

Cocoaent

SPECIFICATIONS FOR APPROVAL

MODEL : KPOP DEMON HUNTERS OFFICIAL LIGHT STICK_SAJA BOYS

PATTERN ANTENNA

1.Product Information

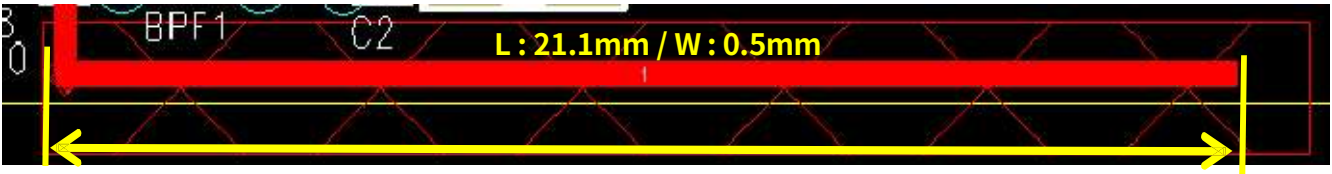
1.1 Feature

PART NUMBER	Pattern ANT
ANTENNA TYPE	PCB Pattern Antenna
APPLICATIONS	BLE

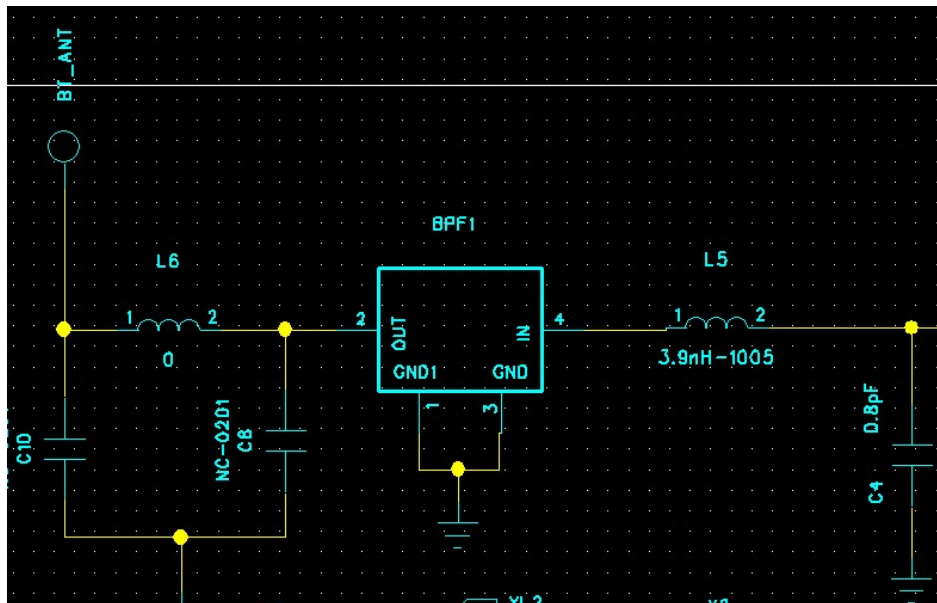
1.2 Electrical Specifications

Frequency Range (TX)		2400MHz~2485MHz	
Frequency Range (RX)		2400MHz~2485MHz	
IMPEDANCE		50Ω	
V.S.W. R	TX	2400MHz	2485MHz
		2 ↓	2 ↓
	RX	2400MHz	2485MHz
		2 ↓	2 ↓
RADIATION PATTERN		Omni-directional	
POLARIZATION		Linear	

1.3 Pattern Specifications



1.3 Matching Network



1.4 Electrical Characteristics

1.4.1 Test Overview

a. Measurement Summary

VSWR is measured by mounting a conductive antenna to check the performance of the pattern antenna.

