



WS.01  
on ground-plane

## Hercules

**WS.01.B.305151**

### Specification

<b>Part No.</b>	<b>WS.01.B.305151</b>
<b>Product Name</b>	<b>Hercules</b> Heavy Duty Screw Mount Antenna Dual-Band 2.4~5.2GHz
<b>Feature</b>	2.4GHz~5.2GHz suitable for ISM Bands/ZigBee/WLAN/Bluetooth IEEE.802.11/IEEE.802.15 UV and Vandal Resistant ABS Housing IP67 & IP69K Waterproof Rating 3M NFC-200 RP-SMA(M) – Standard RoHS Compliant

## 1. Scope

WS.01 Hercules is a high efficiency, high gain thread mount dual band wireless antenna for external use on vehicles and outdoor assets worldwide. Omni-directional gain across both bands ensures constant reception and transmission making the WS.01 an ideal solution for a Zigbee Wireless Mesh for remote applications e.g. – remote metering.

It has been designed for heavy duty work with extra thick threads; with durable UV-resistant PVC housing is resistant to vandalism and direct attack. At only 29mm high it complies with the latest EU height restrictions directives for roof-mounted objects, whilst also enabling covert operation with a diameter of 49mm.

The antenna housing is completely waterproof to IP67, and also to IP69K, which means it is waterproof against high pressure water jets used in industrial environments for cleaning.

## 2. Specifications

### Electrical

<b>Frequency (GHz)</b>	2.4	2.45	2.5	5.15	5.25	5.35
<b>VSWR</b>	1.46	1.66	1.6	1.76	1.41	1.48
<b>Return Loss (dB)</b>	-14.5	-12.1	-12.7	-11.1	-15.3	-14.2
<b>Impedance</b>	50Ω					
<b>Polarization</b>	Linear - Horizontal					
<b>Radiation Pattern</b>	Omni					
<b>Cable/Connectors</b>	3M NFC-200/RP-SMA(M)					
<b>Recommended Mounting Torque</b>	95Nm					
<b>Maximum Mounting Torque</b>	135Nm					

### Mechanical

<b>Dimensions</b>	Height 29mm x Diameter 49mm
<b>Casing</b>	UV resistant PVC
<b>Base and thread</b>	Nickel plated steel
<b>Thread diameter</b>	18mm
<b>Weather proof gasket</b>	CR4305 foam with 3M9448B double-side adhesive

### Environmental

<b>Waterproof</b>	IP67
<b>Corrosion</b>	5% NaCl for 96hrs - Nickel plated steel base and thread
<b>Temperature Range</b>	-40°C to +85°C
<b>Thermal Shock</b>	100 cycles -40°C to +80°C
<b>Humidity</b>	Non-condensing 65°C 95% RH
<b>Shock (drop test)</b>	1m drop on concrete 6 axes
<b>Cable pull</b>	8 KGf

