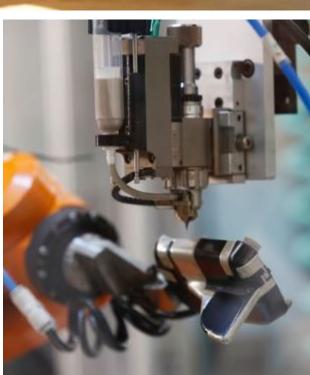
# RP20 lite 2x2 Indoor Panel

# # PDD61606C-200SMAM Application Guide

Date: 7-Jun-2022

Revision: 10.0













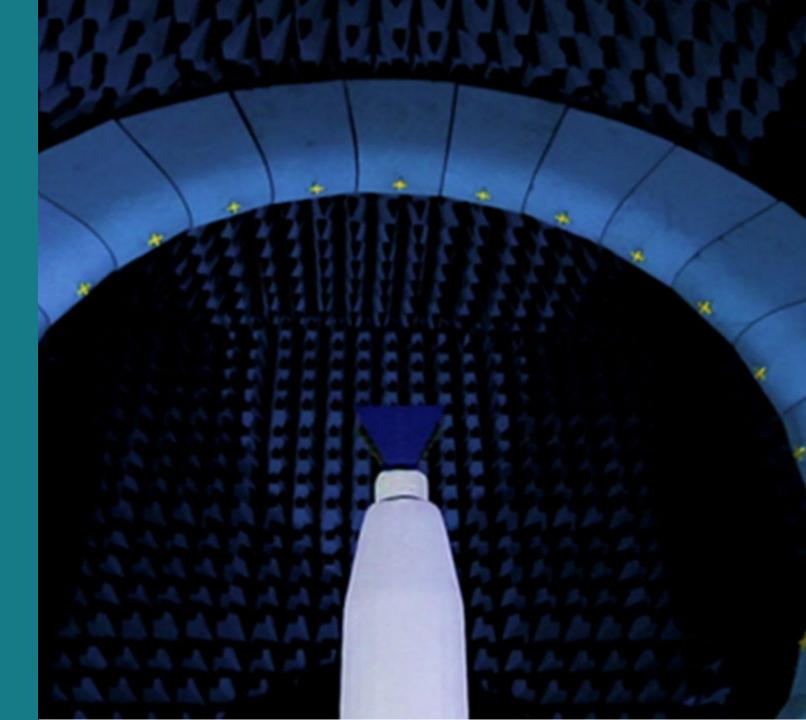
# **Description**

- Antenna (P/N: PDD61606C-200SMAM) used for VSWR/Isolation measurement.
- Below are the test configurations:

Test		Free Space		Above Metal GP 2ft x 2ft	On Acrylic	On Glass	On PC Plastic	On Plaster
	Coax Cable	2m	2ft	2m	2m	2m	2m	2m
VSWR	Bend	Yes	Yes	Yes	No	No	No	No
	Straight	No	No	No	Yes	Yes	Yes	Yes
Gain/	Bend	Yes	Yes	No	No	No	No	No
Total Eff.	Straight	No	No	No	No	No	No	No
		<u> </u>	<u>.                                    </u>	Ground Plane	Acrylic	Glass	PC Plastic	Plaster

# **Antenna Performance**

VSWR & Port-to-Port Isolation

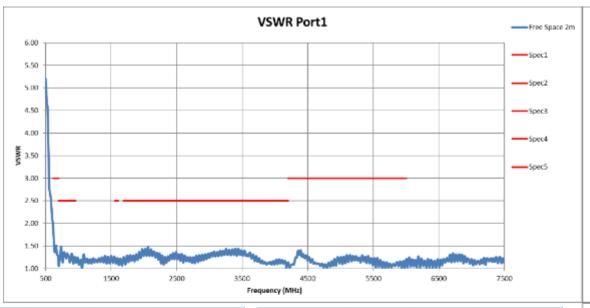


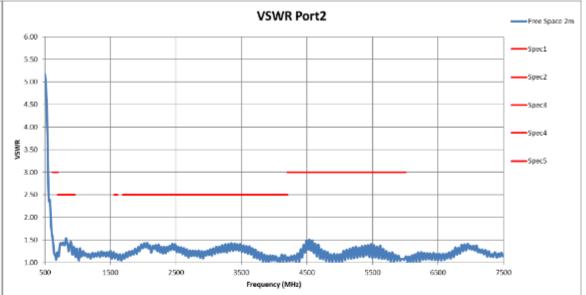
**EVERY CONNECTION COUNTS** 

# **VSWR/Isolation – Free Space 2m Coax Cable**





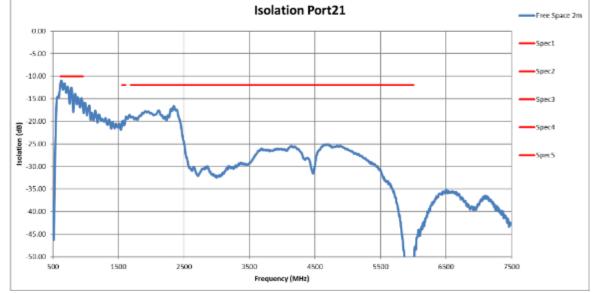




VSWR - Max	Min	Max	Free Space 2m	VSWR - Max	Min	Max	Free Space 2m
617-698	< 3.0	< 3.0	< 1.7	617-698	< 3.0	< 3.0	< 1.5
698-960	< 2.0	< 2.5	< 1.5	698-960	< 2.0	< 2.5	< 1.5
1559-1606	< 2.0	< 2.5	< 1.2	1559-1606	< 2.0	< 2.5	< 1.2
1690-4200	< 2.0	< 2.5	< 1.5	1690-4200	< 2.0	< 2.5	< 1.4
4200-6000	< 3.0	< 3.0	< 1.4	4200-6000	< 3.0	< 3.0	< 1.5

200 0000	٠ ٥.٥	٠ ٥.٥	` 1	7200 0000	٠ ٥.٥	٠ ٥.٥
solation	May	Free Space				
Max	Max	2m				
17-698	> 10	> 11.0			- 4	
98-960	> 10	> 12.3			- 1	
559-1606	> 10	> 19.6				
690-4200	> 10	> 16.6				_ /
200-6000	> 10	> 25 1				





# **VSWR/Isolation – Free Space 2ft Coax Cable**





Free Space 2ft

Spec1

Spec2

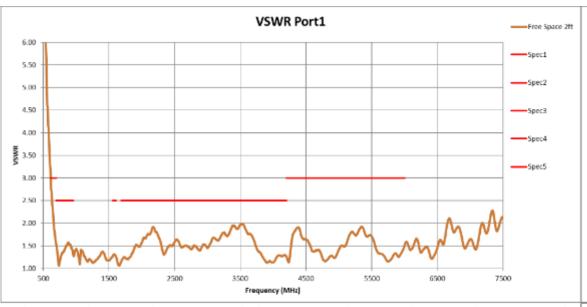
Spec3

Spec4

Spec5

7500

6500



ft	VSWR Port2	Free Space 2ft
	6.00	——Spec1
	5.50	——Spec2
	4.50	——Spec3
	4.00	——Spec4
	8 3.50 -	——Spec5
	3.00	-
	2.50	
	1.50	٨
	1.00 1500 2500 3500 4500 5500 6500 :	7500
	Frequency (MHz)	

**Isolation Port21** 

VSWR - Max	Min	Max	Free Space 2ft
617-698	< 3.0	< 3.0	< 2.7
698-960	< 2.0	< 2.5	< 1.6
1559-1606	< 2.0	< 2.5	< 1.3
1690-4200	< 2.0	< 2.5	< 2.0
4200-6000	< 3.0	< 3.0	< 1.9

VSWR - Max	Min	Max	Free Space 2ft
617-698	< 3.0	< 3.0	< 1.9
698-960	< 2.0	< 2.5	< 2.1
1559-1606	< 2.0	< 2.5	< 1.4
1690-4200	< 2.0	< 2.5	< 1.7
4200-6000	< 3.0	< 3.0	< 2.0

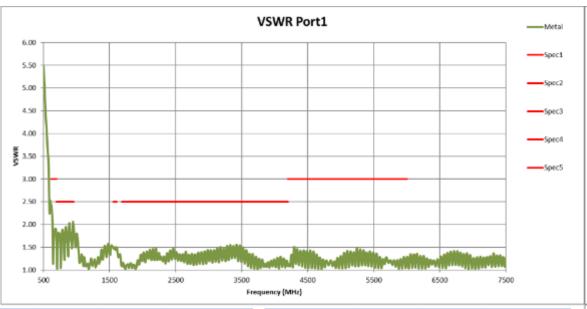
	/W \						_
-15.00 -	//\/	/ pm					_
-20.00 -	I NAN	<u> </u>	\	<i>~</i> ~~	~		
-20.00 - (gp) uotsetou -25.00 - -30.00 -			\			$\overline{}$	_
-30.00 -			Mary Mr.			$\vdash$	-
-35.00 -			-			-	1
-40.00 -							┞
-45.00 -						-	L
-50.00 +						_1/	
50	0 150	00 25	35		500 55	00	
				Frequency (MHz)			

solation - Max	Max	Free Space 2ft
617-698	> 10	> 8.5
698-960	> 10	> 8.1
1559-1606	> 10	> 16.1
1690-4200	> 10	> 10.7
4200-6000	> 10	> 18.1

