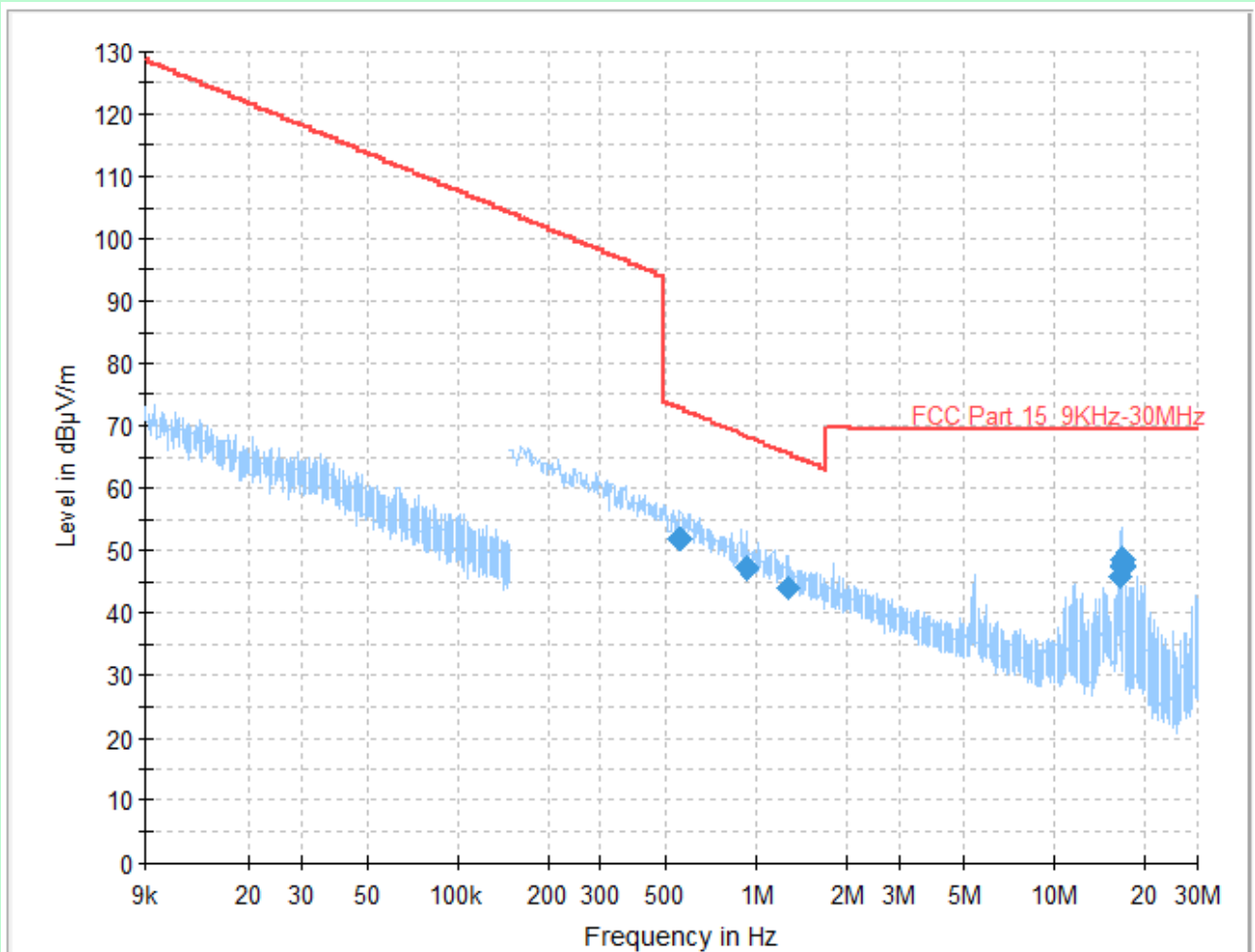
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	EMI Test Receiver	R&S	ESU26	100229	7-Aug-20
Y	3m Semi Anechoic Chamber	ETS Lindgren	DKE 6X7 DBL.DR	1625	30-Jul-22
Y	Double Ridge Guide Horn Antenna	ETS Lindgren	3117	64055	1-Nov-21
Y	Bilog Antenna	ETS Lindgren	HLP3003C	130525	5-Nov-21
Y	Loop Antenna	ETS Lindgren	6507	103694	15-Nov-21
Y	RF cable (9KHz to 18GHz)	Huber + Schuner	Sucoflex100	515518/126E	04-Oct-21
Y	Signal Conditioning unit	R&S	SCU-18	10178	5-Jun-20
Y	High Pass Filter	Wainwright	WHKX1.5/15G-12ST	1	24-Feb-21
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 2)