Antenna Gain is the result calculated by measuring the EIRP of each of Theta-polarization, Phi-polarization, and Theta+Phi- polarization in the test chamber.

b. Laboratory information

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c. Equipment Information



◀ Network Analyzer (E5071C)

d. Equipment calibration information



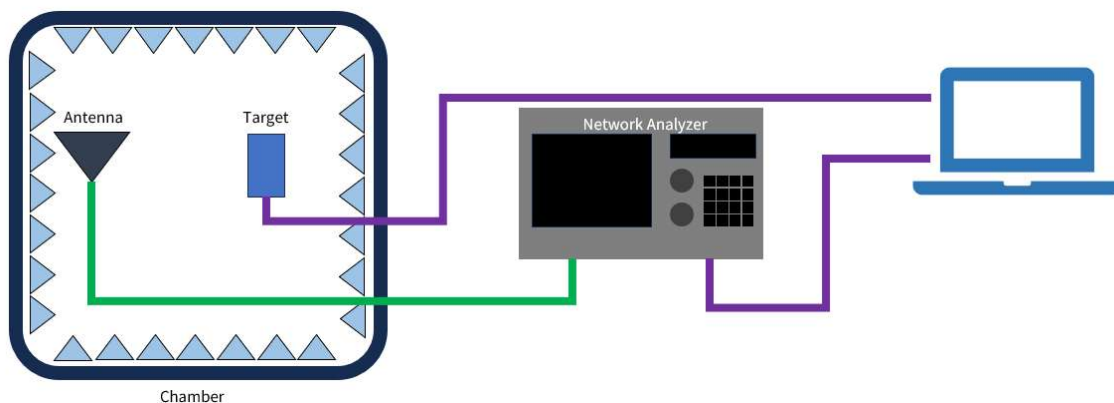
Description	Manufacturer	Serial No.	Model name	Calibrated Date
Network Analyzer	KEYSIGHT	MY46736386	E5071C	2025.10.15

e. Test Person Name/Signature

Test Person : LEE SUN BIN (Project Leader)

Test Date : 2025. 10.17

f. Test Setting Block Diagram



Chamber

- ▷ Size : 1.5x1.5x2.4m(H)
- ▷ Frequency : 700MHz ~ 6GHz
- ▷ MW Absorber : 12inch Pyramidal Absorber
- ▷ Measurement Distance : 1.3m
- ▷ Test Condition : Free Space Only

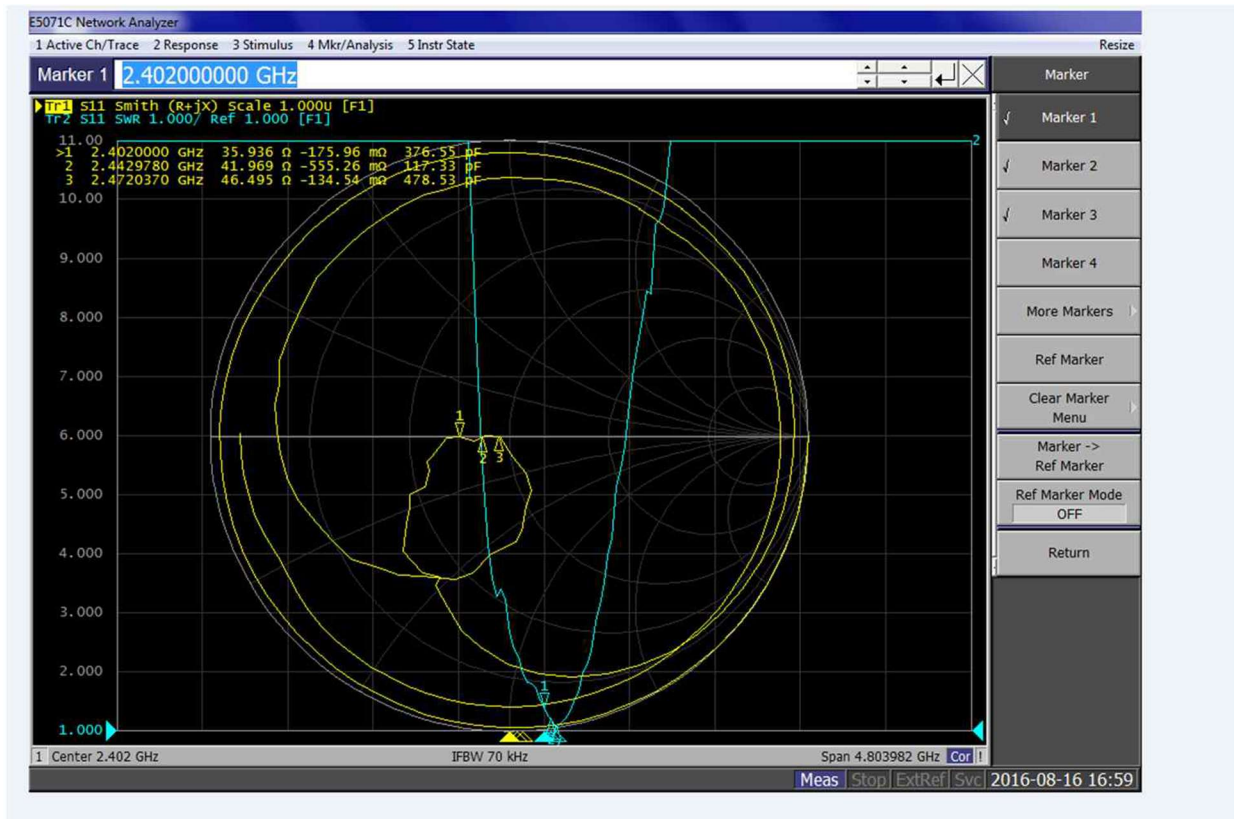
g. Test Procedure(VSWR Measurement)