### 3. Antenna S11 Parameters

#### 3.1 Return Loss



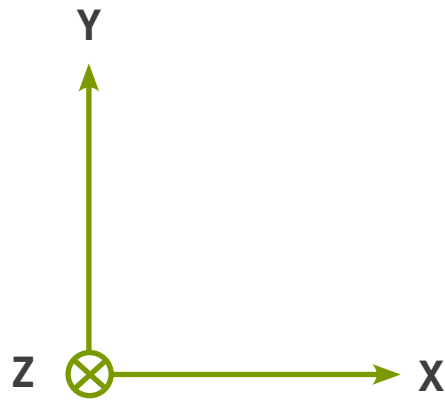
### 3. Antenna S11 Parameters

#### 3.2 VSWR

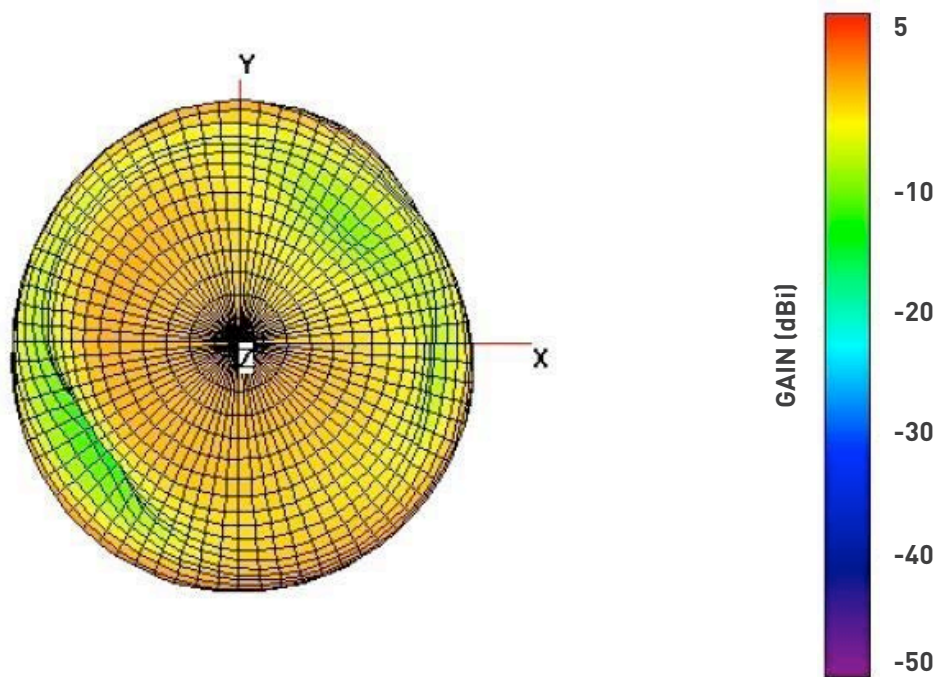


## 4. Antenna Radiation

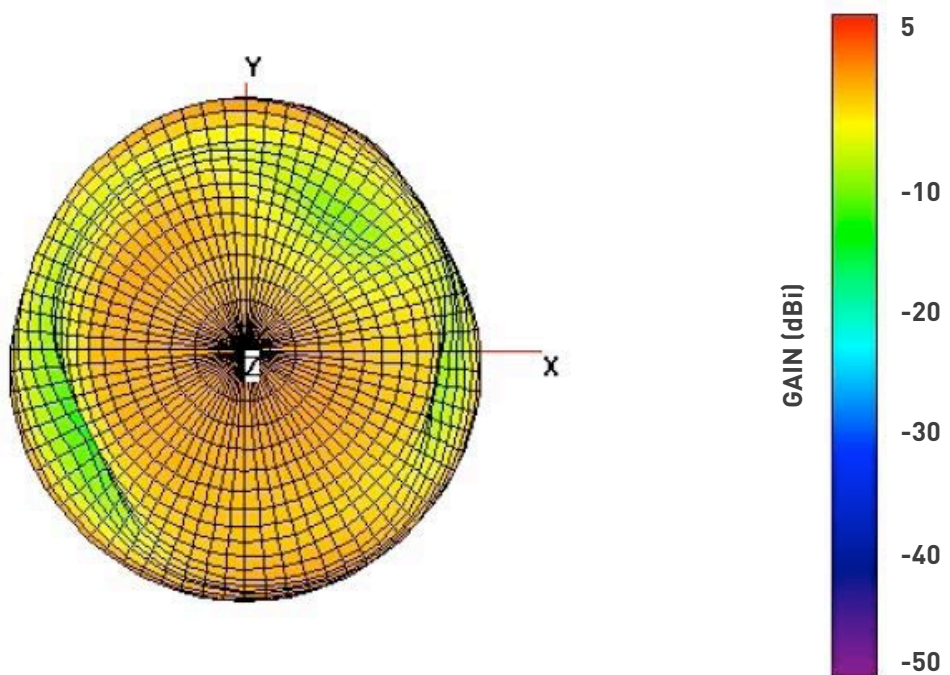
### 4.1 3D Radiation Pattern



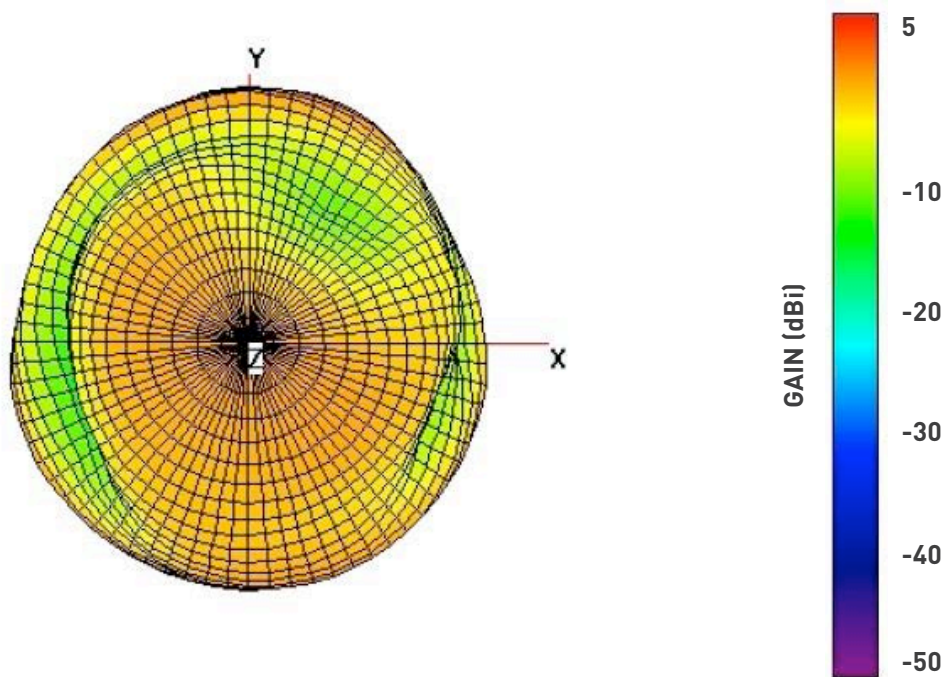
2.4GHz



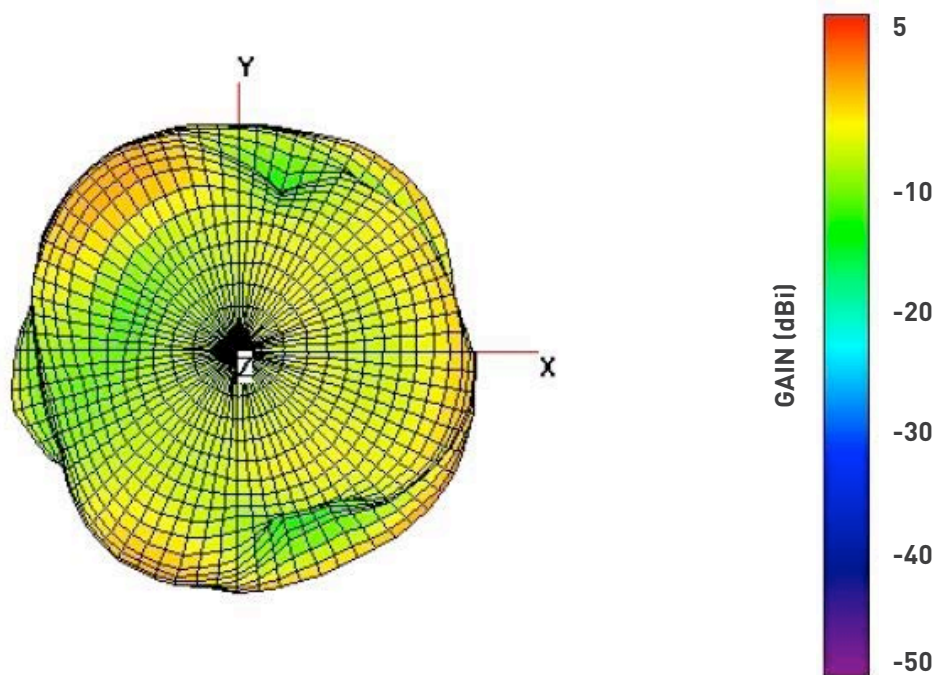
2.45GHz



2.5GHz

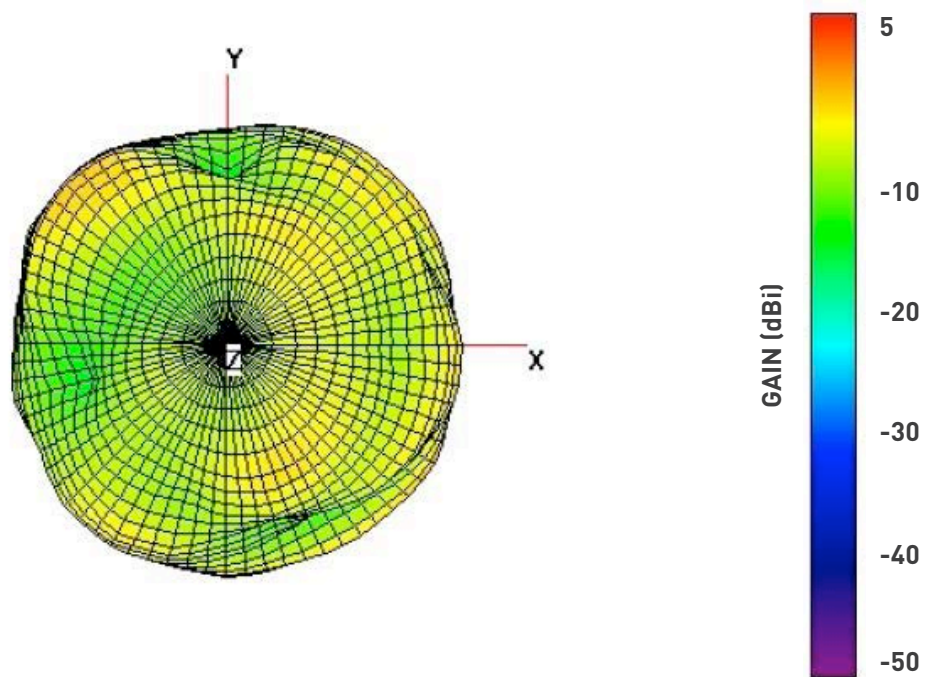


5.15GHz

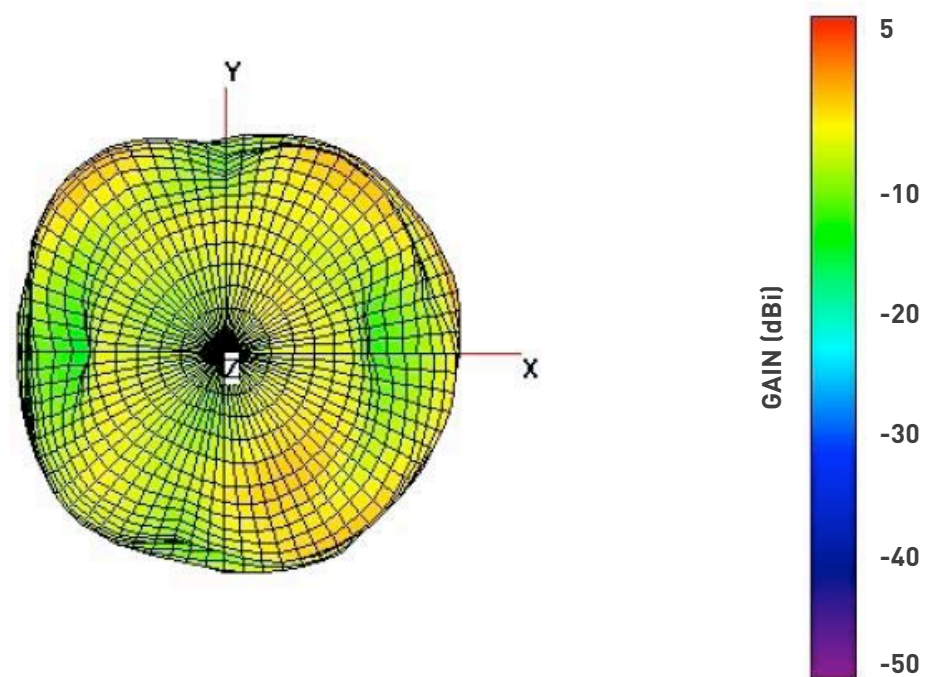




5.25GHz



5.35GHz



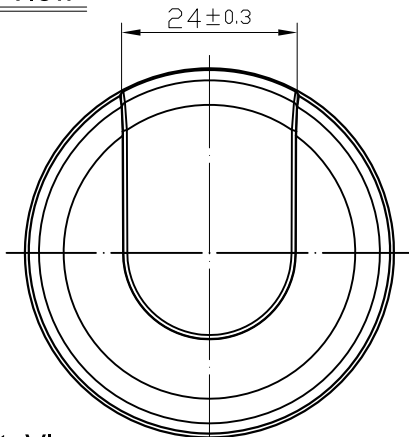
## 4. Antenna Radiation

### 4.2 Result Summary

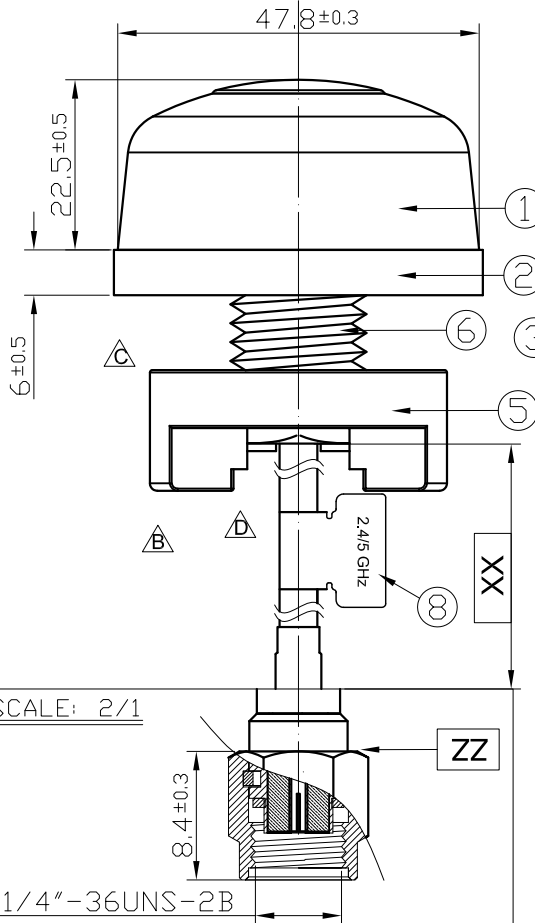