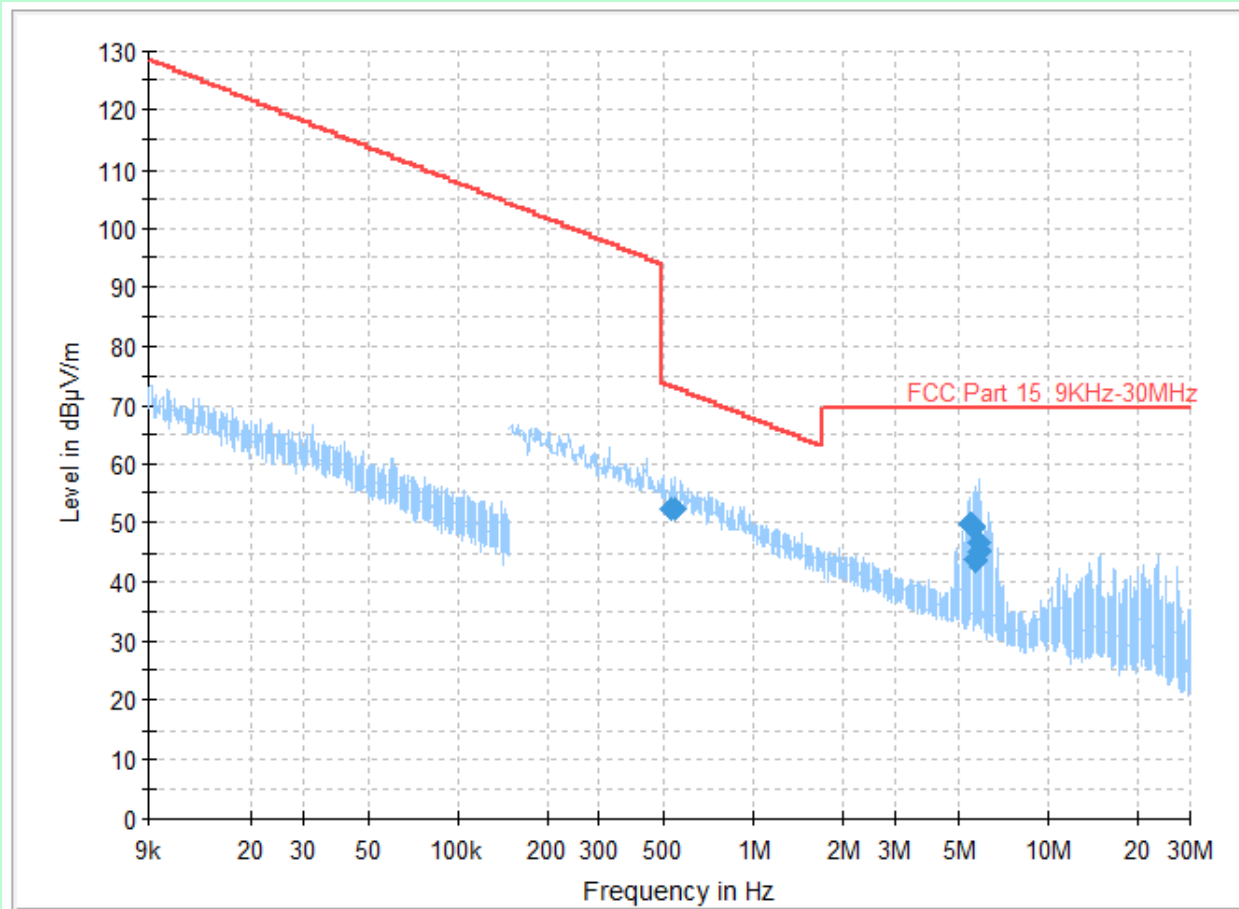
Channel 1 (902.875MHz) – Parallel

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



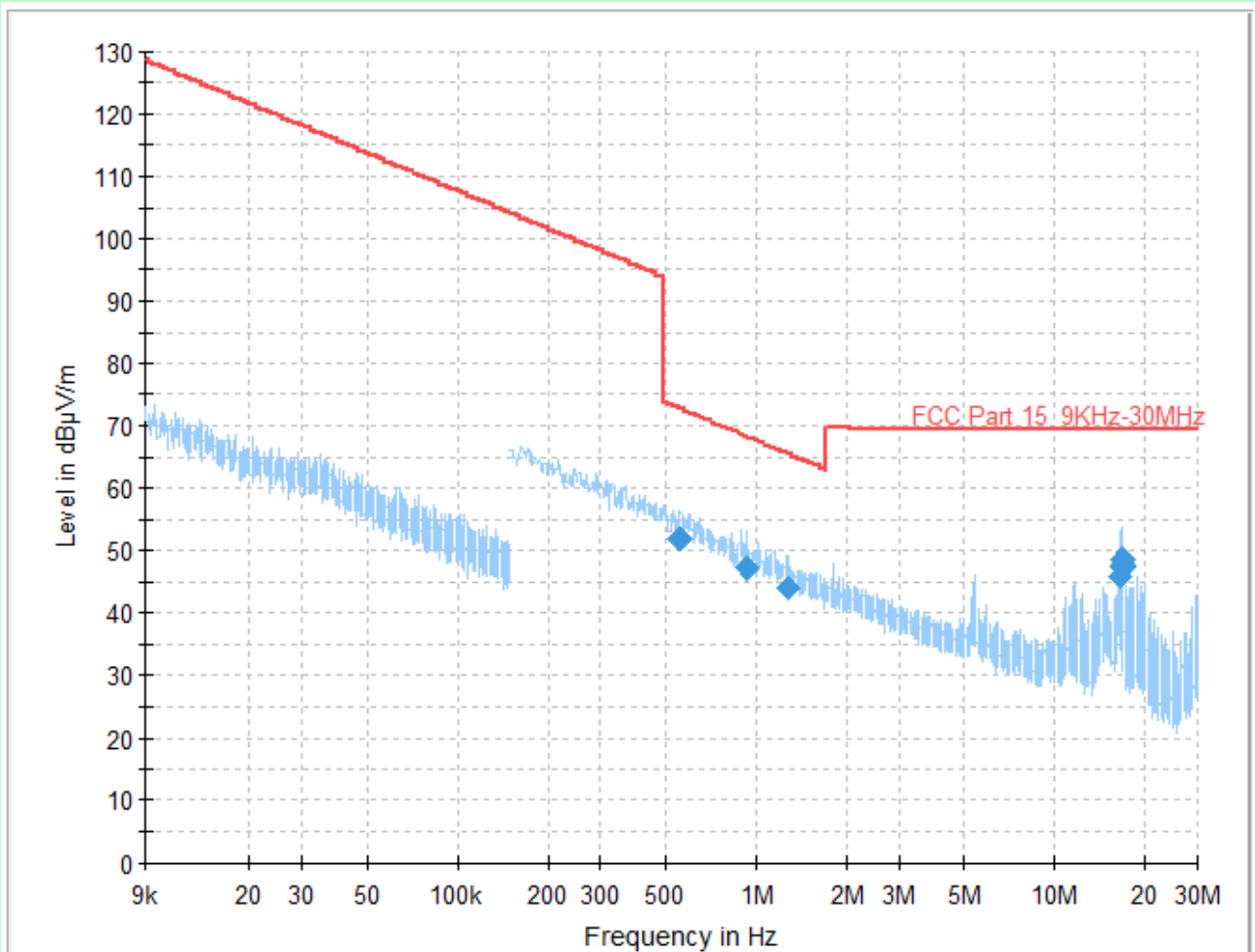
Channel 1 (902.875MHz) – Perpendicular

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



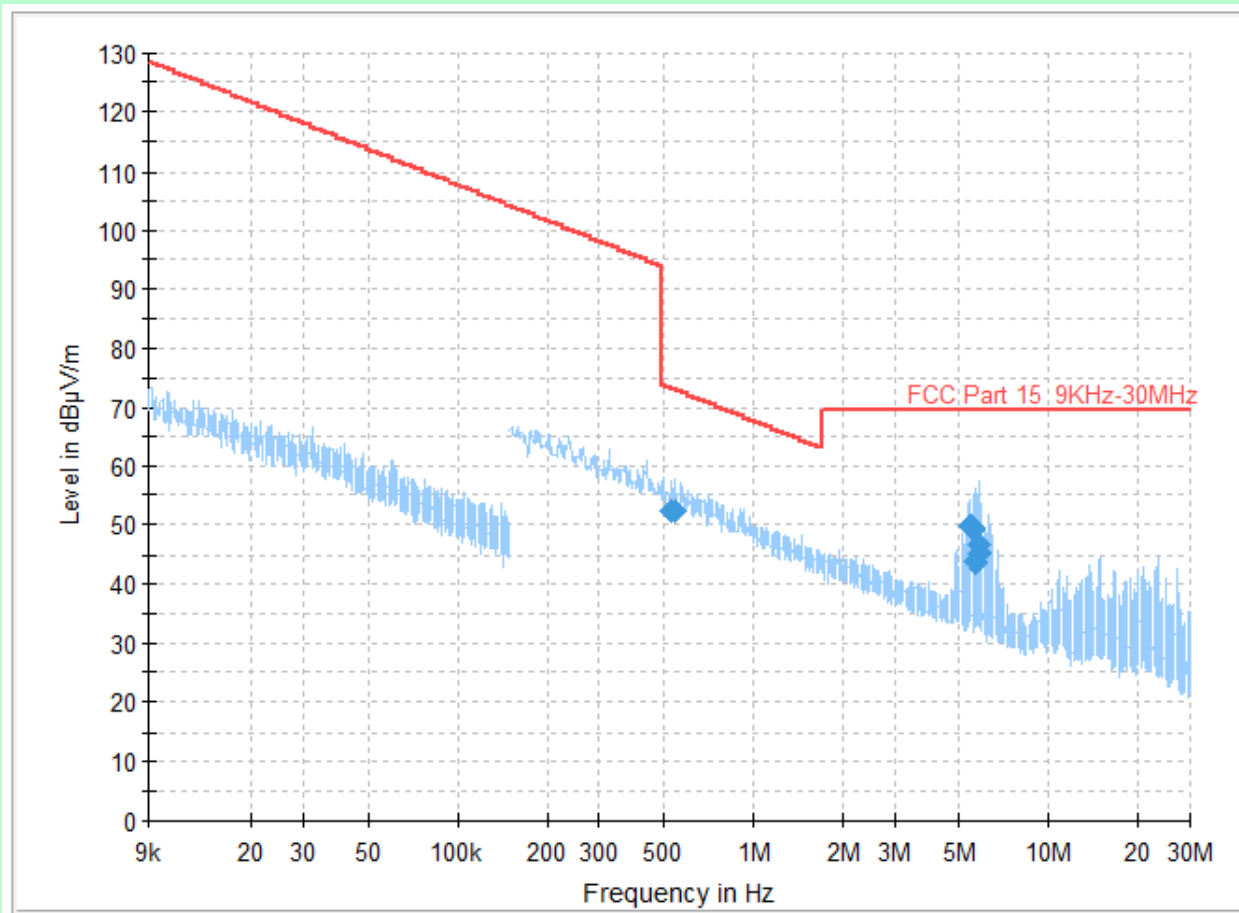
Channel 4 (915.325MHz) – Parallel