## **VSWR/Isolation – Above Metal Ground Plane**





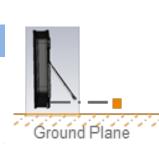


VSWR Port2									
6.00 -								Spec1	
5.50 -									
5.00 -	-							Spec2	
4.50 -	-							——Spec3	
4.00 -								Spec4	
3.50 -	-							—Spec5	
3.00 -	+							-,	
2.50 -	<del> </del>								
2.00 -	-								
1.50 -		Name of the little of	Topos control 1111	Manage of	Name and Post	أوالسيب بيناأأأ			
1.00 -	500 15	500 25	00 35	500 45	00 55	oo e	500 750	0	
	Frequency (Mitz)								

VSWR - Max	Min	Max	Metal	VSWR - Max	Min	Max	Metal
617-698	< 3.0	< 3.0	< 2.4	617-698	< 3.0	< 3.0	< 2.0
698-960	< 2.0	< 2.5	< 2.1	698-960	< 2.0	< 2.5	< 2.1
1559-160	6 < 2.0	< 2.5	< 1.5	1559-1606	< 2.0	< 2.5	< 1.4
1690-420	0 < 2.0	< 2.5	< 1.6	1690-4200	< 2.0	< 2.5	< 1.5
4200-600	0 < 3.0	< 3.0	< 1.5	4200-6000	< 3.0	< 3.0	< 1.6

	Isolation Port21	Metal
	00	
	00	Spec1
-1	00 Badle	——Spec2
		——Spec3
n (dB)	00	Spec4
l de	00 00	Spec5
	00	
.	00	
	00	
-8	00	
	500 1500 2500 3500 4500 5500 6500 7500 Frequency (MHz)	'

Max	Metal
> 10	> 11.4
> 10	> 11.4
> 10	> 14.9
> 10	> 14.0
> 10	> 25.6
	> 10 > 10 > 10 > 10 > 10

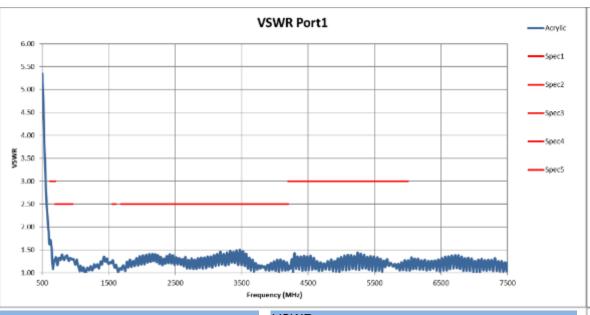


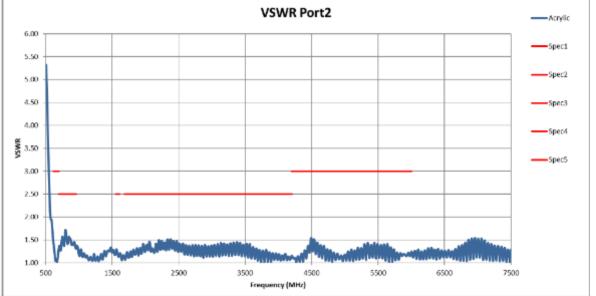


# **VSWR/Isolation – On Acrylic**









VSWR - Max	Min	Max	Acrylic	VSWR - Max	Min	Max	Acrylic
617-698	< 3.0	< 3.0	< 1.7	617-698	< 3.0	< 3.0	< 1.4
698-960	< 2.0	< 2.5	< 1.4	698-960	< 2.0	< 2.5	< 1.7
1559-1606	< 2.0	< 2.5	< 1.3	1559-1606	< 2.0	< 2.5	< 1.3
1690-4200	< 2.0	< 2.5	< 1.5	1690-4200	< 2.0	< 2.5	< 1.5
4200-6000	< 3.0	< 3.0	< 1.4	4200-6000	< 3.0	< 3.0	< 1.5

					isolation P	OrtZI			Acrylic
	0.00								——Spec1
	-5.00								аресл
	-10.00 -								——Spec2
	-15.00 -	Mm .	. ^						——Spec3
(BP)	-20.00 -	, /W	pm /						——Spec4
(solation (dB)	-25.00 -				my	<b>M</b>			Spec5
-	-30.00			James 1		May			
	-35.00 -			Mark		700			
	-40.00 -			¥			1	Married	
	45.00 -						V W	1	
	-50.00 -							1	
	50	00 15	500 25	00 35	OD 45 Frequency (MHz)	500 55	00 6:	500 7500	

Isolation Port21

Isolation - Max	Max	Acrylic
617-698	> 10	> 10.6
698-960	> 10	> 12.6
1559-1606	> 10	> 17.4
1690-4200	> 10	> 16.1
4200-6000	> 10	> 27.2

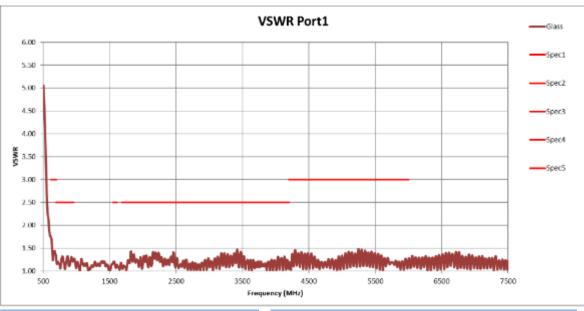


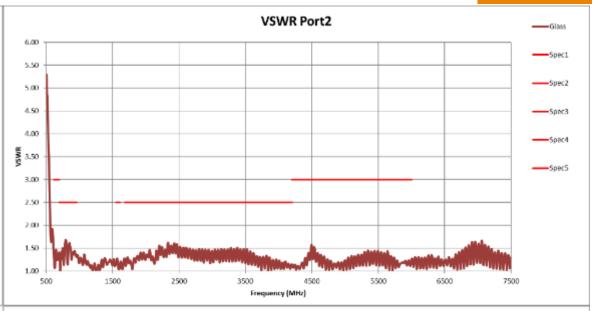


## **VSWR/Isolation – On Glass**









VSWR - Max	Min	Max	Glass	VSWR - Max	Min	Max	Glass
617-698	< 3.0	< 3.0	< 1.7	617-698	< 3.0	< 3.0	< 1.5
698-960	< 2.0	< 2.5	< 1.3	698-960	< 2.0	< 2.5	< 1.7
1559-1606	< 2.0	< 2.5	< 1.2	1559-1606	< 2.0	< 2.5	< 1.3
1690-4200	< 2.0	< 2.5	< 1.5	1690-4200	< 2.0	< 2.5	< 1.6
4200-6000	< 3.0	< 3.0	< 1.5	4200-6000	< 3.0	< 3.0	< 1.6

-5.00 - -5.00 - -10.00 - -15.00 - -20.00 -		——Spec1 ——Spec2 ——Spec3 ——Spec4
-25.00 - -30.00 - -35.00 -	Man Man	Spec5
-45.00 - -50.00 -		
50.00	00 1500 2500 3500 4500 5500 6500 750 Frequency (MHz)	O

**Isolation Port21** 

Isolation - Max	Max	Glass
617-698	> 10	> 9.9
698-960	> 10	> 9.7
1559-1606	> 10	> 20.2
1690-4200	> 10	> 16.9
4200-6000	> 10	> 29.9

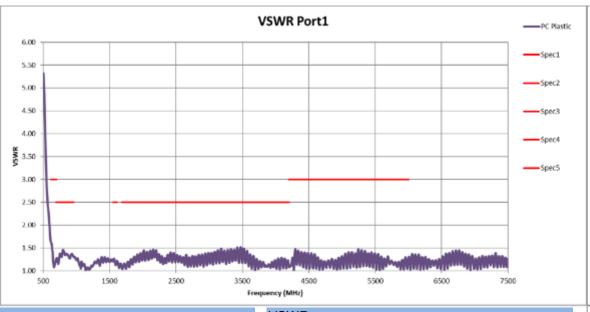


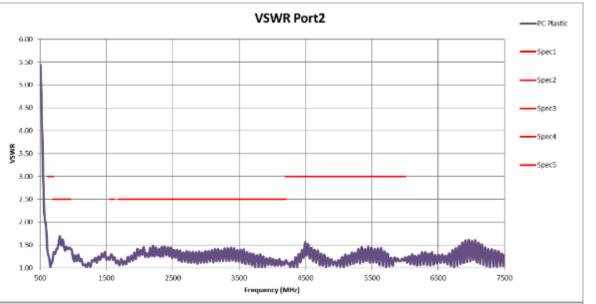


## **VSWR/Isolation – On PC Plastic**









VSWR - Max	Min	Max	PC Plastic	VSWR - Max	Min	Max	PC Plastic
617-698	< 3.0	< 3.0	< 1.6	617-698	< 3.0	< 3.0	< 1.3
698-960	< 2.0	< 2.5	< 1.5	698-960	< 2.0	< 2.5	< 1.7
1559-1606	< 2.0	< 2.5	< 1.3	1559-1606	< 2.0	< 2.5	< 1.3
1690-4200	< 2.0	< 2.5	< 1.5	1690-4200	< 2.0	< 2.5	< 1.5
4200-6000	< 3.0	< 3.0	< 1.5	4200-6000	< 3.0	< 3.0	< 1.6