1. Connect the DUT (Device Under Test, Conductor Antenna Mounted) to Port 1 and Port 2 with SMA cables.
2. Perform calibration in the following order: Open / Short / Load / Thru.
3. Set the Frequency Range, IF Bandwidth, Power Level, Sweep Point, etc.
4. Measure S-Parameters.
5. Check the graphs (VSWR, SMITH).

h. Test Procedure(Gain measurement)

1. Check Internal Chamber Noise and Secure the DUT
2. Connect the DUT Power/Communication (BLE)
3. Connect the E5071C to the Measurement Equipment (MAIN PCB)
4. Run the Control PC Software
5. Perform System Calibration using the Reference Antenna in the Chamber
6. Update the Gain Reference Value
7. Set the DUT Mode (Tx Mode)
8. Specify the Measurement Frequency, Polarization, Angle Step, and Number of Averages
9. Automatically rotate the DUT and measure the radiation pattern.
10. Automatically calculate results such as Gain, ERP/EIRP, and Efficiency.

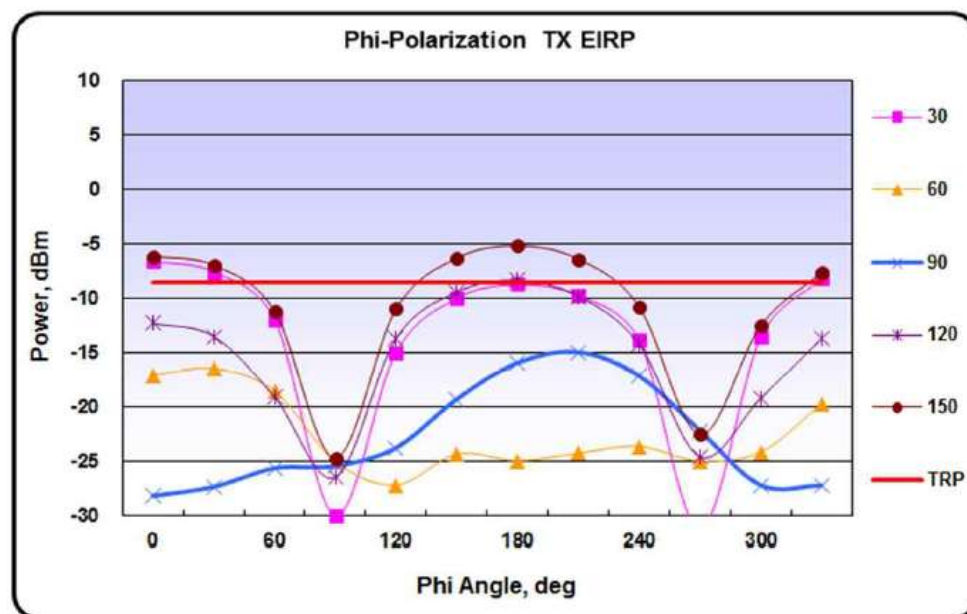
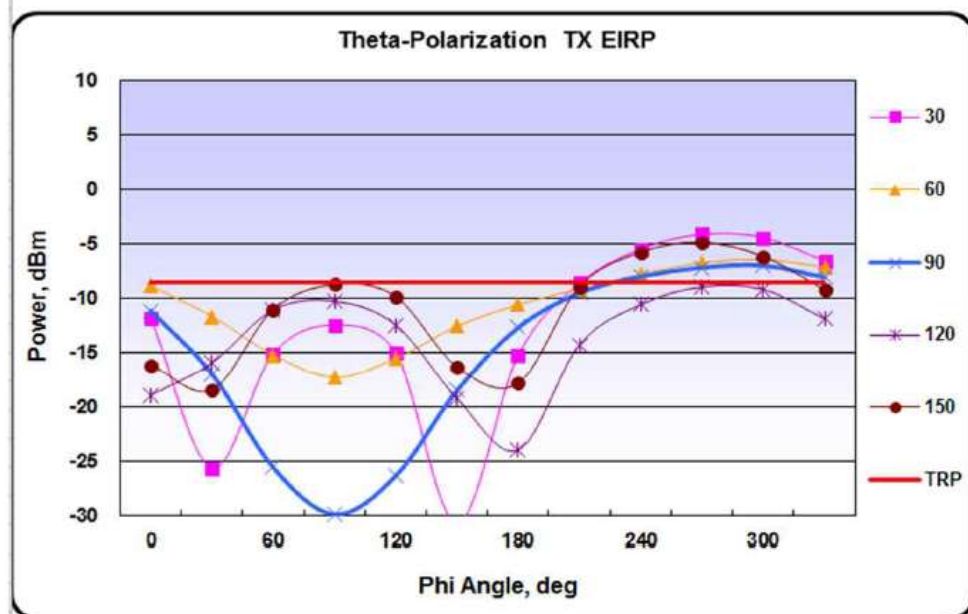
1.4.2 VSWR & SMITH