Channel	2400	2450	2500	5150	5250	5350
<b>Note</b>						
Ant. Port Input Pwr. (dBm)	0	0	0	0	0	0
Tot. Rad. Pwr. (dBm)	-1.98761	-1.61782	-1.77651	-3.01447	-3.8051	-3.23583
Peak EIRP (dBm)	3.0513	4.05447	4.1152	4.7407	4.37813	4.71773
Directivity (dBi)	5.03891	5.67229	5.89171	7.75517	8.18322	7.95356
Efficiency (dB)	-1.98761	-1.61782	-1.77651	-3.01447	-3.8051	-3.23583
Efficiency (%)	63.276	68.8997	66.4276	49.952	41.638	47.4698
Gain (dBi)	3.0513	4.05447	4.1152	4.7407	4.37813	4.71773
NHPRP ±Pi/4 (dBm)	-3.25016	-2.86259	-3.02232	-4.67614	-5.69757	-5.29538
NHPRP ±Pi/6 (dBm)	-4.39266	-4.02363	-4.19465	-6.60698	-7.70604	-7.19484
NHPRP ±Pi/8 (dBm)	-5.32364	-5.01353	-5.19258	-7.87659	-8.98205	-8.37507
Upper Hem. PRP (dBm)	-6.08301	-5.80993	-5.86805	-7.71601	-8.71586	-8.08409
Lower Hem. PRP (dBm)	-4.13045	-3.70008	-3.92182	-4.81064	-5.49788	-4.95872
NHPRP4 / TRP Ratio (dB)	-1.26255	-1.24477	-1.2458	-1.66167	-1.89247	-2.05955
NHPRP4 / TRP Ratio (%)	74.773	75.0798	75.062	68.2076	64.6774	62.2365
NHPRP6 / TRP Ratio (dB)	-2.40505	-2.4058	-2.41814	-3.59251	-3.90094	-3.95901
NHPRP6 / TRP Ratio (%)	57.4771	57.4672	57.3041	43.7269	40.7292	40.1882
NHPRP8 / TRP Ratio (dB)	-3.33604	-3.39571	-3.41607	-4.86212	-5.17695	-5.13924
NHPRP8 / TRP Ratio (%)	46.387	45.754	45.54	32.6428	30.3602	30.625
