

# DockOn

*Unlocking wireless performance everywhere*

*088.UEI(Panasonic-RC)*

*Passive  
Characterization*

*10/07/2013*



# Summary

- Measured Passive performance of VO7 board
  - PC top case and NCVM top case
  - Matching Circuit used
  - Dockon Match  $\pm 0.1$  pF
    - LC1: Murata, GJM1555C1H1R6CBB01, 1.6 pF
    - LC2: Murata, GJM1555C1H1R3CBB01, 1.3 pF

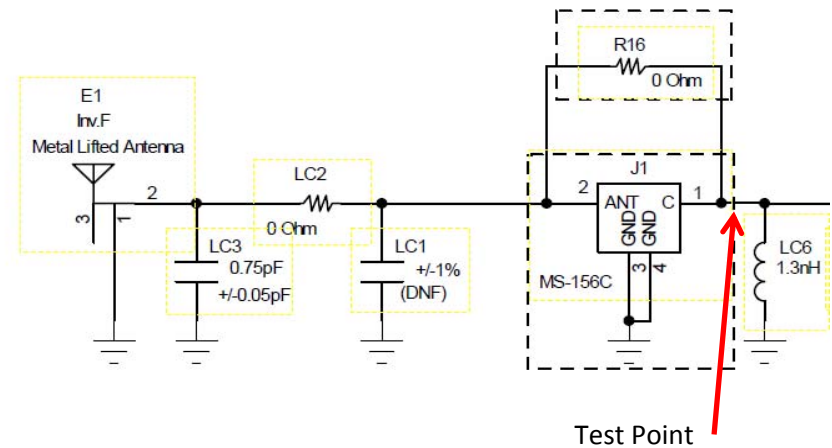
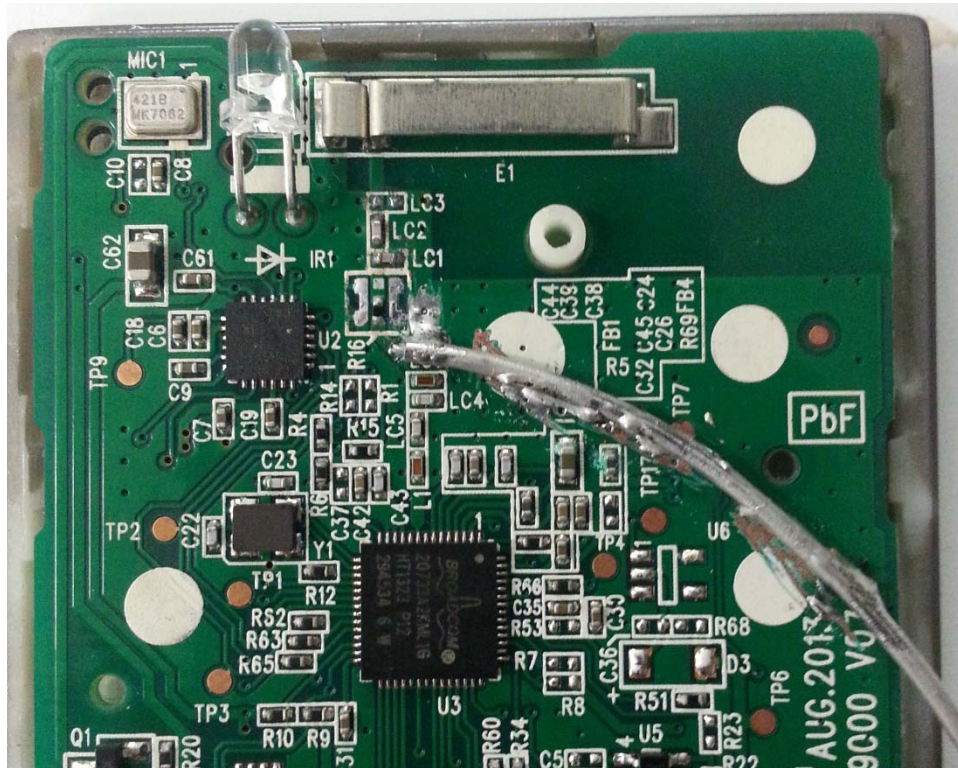
# V07