					Isolation P	ort21			PC Plastic
	0.00 -								F===1
-	5.00 -								Spec1
-1	0.00 -								Spec2
-1	5.00 -	Λ	Λ						——Spec3
(8) ·2	- 00.00	- "W-W	mms/						Spec4
(dB) volation (dB)	5.00 -			\	<u>سمم</u>	$\sim$			SpecS
	0.00			h		1			
	5.00 -			W			1	V.m.	
	15.00 -								
-5	0.00							<u> </u>	
	50	00 15	600 25	00 35	Frequency (MHz)	00 55	. 60	500 7500	J

Isolation	Max	PC Plastic
- Max		
617-698	> 10	> 10.6
698-960	> 10	> 11.8
1559-1606	> 10	> 18.3
1690-4200	> 10	> 15.6
4200-6000	> 10	> 25.6
1690-4200	> 10	> 15.6

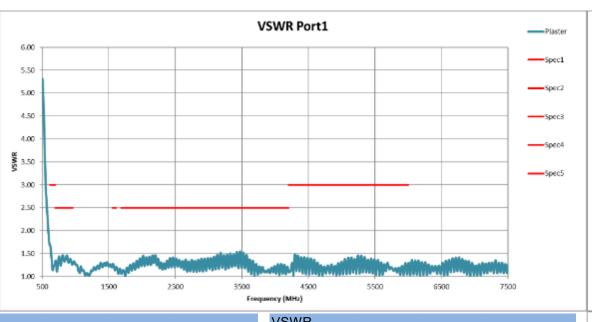


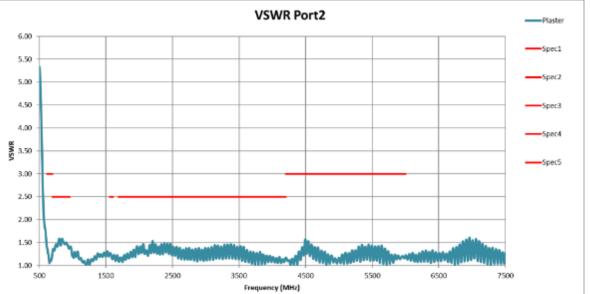


# **VSWR/Isolation – On Plaster Ceiling Board**









VSWR - Max	Min	Max	Plaster	VSWR - Max	Min	Max	Plaster
617-698	< 3.0	< 3.0	< 1.7	617-698	< 3.0	< 3.0	< 1.4
698-960	< 2.0	< 2.5	< 1.5	698-960	< 2.0	< 2.5	< 1.6
1559-1606	< 2.0	< 2.5	< 1.3	1559-1606	< 2.0	< 2.5	< 1.3
1690-4200	< 2.0	< 2.5	< 1.5	1690-4200	< 2.0	< 2.5	< 1.5
4200-6000	< 3.0	< 3.0	< 1.5	4200-6000	< 3.0	< 3.0	< 1.6

		Isolation Port21	Plaster
	0.00		Fnord
	-5.00		Spec1
	-10.00	) +	Spec2
	-15.00		Spec3
(ap	-20.00	, Then many	——Spec4
(solation (dB)	-25.00		_
2	-30.00		Spec5
	-35.00		
	-40.00		<u> </u>
	-45.00		1
	-50.00		
	5	500 1500 2500 3500 4500 5500 6500 Frequency (MHz)	7500

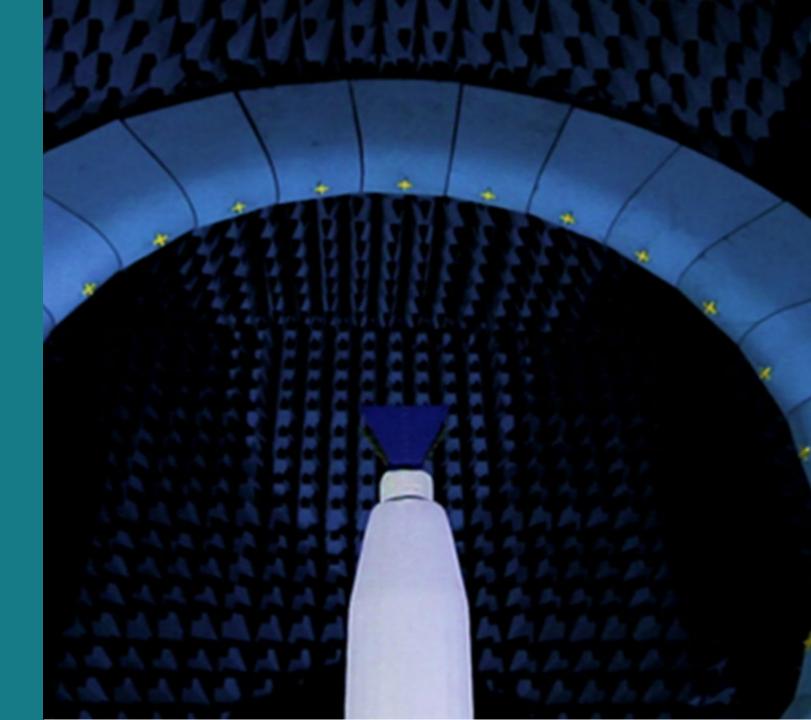
Isolation - Max	Max	Plaster
617-698	> 10	> 10.7
698-960	> 10	> 12.2
1559-1606	> 10	> 18.8
1690-4200	> 10	> 15.5
4200-6000	> 10	> 26.2





# **Antenna Performance**

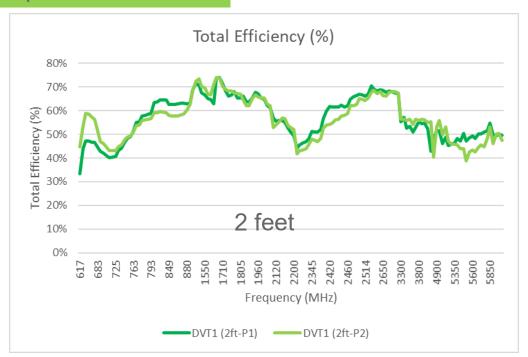
Total Efficiency & Gain



# **Total Efficiency, %**

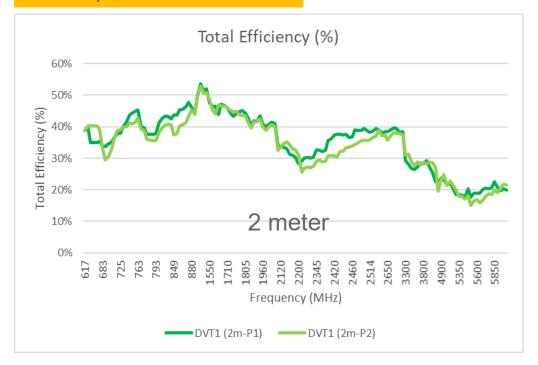
# External Antennas is now part of

#### Free Space 2 ft RG174T



3D Total Efficiency	(%)	
Avorago	DVT1 (2ft- DVT1 (2ft-	
- Average	P1)	P2)
617-960	54%	55%
1559-1606	65%	69%
1690-6000	58%	56%

3D Total Efficiency	(%	6)
- Min	DVT1 (2ft- DVT1 (2ft-	
	P1)	P2)
617-960	33%	43%
1559-1606	63%	67%
1690-6000	43%	39%



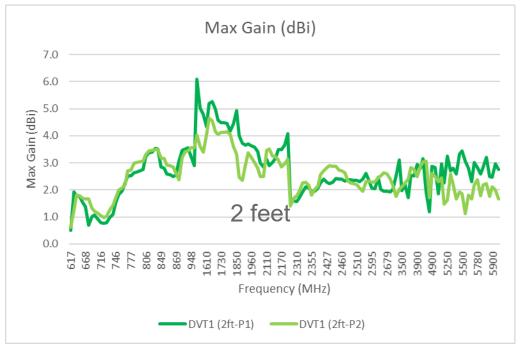
3D Total Efficiency	(%	6)
Avorago	DVT1 (2m-	DVT1 (2m-
- Average	P1)	P2)
617-960	41%	40%
1559-1606	46%	46%
1690-6000	32%	31%