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



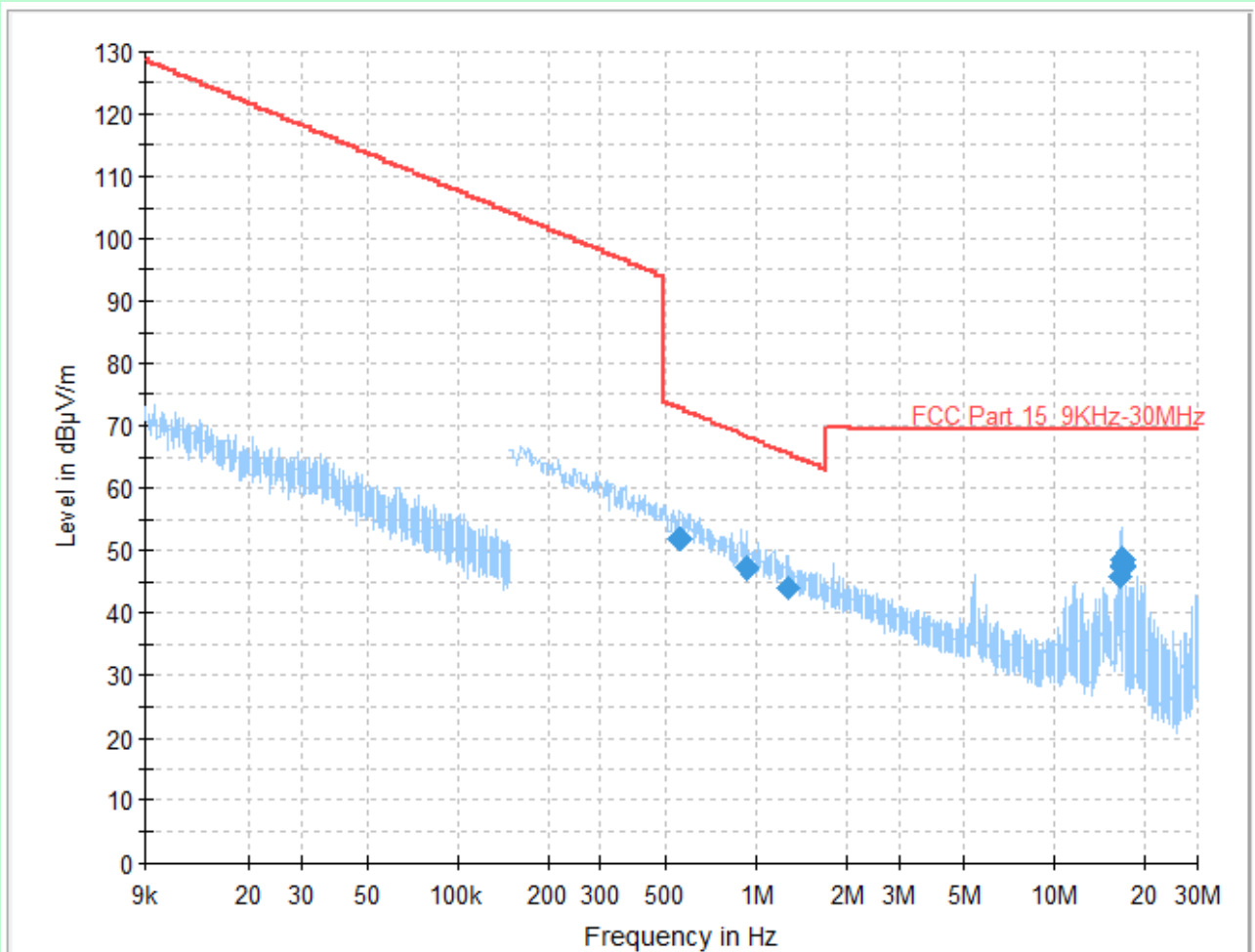
Channel 4 (915.325MHz) – Perpendicular

TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



Channel 6 (927.125MHz) – Parallel

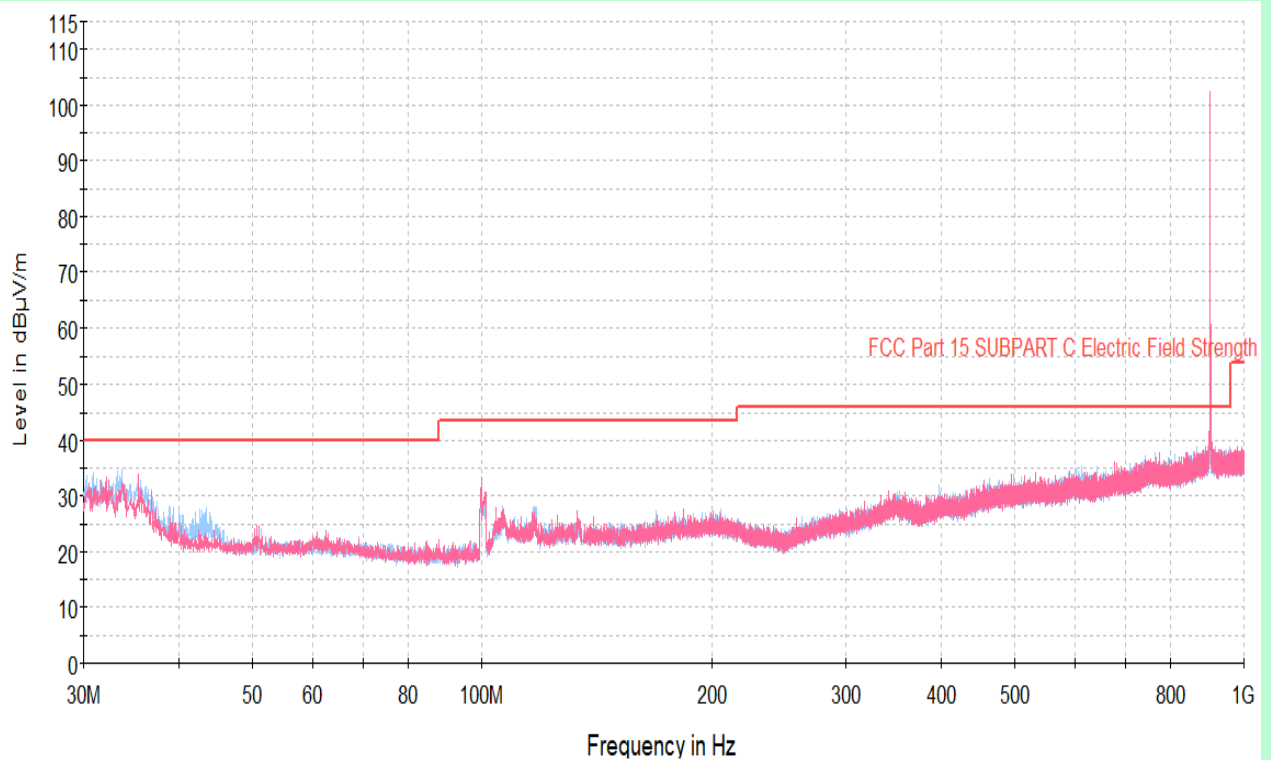
TEST GRAPHS – 9 KHz to 30 MHz (Antenna 2)



