TAOGLAS

Datasheet

Multiband GNSS, Stacked Terrablast Patch Antenna

Part No:
HP5010A

Description:

50x50x10.5mm Terrablast GPS L1/L2/L5 Patch Antenna, 1176.45-1227.6MHz, 1561-1610MHz

Features:

- GPS L1, GPS L2 and GPS L5 band, GLONASS, Galileo and BeiDou Operation
- Right-Hand Circularly Polarized Patch
- Single Feed Patch Assembly
- Ultra-Impact Resistant Terrablast Material
- Dimensions: 50*50*10.5mm
- Tuned for Centre Positioning on a 70*70mm Ground-plane
- Patent Pending Design
- RoHS & REACH Compliant

1. Introduction

The Taoglas HP5010A is a triple stacked 50*50*10.5mm Terrablast GPS L1, GPS L2 and GPS L5, GLONASS, BeiDou embedded passive patch antenna with 10.5mm thickness. This patch is made from Terrablast, a revolutionary new material developed to meet the unique needs of the UAV and automotive industries. It uses a patent pending antenna technology which results in much lighter weight and built to withstand greater impacts.

Typical applications include:

:: Transportation :: Defence :: E-Mobility

:: Agriculture :: UAV navigation

The antenna has been tuned and tested on a 70*70mm ground plane, working at GPS L1: 1575.42MHz, L2: 1227.6MHz and L5: 1176.45MHz. This Terrablast patch also operates at other worldwide Navigation systems such as GLONASS, Galileo and BeiDou.

The HP5010A is mounted via a pin and double-sided adhesive. This antenna works well without modifications in most environment but can be tuned and further optimized to different ground planes and enclosures if this is required. Custom antenna modifications are subject to possible NRE and minimum order quantity.

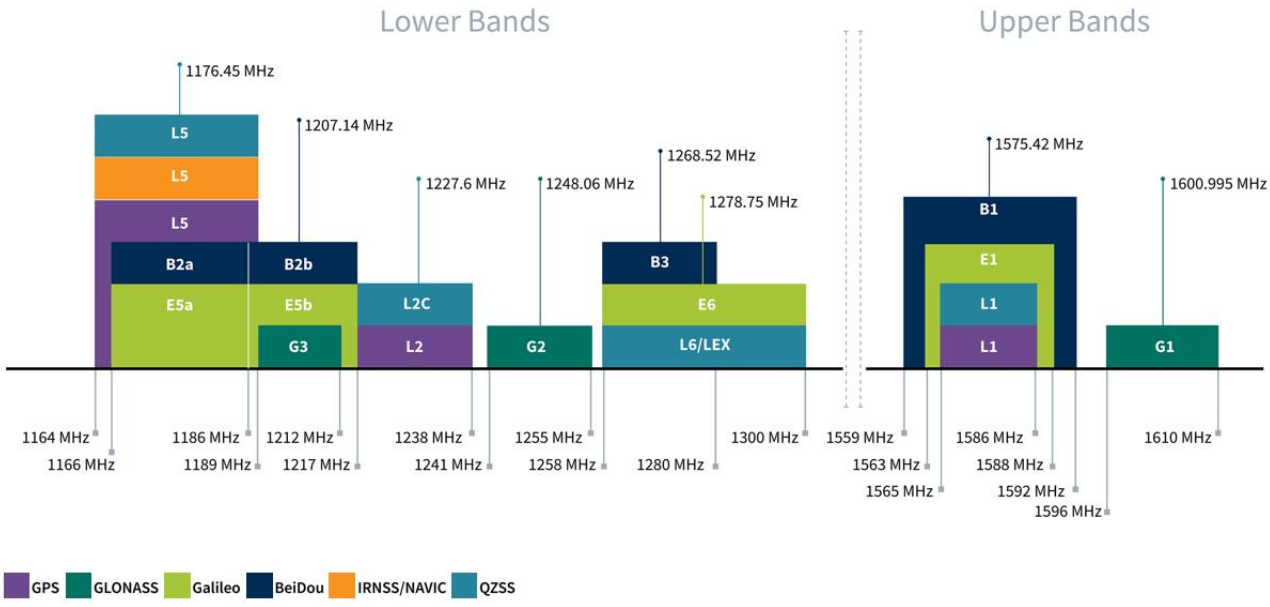
Terrablast antennas are not suitable for SMD reflow. The correct method is manual soldering at a soldering temperature of 380°C +/- 20°C for a duration of 3 to 5 seconds. All Terrablast antennas undergo rigorous temperature, vibration and impact tests and exceed the highest ISO16750 standards.

For further information, or support to test and integrate Taoglas Terrablast technology please contact your regional Taoglas customer support team.

2. Specifications

GNSS Frequency Bands Covered						
GPS	L1	L2	L5			
	■	■	■			
GLONASS	G1	G2	G3			
	■	■	■			
Galileo	E1	E5a	E5b	E6		
	■	■	■	□		
BeiDou	B1	B2a	B2b	B3		
	■	■	■	■		
QZSS (Regional)	L1	L2C	L5	L6		
	■	■	■	□		
IRNSS (Regional)	L5					
	■					
SBAS	L1/E1/B1	L5/B2a/E5a	G1	G2	G3	
	■	■	■	■	■	

*SBAS systems: WASS(L1/L5), EGNOSS(E1/E5a), SDCM(G1/G2/G3), SNAS(B1,B2a), GAGAN(L1/L5), QZSS(L1/L5), KAZZ(L1/L5).



GNSS Bands and Constellations

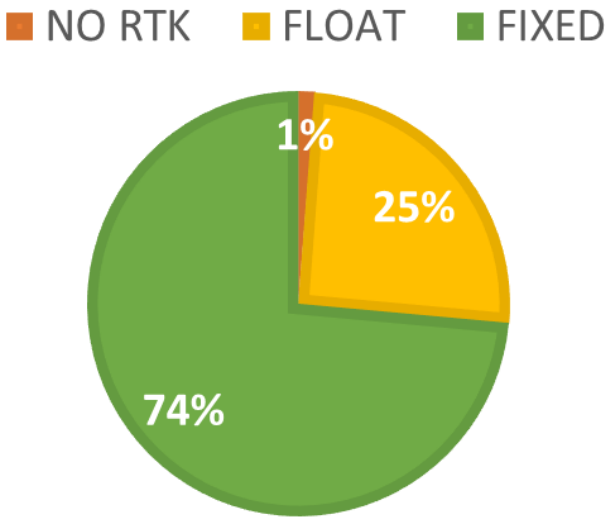
GNSS Electrical					
Frequency (MHz)	**1176.45**	**1227.6**	**1561**	**1575.42**	**1602**
VSWR (max.)	2.0:1	2.0:1	2.0:1	2.0:1	2.0:1
Passive Antenna Efficiency (%)	58.4	78.5	62.6	64.7	68.2
Passive Antenna Gain at Zenith (dBi)	3.0	3.7	3.6	3.7	4.0
Average Gain (dB)	10.8	17.1	10.4	4.98	7.3
Polarization	RHCP				
Impedance	50Ω				

Mechanical	
Height	10.5 ±2 mm
Planner Dimension	50*50*10 mm
Weight	59.5 g

Environmental	
Temperature Range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

