



Specification

# SPECIFICATION

Model No. : WS.01  
Part No. : WS.01.305151  
Product Name : Heavy Duty Screw Mount Antenna - Dual-Band 2.4~5.2GHz  
Description : 2.4GHz~5.2GHz suitable for ISM Bands/ZigBee/WLAN/Bluetooth IEEE.802.11/IEEE.802.15  
3M CFD-200 RP-SMA(M) - Standard Height 29mm Diameter 49mm  
**RoHS Compliant**



Version	Date	Page	Revision Description	Prepared	Approved
A	May 11 <sup>th</sup> 2009	All	New Product	TW Product Centre	Zita Lin
B	Jul 20 <sup>th</sup> 2010	All	Mechanical Change	TW Product Centre	Zita Lin



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## I. 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.

## II. Specifications

ELECTRICAL						
Frequency (GHz)	2.4	2.45	2.5	5.15	5.25	5.35
VSWR	1.46	1.66	1.6	1.76	1.41	1.48
Return Loss (dB)	-14.5	-12.1	-12.7	-11.1	-15.3	-14.2
Impedance	50Ω					
Polarization	Linear - Horizontal					
Radiation Pattern	Omni					
Cable/Connectors	3M CFD-200/RP-SMA(M)					
Recommended Mounting Torque	95Nm					
Maximum Mounting Torque	135Nm					
MECHANICAL						
Dimensions	Height 29mm x Diameter 49mm					
Casing	UV resistant PVC					
Base and thread	Nickel plated steel					
Thread diameter	18mm					
Weather proof gasket	CR4305 foam with 3M9448B double-side adhesive					
ENVIRONMENTAL						
Waterproof	IP-65					
Corrosion	5% NaCl for 96hrs - Nickel plated steel base and thread					
Temperature Range	-40°C to +85°C					
Thermal Shock	100 cycles -40°C to +80°C					
Humidity	Non-condensing 65°C 95% RH					
Shock (drop test)	1m drop on concrete 6 axes					
Cable pull	8 KGf					

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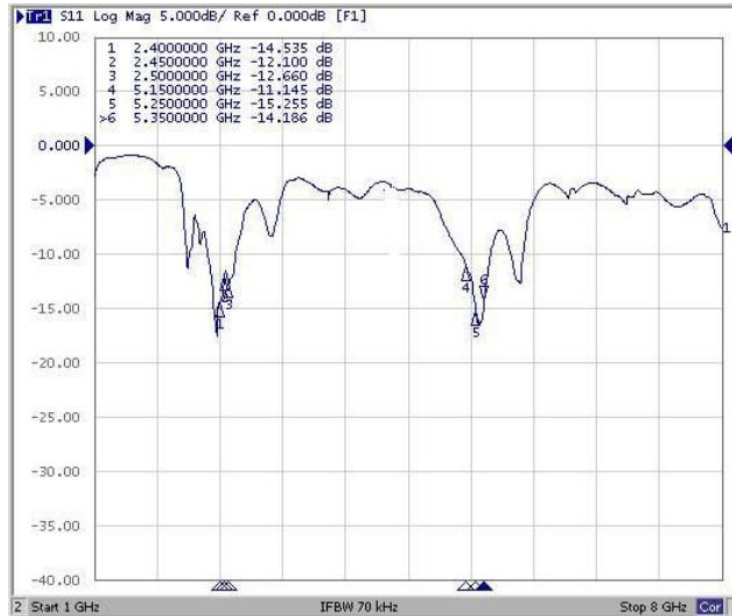
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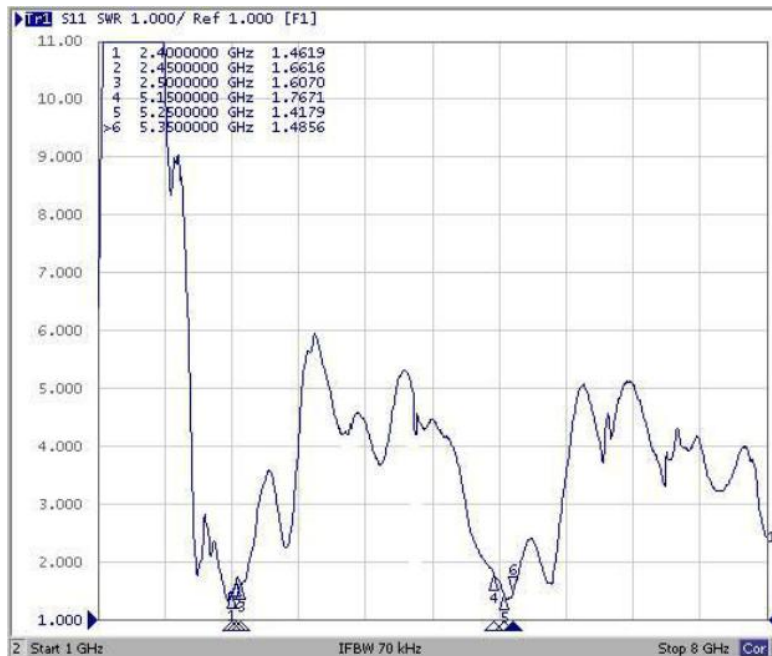
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### III. Antenna S11 Parameters