UHPRP / TRP Ratio (dB)	-4.0954	-4.19211	-4.09154	-4.70155	-4.91076	-4.84826
UHPRP / TRP Ratio (%)	38.9457	38.0881	38.9804	33.8723	32.2793	32.7472
LHPRP / TRP Ratio (dB)	-2.14284	-2.08226	-2.1453	-1.79617	-1.69279	-1.7229
LHPRP / TRP Ratio (%)	61.0543	61.9119	61.0196	66.1277	67.7207	67.2528
Front/Back Ratio (dB)	3.42725	3.56765	3.94055	10.1253	13.1799	10.9587
Phi BW (°)	112	96	86	42	40	42
+ Phi BW (°)	66	58	52	17	19	24
- Phi BW (°)	46	38	34	25	21	18
Theta BW (°)	49	35	35	36	34	32
+ Th. BW (°)	25	20	24	23	23	12
- Th. BW (°)	24	15	11	13	11	20
Boresight Phi (°)	270	270	270	75	75	60
Boresight Th. (°)	105	105	105	135	135	150
Maximum Power (dBm)	3.0513	4.05447	4.1152	4.7407	4.37813	4.71773
Minimum Power (dBm)	-15.0552	-14.2956	-14.3893	-15.5291	-16.4014	-15.3489
Average Power (dBm)	-2.26887	-1.84221	-2.02397	-3.4037	-4.13521	-3.4448
Max/Min Ratio (dB)	18.1065	18.3501	18.5045	20.2699	20.7795	20.0666
Max/Avg Ratio (dB)	5.32018	5.89668	6.13917	8.14441	8.51333	8.16253
Max/Avg Ratio (dB)	-12.7863	-12.4534	-12.3653	-12.1254	-12.2662	-11.9041
Average Gain (dB)	-1.98761	-1.61782	-1.77651	-3.01447	-3.8051	-3.23583
E-Plane BW (°)	45	33	34	32	31	35
+ E-Plane BW (°)	20	18	22	19	20	12
- E-Plane BW (°)	25	15	12	13	11	23
H-Plane BW (°)	115	105	93	51	45	39
+ H-Plane BW (°)	69	70	65	16	16	20
- H-Plane BW (°)	46	35	28	35	29	19