Channel 6 (927.125MHz) – Perpendicular

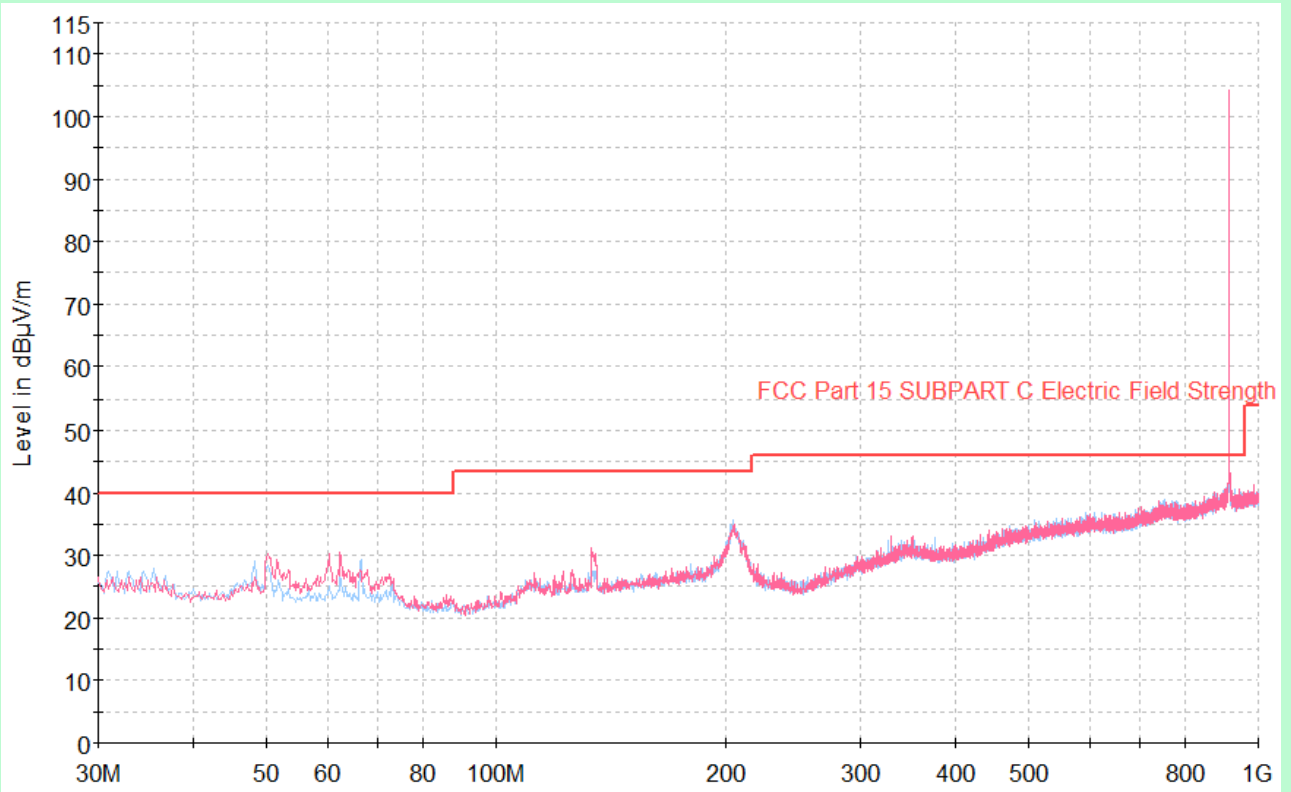
TEST RESULT – 9 KHz to 30 MHz									
Channel	Channel Frequency	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	MHz	dBµV/m	cm	Parallel / Perpendicular	deg	dB	dBµV/m	
No emissions detected that are a product of the transmitter. Emissions shown in the plot 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 2)



