

7 September 2016

Our ref: 20160450_L001_RevA

The Manager
Cirrus Communications Pty Ltd
PO Box 1745
GOSFORD NSW 2250

Attention: Mr Eric Heyde | eric.heyde@cirruscomms.com.au

**Re: Cirrus Antenna Installation – 12m Telescopic Mast
CERTIFICATE OF STRUCTURAL ADEQUACY**

SITE: A3/23-107 Erskine Park Road, Erskine Park

We refer to your instructions in relation to this matter.

In preparation of this report, we have relied upon the following information and documents supplied by Cirrus Communications Pty Ltd:

- Cirrus Communications Antenna/Mast Report 28.07.16.
- Hills Industries Limited, 'Telomast' Specification. Copy enclosed.
- Ubiquiti Networks 'Rocket' Dish Specification. Copy enclosed.
- Site Inspection 19.8.16.

RGH understand that the antenna apparatus proposed for connection to the proprietary mast will consist of a Ubiquiti RD-5G-30 'Rocket' Dish Antenna, 0.6m diameter and 9.8kg in weight as detailed in supplied specification.

RGH has assessed the antenna specification with regard to the Hill's 'Telomast' design requirements and relevant sections of Australian Standard AS/NZS 1170.2:2011, Structural Design Actions, Part 2: Wind Actions for the above mentioned mast location. RGH confirm that the Hills 'Telomast' design criteria specified for maximum site gust wind speed specified (of W41) is suitable for the location regional wind speed $V_{r,25}$, Region A, TC2 in accordance with AS1170.2.

RGH advise that the proposed 'Rocket' dish antenna apparatus attachment and configuration described above conforms to the antenna projected wind area and weight design criteria set-out in the 'Telomast' maximum design load specification enclosed.

Structural plans of the proposed mast location, ref: 20160450/S00-S01/B, accompany this report and should be read in conjunction.

Should you have any queries or require any further assistance in relation to this matter, please do not hesitate to contact the undersigned.

Yours faithfully



Colin Fisher
BE (Civil), MIEAust, CPEng, NER
Senior Engineer
RGH Consulting Group Pty Ltd

6, 9, 12, & 15 metre TELOMASTS

Installation Instructions

Warning: Telomast installation should not be undertaken by inexperienced persons. It is recommended that the mast be installed by a suitably qualified tradesperson. Safety precautions should be observed, including the wearing of a builder's hardhat and safety boots. Beware of overhead electric cables. Local government authorities may require the submission of an application for building approval and/or an Occupational Health & Safety Plan before installation can commence.

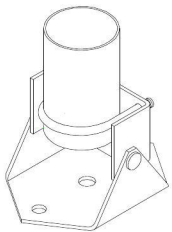


fig 2A sloping foot mount

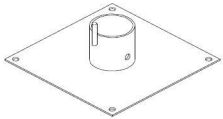


fig 2B level foot

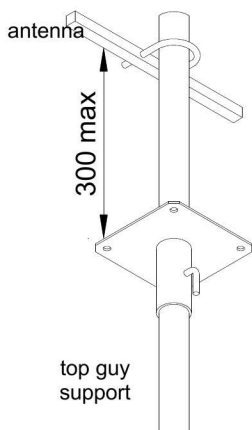


fig 4 antenna position

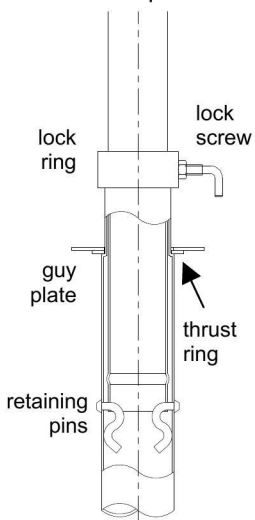


fig 6 joint detail

1. Select the site. For installation on a level surface, the staying diagram (fig 1) indicates the space required. For installation on pitched roofs, special guy lengths and loading conditions will apply. The base and guy anchor points must be capable of supporting the design loads from the mast. For standard installations the base and guy anchor loads are specified in table 2. Foot mounts are available for sloping (fig 2A) and level (fig 2B) surfaces.

2. Securely install the foot mount or base plate to the mast base fixing point. Attach turnbuckles to all guy anchor points. Note: to avoid possible over-stressing of the mast structure, it is important that the guy anchors be located no closer to the mast base than specified in figure 1.