## 5. Technical Drawing

Top View



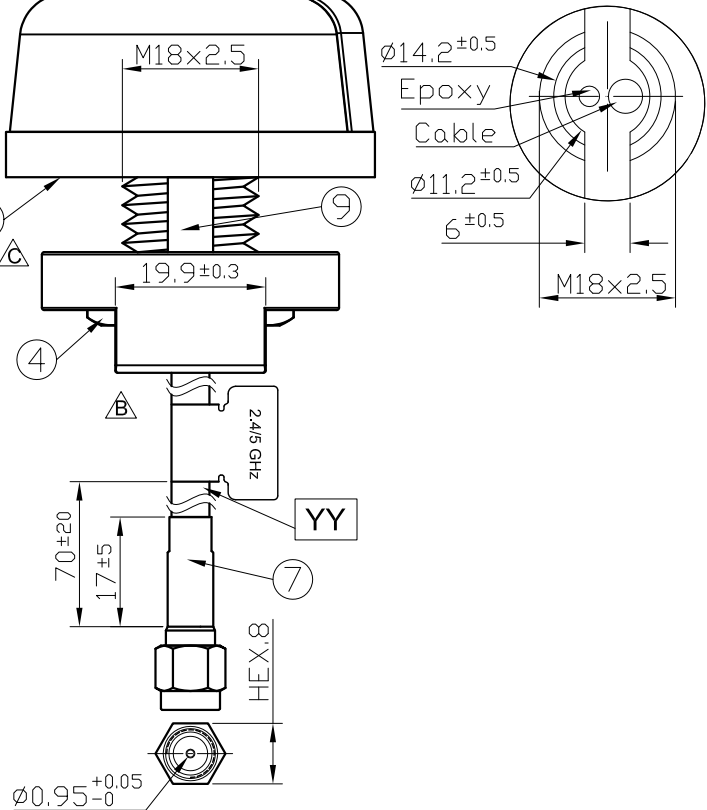
Front View



	Name	Material	Finish	QTY
1	Housing	ABS PA-707	Black	1
2	Closed Cell Foam	CR 4305	Black	1
3	3M Double Adhesive	3M 9448 WC	White Liner	1
4	M18 Inner Nut	Steel Carbon	Ni Plated	1
5	Outer Nut Cover	ABS	Black	1
6	M18x2.5 Thread	Zinc Alloy	Ni Plated	1
7	Heat Shrink Tube	PE	Black	1
8	2.4/5 GHz Label	Coated Paper	Green	1
9	Rubber Stopper	Rubber	Black	1

	Name	Material	Finish	QTY
XX	Cable Length	3000±120mm	Black	1
YY	Cable Type	NFC 200	Black	1
ZZ	Connector Type	SMA(M)RP	Gold	1