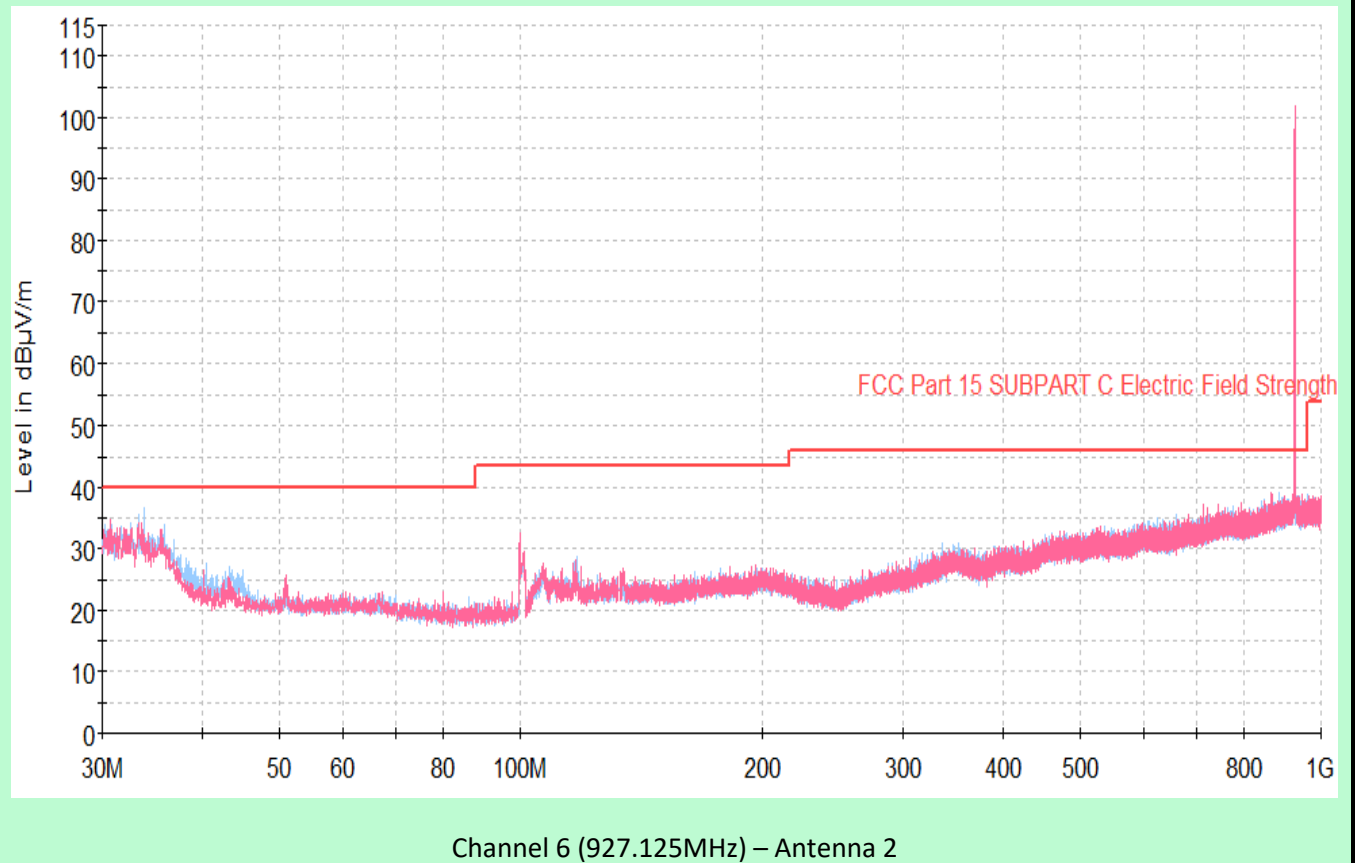
Channel 1 (902.875MHz) – Antenna 2

TEST GRAPHS – 30MHz to 1GHz (Antenna 2)



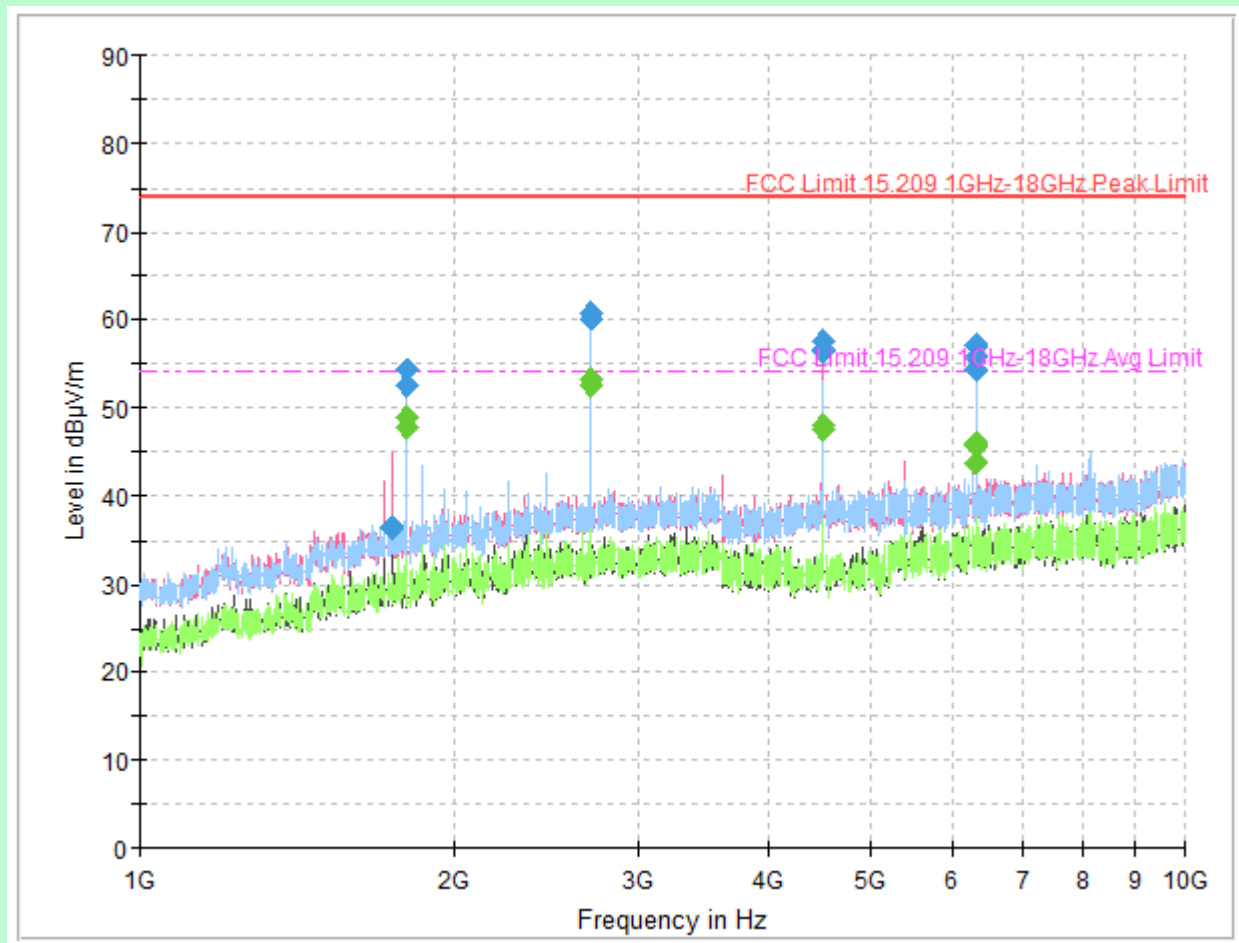
Channel 4 (915.325MHz) – Antenna 2

TEST GRAPHS – 30MHz to 1GHz (Antenna 2)