3. Remove shipping pin (fig 3) from bottom of mast and the small screw from the top lock rings. Slide the top guy support and the top guy plate off the mast and replace them in opposite order. Screw the lock screws (from the accessory bag) into the lock rings, making sure that the lock screw just protrudes into the top hole in each mast section, except the top section which will have its lock ring tightened 300mm below antenna position (fig 4). Install thimbles in the guy plates and attach the guy wires with wire rope grips. Three wire rope grips should be used at each end of the guy wire. Fit the bridge of the wire rope grip to the loaded part of the rope (fig 7).

4. Stand mast in foot mount or base plate. Attach bottom set of guy wires to turnbuckles on anchors. Tighten and check for vertical with spirit level (fig 5).

5. Using an elevated work platform, attach antenna and feeder cable and line up the guy plates so that all fittings are facing in the same direction.

6. Extend top section of mast until stop is reached and tighten lock screw to hold it there. Extend next section of mast a few inches until the holes for the retaining pins are visible, clamp with lock screw, and insert the two retaining pins. Release lock screw holding the top section and allow it to drop down onto the retaining pins, then turn it until the notches engage on the pins (fig 6). Retighten the lock screw. Continue as above until mast is fully extended.

7. Attach the guy wires at the correct anchor points, but do not tighten fully. Turn the mast until antenna gives best results, and then tighten all guy wires evenly, ensuring that the mast remains straight and vertical. Guy pretension is to be 10% of the specified guy minimum breaking force. For the recommended 7/1.25 G380 guying strand, pretension is to be 32 kg. Pretension may be checked by attaching the lifting hook of a suitable spring balance to the lower guy thimble and applying sufficient force to pull the lower guy thimble out of contact with the lower anchor. For added security, wire turnbuckles to each other (fig 7).

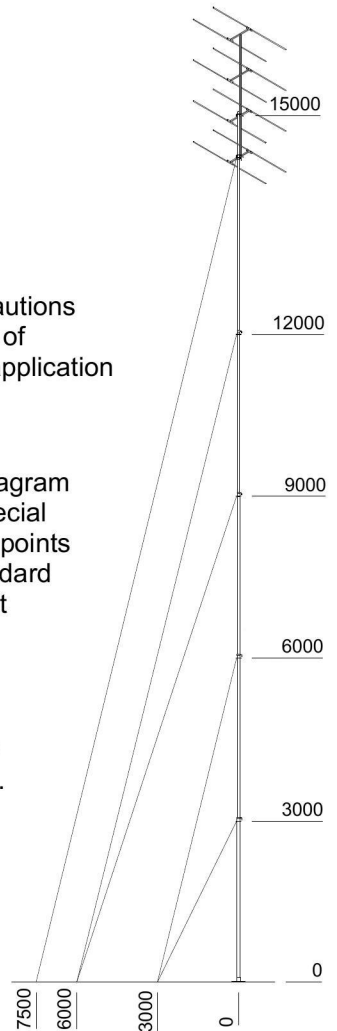


fig 1 15m Telomast arrangement

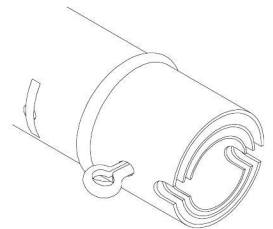


fig 3 shipping pin

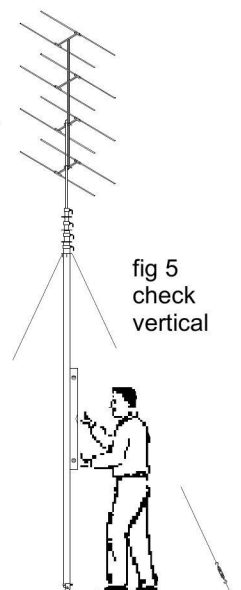


fig 5 check vertical

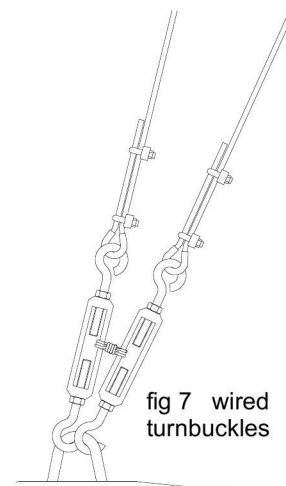


fig 7 wired turnbuckles

Hills Telomast has been designed to conform to the requirements of the relevant Australian Standards:

AS 1170.1 1989 SAA Loading Code Part 1: Dead and live loads and load combinations

AS 4055-1992 Wind loads for housing

AS 4100-1990 Steel structures

AS 1170.2-1989 SAA Loading Code Part 2: Wind loads

AS/NZ 4600-1996 Cold-formed steel structures

Rationalised gust wind speeds have been used to simplify the determination of the maximum allowable head loads (antenna projected wind area and weight).