#### III.1. Return Loss



#### III.2. VSWR

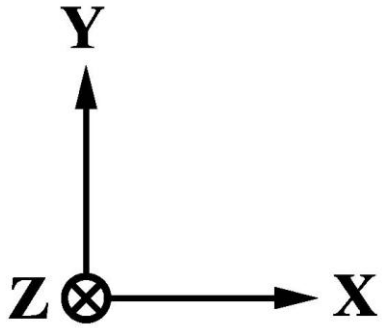




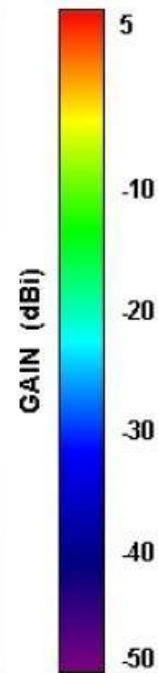
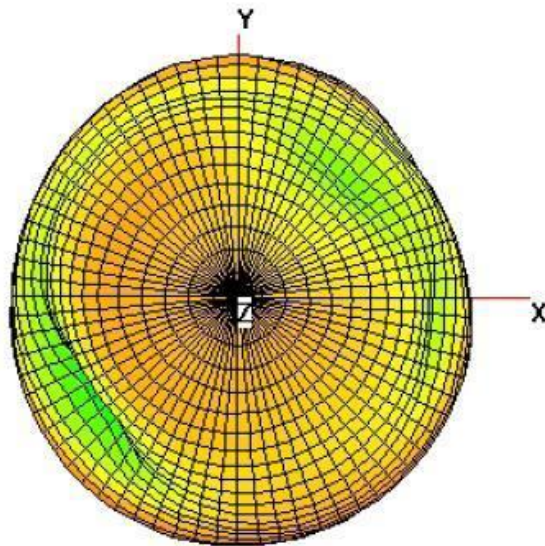
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## IV. Antenna Radiation