3D Total Efficiency	(%	6)
- Min	DVT1 (2m· DVT1 (2m	
- IVIIII	P1)	P2)
617-960	34%	30%
1559-1606	44%	44%
1690-6000	18%	15%

## 3D Gain, dBi

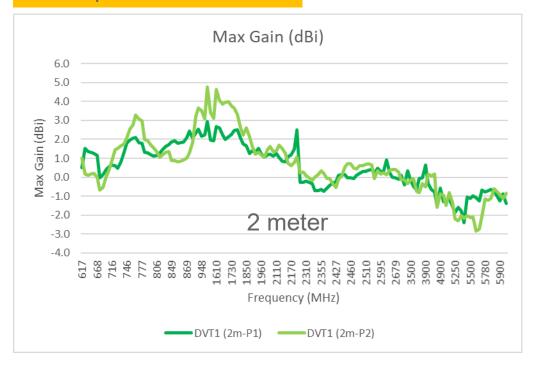
## External Antennas is now part of

#### Free Space 2 ft RG174T



3D Max Gain (dBi)	DVT1 (2ft- DVT1 (2ft-	
	P1)	P2)
617-960	3.6	3.6
1559-1606	6.1	4.0
1690-6000	5.3	4.6

3D Max Gain (dBi)	DVT1 (2ft-	DVT1 (2ft-
- Average	P1)	P2)
617-960	2.3	2.5
1559-1606	5.1	3.8
1690-6000	2.9	2.6



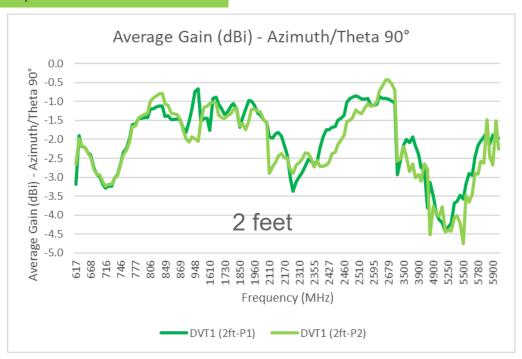
3D Max Gain (dBi)	DVT1 (2m-	•
	P1)	P2)
617-960	2.5	3.7
1559-1606	3.0	4.8
1690-6000	2.6	4.1

3D Max Gain (dBi)	DVT1 (2m-	DVT1 (2m
- Average	P1)	P2)
617-960	1.5	1.6
1559-1606	2.4	4.0
1690-6000	0.3	0.5

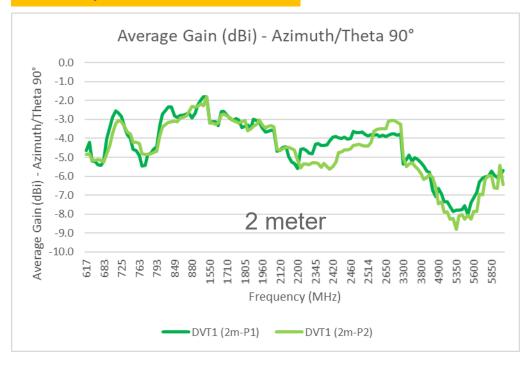
# Azimuth/Theta 90° Average Gain, dBi



#### Free Space 2 ft RG174T



Average Gain (dBi) - Azimuth/Theta 90°	DVT1 (2ft- P1)	DVT1 (2ft- P2)
617-960	-1.9	-1.9
1559-1606	-1.5	-1.2
1690-6000	-1.9	-2.2

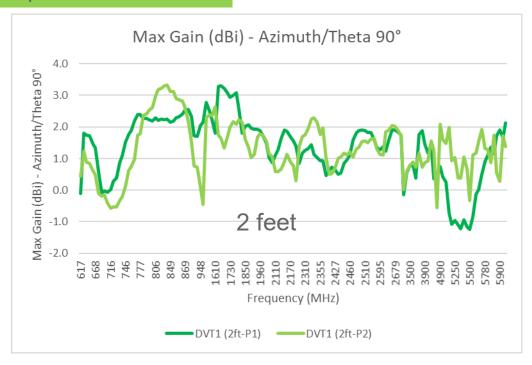


Average Gain (dBi) - Azimuth/Theta 90°	DVT1 (2m- P1)	DVT1 (2m- P2)
617-960	-3.5	-3.6
1559-1606	-3.2	-3.2
1690-6000	-4.6	-4.8

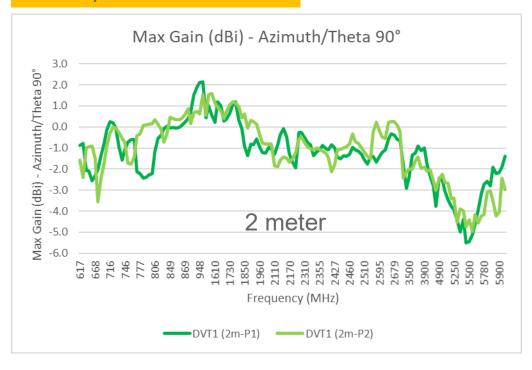
# Azimuth/Theta 90° Max Gain, dBi



#### Free Space 2 ft RG174T



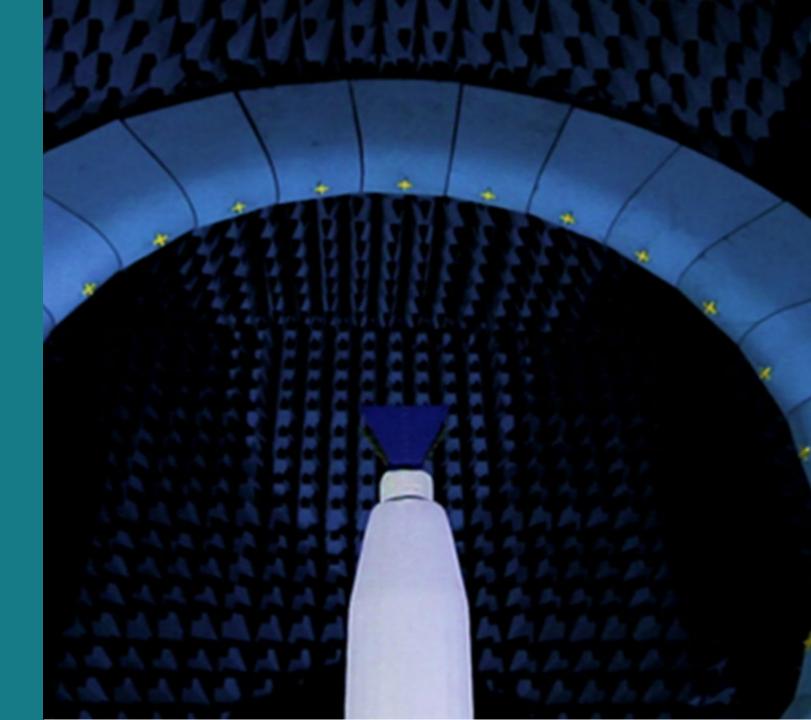
Max Gain (dBi) - Azimuth/Theta 90°	DVT1 (2ft- P1)	DVT1 (2ft- P2)
617-960	2.6	3.3
1559-1606	2.8	2.6
1690-6000	3.3	2.3



Max Gain (dBi)	DVT1 (2m-	DVT1 (2m-
- Azimuth/Theta 90°	P1)	P2)
617-960	2.1	1.5
1559-1606	1.0	1.6
1690-6000	1.2	1.2