PC

NCVM

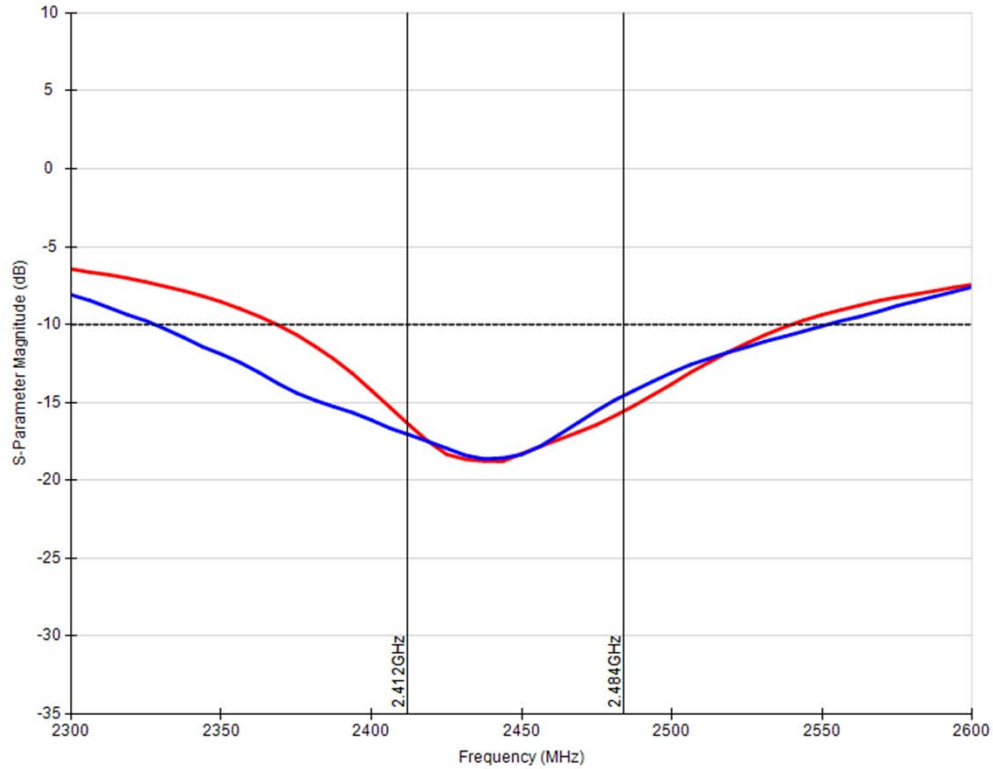
# Matching Circuit



UEI Matching values:  
LC3=DNI, LC2= 1.3pF, LC1=1.6pF

# S-Parameter Comparison

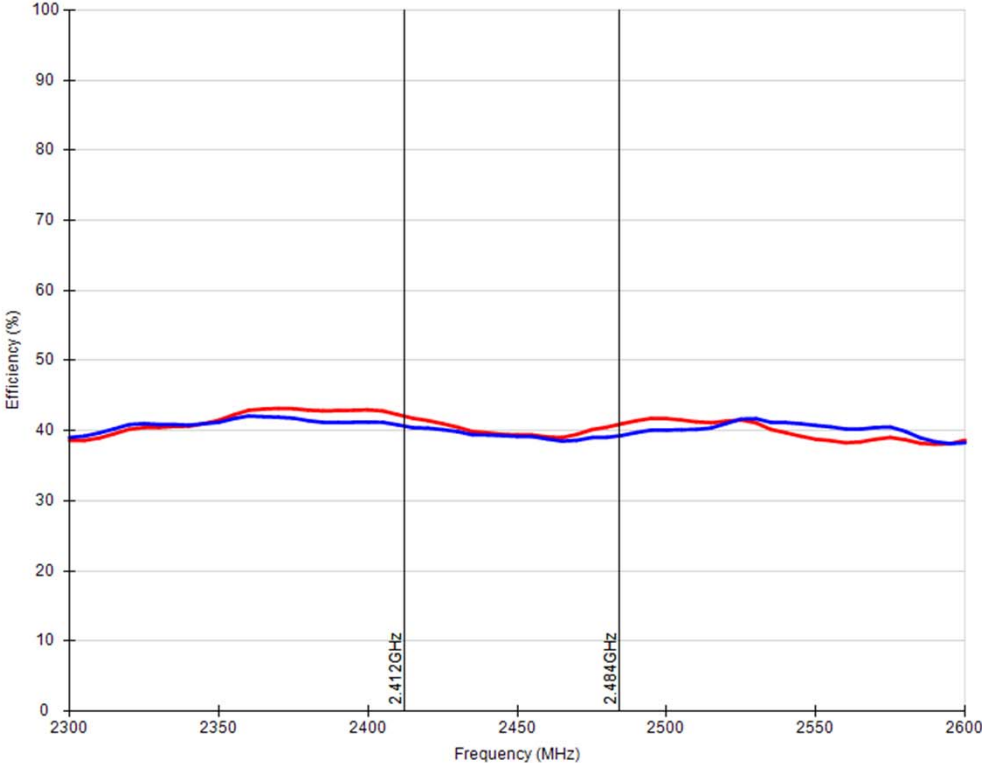
VNA Trace Plot



NCVM  
PC

# Efficiency Comparison

Efficiency Trace Plot

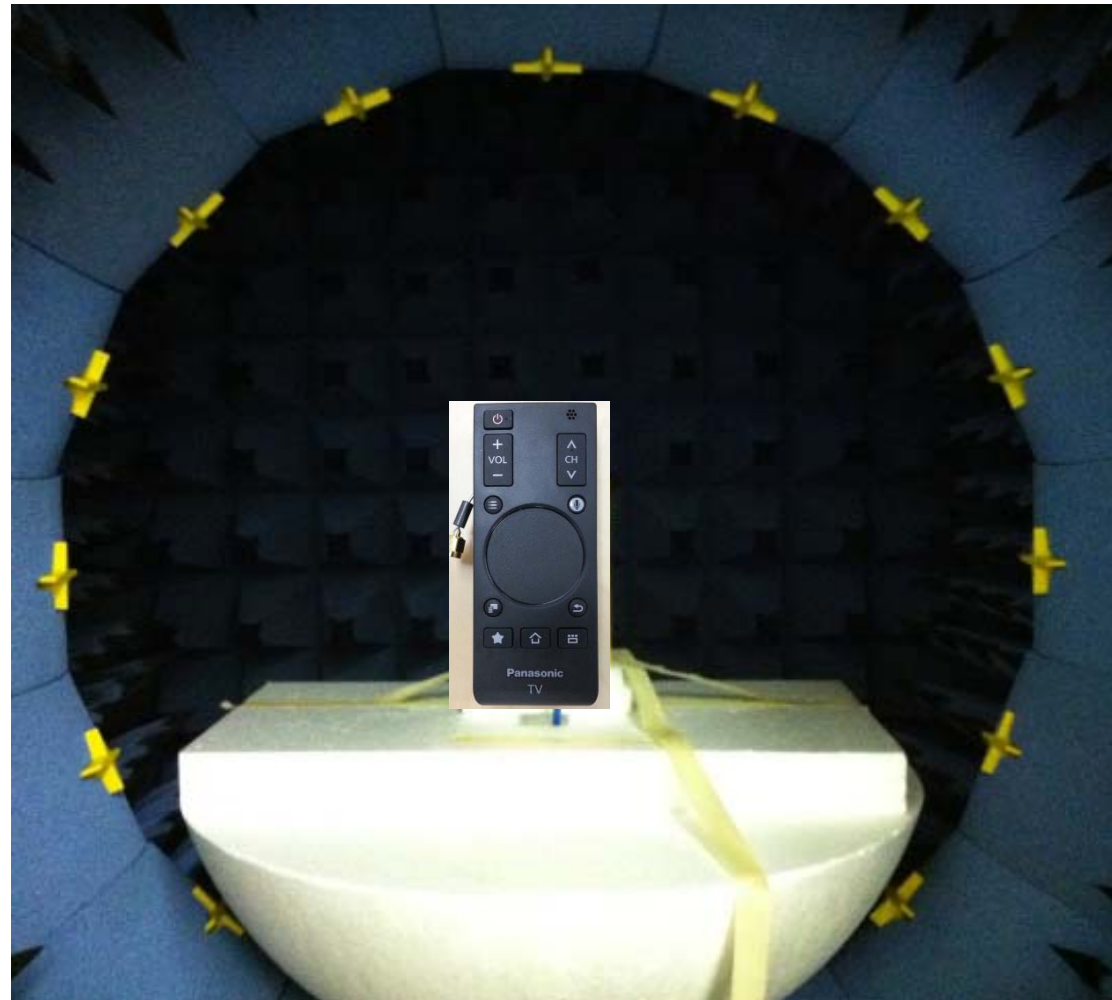
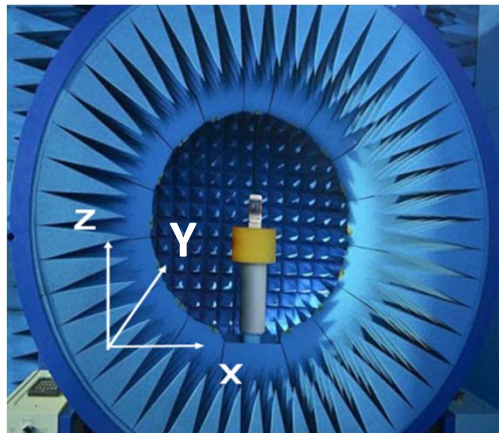


NCVM  
PC

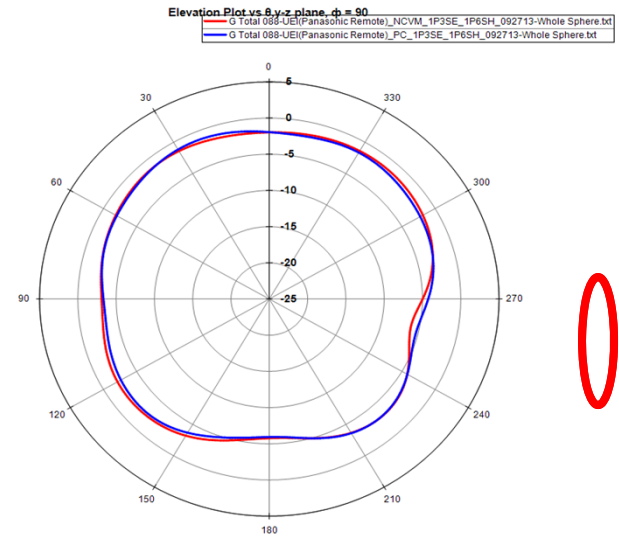
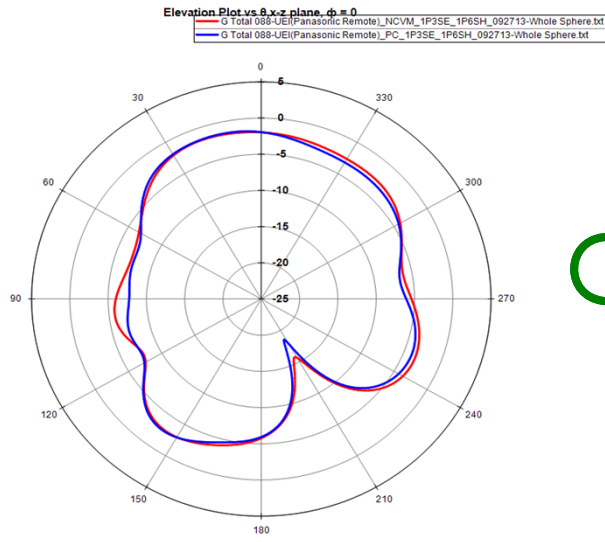
— AVG: 40.06% 088-UEI(Panasonic Remote)\_NCVM\_1P3SE\_1P6SH\_092713-efficiency  
— AVG: 39.38% 088-UEI(Panasonic Remote)\_PC\_1P3SE\_1P6SH\_092713-efficiency



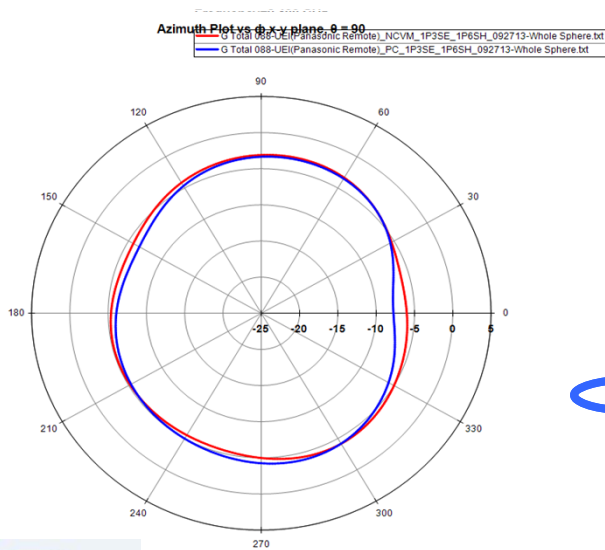
# Chamber Orientation – Existing Antenna