Maximum Permissible Head Loading

for wind classifications up to **W41**: **Maximum antenna $C_d \cdot \text{Area}^\dagger$ 0.30 m²**

Maximum antenna weight 15 kg

Table 1. Typical Antenna Head Loadings:

Hills Part#	Antenna	Projected Area	C _d *Area [†]	Weight
FB601308	CA16 VHF Antenna	0.23 m ²	0.28 m ²	6.2 kg
FB607083	TMX34 UHF Antenna	0.08 m ²	0.10 m ²	1.8 kg
FB608519	OMX400plus VHF/UHF Antenna	0.20 m ²	0.24 m ²	6.5 kg
FB606962	REF 25 Microwave Reflector	0.11 m ²	0.14 m ²	3.7 kg

[†] C_d * Area is the sum of the projected areas of each of the components of the antenna multiplied by a drag force coefficient in accordance with AS1170.2

Table 2. Worst case ultimate limit state loads at mast base and guy anchor points resulting from maximum permissible head loading:

Load Direction	At 3m Guy Anchor	At 6m Guy Anchor	At 7.5m Guy Anchor	At Mast Base
F_H	1.38 kN	1.08 kN	1.50 kN	0.15 kN
F_V	1.92 kN	1.88 kN	2.73 kN	6.24 kN

It is the responsibility of the installer to ensure that any structure to which the Telomast is fixed, as well as the fixing devices, are capable of supporting the design loads. The maximum ultimate limit state loads at the mast base and guy anchor points for the worst case loading situation are shown in the table above. The loadings are applicable to three and four way guying arrangements.

Manufactured by HILLS INDUSTRIES LIMITED ABN 35 007 573 417

ANTENNA & TV SYSTEMS DIVISION - HEAD OFFICE

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STATE SALES OFFICES

SOUTH AUSTRALIA

Phone: (08) 8371 0277 Fax: (08) 8371 1519

WESTERN AUSTRALIA

Phone: (08) 9209 7000 Fax: (08) 9209 7044

NEW SOUTH WALES

Phone: (02) 9717 5290 Fax: (02) 9717 5226

NEW ZEALAND

Phone: (64) (9) 262 3052 Fax: (64) (9) 262 3053

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Phone: (03) 9238 2533 Fax: (03) 9238 2535

TASMANIA

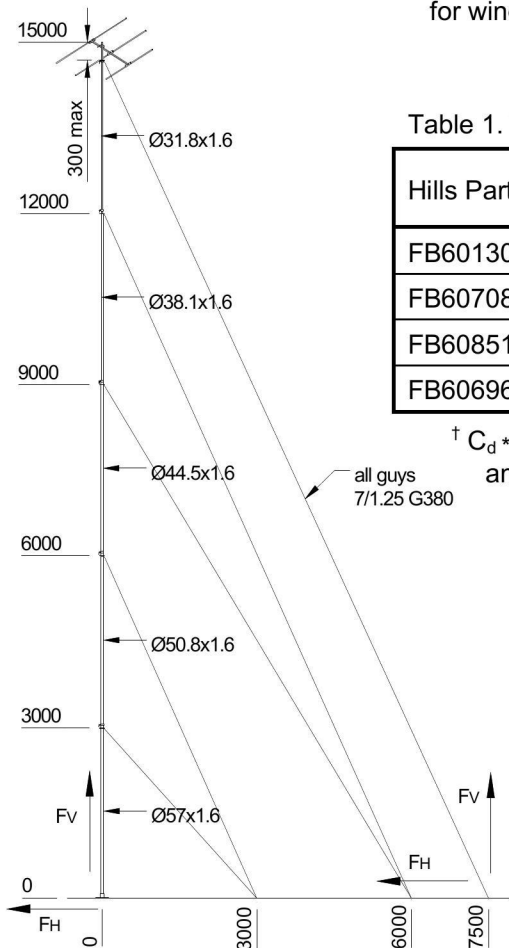
C/- Phone: (03) 9238 2533 Fax: (03) 9238 2535