1.4.3 Gain Performance

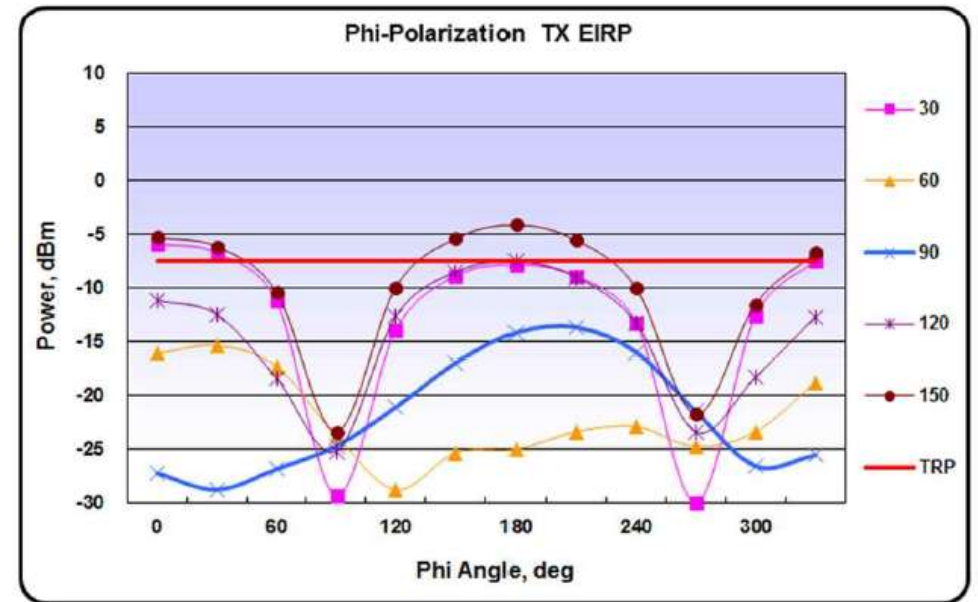
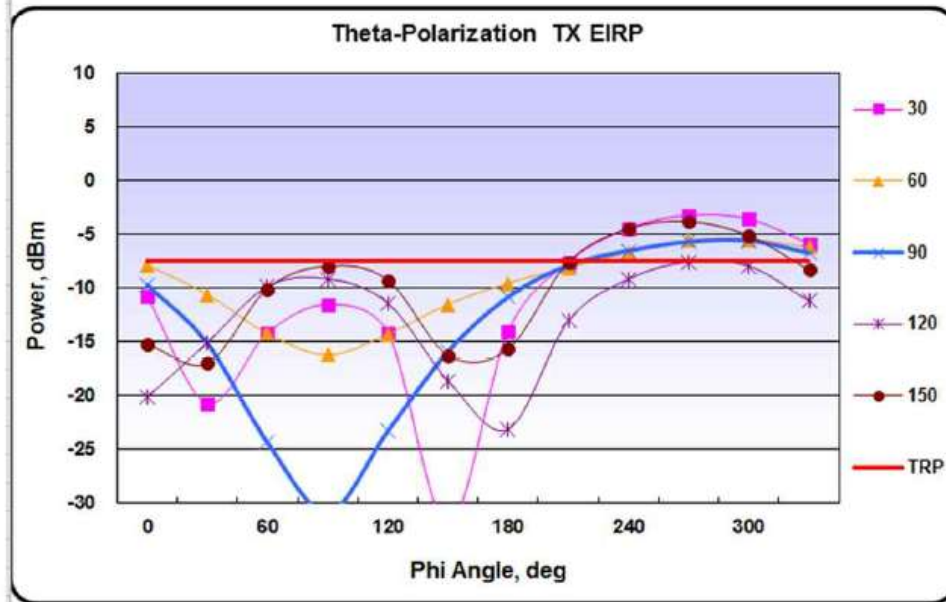
Model																
Test Date																
Event Status																
IMEI																
FCC ID Number																
Hardware Version																
Software Version																
Total Radiated Power(TRP, 30degrees)								Total Isotropic Sensitivity(TIS)								
Band	BLE	BLE	BLE						Band							
Channel	0	12	39							Channel						
TX Frequency(MHz)				Average					RX Frequency(MHz)							
TRP(dBm), 30degree	-8.47	-7.41	-4.24	-6.32					TIS(dBm)							
TRP Limit(dBm)									TIS Limit(dBm)							
Pass/Fail									Pass/Fail							
TRP _{eq} /TRP _{AVG} (dB)	-2.15	-1.09	2.08						TIS _{eq} /TIS _{AVG} (dB)							
Limit(dB)									Limit(dB)							
Pass/Fail									Pass/Fail							
Conducted Power(dBm)									Conducted Sensitivity(dBm)							
TRP _{mea} (dBm)	-10.20	-9.07	-5.69	-7.88					TIS _{mea} (dBm)							
TRP _{PM} (dBm)	-13.31	-12.40	-9.72	-11.53					TIS _{PM} (dBm)							
UHRP(dBm)	-11.59	-10.55	-7.49	-9.52					UHS(dBm)							
Peak EIRP(dBm)	-3.85	-3.01	-0.39	-2.15					Peak EIS(dBm)							
Directivity(dBi)	4.62	4.41	3.86	4.31					Directivity(dBi)							
Efficiency(dB)									Efficiency(dB)							
Efficiency(%)									Efficiency(%)							
Gain(dBi)	-3.00	-2.50	-2.00	-2.50					Gain(dBi)							
NHRP±30(π/6)(dBm)	-12.93	-11.68	-7.86	-10.26					NHPIS±30(π/6)(dBm)							
NHRP±45(π/4)(dBm)	-10.35	-9.21	-5.71	-7.95					NHPIS±45(π/4)(dBm)							
Minimum Power(dBm)	-24.05	-23.70	-16.55	-19.95					Minimum Sensitivity(dBm)							
Test Condition	FS	FS	FS						Test Condition							
Antenna Type										Antenna Type						