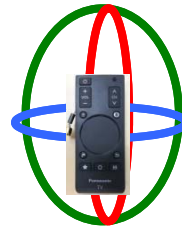
# 2.400 GHz – Pattern Comparison



Frequency=2.400 GHz



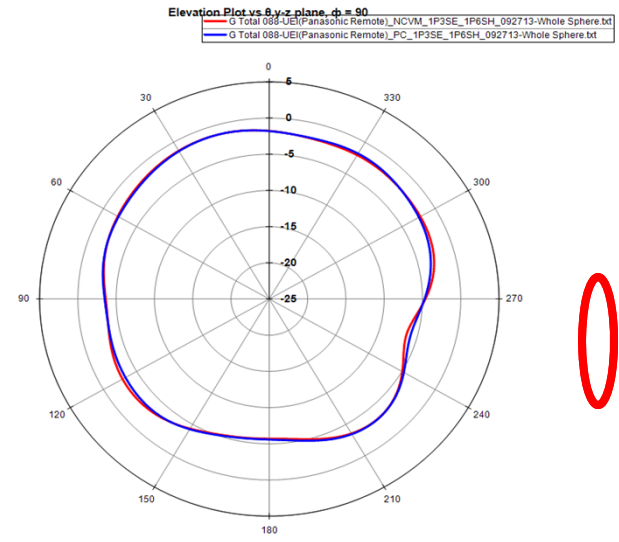
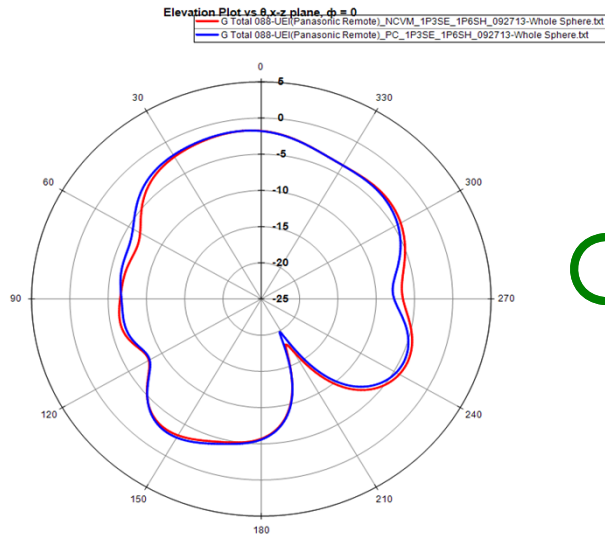
Frequency=2.400 GHz



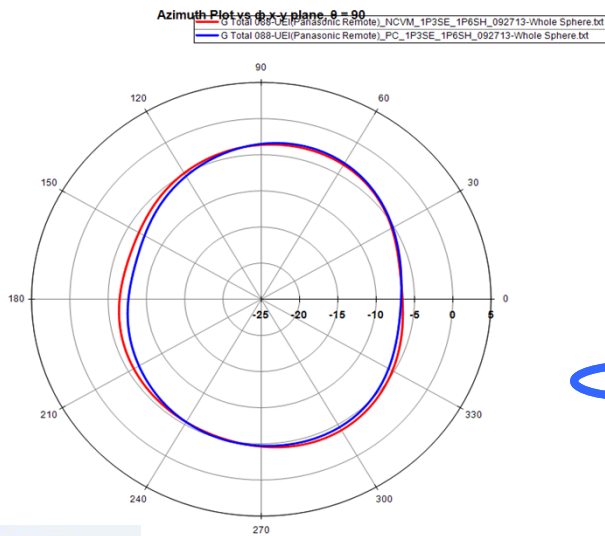
NCVM  
PC



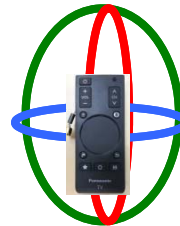
# 2.450 GHz – Pattern Comparison



Frequency=2.450 GHz

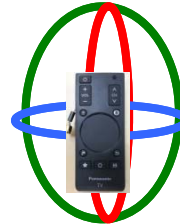
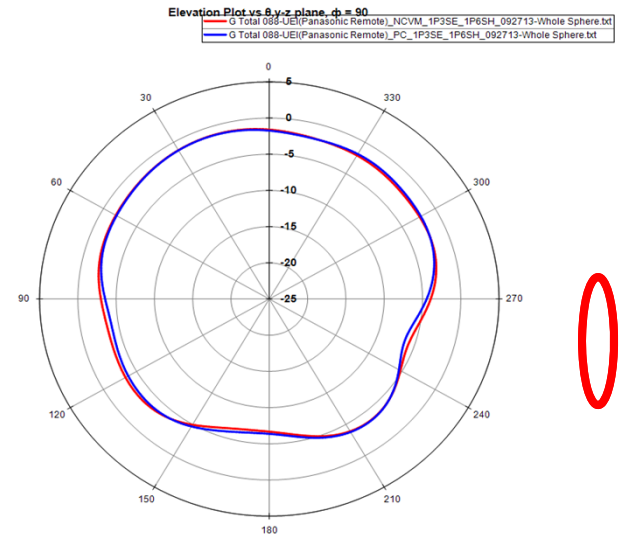
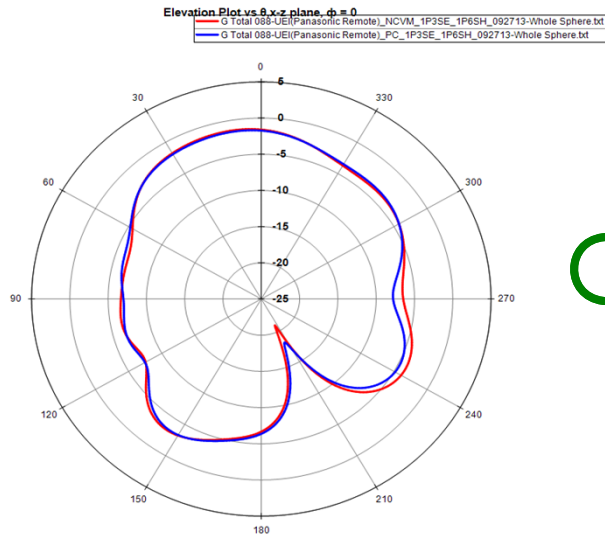


Frequency=2.450 GHz

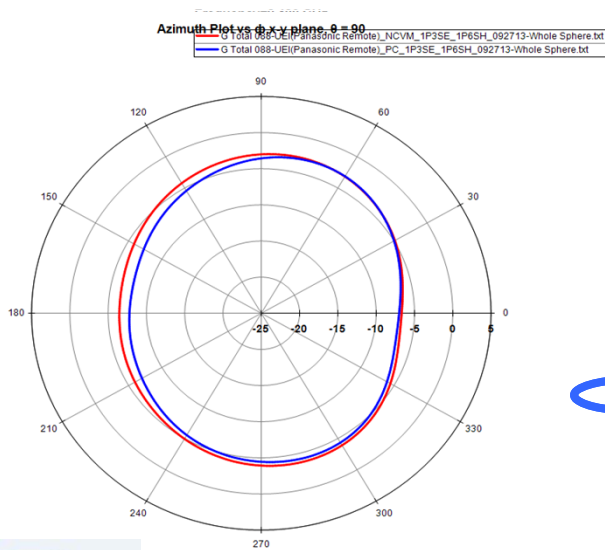


NCVM  
PC

# 2.480 GHz – Pattern Comparison



Frequency=2.480 GHz



NCVM  
PC

Frequency=2.480 GHz

## Existing Antenna – Gain Tables [dBi] for each plane

NCVM-Plastic Cover							
Plane	Polarization	2400 MHz		2450 MHz		2480 MHz	
		Max	Ave	Max	Ave	Max	Ave
xz	G Total	-1.71	-4.40	-1.64	-4.70	-1.40	-4.57
	G $\theta$	-1.75	-4.53	-1.72	-4.83	-1.50	-4.69
	G $\phi$	-14.38	-19.39	-15.69	-19.79	-17.21	-20.19
yz	G Total	-1.32	-2.76	-1.29	-3.07	-1.19	-3.08
	G $\theta$	-7.31	-13.62	-7.23	-13.61	-7.06	-13.46
	G $\phi$	-1.33	-3.13	-1.31	-3.47	-1.23	-3.50
xy	G Total	-3.01	-4.73	-3.38	-5.05	-2.86	-4.71
	G $\theta$	-5.24	-8.40	-6.33	-8.86	-6.43	-8.84
	G $\phi$	-3.12	-7.17	-3.66	-7.38	-3.10	-6.83