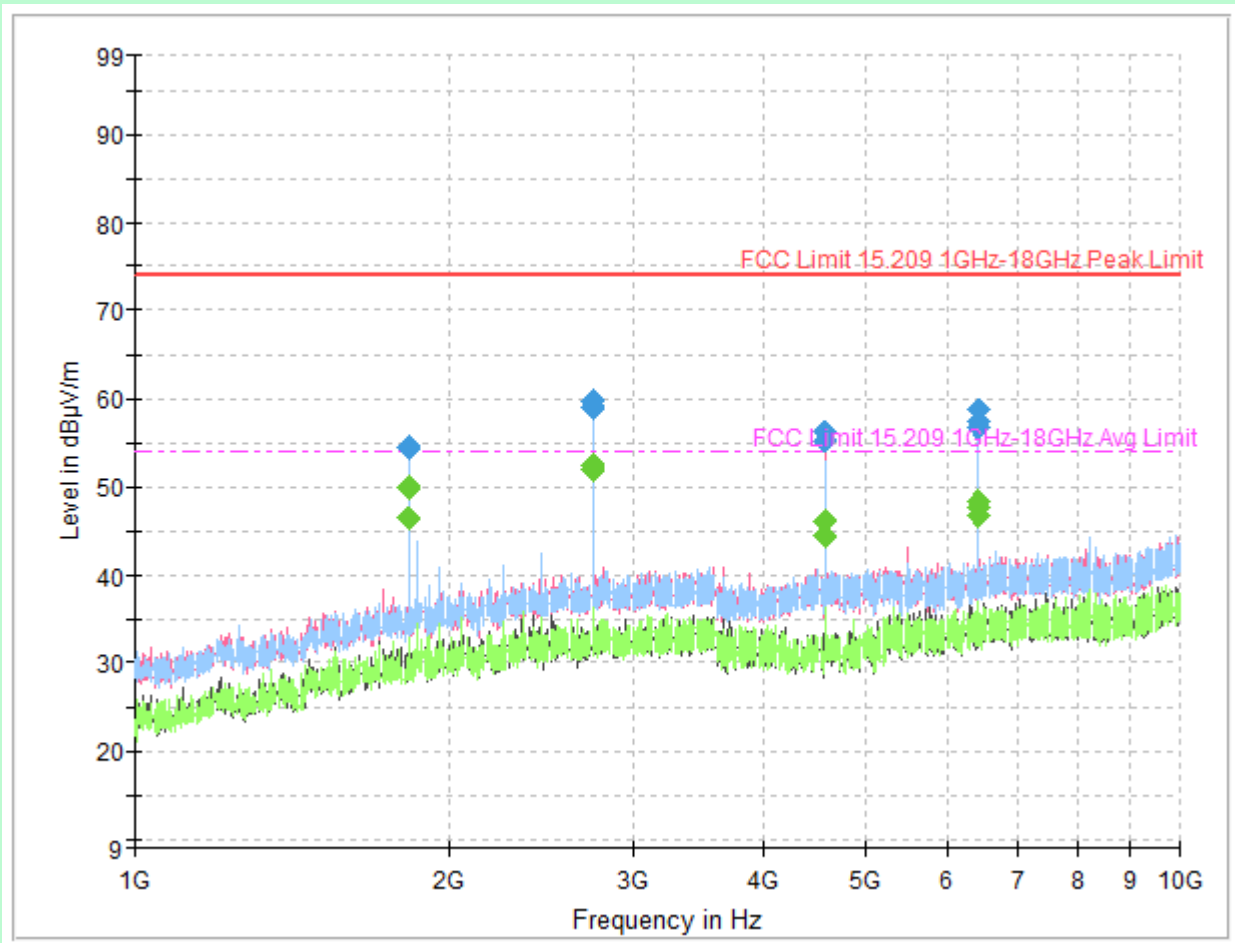
TEST RESULT – 30 MHz to 1 GHz								
Channel	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	dBμV/m	Cm	H / V	deg	dB	dBμV/m	
Antenna – 2								
CH-1	633.92	30.2	100	V	187	15.8	46	Pass
CH-1	773.02	32.23	100	H	290	13.77	46	Pass
CH-1	846.54	32.88	200	V	14	13.12	46	Pass
CH-1	847.51	32.87	100	H	53	13.13	46	Pass
CH-1	902.74	103.51	200	V	213	-	-	Intended Frequency
CH-4	656.81	30.12	200	V	112	15.88	46	Pass
CH-4	689.21	30.85	400	H	295	15.15	46	Pass
CH-4	696.77	31.01	100	V	277	14.99	46	Pass
CH-4	751.09	32.25	100	H	244	13.75	46	Pass
CH-4	754.39	32.36	200	H	20	13.64	46	Pass
CH-4	825.78	32.43	400	V	280	13.57	46	Pass
CH-4	902.41	34.49	100	V	256	11.51	46	Pass
CH-4	915.22	104.03	100	V	358	-	-	Intended Frequency
CH-6	694.45	31.02	100	H	319	14.98	46	Pass
CH-6	752.65	32.39	100	H	258	13.61	46	Pass
CH-6	844.02	32.81	300	H	5	13.19	46	Pass
CH-6	844.8	32.85	200	H	0	13.15	46	Pass
CH-6	926.99	101.72	100	V	168	-	-	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 2)



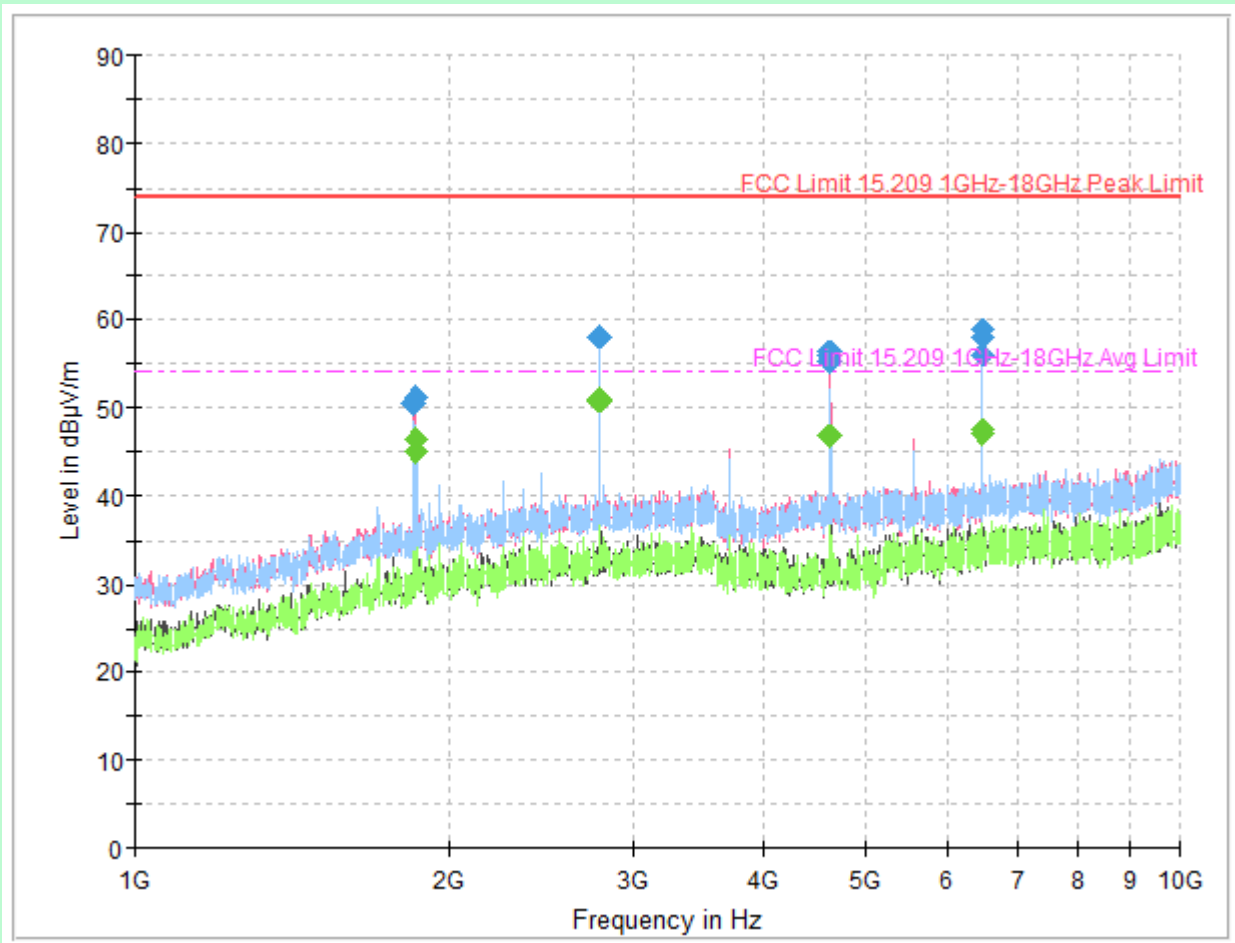
Channel 1 (902.875MHz) – Antenna 2

TEST GRAPHS – 1GHz to 10GHz (Antenna 2)



Channel 4 (915.325MHz) – Antenna 2

TEST GRAPHS – 1GHz to 10GHz (Antenna 2)