# **Antenna Performance**

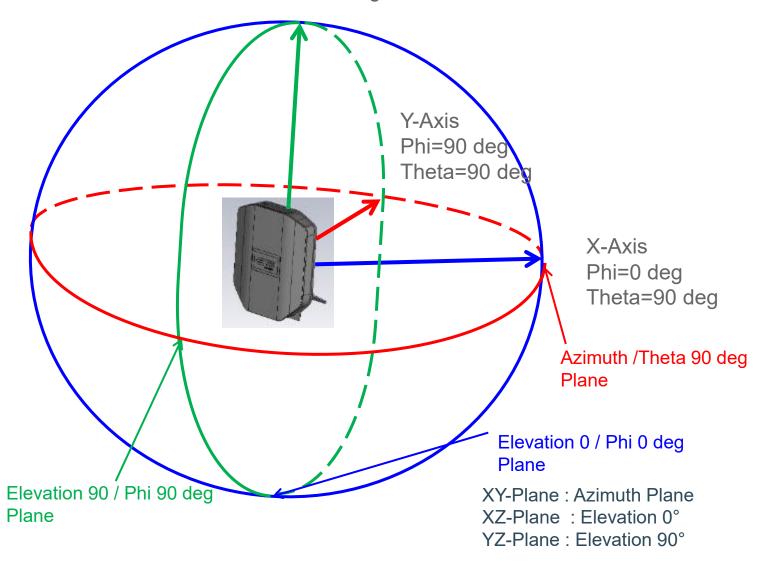
Radiation Pattern



# 3D Gain Measurement Coordinate System

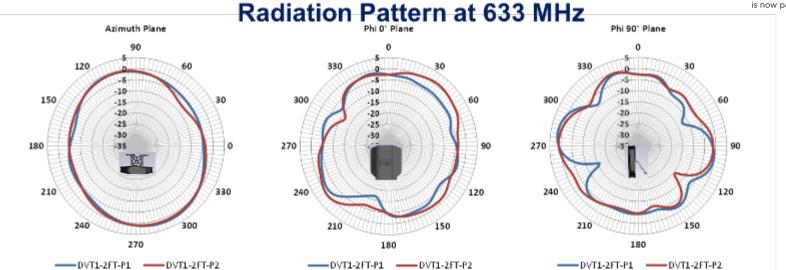


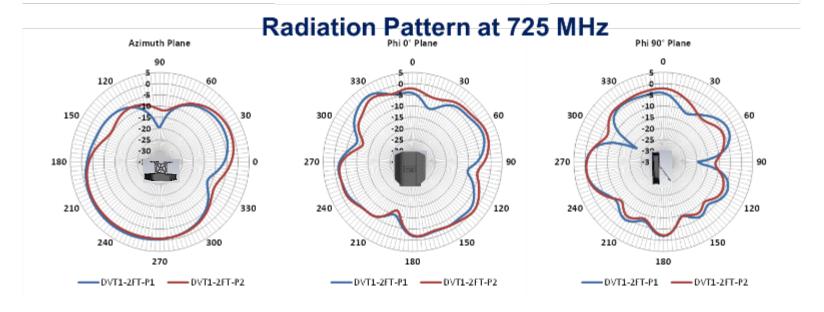
Z- Axis Theta=0 deg





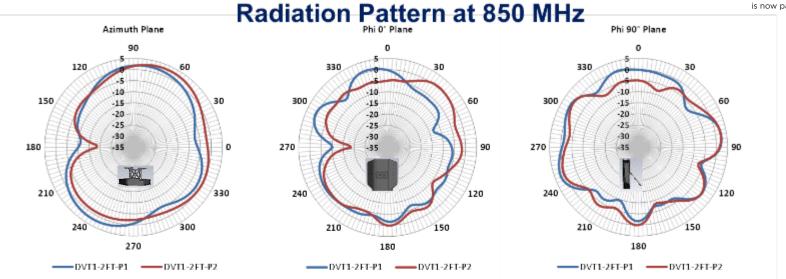


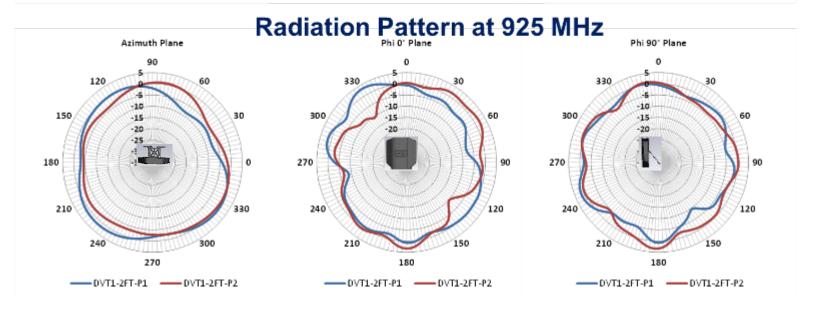






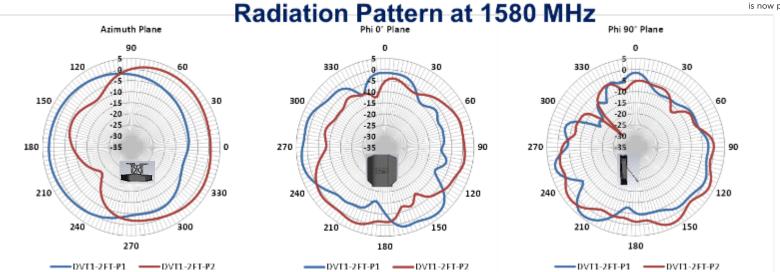


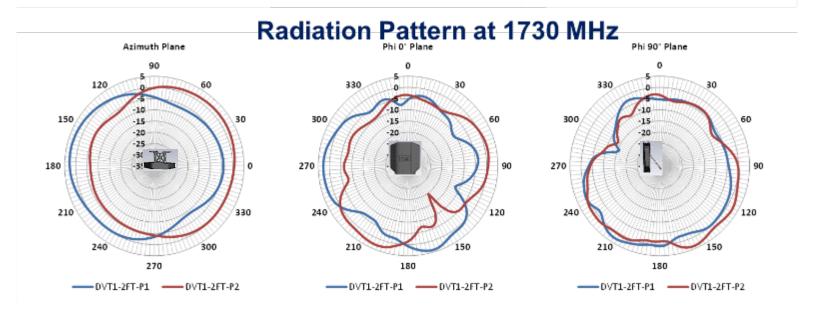






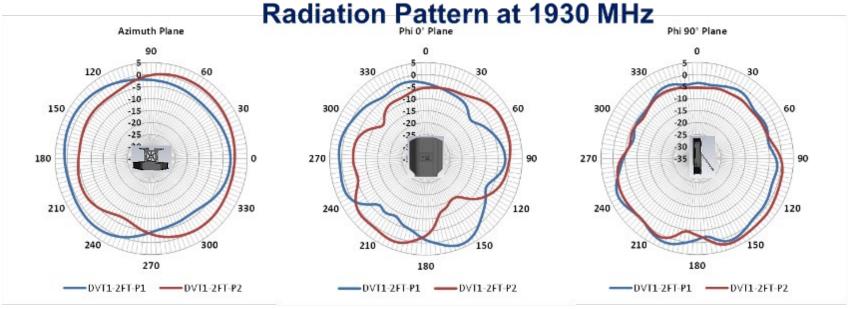


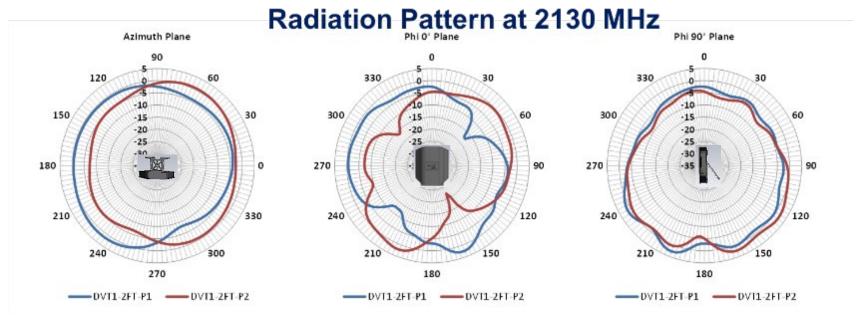