## Existing Antenna – Gain Tables [dBi] for each plane

PC-Plastic Cover							
Plane	Polarization	2400 MHz		2450 MHz		2480 Mhz	
		Max	Ave	Max	Ave	Max	Ave
xz	G Total	-1.60	-4.65	-1.63	-4.71	-1.60	-4.72
	G $\theta$	-1.63	-4.78	-1.66	-4.81	-1.65	-4.82
	G $\phi$	-14.96	-19.72	-15.36	-20.90	-16.53	-21.15
yz	G Total	-1.14	-2.87	-1.30	-3.08	-1.23	-3.16
	G $\theta$	-7.14	-13.45	-7.58	-13.77	-7.65	-13.60
	G $\phi$	-1.15	-3.26	-1.32	-3.47	-1.24	-3.57
xy	G Total	-3.25	-5.00	-3.07	-5.30	-3.00	-5.30
	G $\theta$	-5.94	-9.35	-6.75	-9.45	-6.96	-9.55
	G $\phi$	-3.31	-6.99	-3.45	-7.41	-3.54	-7.35

## Existing Antenna – 3D Max Gain Tables [dBi]

NCVM-Plastic Cover- 3D Max Gain		
2400 MHz	2450 MHz	2480 MHz
-1.24	-1.28	-1.18

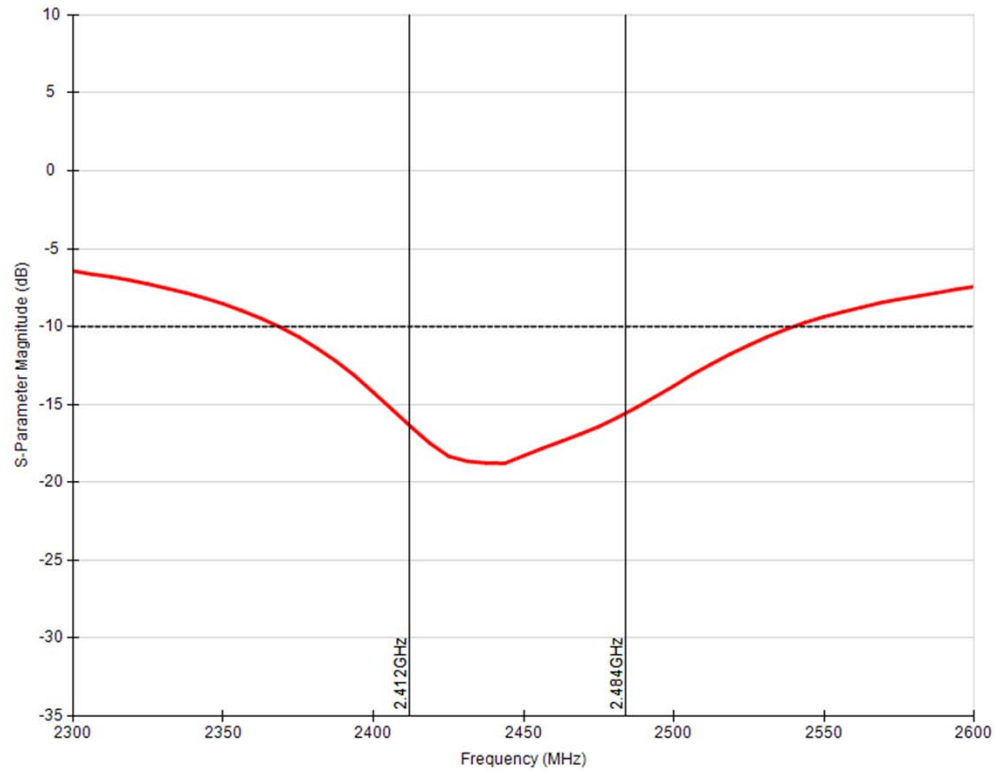
PC-Plastic Cover- 3D Max Gain		
2400 MHz	2450 MHz	2480 MHz
-1.07	-1.28	-1.22

# Appendix

- Single Frequency Items

# NCVM Return Loss

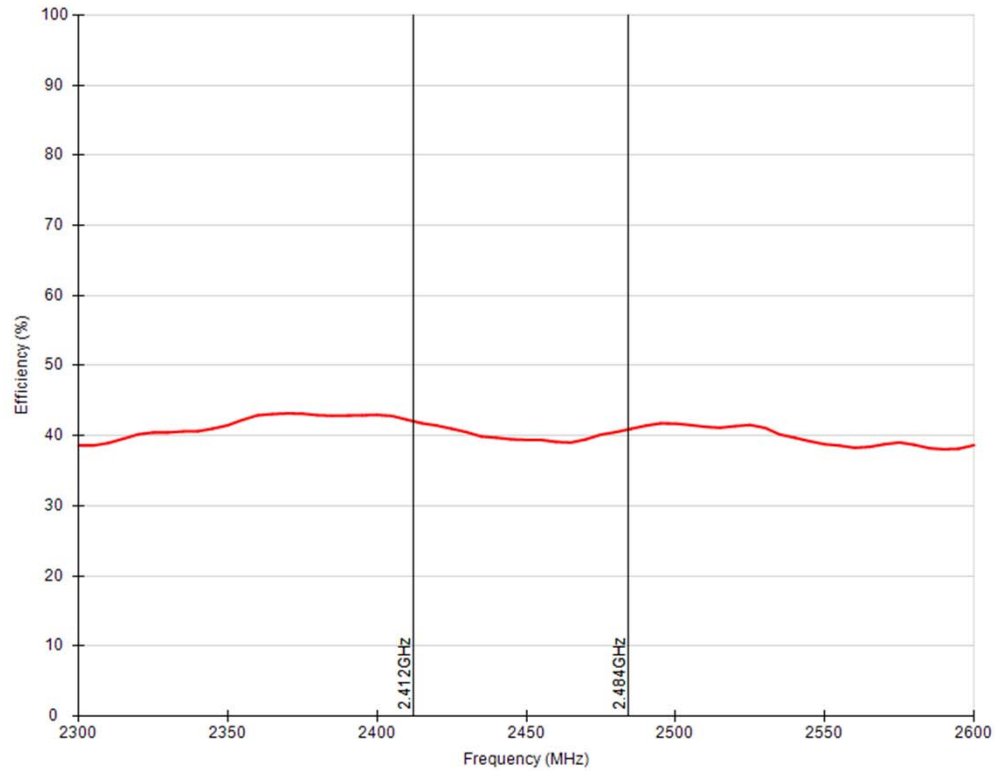
VNA Trace Plot



EXISTING\_ANT\_NM\_NCVM\_1P3SE\_1P6SH\_DOCKON

# NCVM Efficiency

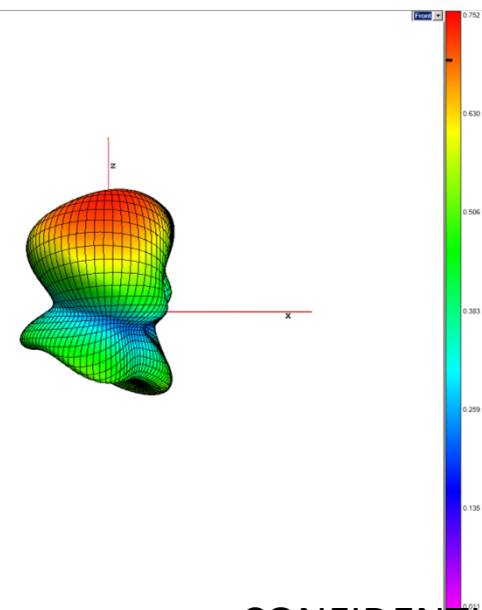
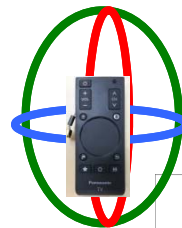
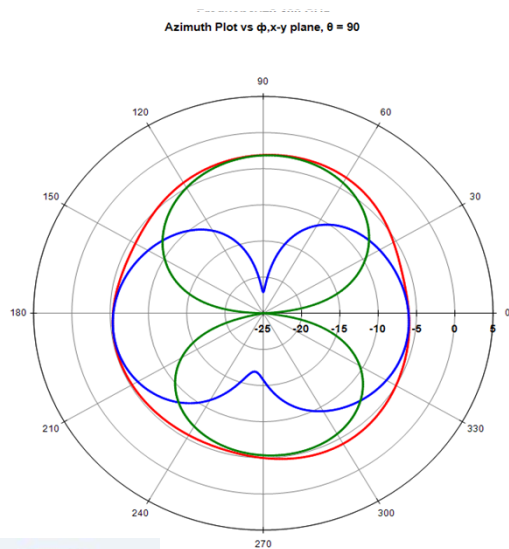
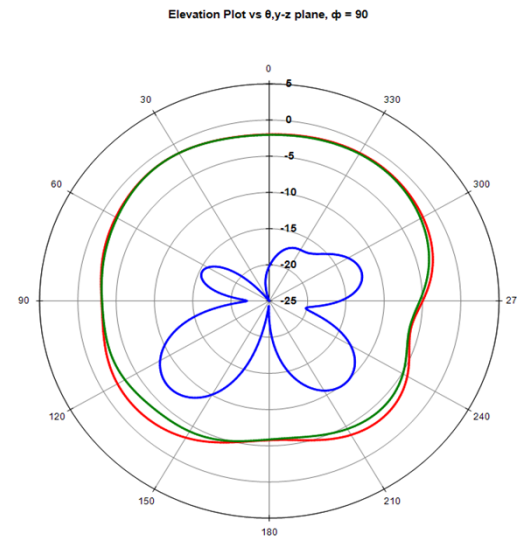
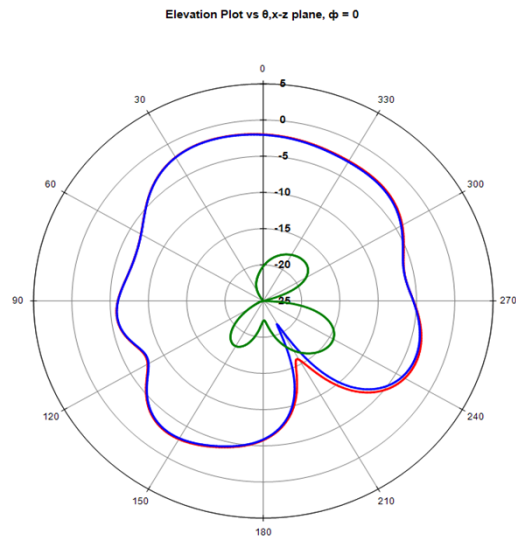
Efficiency Trace Plot