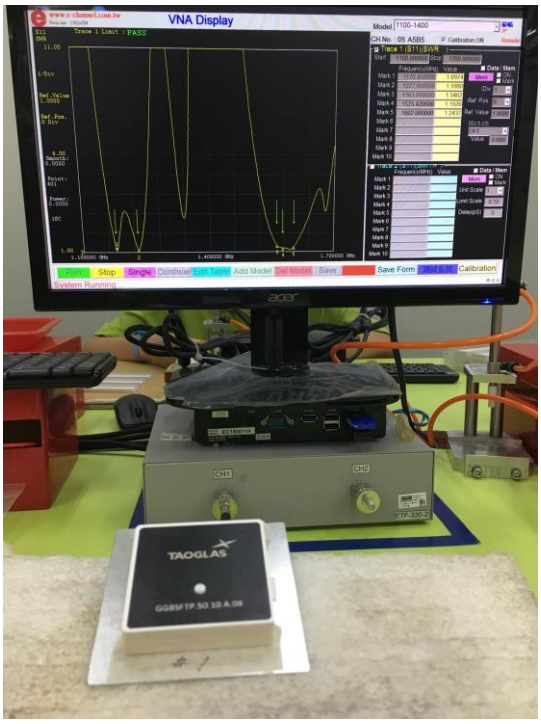
Field Test Result								
Frequency	**GPS L1**	**GPS L2**	**Galileo E1**	**Galileo E5b**	**GLONASS G1**	**GLONASS G2**	**BeiDou B1I**	**BeiDou B2I**
	1563-1587	**1215-1239.6**	**1559-1591**	**1189-1214**	**1598-1605**	**1242-1249**	**1559-1563**	**1200-1214**
Tracking Number without RTK (dB-Hz)	39	32.3	37.4	37.5	36.8	33.5	38.4	33.5
2*DRMS Positioning Accuracy (cm) without RTK	95	95	95	95	95	95	95	95
TTFF(s) without RTK	23	23	23	23	23	23	23	23
Tracking Number with **RTK** (dB-Hz)	39	32.3	37.4	37.5	36.8	33.5	38.4	33.5
2*DRMS Positioning Accuracy (cm) with **RTK**	20	20	20	20	20	20	20	20
TTFF(s) with **RTK**	23	23	23	23	23	23	23	23
Group Delay @ Zenith Variation Across Single Constellation(ns)	2	6	2	6	2	6	2	6
Phase Centre Offset PCO (cm)	0.03	0.57	0.03	0.57	0.03	0.57	0.03	0.57
Phase Centre Variation PCV (mm) including Active Circuitry	8	10	8	10	8	10	8	10
Axial Ratio Phase Centre Variation	6	15	6	15	6	15	6	15

*All outdoor measurements performed on the roof top of the Taoglas R&D Labs facility in Dublin Ireland.
** Recommended Minimum C/No for Standard Precision Acquisition/ Tracking (dB-Hz): 26-30/ 12-15.
***Data Measured Free Space.
****Group Delay, PCO, PCV and Axial Ratio values includes Active Circuitry.
*****Ublox C099-F9P application board is used for Field test Measurements.