### IV.1. 3D Radiation Pattern



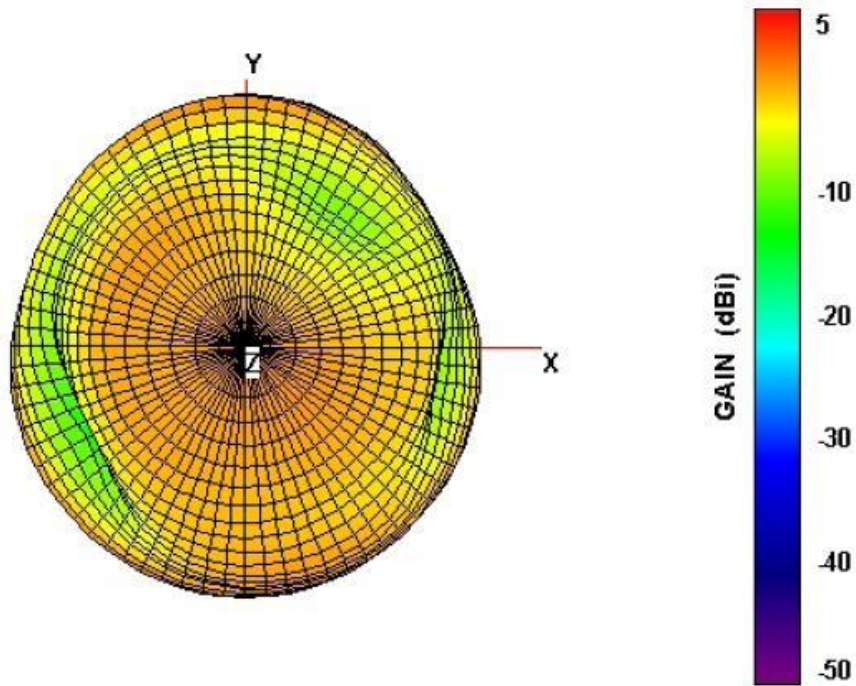
2.4GHz



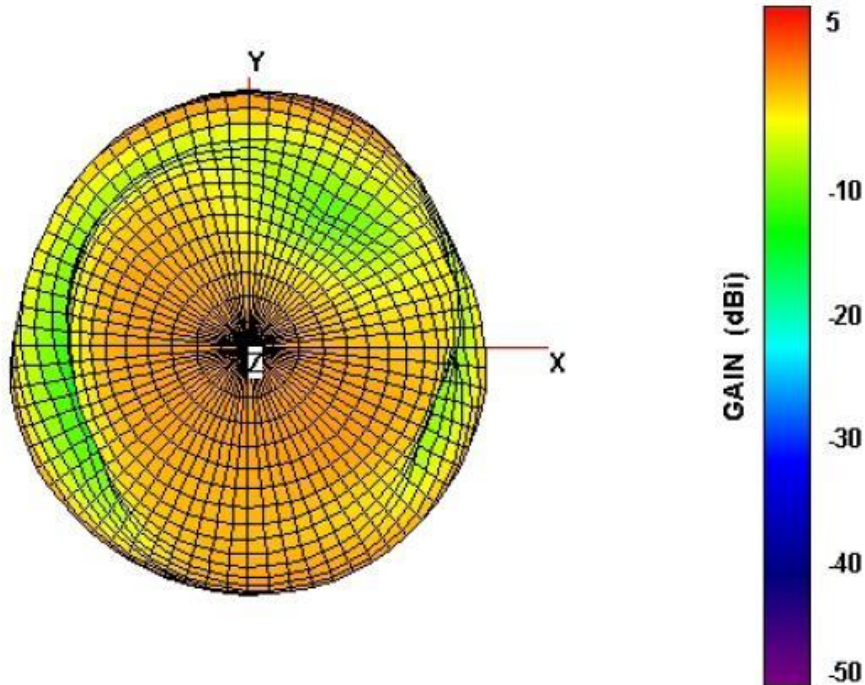


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2.45GHz



2.5GHz

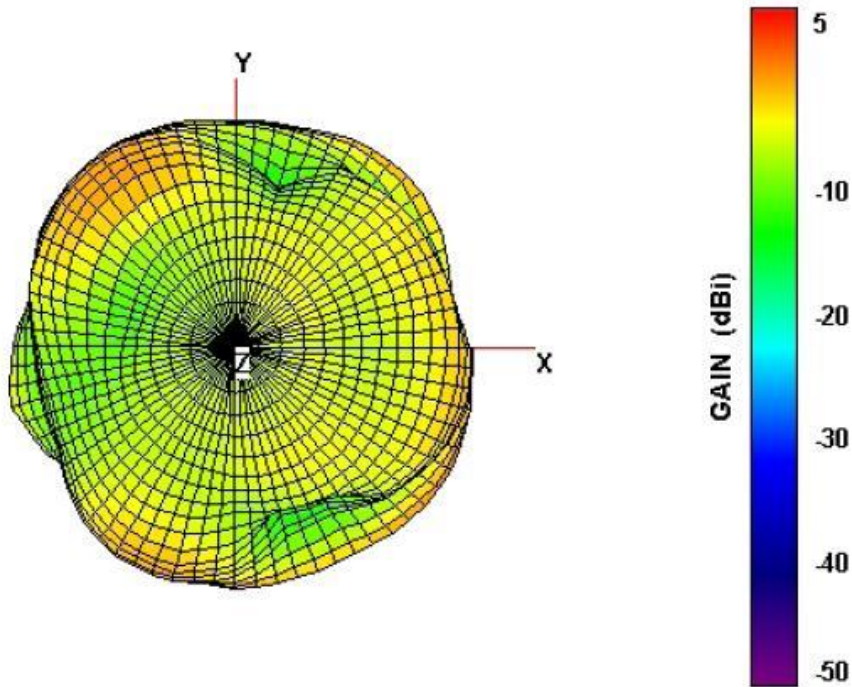




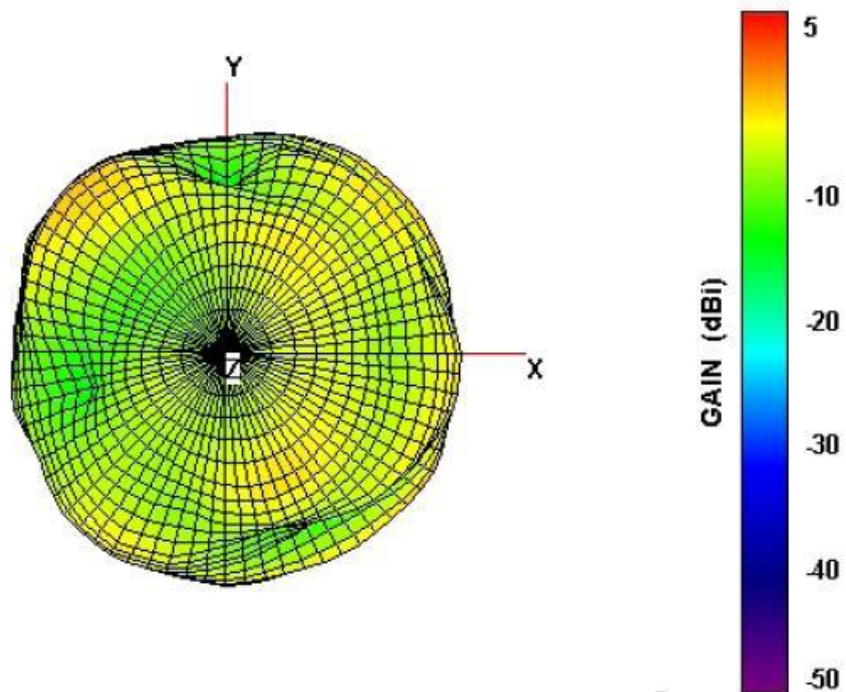


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5.15GHz



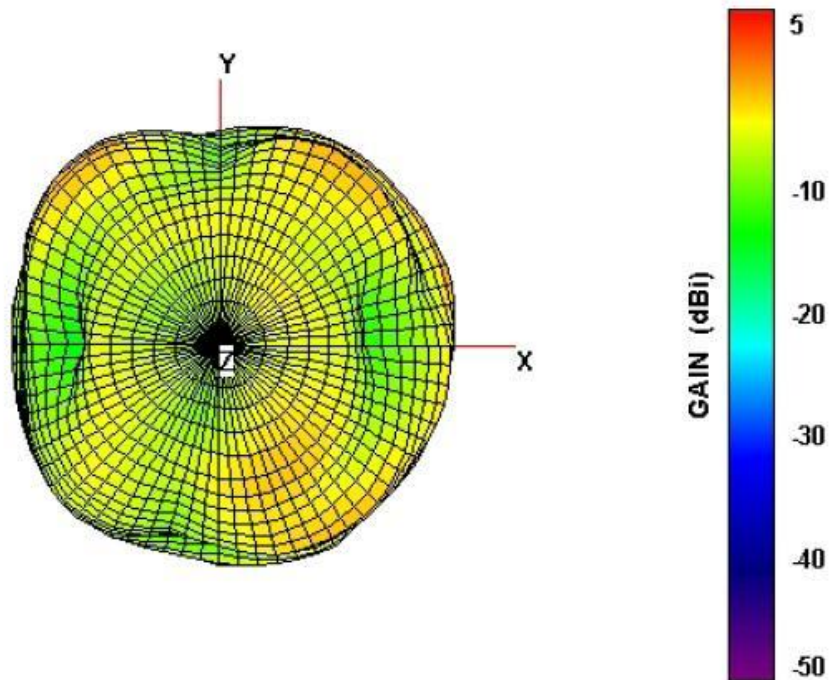
5.25GHz





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5.35GHz





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IV.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
<b>Efficiency (%)</b>	<b>63.276</b>	<b>68.8997</b>	<b>66.4276</b>	<b>49.952</b>	<b>41.638</b>	<b>47.4698</b>
<b>Gain (dBi)</b>	<b>3.0513</b>	<b>4.05447</b>	<b>4.1152</b>	<b>4.7407</b>	<b>4.37813</b>	<b>4.71773</b>
NHPRP $\pm\pi/4$ (dBm)	-3.25016	-2.86259	-3.02232	-4.67614	-5.69757	-5.29538
NHPRP $\pm\pi/6$ (dBm)	-4.39266	-4.02363	-4.19465	-6.60698	-7.70604	-7.19484
NHPRP $\pm\pi/8$ (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
Min/Avg Ratio (dB)	-12.7863	-12.4534	-12.3653	-12.1254	-12.2662	-11.9041
<b>Average Gain (dB)</b>	<b>-1.98761</b>	<b>-1.61782</b>	<b>-1.77651</b>	<b>-3.01447</b>	<b>-3.8051</b>	<b>-3.23583</b>
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