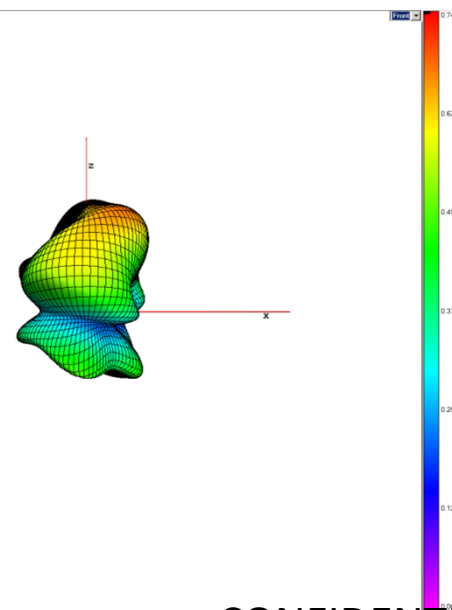
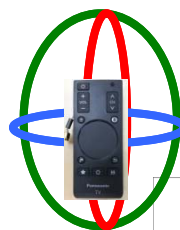
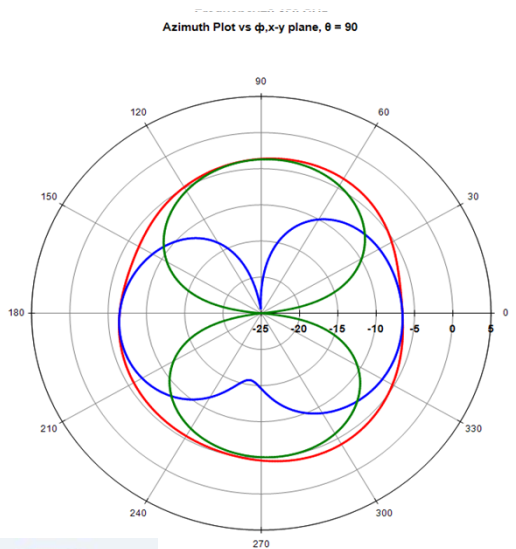
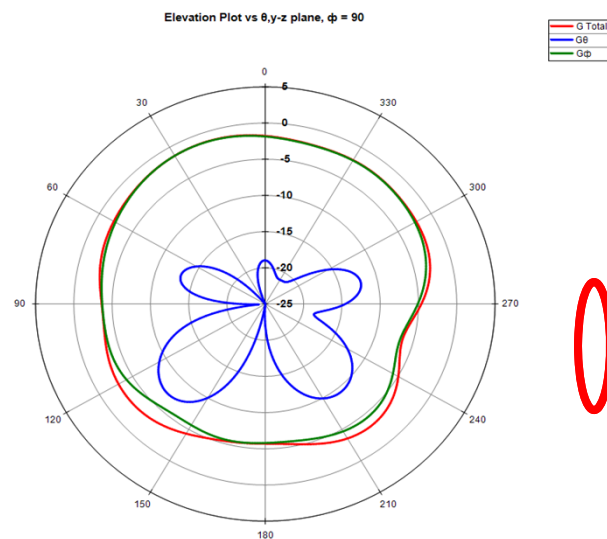
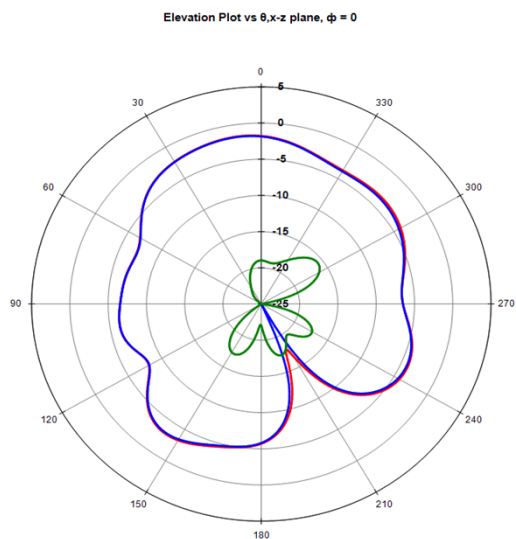
AVG: 40.06% 088-UEI(Panasonic Remote)\_NCVM\_1P3SE\_1P6SH\_092713-efficiency



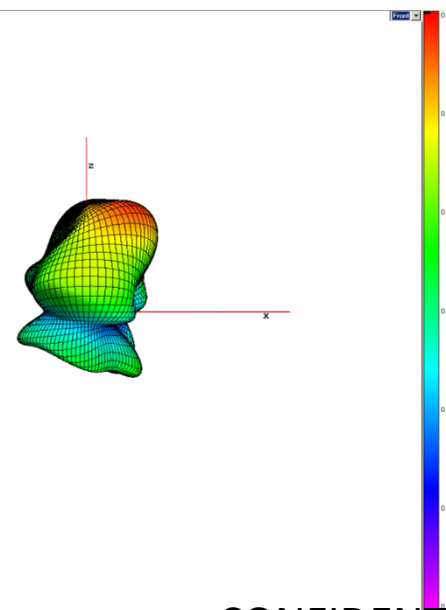
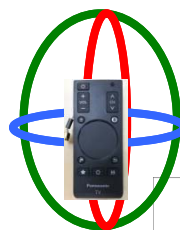
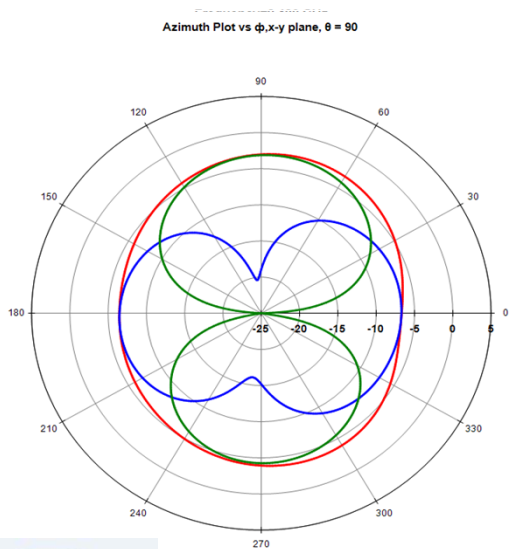
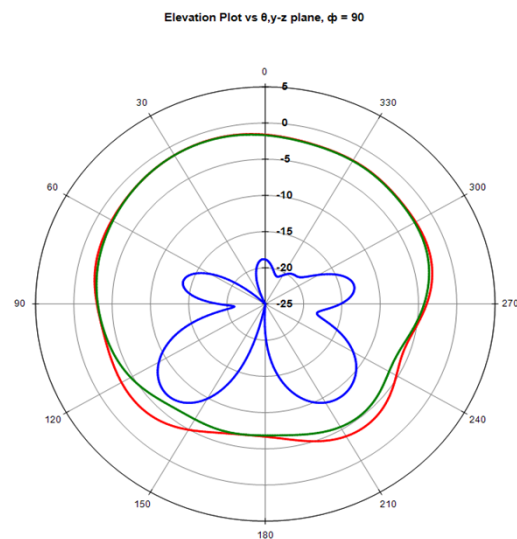
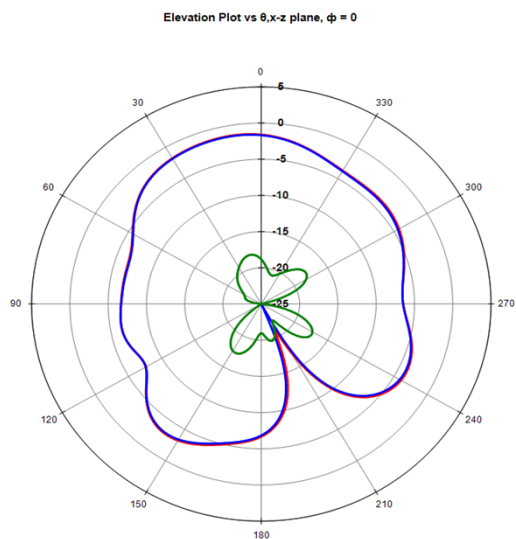
# 2.400 GHz – NCVM Radiation Pattern