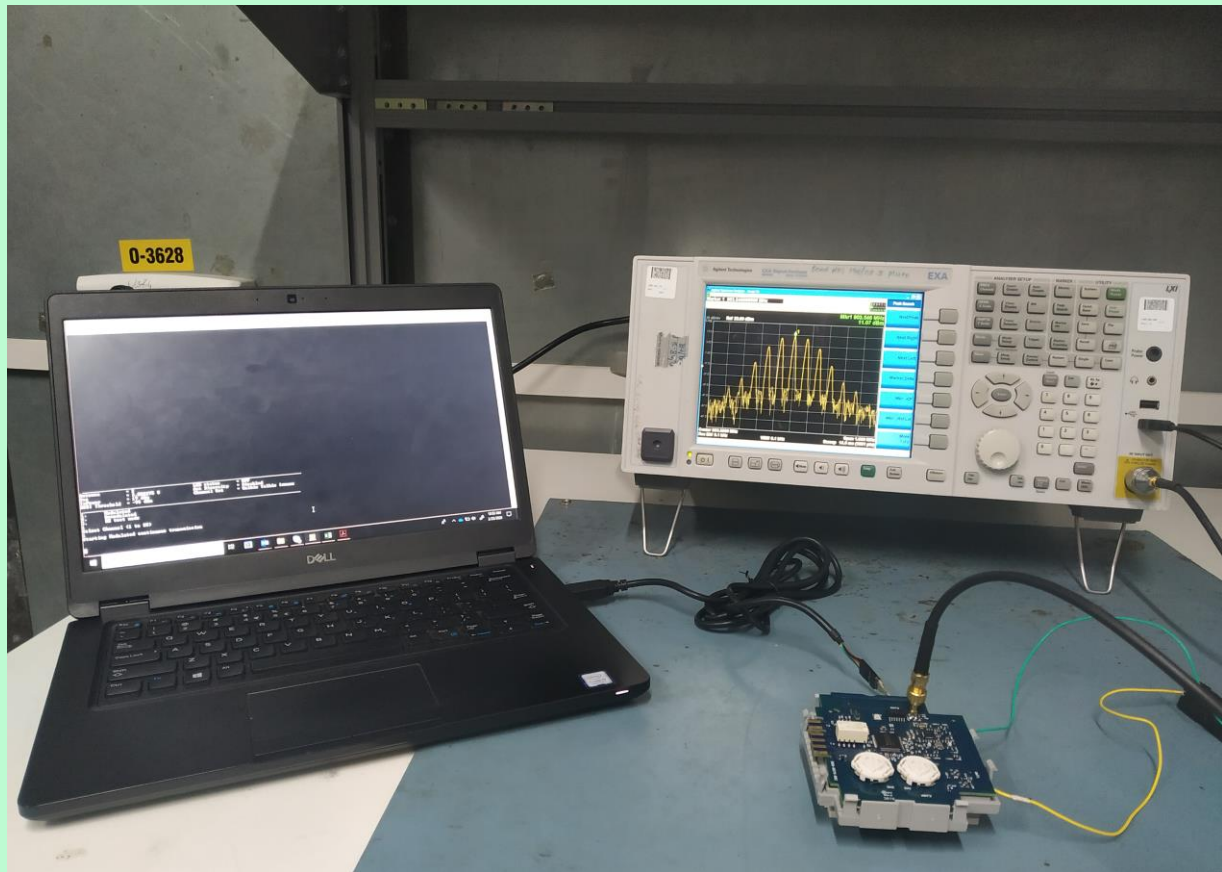
Channel 6 (927.125MHz) – Antenna 2

TEST RESULT – 1 GHz to 10 GHz					RESTRICTED BAND – PEAK			
Channel	Frequency	Measured Field Strength	Height	Ant Pol	Azimuth	Margin	Limit	Result
#	(MHz)	(dBμV/m)	(cm)	H / V	(deg)	(dB)	(dBμV/m)	
Antenna – 2								
CH-1	2707.75	60.84	300	V	0	13.16	74	PASS
CH-1	2709.35	60.2	300	V	28	13.8	74	PASS
CH-1	4512.89	57.69	300	V	7	16.31	74	PASS
CH-1	4513.85	56.24	300	V	2	17.76	74	PASS
CH-1	4515.46	56.61	300	V	2	17.39	74	PASS
CH-4	2745.03	59.78	100	V	0	14.22	74	PASS
CH-4	2746.64	59.1	100	V	351	14.9	74	PASS
CH-4	4575.25	56.27	400	V	339	17.73	74	PASS
CH-4	4575.89	55.18	400	V	345	18.82	74	PASS
CH-4	4578.14	56.26	400	V	339	17.74	74	PASS
CH-6	2780.39	58.16	100	V	352	15.84	74	PASS
CH-6	2782.00	57.95	100	V	357	16.05	74	PASS
CH-6	4634.07	56.27	300	V	38	17.73	74	PASS
CH-6	4636.32	55.18	300	V	0	18.82	74	PASS
CH-6	4637.28	56.16	300	V	27	17.84	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 – 2								
CH-1	2707.75	52.43	300	V	0	1.57	54	PASS
CH-1	2709.03	53.28	300	V	0	0.72	54	PASS
CH-1	4513.21	48.08	300	V	0	5.92	54	PASS
CH-1	4515.46	47.51	300	V	2	6.49	54	PASS
CH-4	2745.35	52.6	100	V	0	1.4	54	PASS
CH-4	2746.64	51.94	100	V	351	2.06	54	PASS
CH-4	4575.25	46.3	200	V	340	7.7	54	PASS
CH-4	4576.85	44.37	400	V	345	9.63	54	PASS
CH-4	4577.82	46.14	200	V	340	7.86	54	PASS
CH-6	2780.71	51.13	200	V	0	2.87	54	PASS
CH-6	2781.67	50.89	200	V	12	3.11	54	PASS
CH-6	4634.71	46.85	300	V	351	7.15	54	PASS
CH-6	4636.96	46.73	300	V	351	7.27	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	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 – 2									
CH-1	103.51	1744.42	36.36	100	V	327	83.51	47.15	PASS
CH-1	103.51	1804.85	52.66	300	V	2	83.51	30.85	PASS
CH-1	103.51	1806.14	54.26	100	V	352	83.51	29.25	PASS
CH-1	103.51	6318.03	57.05	300	V	328	83.51	26.46	PASS
CH-1	103.51	6321.25	54.39	400	V	328	83.51	29.12	PASS
CH-1	103.51	6322.21	55.92	400	H	127	83.51	27.59	PASS
CH-4	104.03	1829.92	54.55	100	V	351	84.03	29.48	PASS
CH-4	104.03	1830.57	54.5	100	V	357	84.03	29.53	PASS
CH-4	104.03	6404.82	57.42	400	H	127	84.03	26.61	PASS
CH-4	104.03	6406.42	56.88	400	H	122	84.03	27.15	PASS
CH-4	104.03	6409.32	58.87	400	H	122	84.03	25.16	PASS
CH-6	101.72	1853.39	50.47	100	V	8	81.72	31.25	PASS
CH-6	101.72	1854.67	51.25	200	V	0	81.72	30.47	PASS
CH-6	101.72	6487.75	58.11	200	H	317	81.72	23.61	PASS
CH-6	101.72	6489.67	56.13	400	V	0	81.72	25.59	PASS
CH-6	101.72	6491.92	58.89	400	V	0	81.72	22.83	PASS
Note :									
Measured Harmonic Field Strength (dBuV/m) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss - Pre amplifier Gain (dB)									