Theta-Polarization EIRP(dBm)													Phi-Polarization EIRP(dBm)												
θ_N (deg)	φ_M (deg)												θ_N (deg)	φ_M (deg)											
	0	30	60	90	120	150	180	210	240	270	300	330		0	30	60	90	120	150	180	210	240	270	300	330
0													0												
30	-11.76	-25.55	-15.02	-12.39	-14.94	-30.59	-15.18	-8.55	-5.41	-4.06	-4.35	-6.50	30	-6.52	-7.51	-11.86	-29.92	-14.90	-9.95	-8.68	-9.71	-13.79	-31.14	-13.52	-8.15
60	-8.80	-11.58	-15.15	-17.19	-15.48	-12.50	-10.52	-9.08	-7.73	-6.68	-6.36	-7.08	60	-17.03	-16.39	-18.48	-24.95	-27.12	-24.27	-24.90	-24.20	-23.56	-24.93	-24.10	-19.68
90	-11.08	-16.91	-25.51	-29.82	-26.28	-18.42	-12.63	-9.45	-7.93	-7.11	-6.92	-8.02	90	-28.12	-27.29	-25.58	-25.38	-23.70	-19.22	-15.87	-14.89	-17.08	-22.13	-27.14	-27.16
120	-18.84	-15.89	-10.99	-10.20	-12.38	-19.15	-23.91	-14.22	-10.51	-8.89	-9.11	-11.82	120	-12.23	-13.44	-19.02	-26.43	-13.63	-9.37	-8.28	-9.75	-14.16	-24.54	-19.14	-13.67
150	-16.06	-18.35	-10.96	-8.67	-9.77	-16.26	-17.75	-8.87	-5.70	-4.80	-6.08	-9.16	150	-6.06	-6.91	-11.11	-24.64	-10.91	-6.25	-5.10	-6.34	-10.70	-22.48	-12.44	-7.56
180													180												



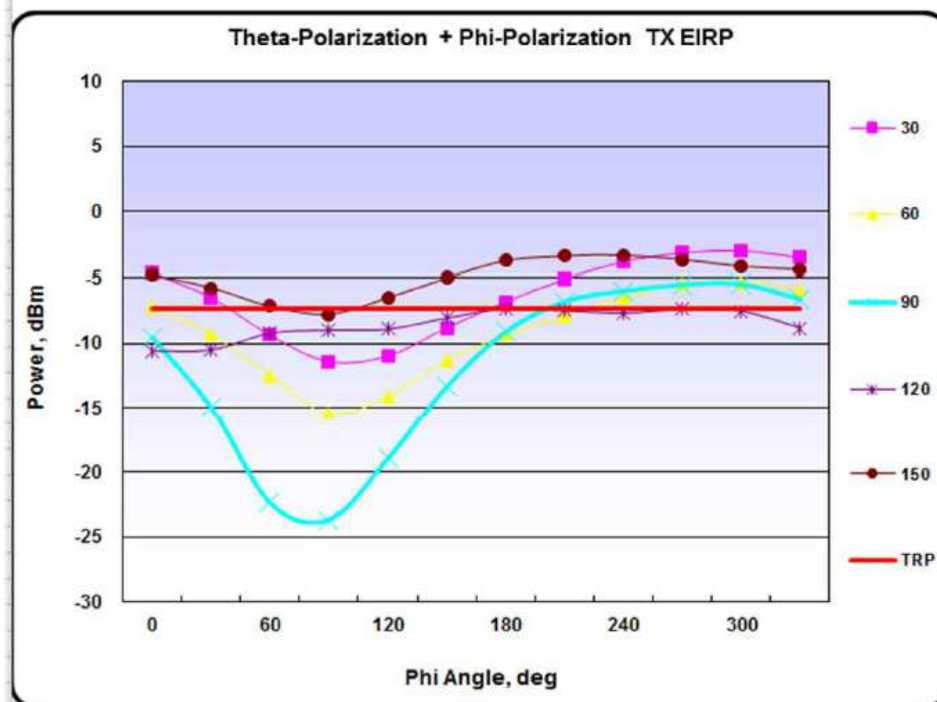
Total Radiated Power(TRP)	-8.469dBm	Theta -10.20 dBm	Phi -13.31 dBm	UHRP -11.59 dBm	NHRP±30 -12.93 dBm	NHRP±45 -10.35 dBm