# 2.450 GHz – NCVM Radiation Pattern

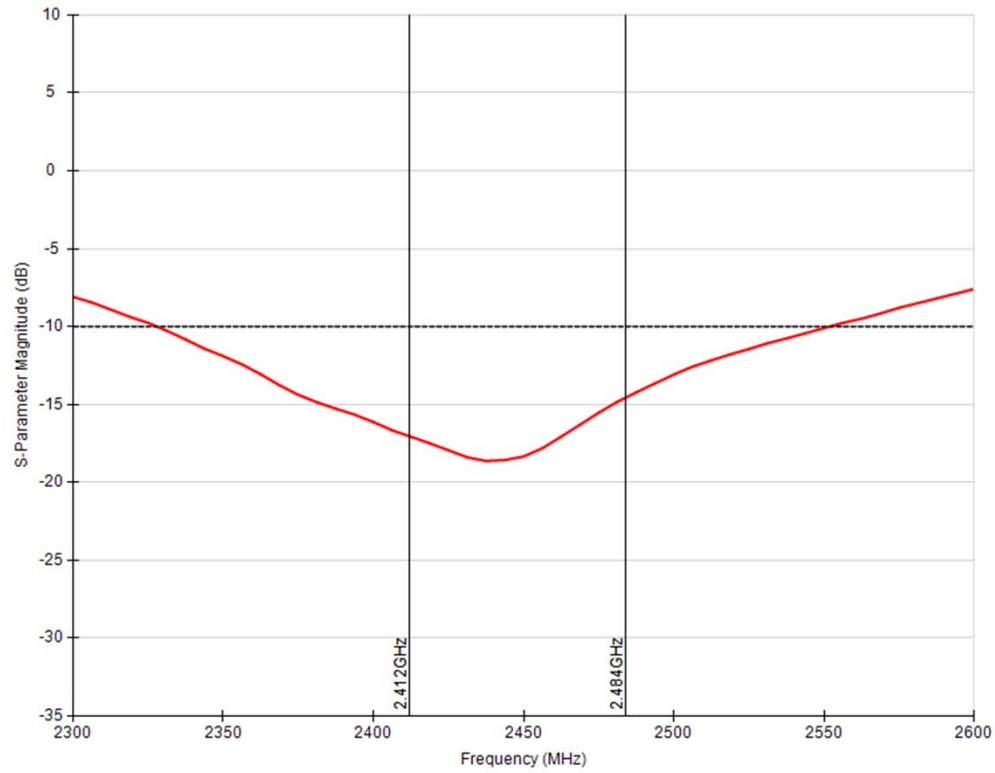


# 2.480 GHz – NCVM Radiation Pattern



# PC Return Loss

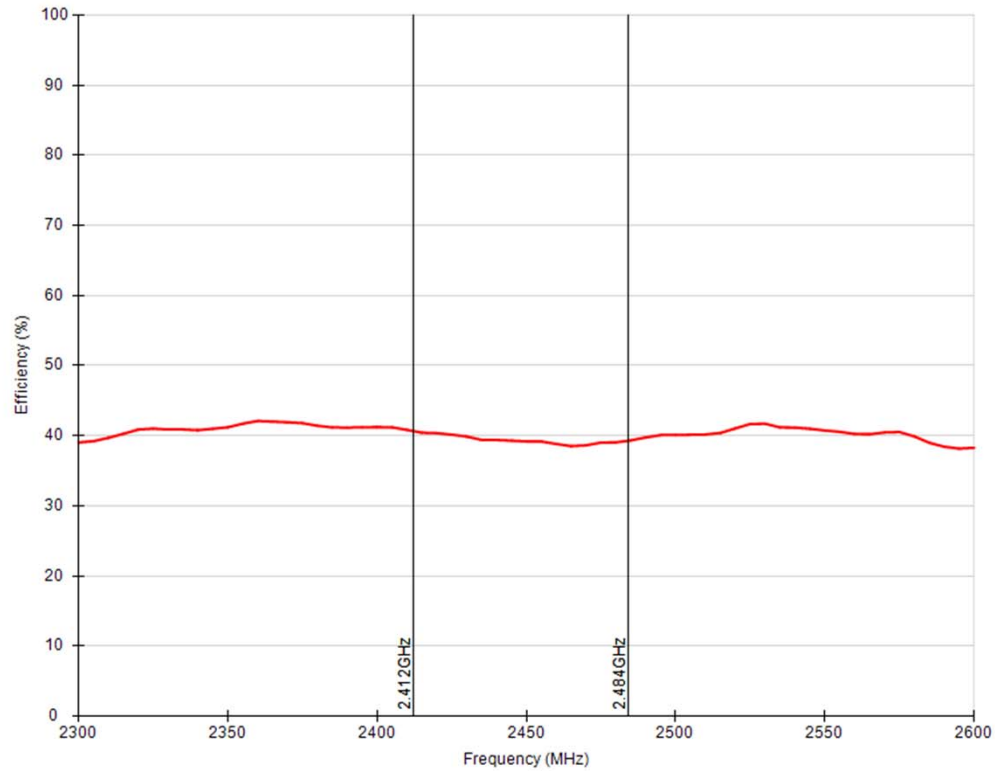
VNA Trace Plot



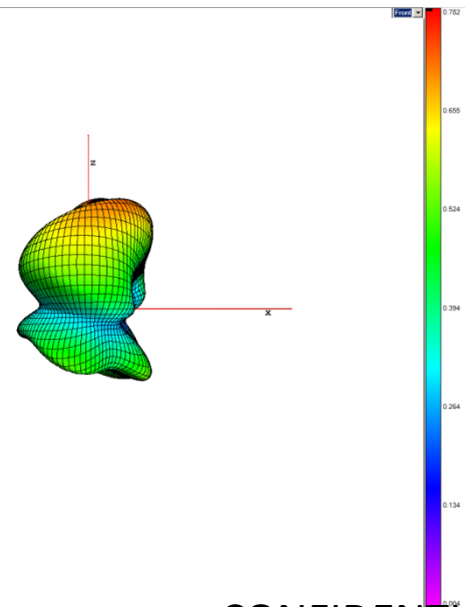
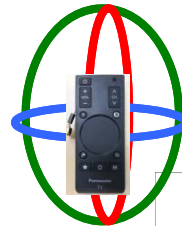
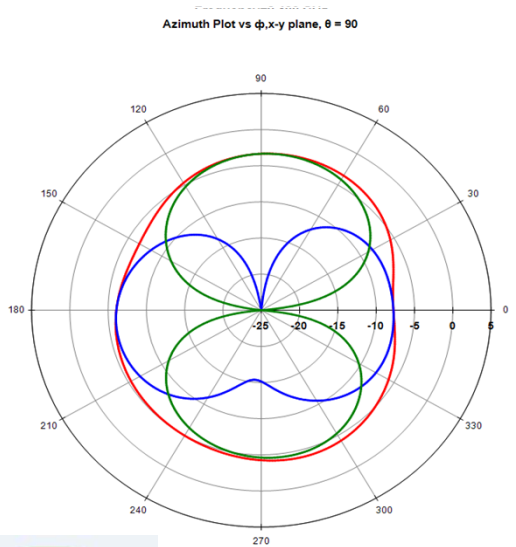
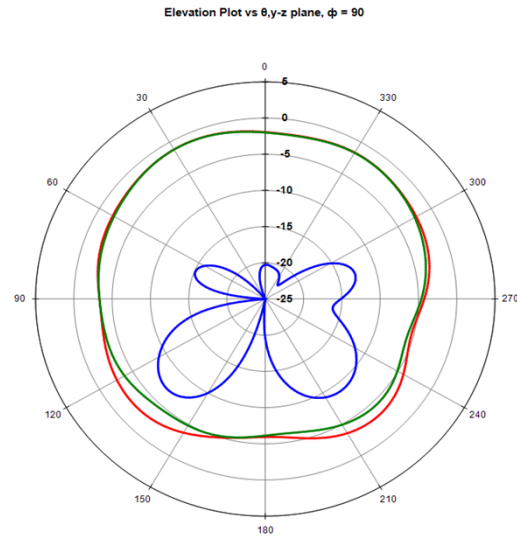
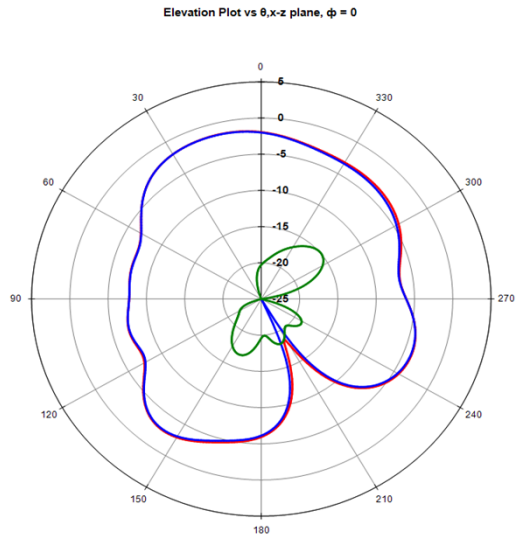
EXISTING\_ANT\_NM\_PC\_1P3SE\_1P6SH\_DOCKON