Annexure – 1

CONDUCTED RF TEST SETUP**Conducted RF test setup**

RADIATED EMISSION SETUP

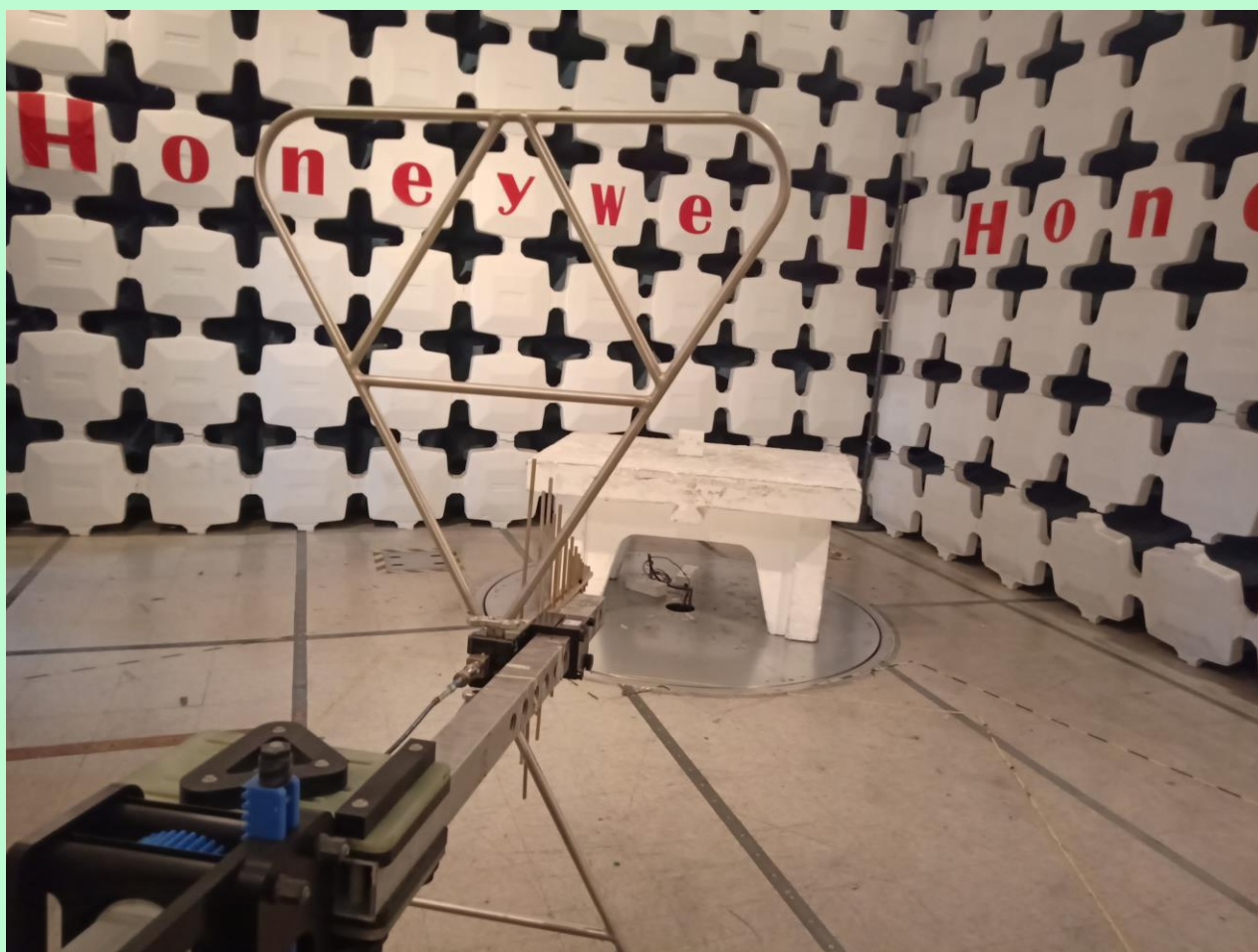


Radiated Emission Setup – 9 KHz to 30 MHz [Parallel]

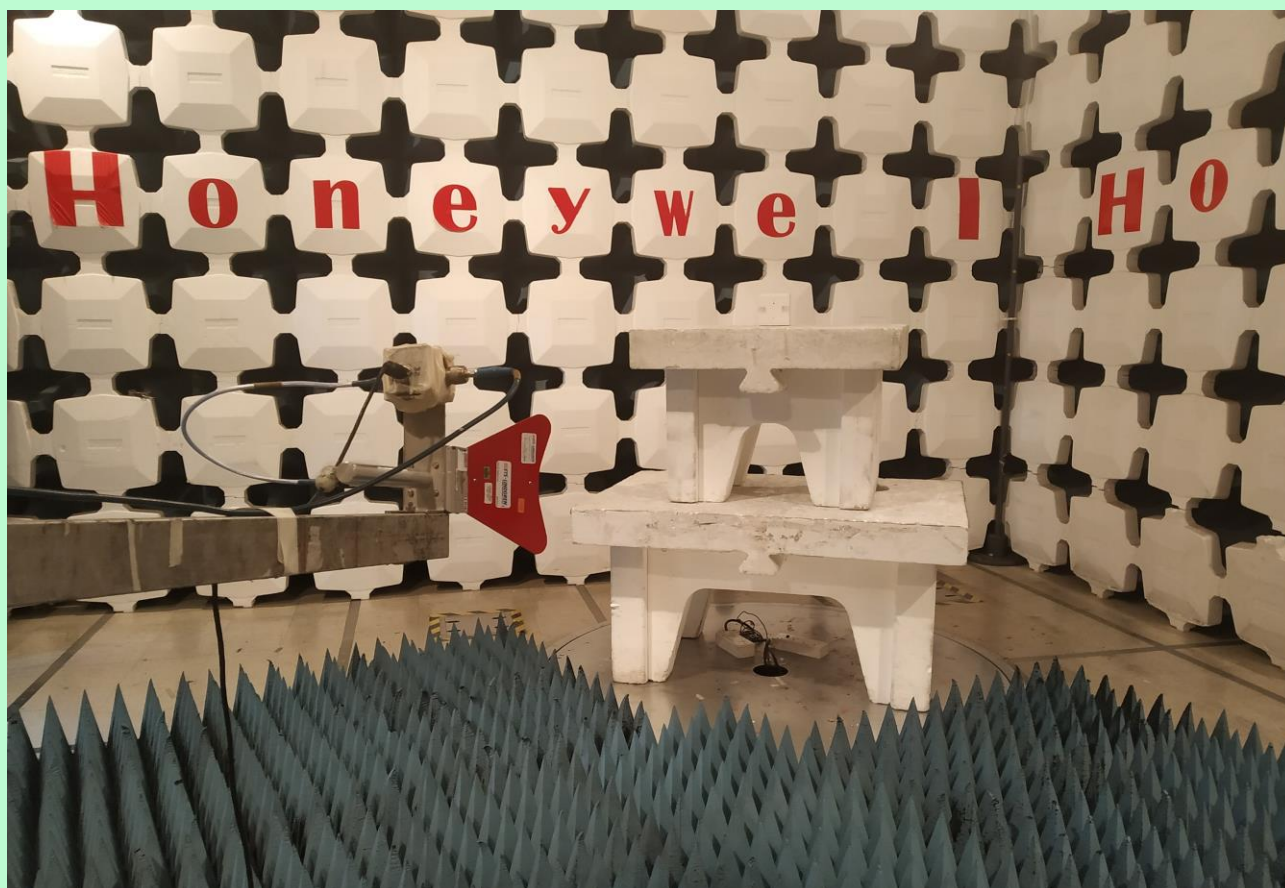




Radiated Emission Setup –30 MHz to 1 GHz [Horizontal Polarization]



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



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



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