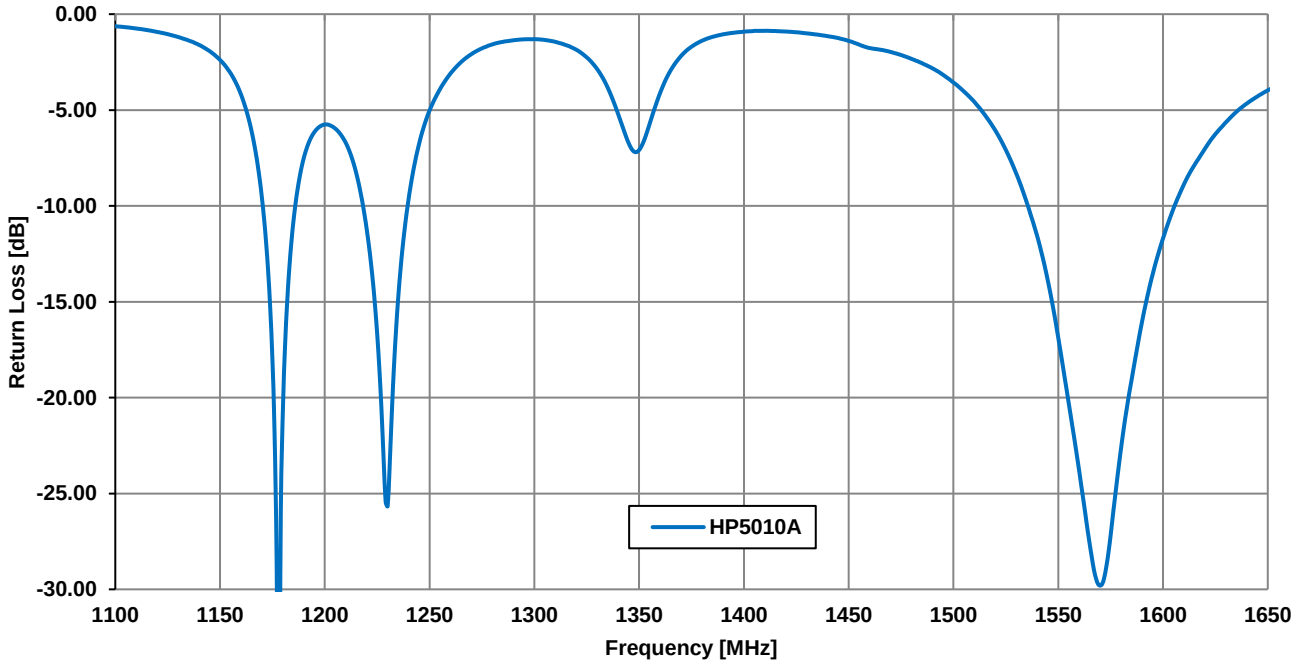


3. Antenna Characteristics

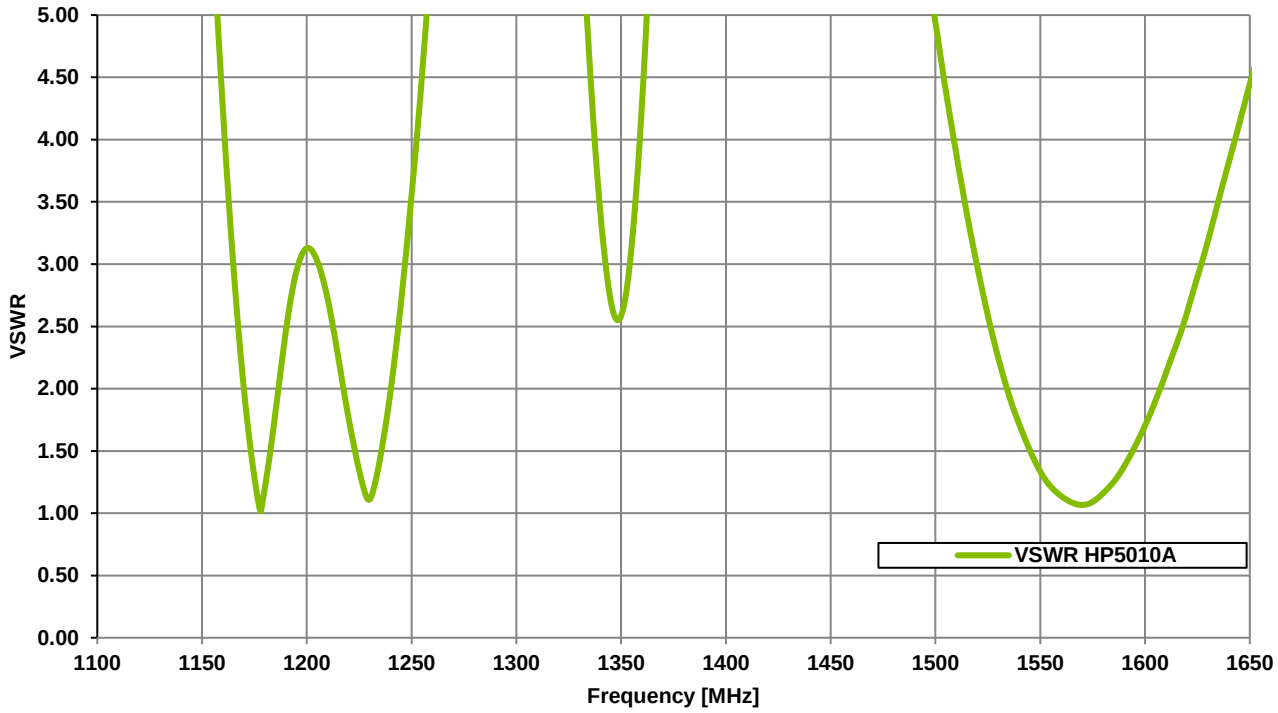
3.1 Measurement environment



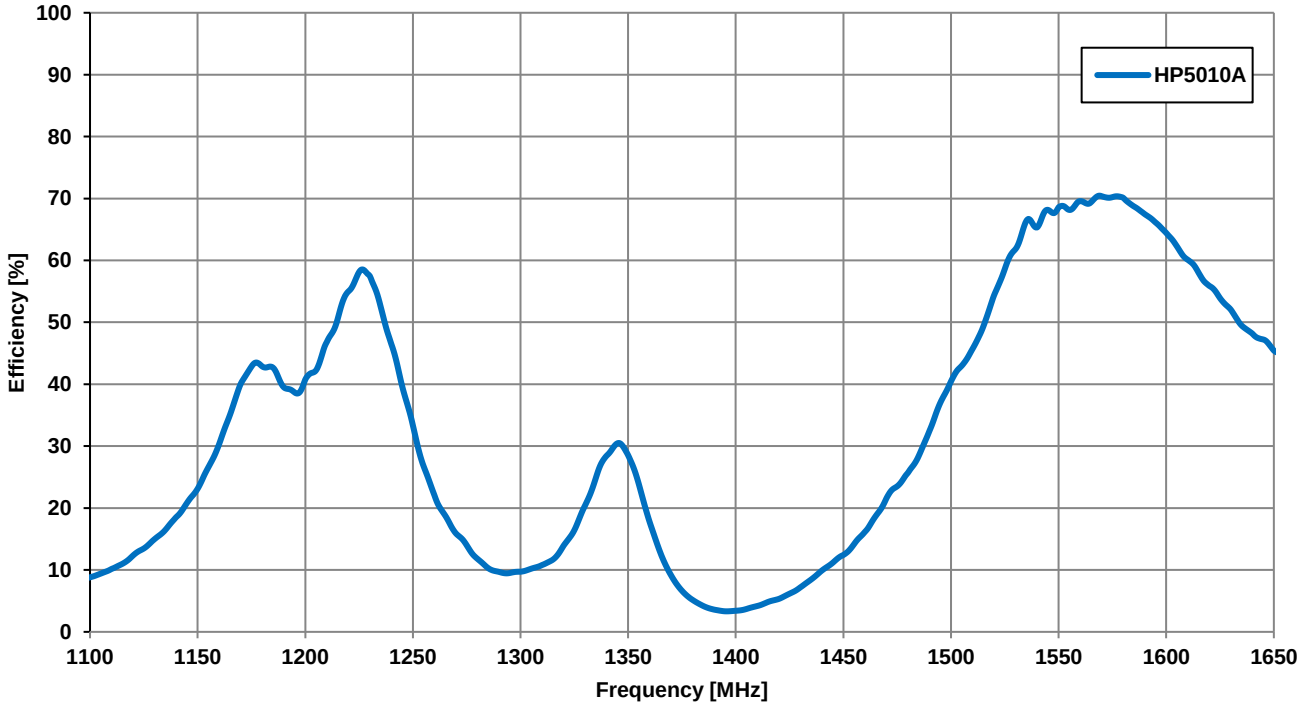
3.2 Return Loss



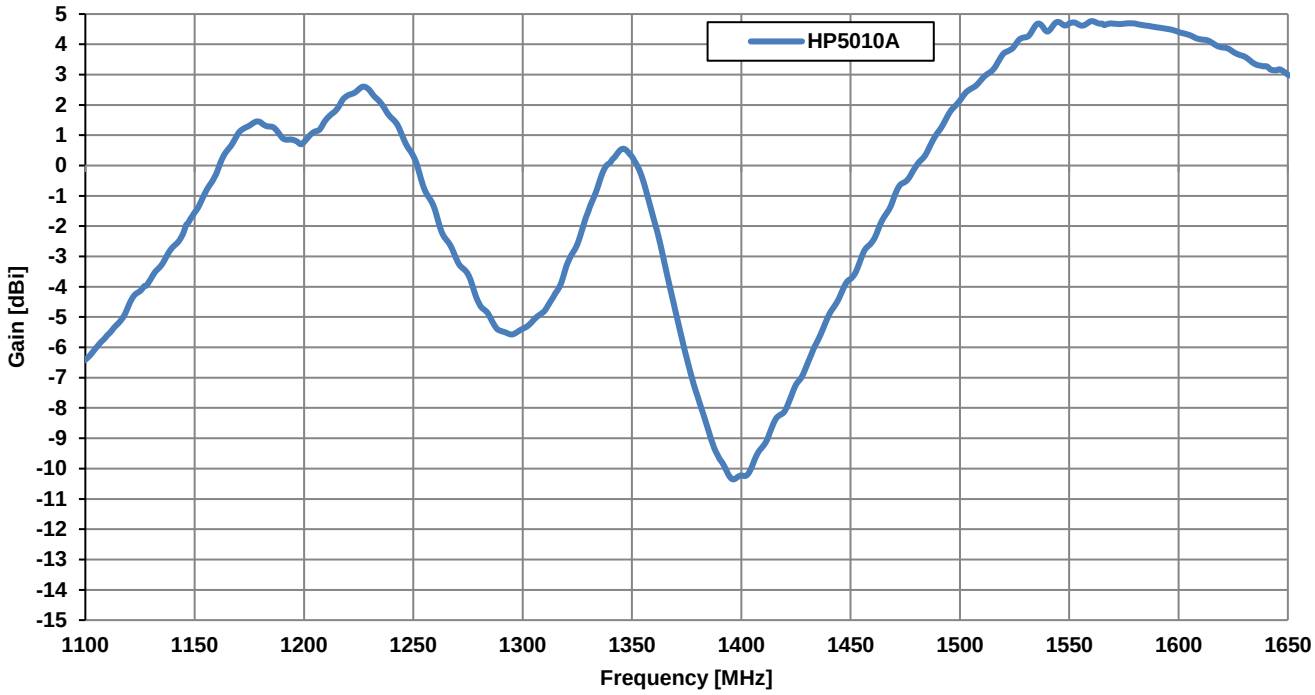
3.3 VSWR



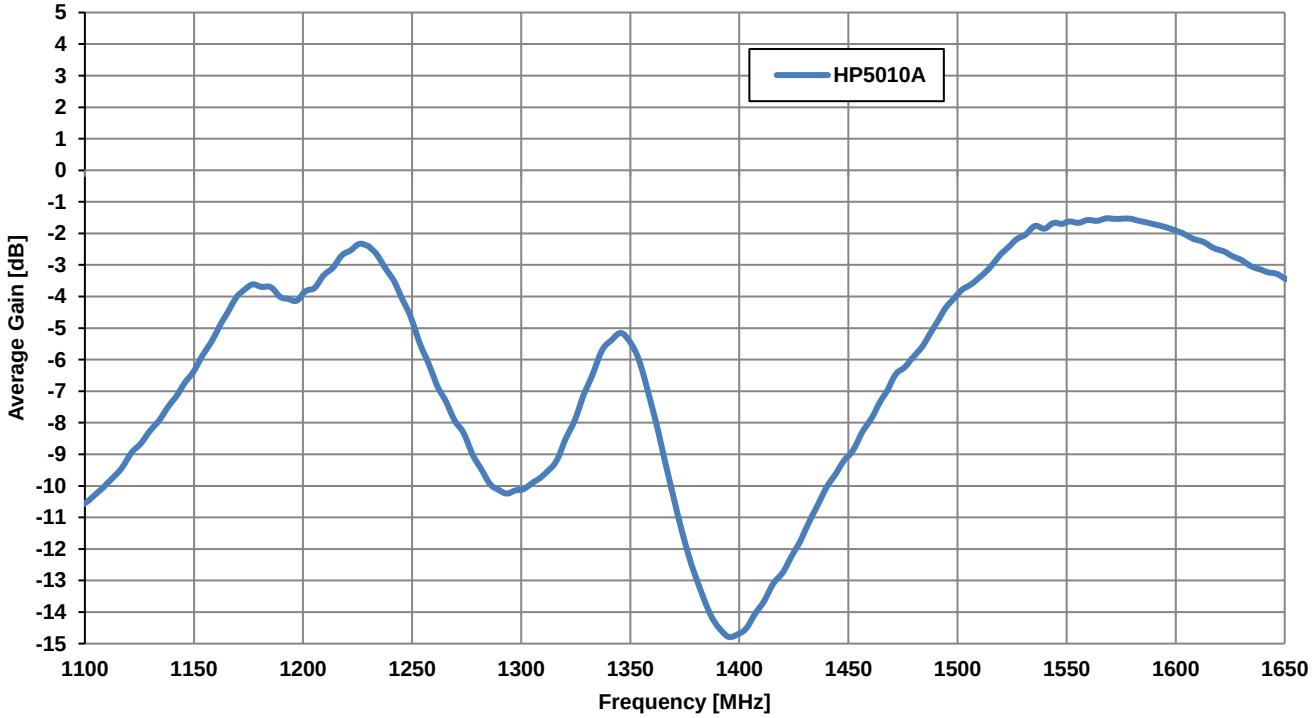
3.4 Efficiency



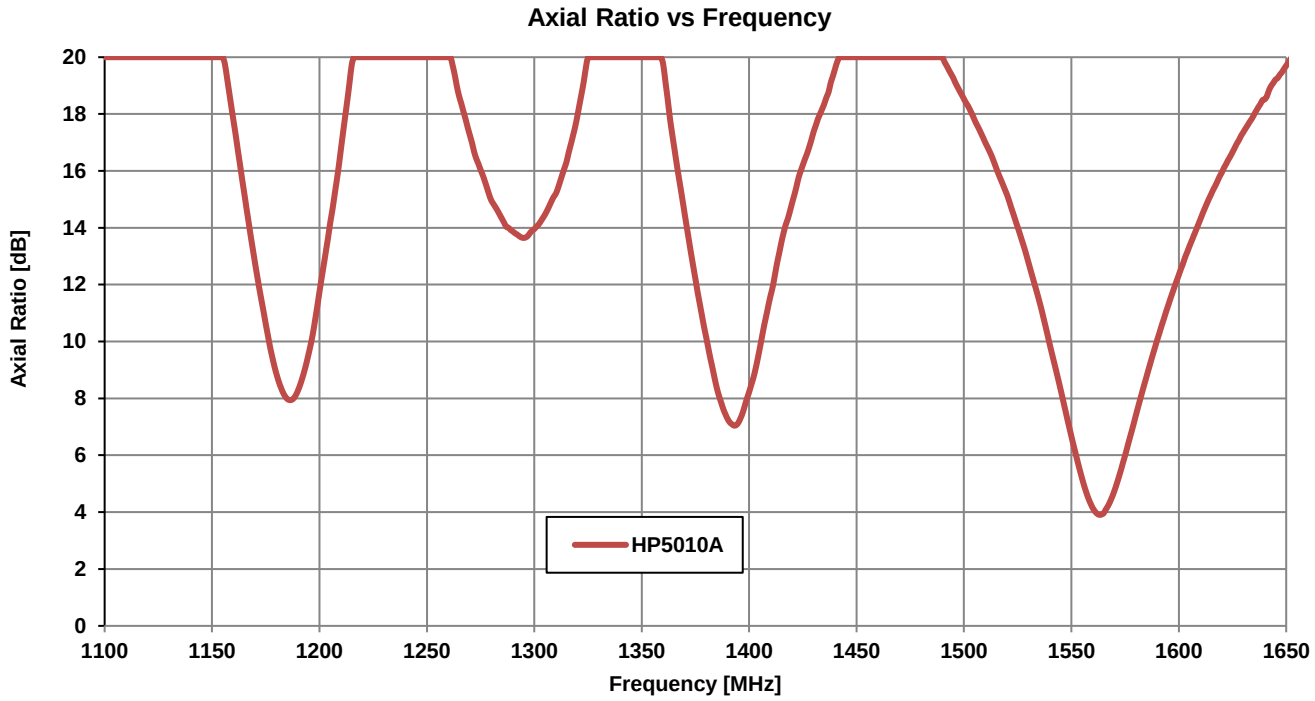
3.5 Peak Gain



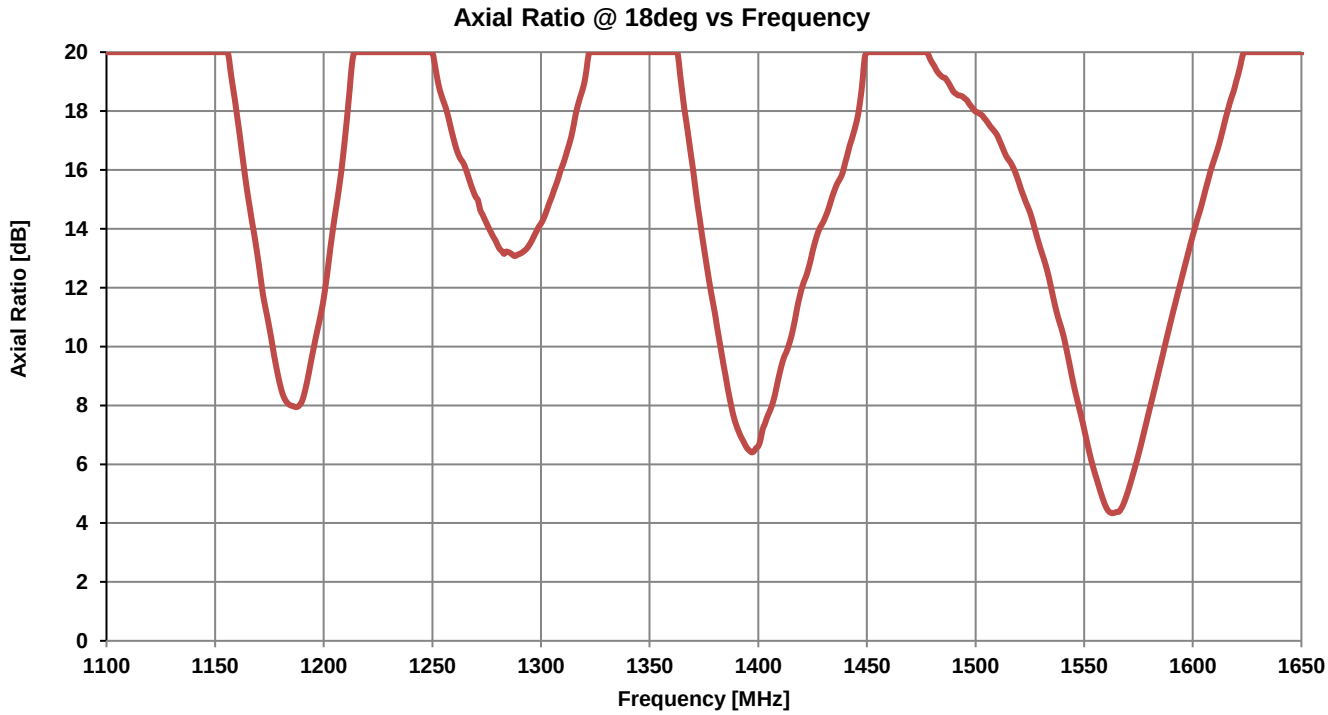
3.6 Average Gain



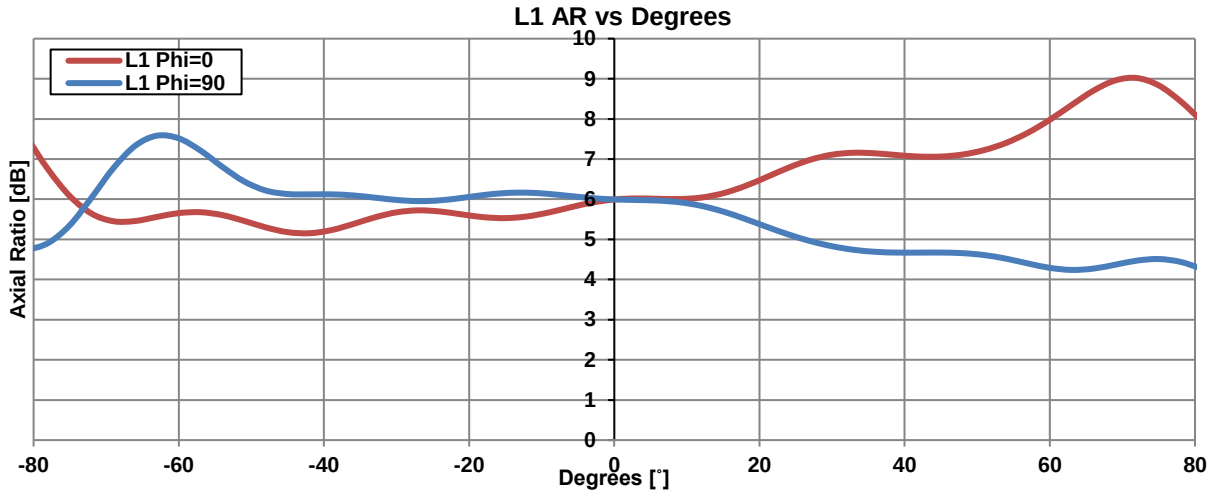
3.7 Axial Ratio @zenith vs Frequency

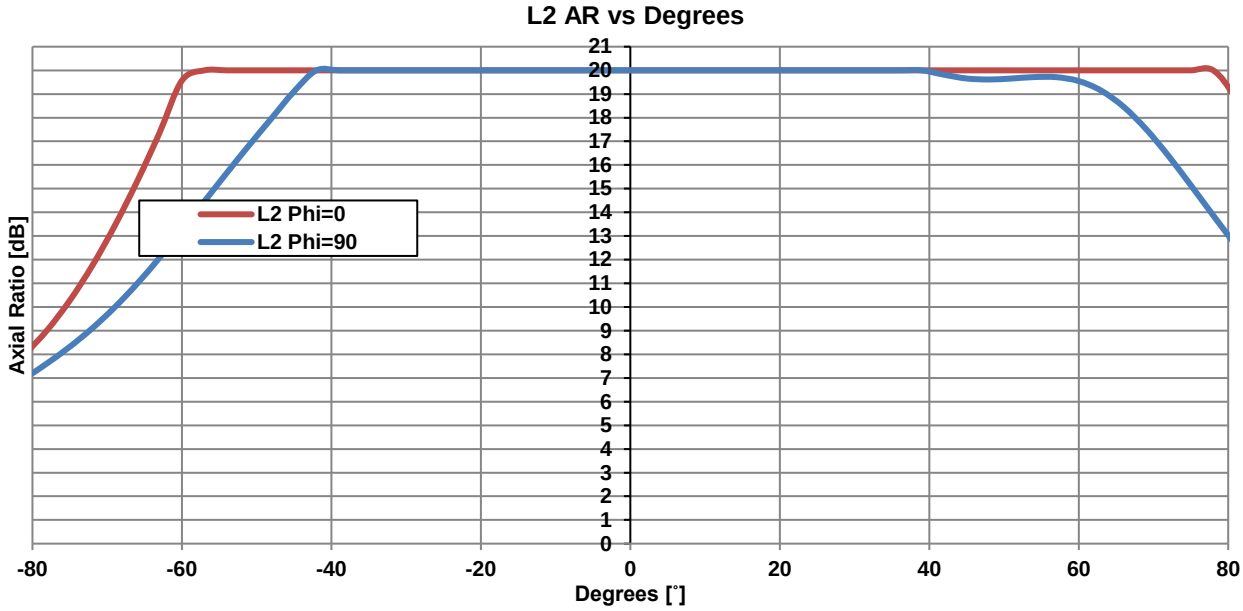


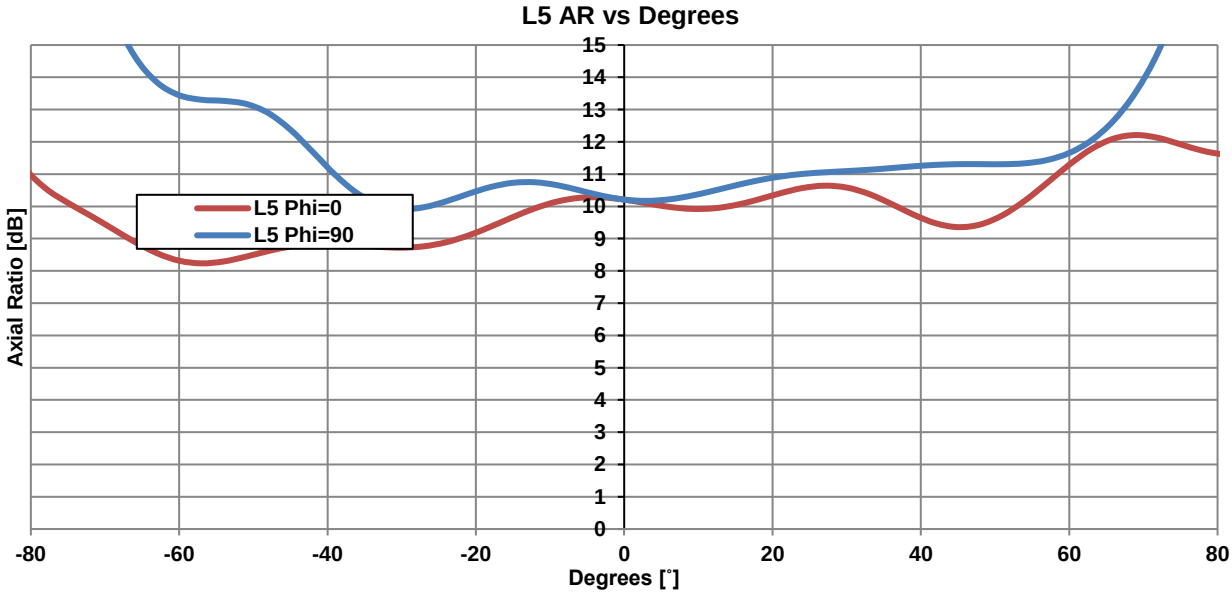
3.8 Axial Ratio @18deg vs Frequency



3.9 Axial Ratio vs Degrees