# PC Efficiency

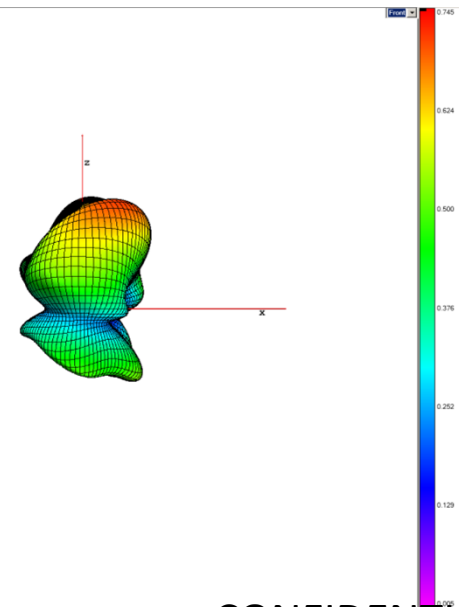
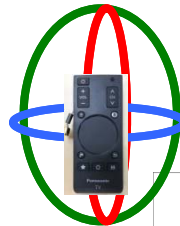
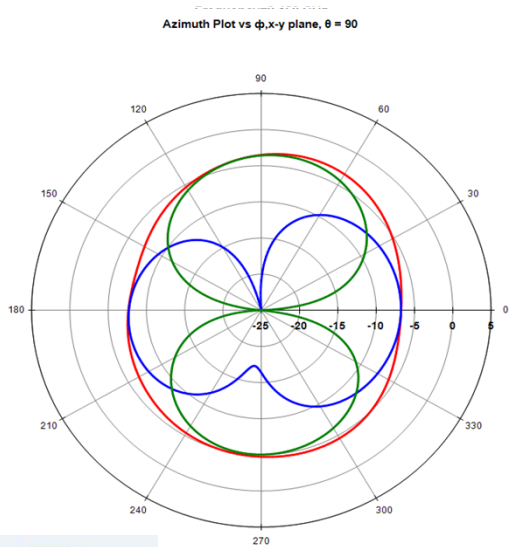
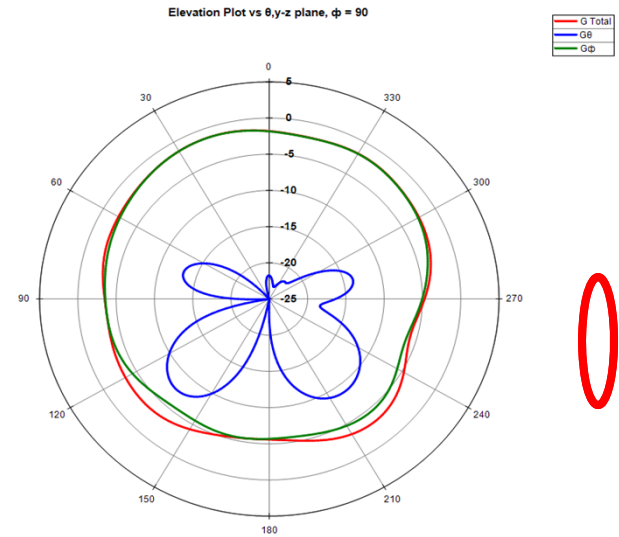
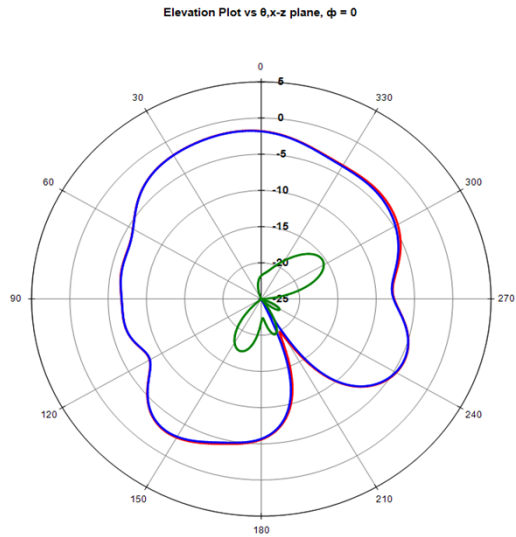
Efficiency Trace Plot



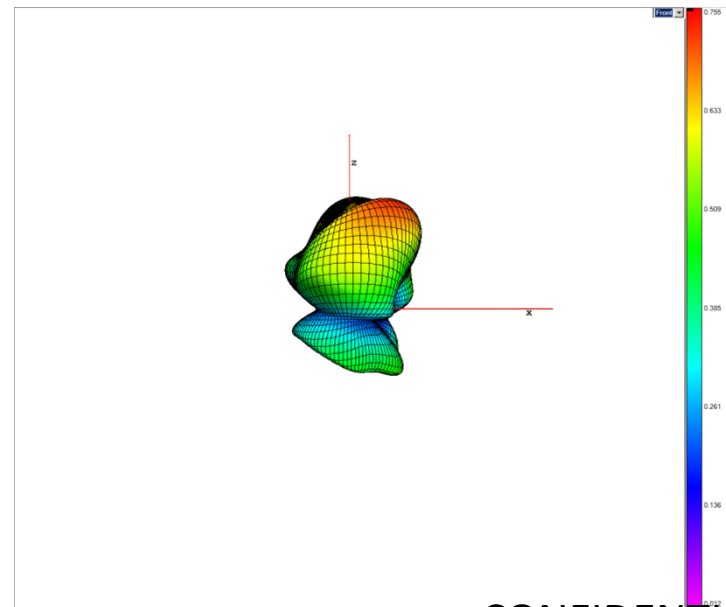
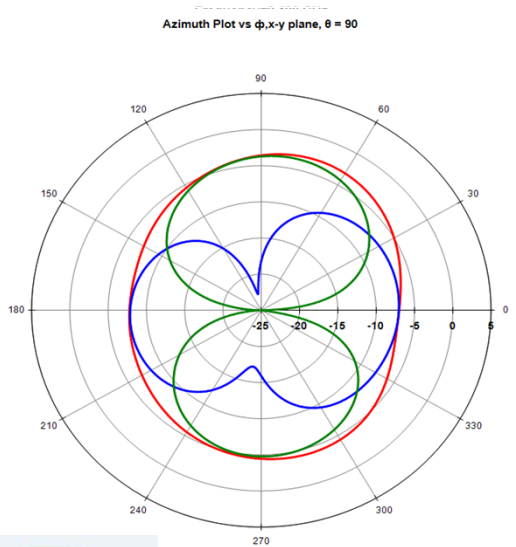
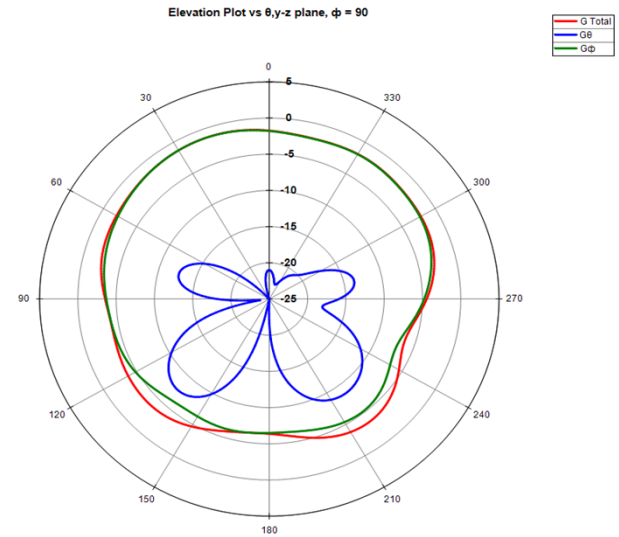
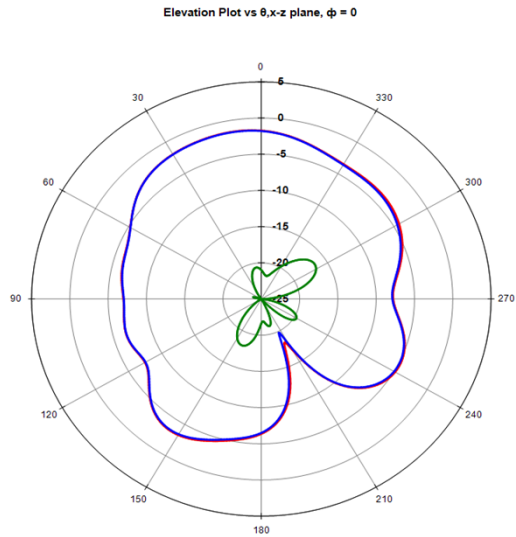
# 2.400 GHz – PC Radiation Pattern