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Theta-Polarization EIRP(dBm)													Phi-Polarization EIRP(dBm)												
θ_N (deg)	φ_M (deg)												θ_N (deg)	φ_M (deg)											
	0	30	60	90	120	150	180	210	240	270	300	330		0	30	60	90	120	150	180	210	240	270	300	330
0													0												
30	-10.78	-20.66	-14.15	-11.49	-14.12	-31.83	-13.96	-7.54	-4.38	-3.18	-3.52	-5.83	30	-5.86	-6.69	-11.16	-29.28	-13.86	-8.84	-7.77	-8.87	-13.18	-29.93	-12.53	-7.39
60	-7.83	-10.56	-14.21	-16.18	-14.24	-11.47	-9.50	-8.04	-6.66	-5.49	-5.40	-6.17	60	-16.04	-15.29	-17.26	-23.71	-28.73	-25.29	-24.96	-23.31	-22.84	-24.71	-23.32	-18.73
90	-9.64	-15.13	-24.33	-30.78	-23.25	-15.85	-10.79	-7.84	-6.47	-5.65	-5.53	-6.69	90	-27.20	-28.72	-26.80	-24.65	-21.04	-16.92	-14.10	-13.62	-15.93	-21.43	-26.52	-25.51
120	-20.09	-15.03	-9.81	-9.10	-11.37	-18.56	-23.08	-13.01	-9.13	-7.51	-7.92	-11.16	120	-11.09	-12.41	-18.33	-25.14	-12.58	-8.48	-7.48	-8.95	-13.21	-23.34	-18.26	-12.64
150	-15.19	-16.95	-10.01	-7.90	-9.23	-16.22	-15.62	-7.54	-4.42	-3.75	-5.09	-8.28	150	-5.24	-6.11	-10.34	-23.32	-9.87	-5.38	-4.06	-5.52	-9.94	-21.71	-11.46	-6.70
180													180												