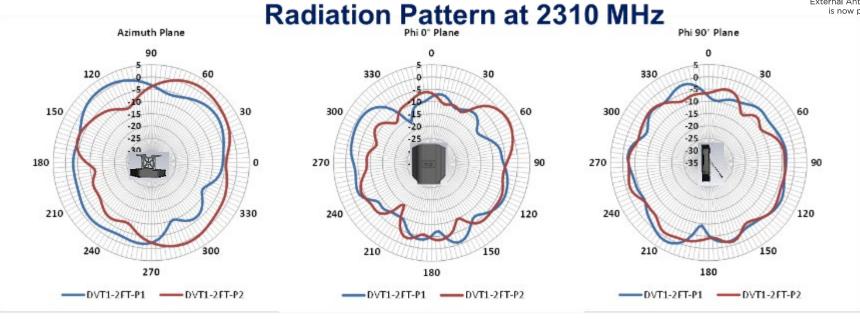


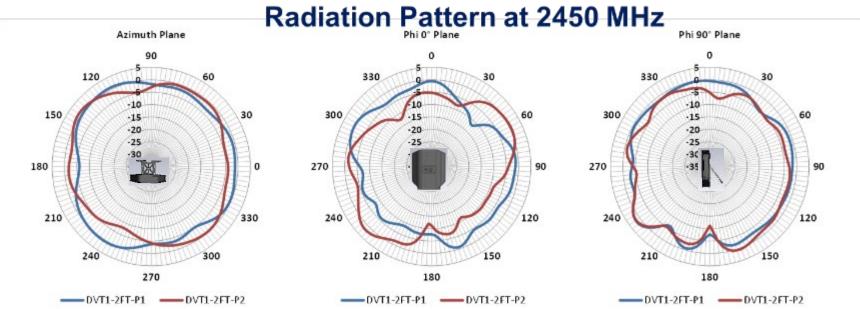








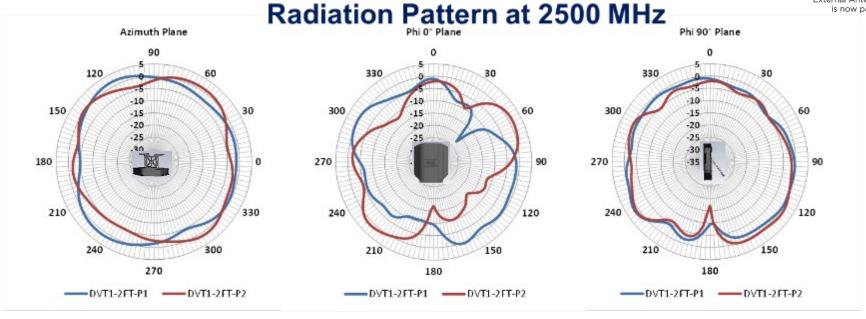


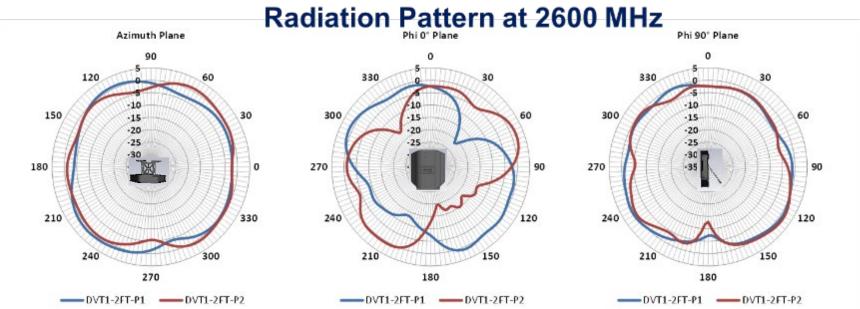






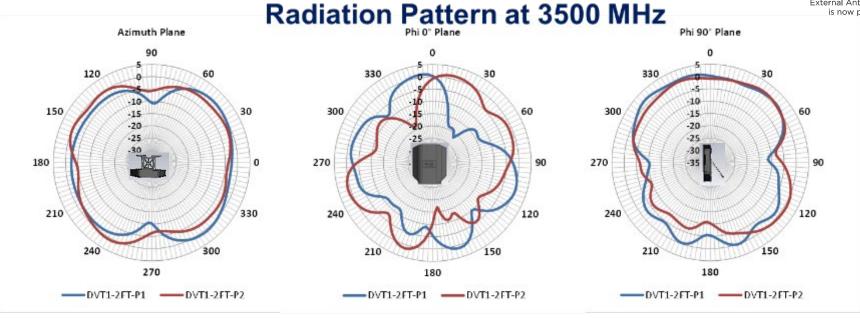


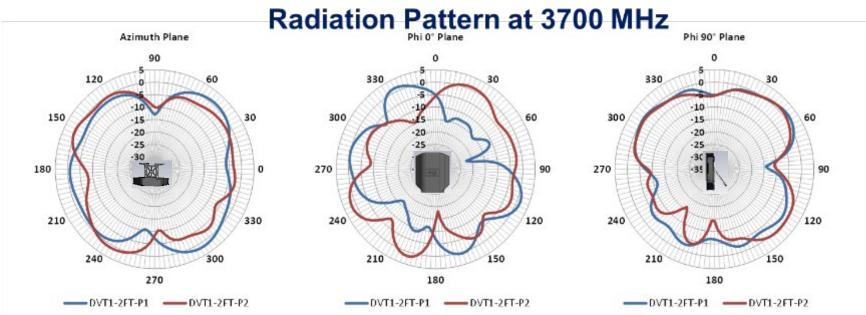






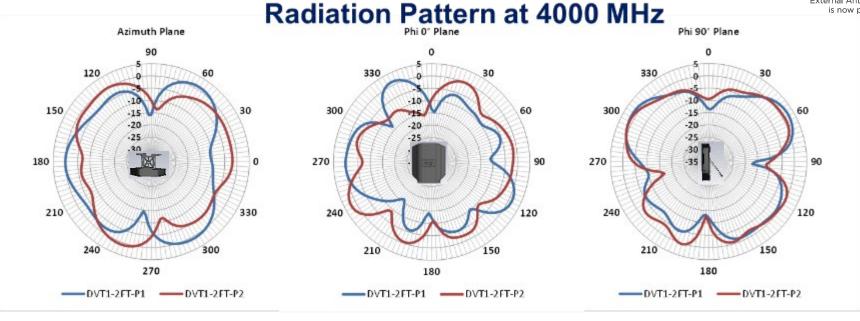


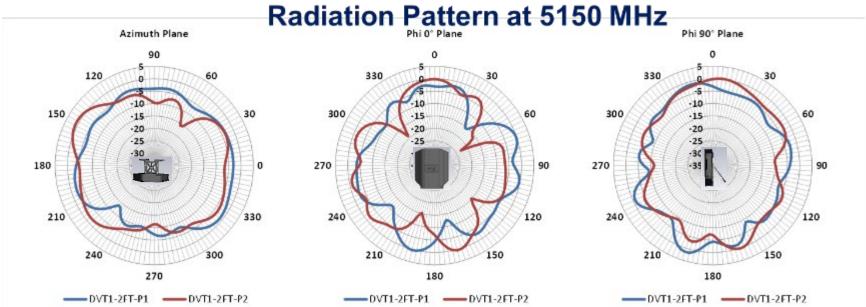








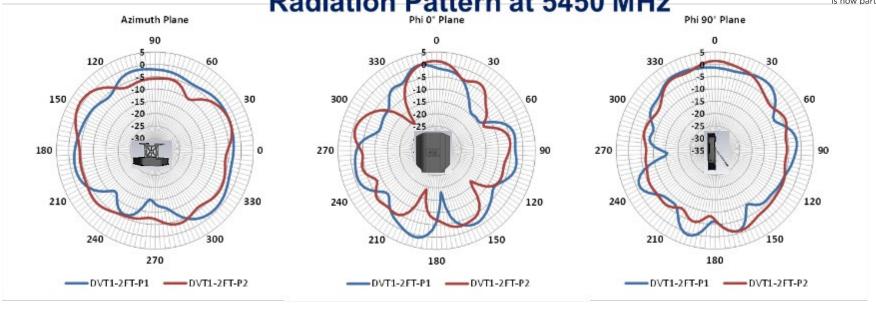


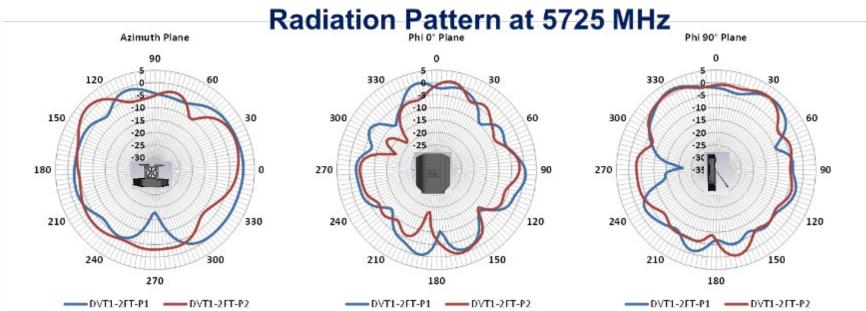






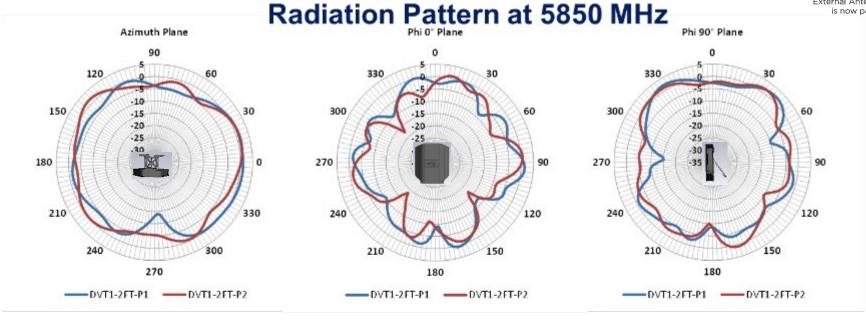