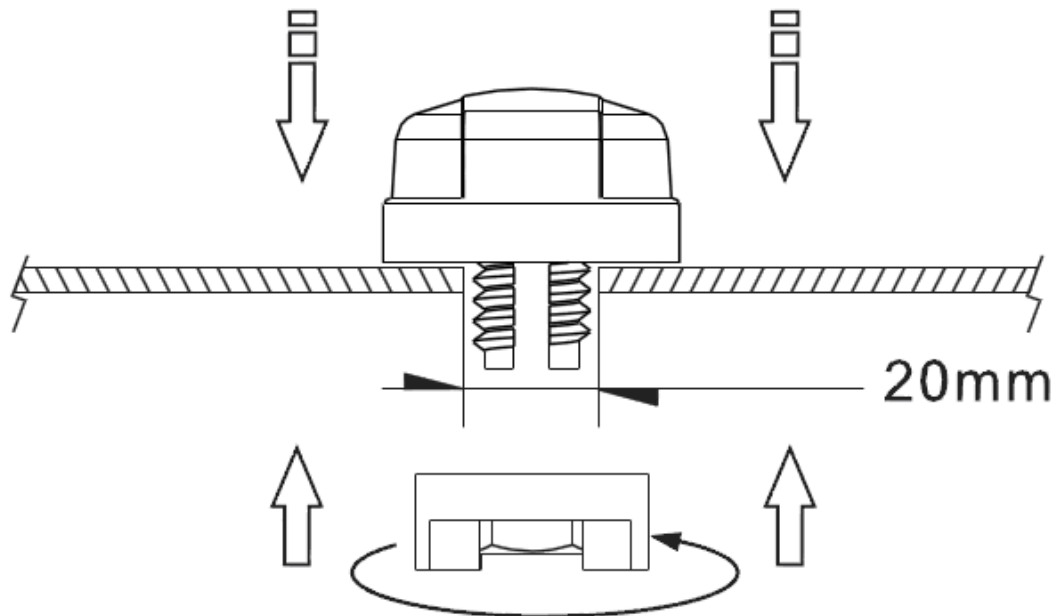
Bottom Thread View



SCALE: 2/1

1/4"-36UNS-2B

## 6. Installation



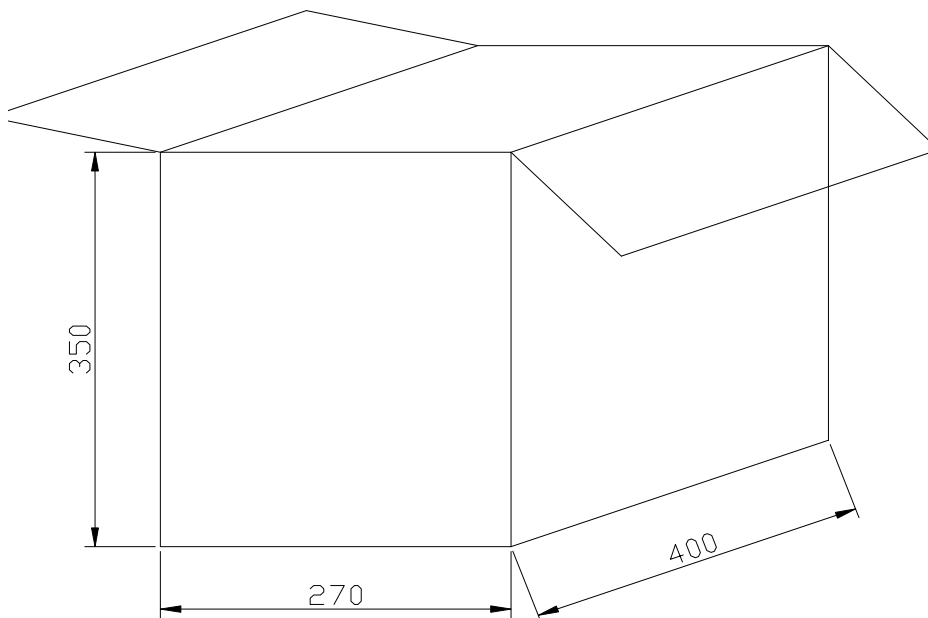
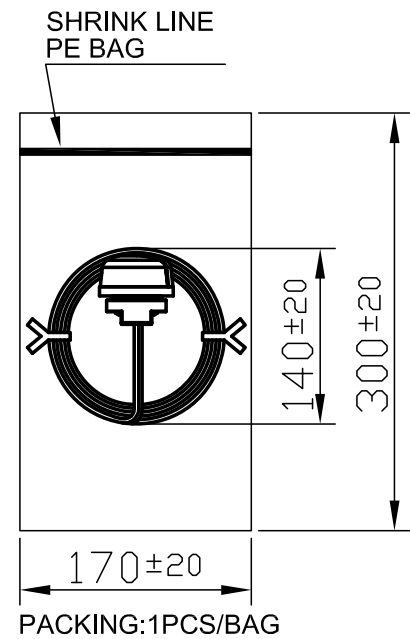
Recommended torque for mounting is 95Nm or 70ftlbs  
Maximum torque for mounting is 135.6Nm or 100ft lbs



## 7. Packaging

1pcs antenna per big PE bag  
40 big PE bags per box

Unit : mm



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