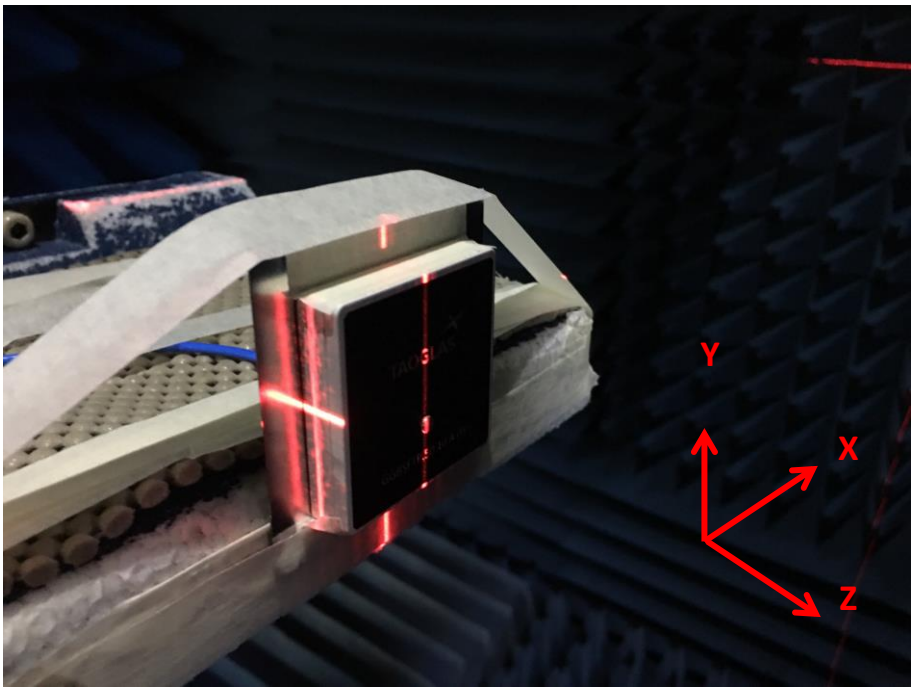






4. Radiation Patterns

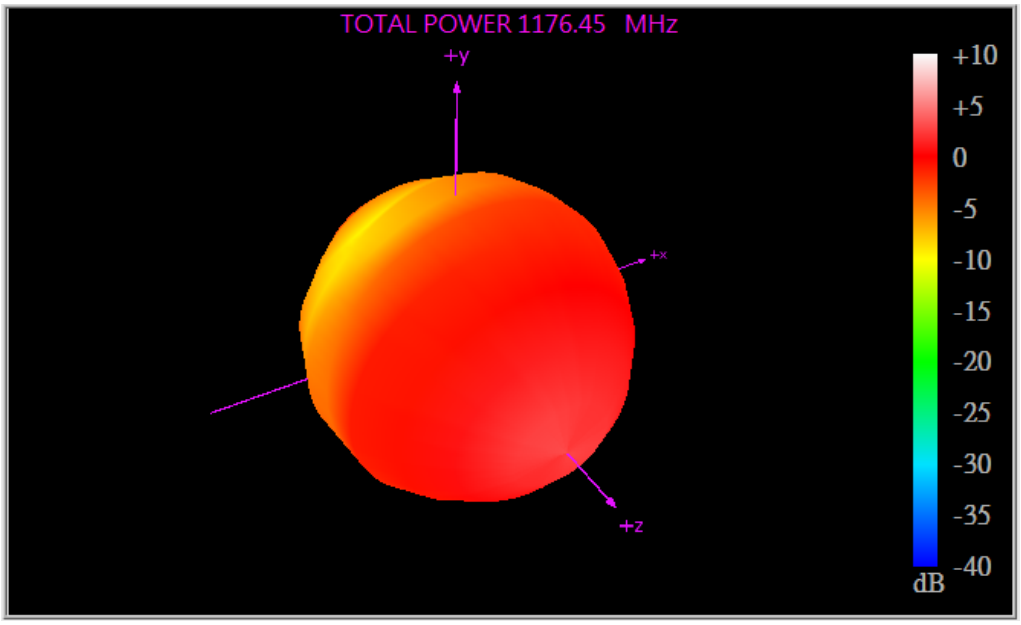
4.1 Test Setup



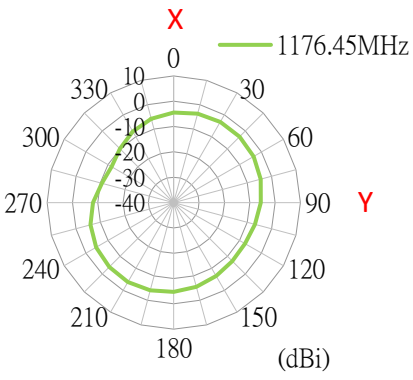
70*70mm Ground Plane

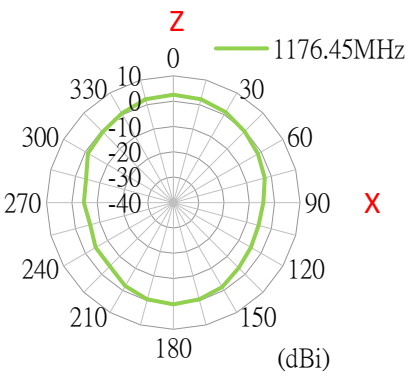
4.2 Radiation Patterns

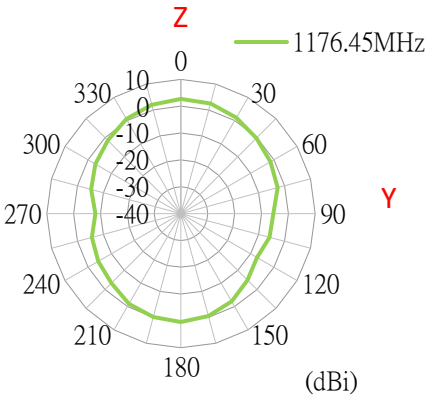
1176.45MHz



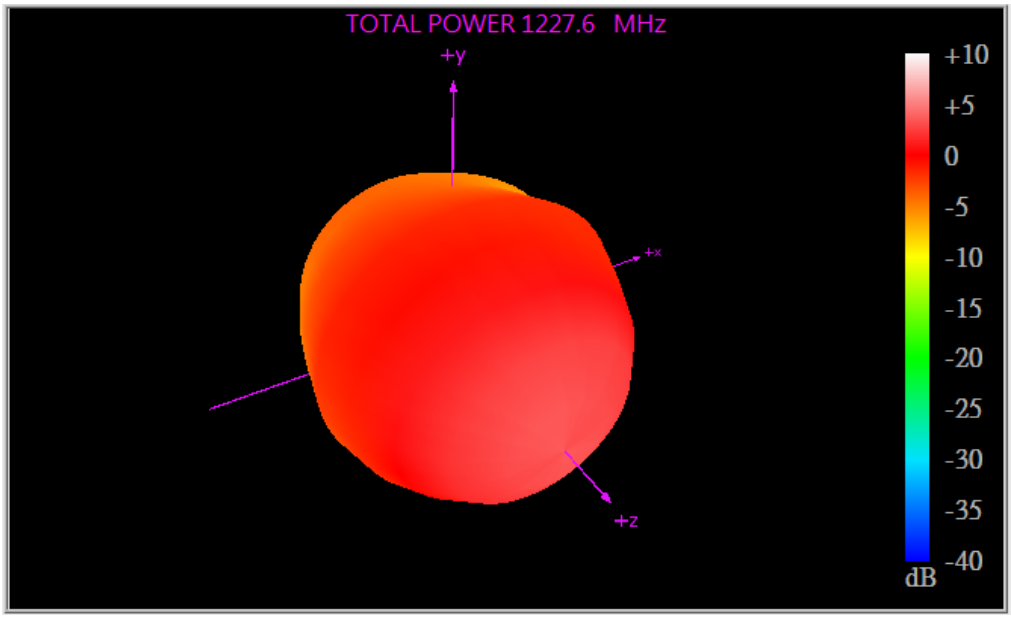
XY Plane	XZ Plane	YZ Plane



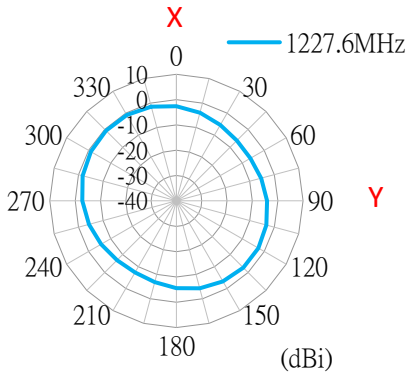


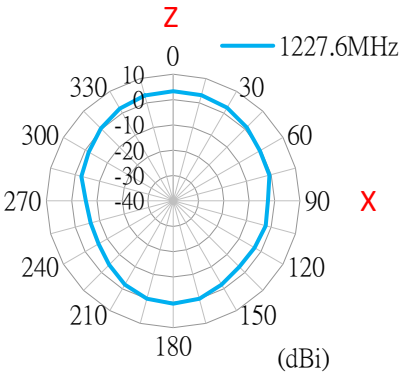


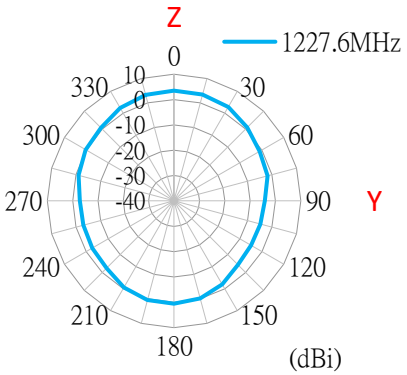
1227.6MHz



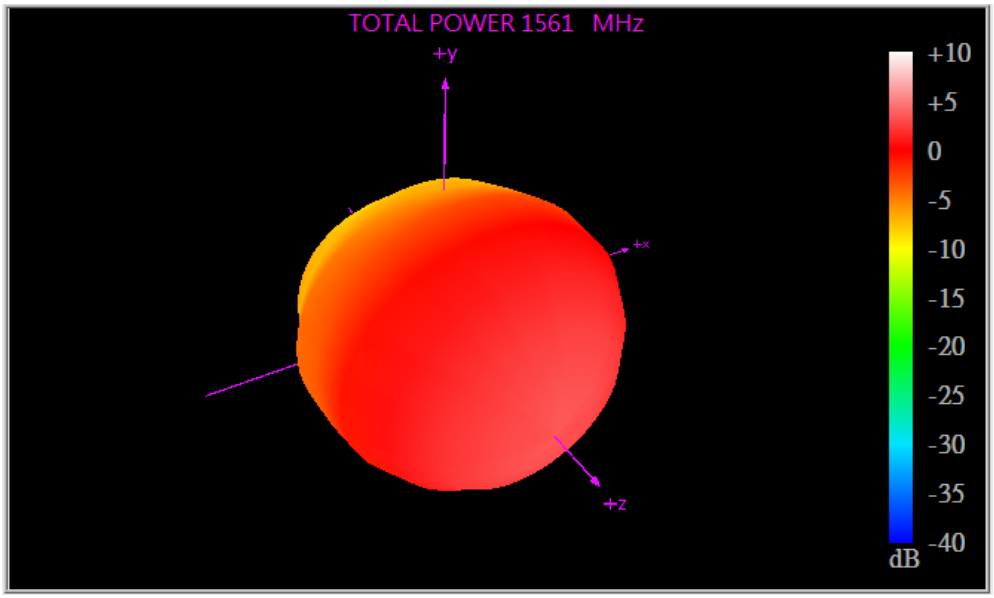
XY Plane	XZ Plane	YZ Plane



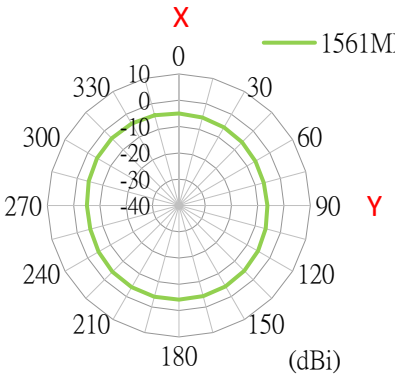


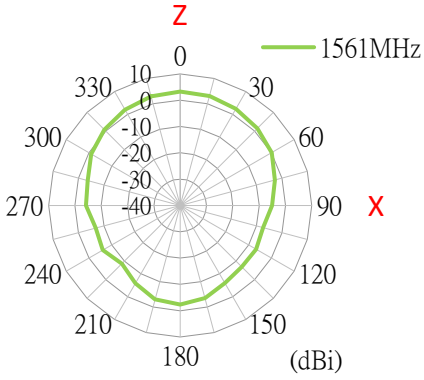