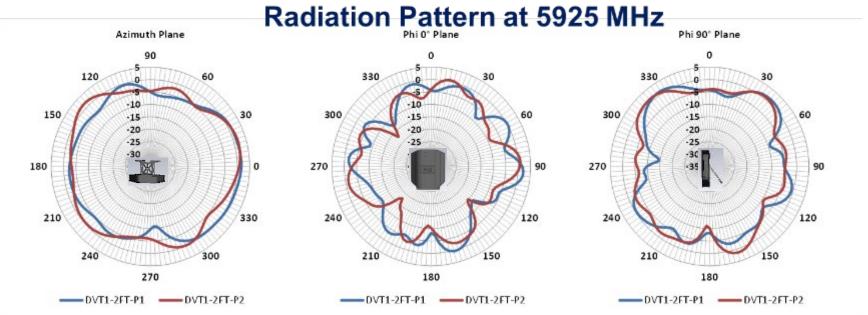








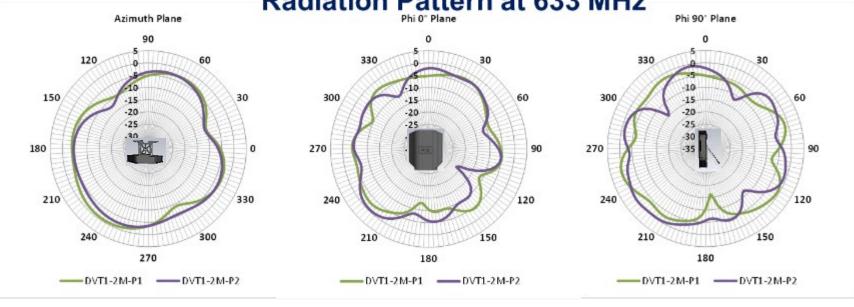


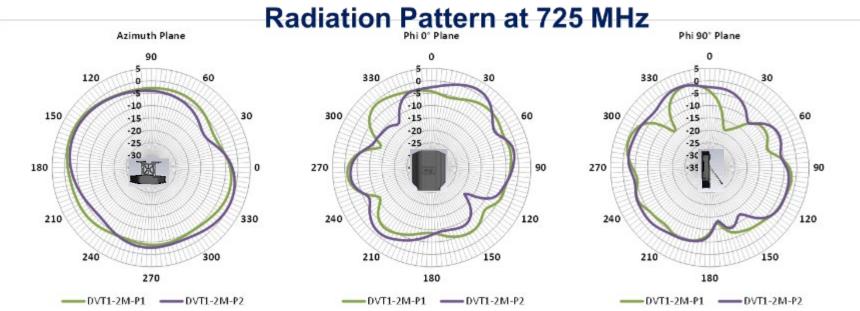








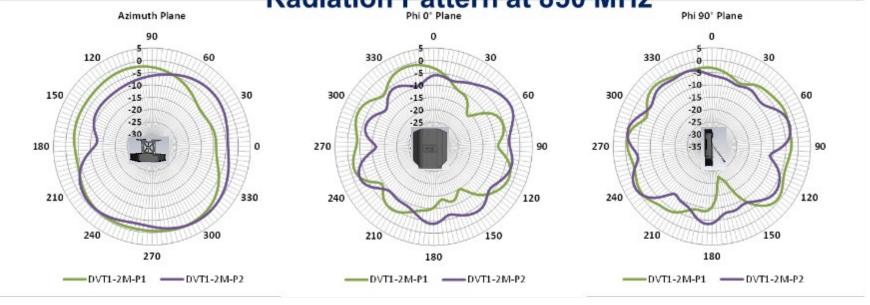


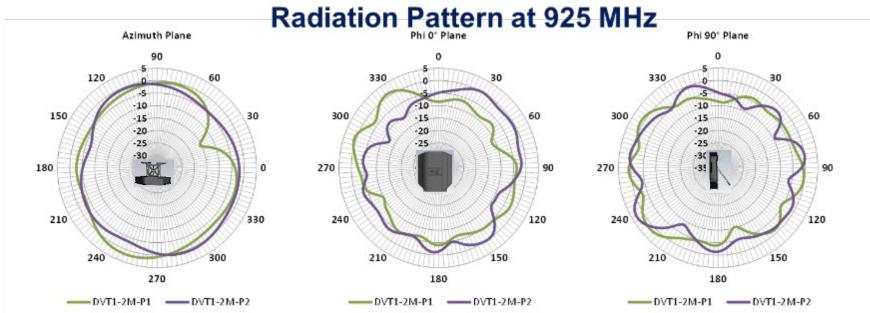








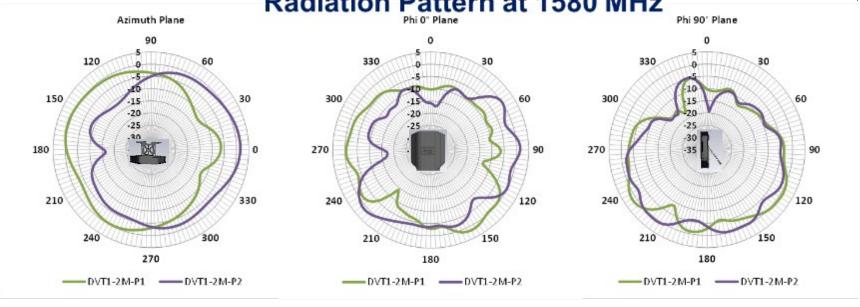


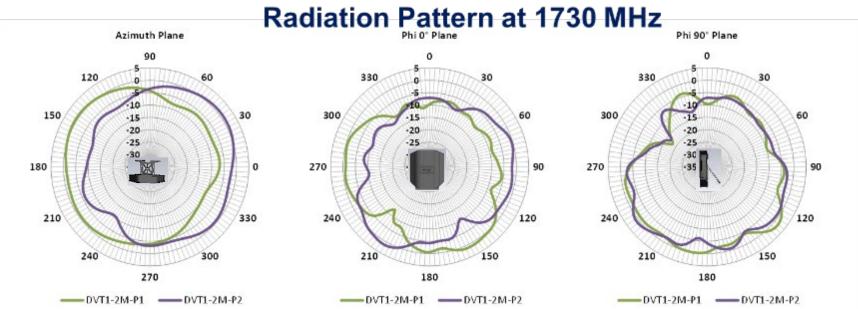








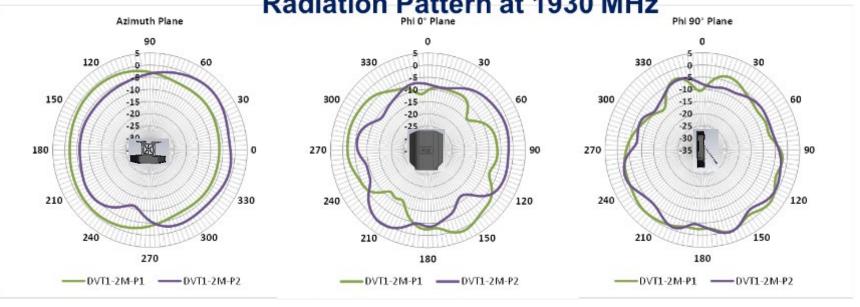


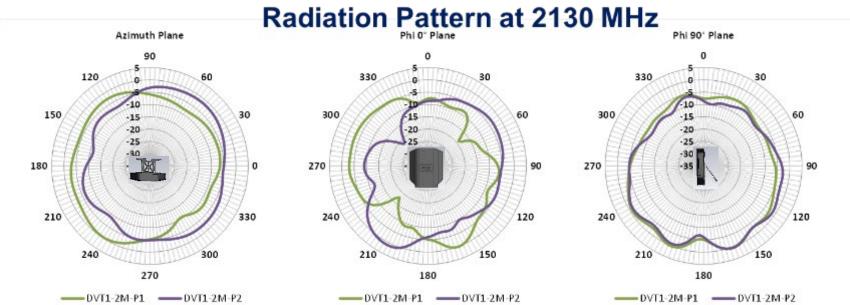






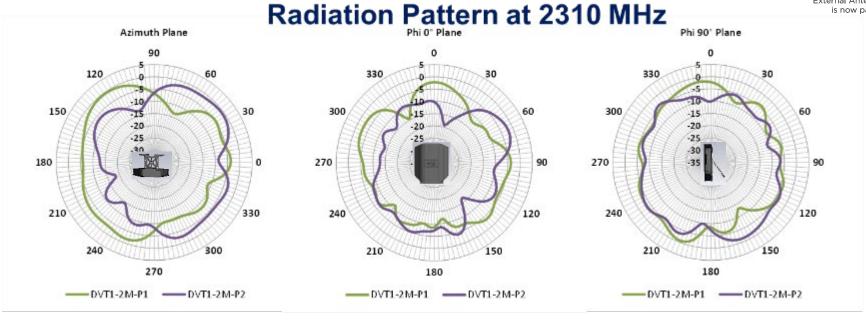


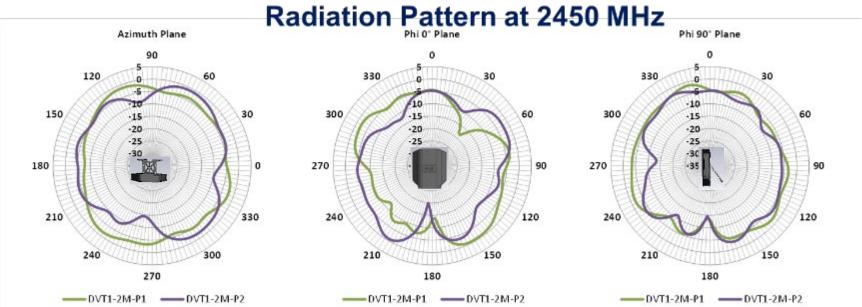






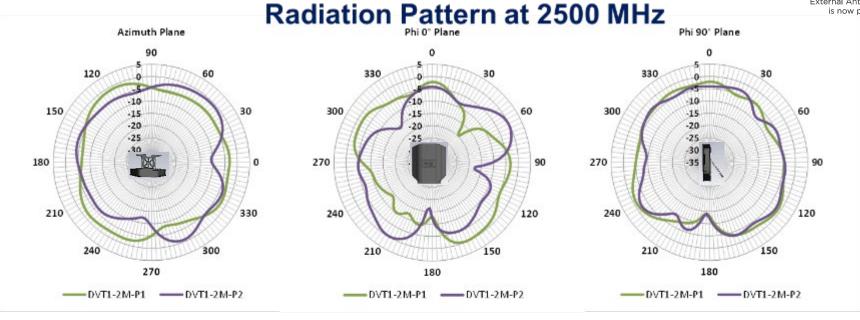