# 2.450 GHz – PC Radiation Pattern



# 2.480 GHz – Radiation Pattern





# Existing Antenna – Gain Tables [Total]

## Average Gain(dB) Total

Average Gain(dB) NCVN	-95 to -85	-85 to -75	-75 to -65	-65 to -55	-55 to -45	-45 to -35	-35 to -25
Freq=2400MHz	-5.34	-6.10	-5.44	-4.06	-3.08	-2.72	-2.66
Freq=2450MHz	-6.41	-6.18	-5.02	-4.01	-3.53	-3.56	-3.65
Freq=2480MHz	-6.39	-6.14	-5.14	-4.26	-3.85	-3.84	-3.69

-25 to -15	-15 to -5	-5 to 5	5 to 15	15 to 25	25 to 35	35 to 45
-2.50	-2.23	-2.05	-1.79	-1.74	-2.11	-3.20
-3.23	-2.41	-1.92	-1.68	-1.92	-2.33	-3.13
-3.04	-2.20	-1.74	-1.42	-1.50	-1.77	-2.38

45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	Average
-4.91	-6.48	-7.12	-6.81	-6.03	-3.65
-4.70	-6.61	-7.17	-6.84	-6.56	-3.89
-3.69	-5.50	-6.60	-6.75	-6.66	-3.65

Average Gain(dB) PC	-95 to -85	-85 to -75	-75 to -65	-65 to -55	-55 to -45	-45 to -35	-35 to -25
Freq=2400MHz	-6.01	-6.58	-5.56	-4.31	-3.57	-3.28	-3.21
Freq=2450MHz	-7.52	-7.20	-5.68	-4.45	-3.80	-3.67	-3.66
Freq=2480MHz	-7.66	-6.95	-5.42	-4.26	-3.68	-3.56	-3.47

-25 to -15	-15 to -5	-5 to 5	5 to 15	15 to 25	25 to 35	35 to 45
-3.02	-2.52	-2.10	-1.65	-1.64	-1.94	-2.83
-3.23	-2.44	-1.95	-1.65	-1.78	-2.07	-2.67
-2.98	-2.27	-1.86	-1.61	-1.70	-1.93	-2.45

45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	Average
-4.63	-6.74	-7.52	-7.59	-7.70	-3.87
-3.94	-5.56	-6.26	-6.39	-6.71	-3.85
-3.61	-5.18	-6.09	-6.49	-6.95	-3.71

# Existing Antenna – Gain Tables [Theta]

## Average Gain(dB) Vertical Polarization

Average Gain(dB) NCVM	-95 to -85	-85 to -75	-75 to -65	-65 to -55	-55 to -45	-45 to -35	-35 to -25
Freq=2400MHz	-5.38	-6.12	-5.55	-4.22	-3.24	-2.88	-2.80
Freq=2450MHz	-6.42	-6.23	-5.19	-4.27	-3.79	-3.78	-3.82
Freq=2480MHz	-6.40	-6.17	-5.26	-4.43	-4.02	-3.98	-3.79

-25 to -15	-15 to -5	-5 to 5	5 to 15	15 to 25	25 to 35	35 to 45
-2.61	-2.32	-2.12	-1.84	-1.77	-2.14	-3.22
-3.34	-2.50	-2.00	-1.75	-1.97	-2.38	-3.17
-3.11	-2.27	-1.82	-1.51	-1.59	-1.85	-2.45

45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	Average
-4.94	-6.50	-7.13	-6.82	-6.07	-3.73
-4.75	-6.67	-7.22	-6.87	-6.56	-3.99
-3.77	-5.59	-6.71	-6.83	-6.69	-3.74

Average Gain(dB) PC	-95 to -85	-85 to -75	-75 to -65	-65 to -55	-55 to -45	-45 to -35	-35 to -25
Freq=2400MHz	-6.02	-6.67	-5.79	-4.63	-3.89	-3.55	-3.41
Freq=2450MHz	-7.59	-7.37	-5.97	-4.79	-4.10	-3.87	-3.80
Freq=2480MHz	-7.76	-7.10	-5.64	-4.50	-3.89	-3.72	-3.58

-25 to -15	-15 to -5	-5 to 5	5 to 15	15 to 25	25 to 35	35 to 45
-3.16	-2.61	-2.17	-1.69	-1.66	-1.95	-2.84
-3.32	-2.50	-2.00	-1.68	-1.81	-2.09	-2.69
-3.05	-2.32	-1.91	-1.66	-1.75	-1.96	-2.47

45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	Average
-4.63	-6.77	-7.58	-7.63	-7.70	-3.98
-3.96	-5.58	-6.31	-6.44	-6.74	-3.94
-3.63	-5.21	-6.15	-6.56	-6.99	-3.79

# Existing Antenna – Gain Tables [Phi]

## Average Gain(dB) Horizontal Polarization

Average Gain(dB) NCVM	-95 to -85	-85 to -75	-75 to -65	-65 to -55	-55 to -45	-45 to -35	-35 to -25
Freq=2400MHz	-24.06	-24.98	-21.58	-18.62	-17.54	-17.37	-17.65
Freq=2450MHz	-25.00	-24.11	-19.09	-16.36	-15.80	-16.63	-17.95
Freq=2480MHz	-25.00	-24.87	-21.12	-18.35	-17.89	-18.86	-20.12

-25 to -15	-15 to -5	-5 to 5	5 to 15	15 to 25	25 to 35	35 to 45
-18.24	-19.10	-19.85	-21.30	-22.32	-23.49	-24.82
-18.94	-19.16	-19.02	-19.46	-20.75	-22.29	-23.34
-20.75	-20.16	-19.24	-18.14	-18.36	-19.16	-20.11

45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	Average
-25.00	-25.00	-25.00	-25.00	-25.00	-20.87
-24.39	-25.00	-25.00	-25.00	-25.00	-19.99
-21.27	-22.35	-22.83	-24.05	-25.00	-20.35

Average Gain(dB) PC	-95 to -85	-85 to -75	-75 to -65	-65 to -55	-55 to -45	-45 to -35	-35 to -25
Freq=2400MHz	-25.00	-23.01	-18.40	-15.82	-15.03	-15.56	-16.70
Freq=2450MHz	-24.81	-21.34	-17.56	-15.67	-15.65	-17.00	-18.77
Freq=2480MHz	-24.38	-21.66	-18.52	-16.82	-16.79	-18.04	-19.75

-25 to -15	-15 to -5	-5 to 5	5 to 15	15 to 25	25 to 35	35 to 45
-18.02	-19.28	-19.99	-21.75	-24.30	-25.00	-25.00
-20.26	-21.22	-21.61	-22.72	-24.20	-25.00	-25.00
-21.18	-21.65	-21.26	-20.68	-21.52	-23.37	-24.93

45 to 55	55 to 65	65 to 75	75 to 85	85 to 95	Average
-25.00	-25.00	-25.00	-25.00	-25.00	-19.79
-25.00	-25.00	-25.00	-25.00	-25.00	-20.46
-25.00	-25.00	-24.48	-24.33	-25.00	-20.90