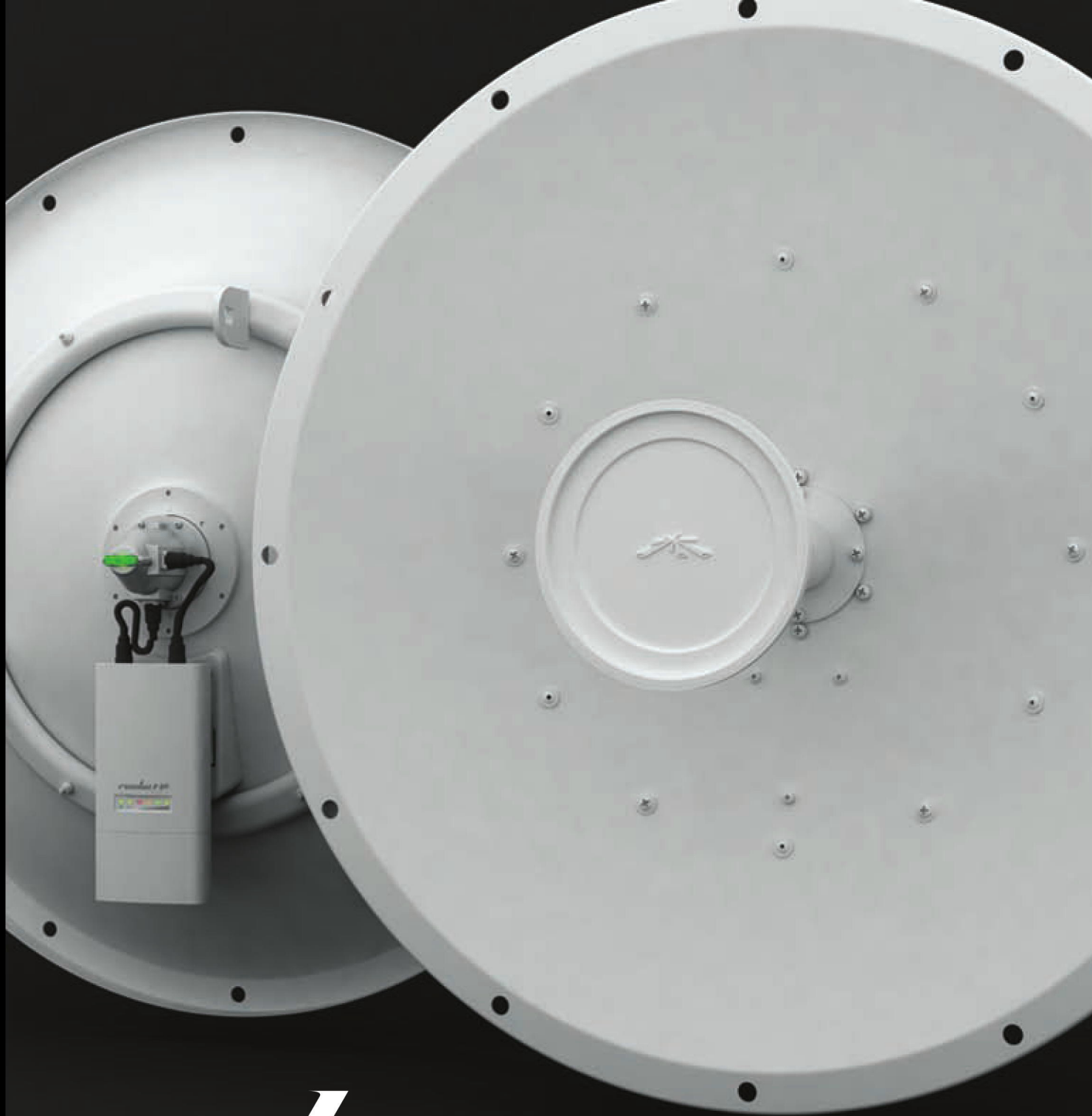
QUEENSLAND

Phone: (07) 3344 3855 Fax: (07) 3344 4866

EXPORT ENQUIRIES

Phone: (08) 8371 3663 Fax: (08) 8371 1519





rocket D I S H

AirMax Carrier Class 2x2 PtP Bridge Dish Antenna

Models: RD-2G-24, RD-3G-26, RD-5G-30, RD-5G-34

Ultimate in RF Performance

Integrated Mount lets you easily
snap Rocket M into place

Incredible Range and Speed



Overview

02

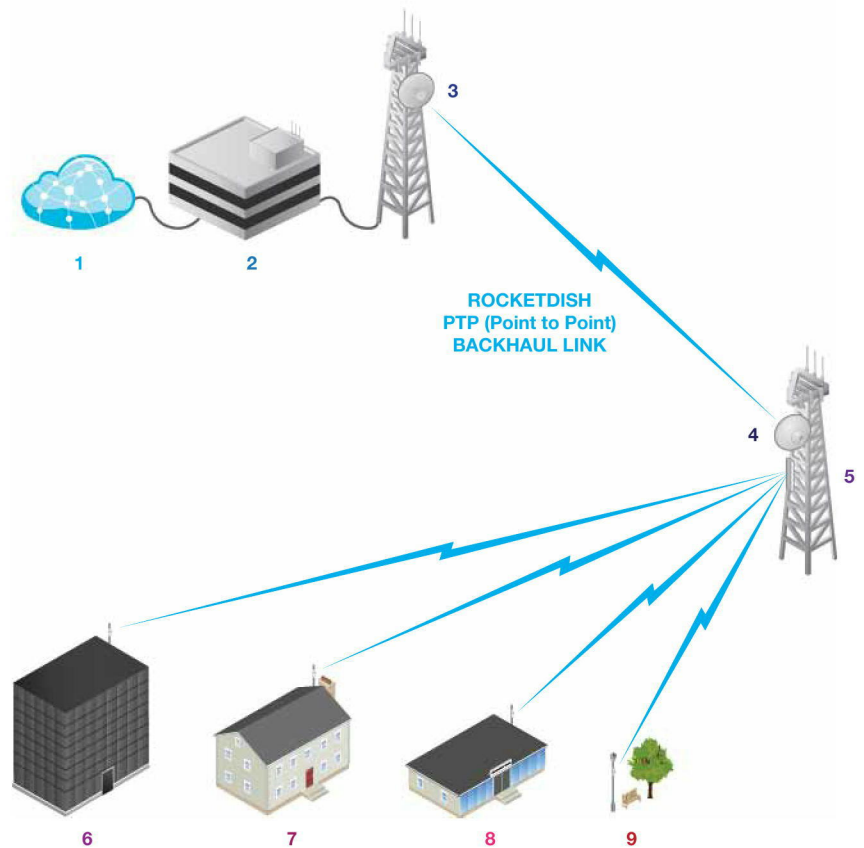
AirMax 2x2 PtP Dish Antenna

RocketDish is a Carrier Class Dish Antenna that was designed to seamlessly integrate with Rocket M radios (sold separately).

Rocket M combines the “brains” in one robust unit; pair Rocket M with RocketDish to create powerful 2x2 MIMO PtP bridging applications. This seamless integration gives network architects unparalleled flexibility and convenience.

On the right is one example of how RocketDishes can be deployed:

- 1 Internet Backbone
- 2 ISP Network
- 3 RocketDish with Rocket M
- 4 RocketDish with Rocket M
- 5 AirMax BaseStation with Rocket M
- 6 Corporate building with NanoStation M client.
- 7 House with NanoStation M client.
- 8 Small business with NanoStation M client.
- 9 Lightpole with NanoStation M daisy-chained to a PicoStation M to create a wireless hotspot.



Integrated AirMax Technology

Unlike standard WiFi protocol, Ubiquiti's Time Division Multiple Access (TDMA) AirMax protocol allows each client to send & receive data using pre-designated time slots scheduled by an intelligent AP controller.

This "time slot" method eliminates hidden node collisions & maximizes air time efficiency. It provides many magnitudes of performance improvements in latency, throughput, & scalability compared to all other outdoor systems in its class.

Intelligent QoS Priority is given to voice/video for seamless access.

Scalability High capacity and scalability.

Long Distance Capable of high speed 50km+ links

Latency Multiple features dramatically reduce noise.