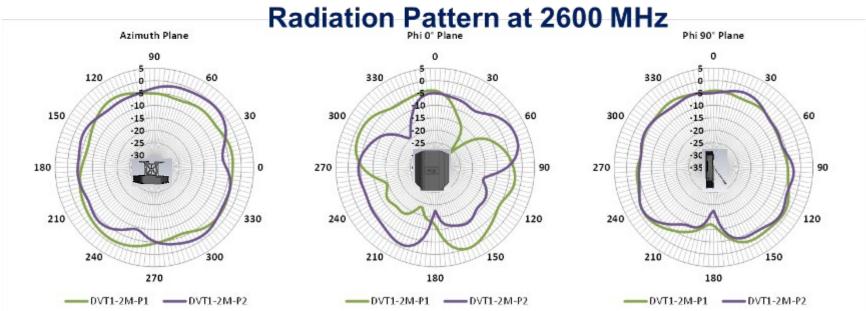








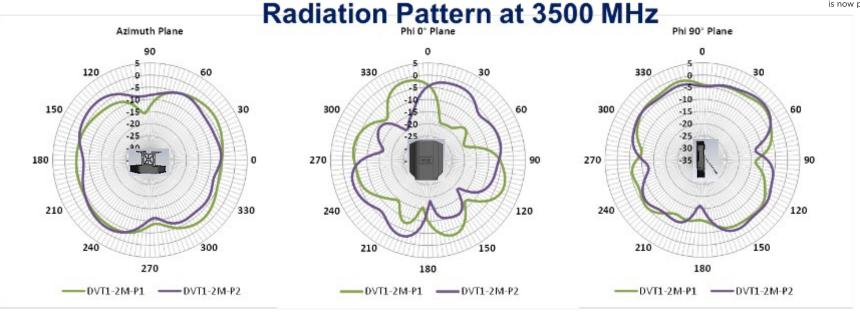


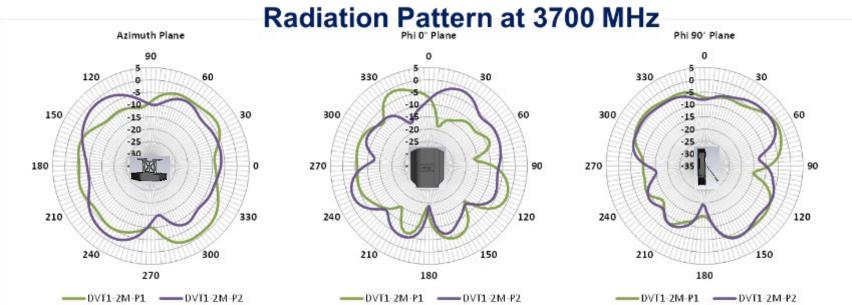








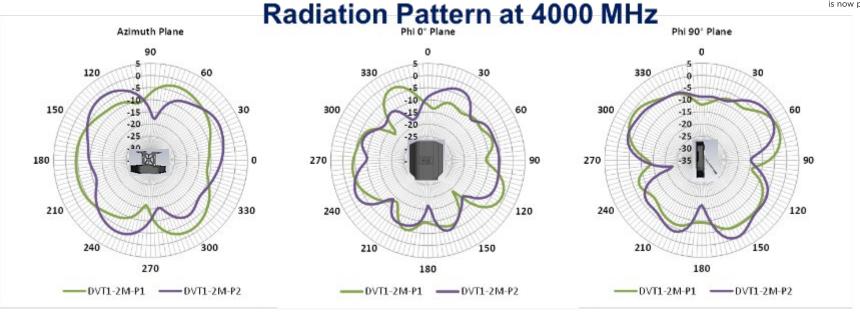


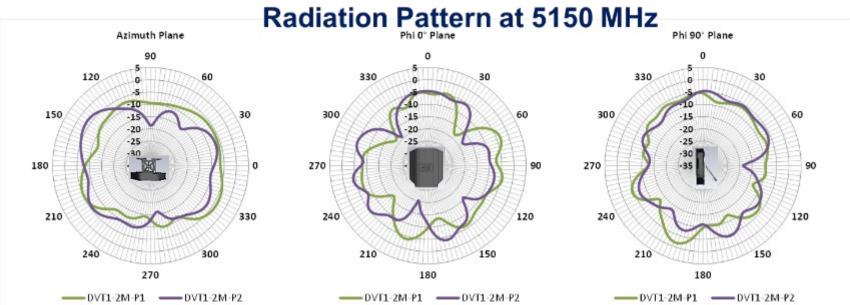








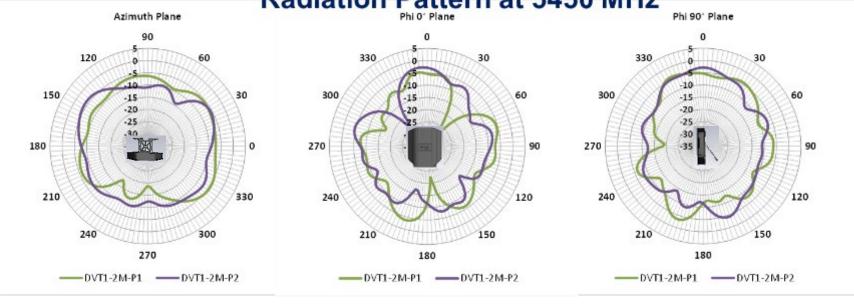


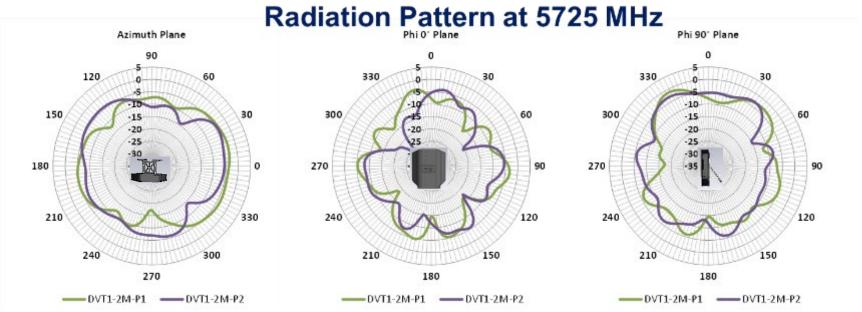








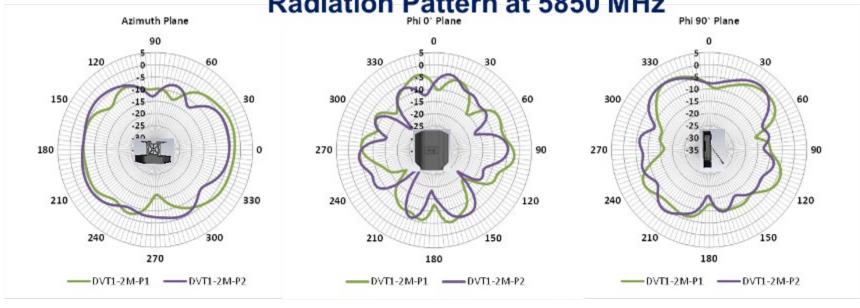


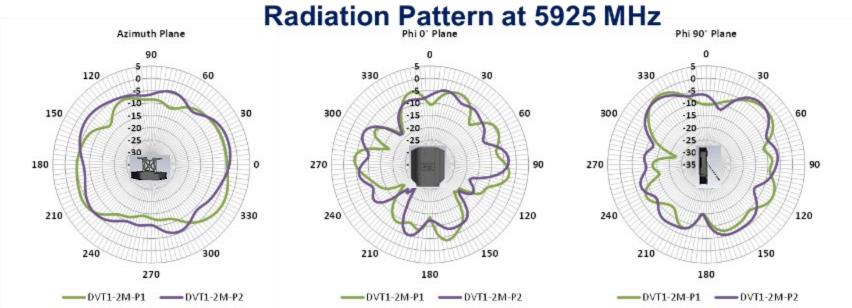






## Radiation Pattern at 5850 MHz





# ANY CONNECTION CAN CHANGE THE WORLD