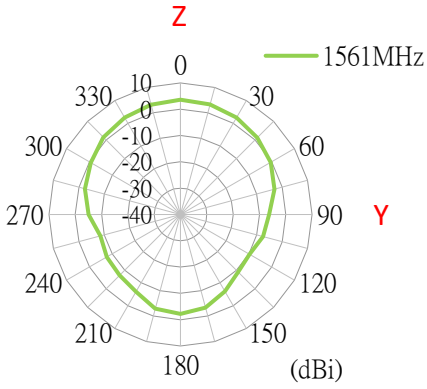
1561MHz



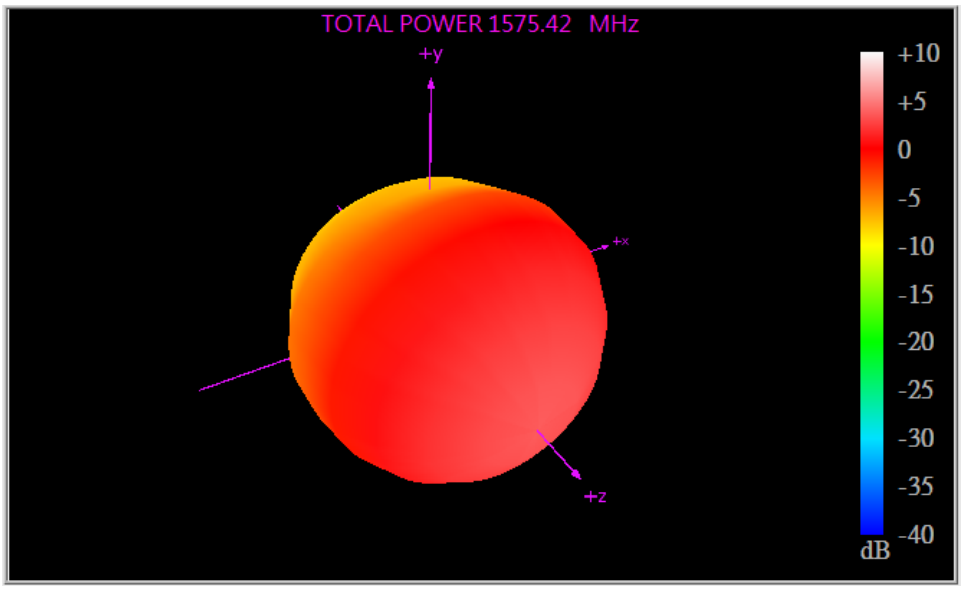
XY Plane	XZ Plane	YZ Plane



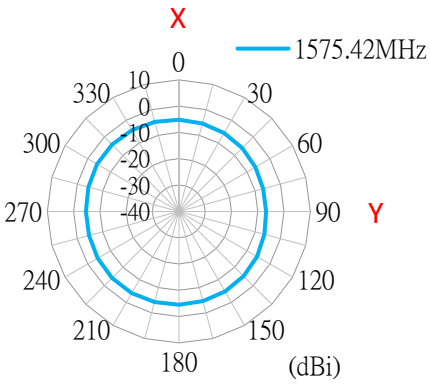


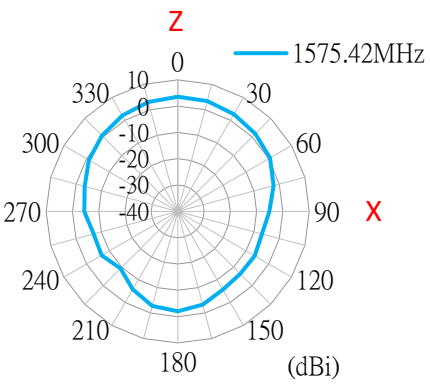


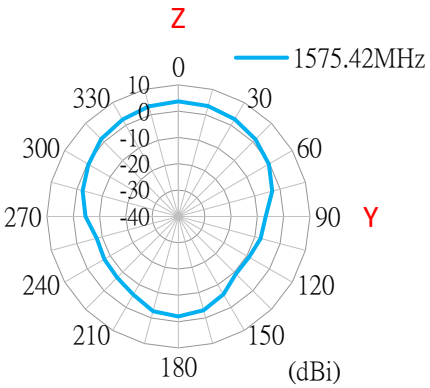
1575.42MHz



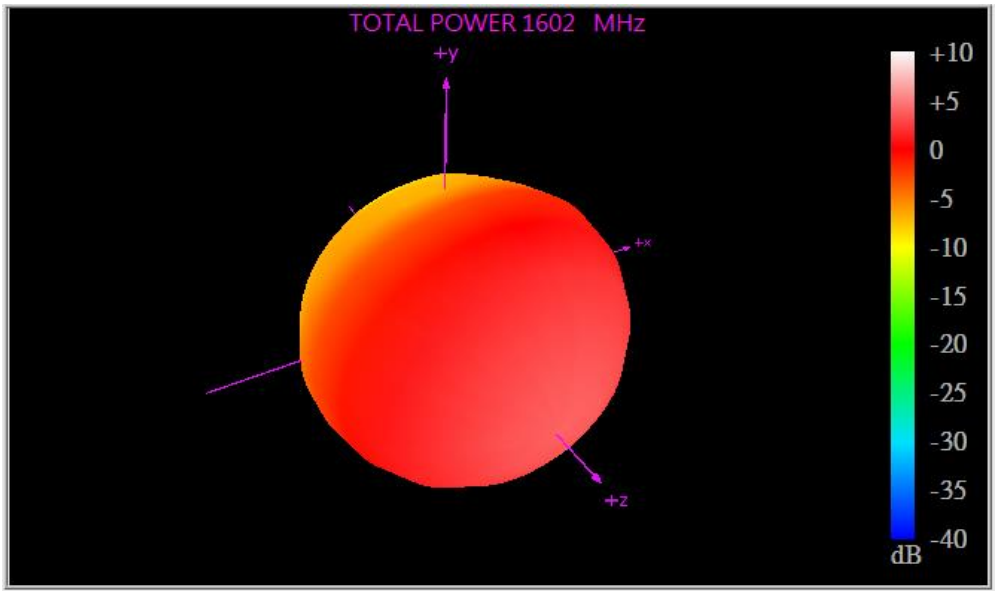
XY Plane	XZ Plane	YZ Plane



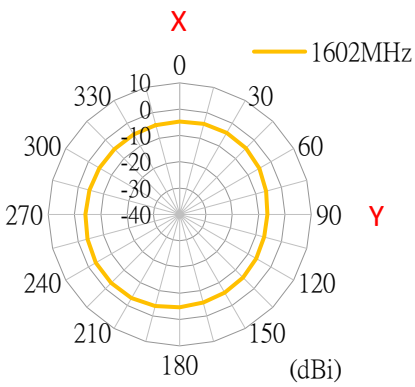


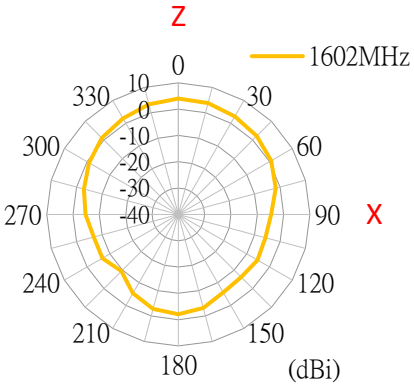


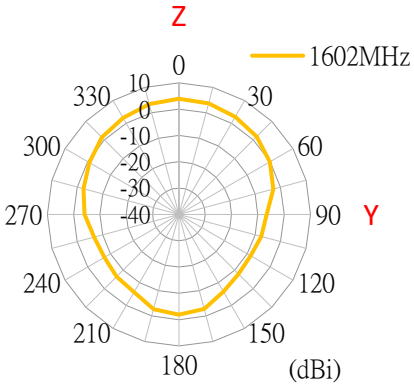
1602MHz



XY Plane	XZ Plane	YZ Plane





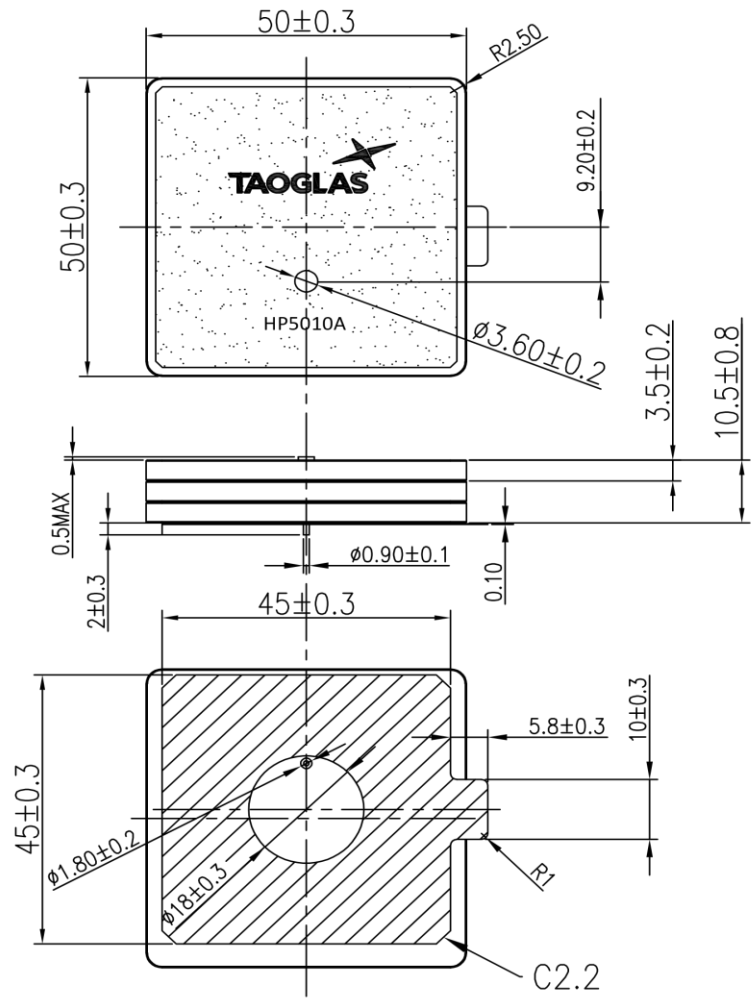


5. Mechanical Drawing (Units: mm)

REV	ZONE	DESCRIPTION	ENG	APPROVED	ISSUED DATE
D01	ALL	Initial Design	Abby	Buluto	2019/06/17