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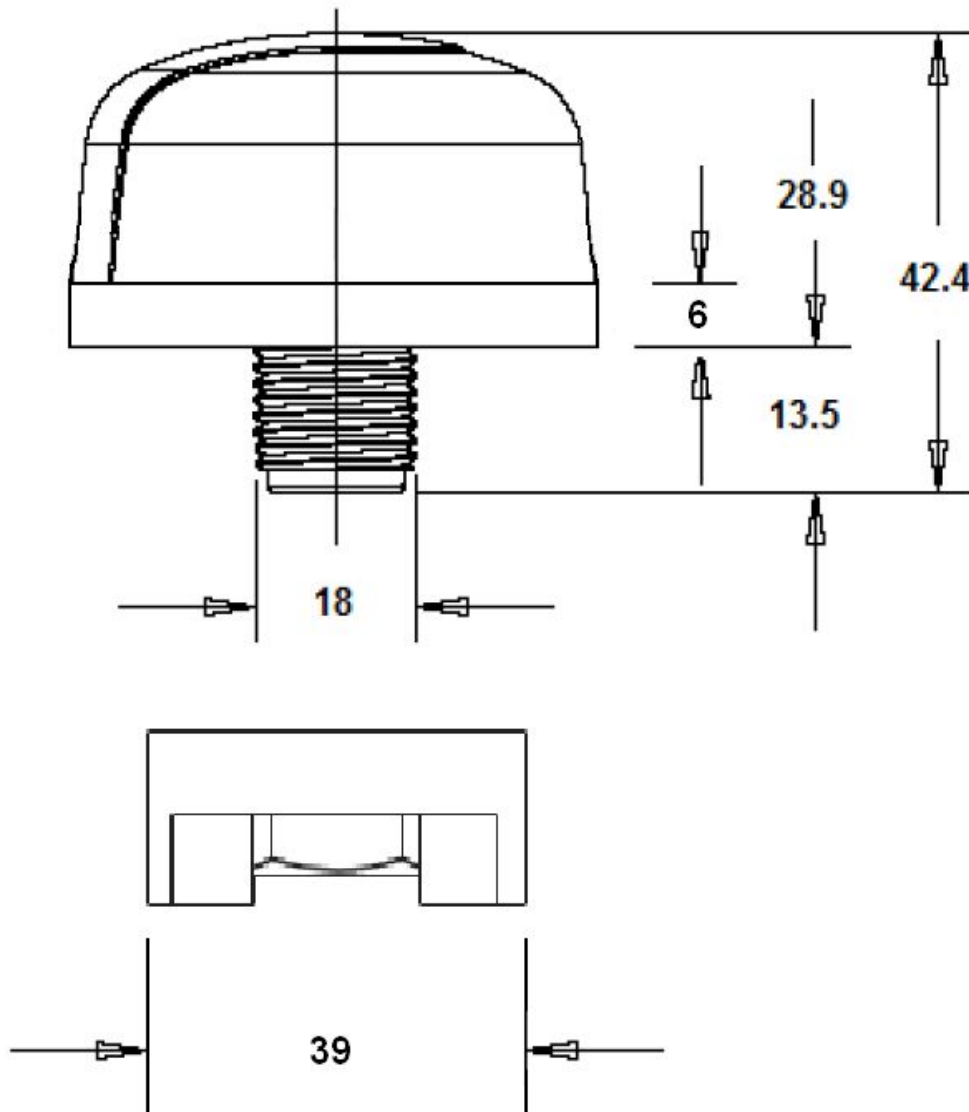
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V. Technical Drawing

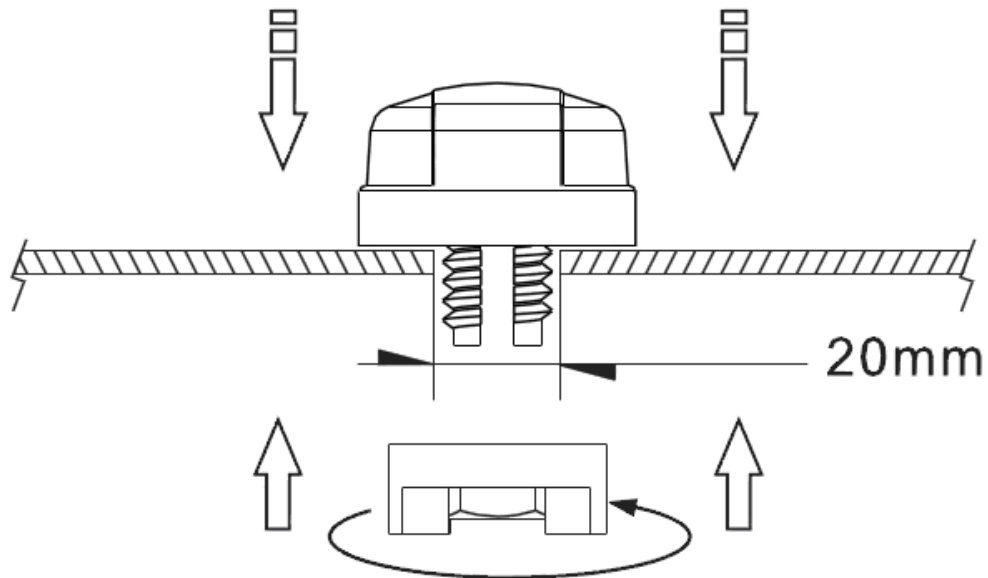


Unit : mm



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## VI. Installation



Recommended torque for mounting is 95Nm or 70ftlbs

Maximum torque for mounting is 135.6Nm or 100ft lbs

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