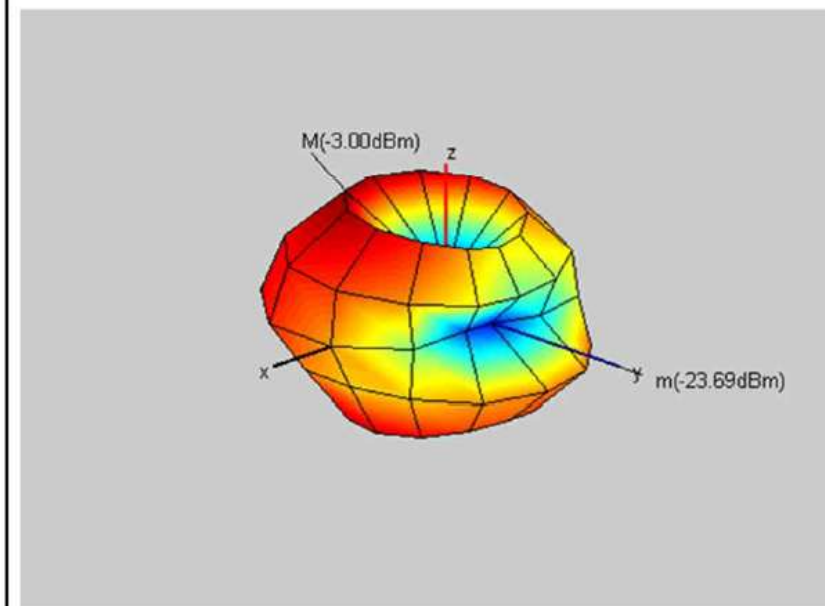


Total Radiated Power(TRP)	-7.413dBm	Theta -9.07 dBm	Phi -12.40 dBm	UHRP -10.55 dBm	NHRP±30 -11.68 dBm	NHRP±45 -9.21 dBm
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Theta-Polarization + Phi-Polarization(dBm)												
θ_N (deg)	ϕ_M (deg)											
0	0	30	60	90	120	150	180	210	240	270	300	330
30	-4.65	-6.52	-9.39	-11.42	-10.98	-8.82	-6.83	-5.14	-3.84	-3.17	-3.01	-3.53
60	-7.22	-9.30	-12.46	-15.47	-14.09	-11.29	-9.38	-7.91	-6.56	-5.44	-5.33	-5.94
90	-9.56	-14.94	-22.38	-23.70	-19.00	-13.34	-9.13	-6.82	-6.00	-5.54	-5.50	-6.63
120	-10.58	-10.52	-9.24	-8.99	-8.92	-8.07	-7.36	-7.51	-7.70	-7.40	-7.54	-8.83
150	-4.82	-5.77	-7.16	-7.78	-6.53	-5.04	-3.77	-3.40	-3.35	-3.68	-4.19	-4.41
180												



3D Plots



Peak EIRP	-3.01dBm	Theta	30 degrees	Phi	300 degrees
Minimum EIRP	-23.70dBm	Theta	90 degrees	Phi	90 degrees

Total Radiated Power(TRP)	-7.413dBm	Theta	-9.07 dBm	Phi	-12.40 dBm	UHRP	-10.55 dBm	NHRP±30	-11.68 dBm	NHRP±45	-9.21 dBm
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