ISO NO: EDW-19-8-xxxx

<Release>



NOTES:
1. Soldered area.
2. Black ink printing area
3. All material must be RoHS compliant.
4. The connector orientation has a fixed position to the antenna as per drawing.
5. "*" Critical Dimensions.

	Name	P/N	Material	Finish	QTY
1	Top Patch(50x50x3.5mm)	013D2CAS00J01B	Terrablast	Clear	1
2	Middle Patch(50x50x3.5mm)	013D2CAS00J02B	Terrablast	Clear	1
3	Bottom Patch(50x50x3.5mm)	013D2CAS00J03B	Terrablast	Clear	1
4	Double sided Adhesive(45x45mm)	001016L090002A	NITTO 5015	White Linter	1

UNLESS OTHERWISE SPECFIED TOLERANCES ON:
.X± 0.2
XX.± 0.5 .XX± 0.1
X.± 0.3 .XXX± 0.05

DATE: 2019/06/17 | MAT'L:
UNIT: mm | FINISH:
THIRD ANGLE PROJECTION | SCALE: 1/1

TAOGLAS TW Design Centre

REV D01

TITLE. : HP5010A–Patch Antenna 50x50x10.5

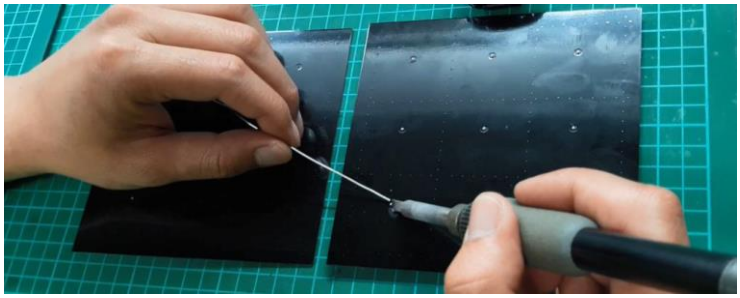
PART NO. : HP5010A

APPROVED BY:	CHECKED BY:	DRAWN BY:	CUSTOMERS SIGNATURE / DATE
Buluto	Ray	Abby	

6. Soldering Recommendations

6.1 Automated Ferrochrome Soldering Machine

Soldering Temperature: 360-380°C
Soldering Duration: 3~4 seconds



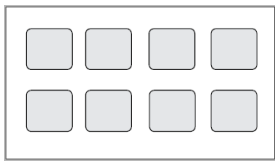
6.2 Automated Ferrochrome Soldering Machine

Soldering Temperature: 360-380°C
Soldering Duration: 3~4 seconds

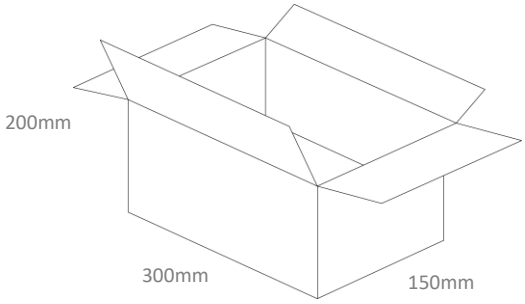
Please note that this process will require a one-time fixture to be made for each PCB design.

7. Packaging

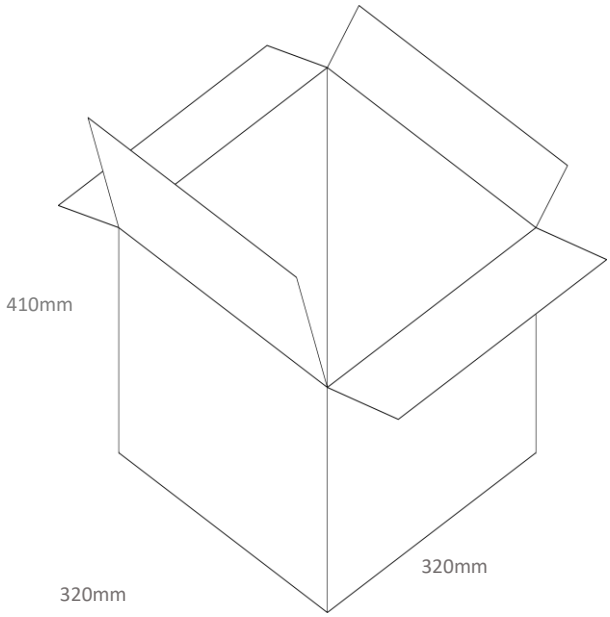
8pcs HP5010A per Tray
Weight – 480g



32pcs HP5010A per Small Box
Dimensions - 300*200*150mm
Weight – 2.1Kg



128pcs HP5010A per Carton
Dimensions - 410*320*320mm
Weight – 8.6Kg



Changelog for the datasheet

SPE-19-8-090 – HP5010A

Revision: D (Current Version)	
Date:	2020-12-07
Notes:	Updated Soldering Recommendations
Author:	Gary West

Previous Revisions

Revision: C	
Date:	2020-03-20
Notes:	Updated RTK Table
Author:	Yu Kai Yeung

Revision: B	
Date:	2020-01-09
Notes:	Updated Test data
Author:	Jack Conroy

Revision: A (Original First Release)	
Date:	2019-06-25
Notes:	
Author:	Jack Conroy

TAOGLAS®

www.taoglas.com