GPS Synchronization*

Pair RocketDish with Rocket M GPS to utilize Ubiquiti AirSync GPS Synchronization technology. AirSync enhances the hardware and software of Rocket M to use GPS signals for precision timing.

GPS Signal Reporting AirOS was upgraded to take full advantage of the new GPS hardware in Rocket M GPS units; easily manage/monitor GPS satellite signals.

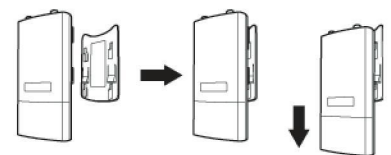
No Co-location Interference Synchronized transmission among Rocket M GPS powered BaseStations effectively eliminates co-location interference.

Seamless AirMax Integration Rocket M GPS units seamlessly integrate with AirMax BaseStation and RocketDish Antennas.

Channel Re-use Frequency reuse for increased scalability.

Easy Installation

RocketDish Antennas and Rocket M radios have been designed to seamlessly work together.



Installing Rocket M on RocketDish requires no special tools, you simply snap it securely into place with the universal Rocket mount built into the antennas.

* When paired with Rocket M GPS

Models

03



RocketDish*

RD-2G-24 (2.4 GHz, 24 dBi)

RD-3G-26 (3.3-3.7 GHz, 26 dBi)

RD-5G-30 (5 GHz, 30 dBi)

RD-5G-34 (5 GHz, 34 dBi)



RocketDish Radome**

RAD-2RD (2 ft / 648 mm)

RAD-3RD (3 ft / 972 mm)

- Greatly Reduce Wind Load
- Protect Antenna Surfaces from Harsh Environments
- Conceal Antenna Equipment from Public view
- Designed specifically for RocketDish Antennas

*RocketDish does not include Rocket M (sold separately)

**RocketDish Radome does not include RocketDish (sold separately)

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 www.ubnt.com

Software*

airOS

AirOS is an intuitive, versatile, highly developed Ubiquiti firmware technology. It is exceptionally intuitive and was designed to require no training to operate. Behind the user interface is a powerful firmware architecture which enables hi-performance outdoor multipoint networking.

Protocol Support

Ubiquiti Channelization

Spectral Width Adjust

ACK Auto-Timing

AAP Technology

GPS Signal Reporting*



www.ubnt.com/airos

airView

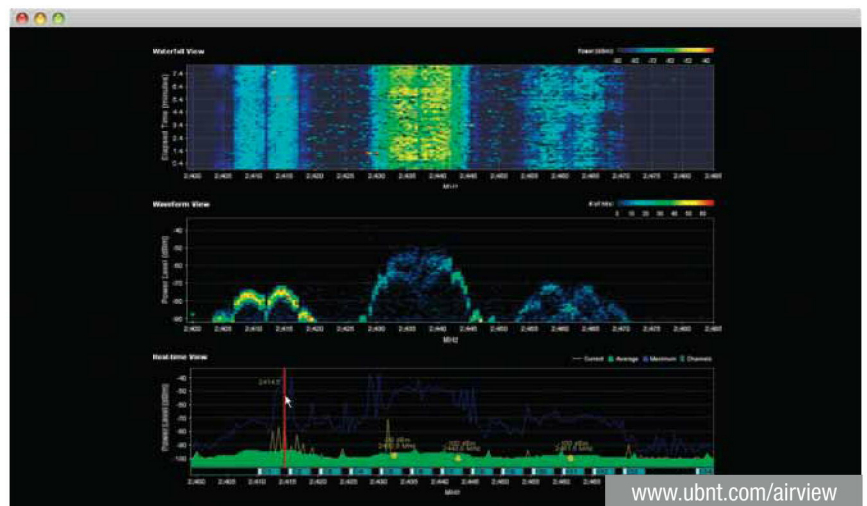
Integrated on all Ubiquiti M products, AirView provides Advanced Spectrum Analyzer Functionality: Waterfall, waveform, and real-time spectral views allow operators to identify noise signatures and plan their networks to minimize noise interference.

Waterfall Aggregate energy over time for each frequency.

Waveform Aggregate energy collected.

Real-time Energy is shown real-time as a function of frequency.

Recording Automize AirView to record and report results.



www.ubnt.com/airview

airControl

AirControl is a powerful and intuitive web based server network management application which allows operators to centrally manage entire networks of Ubiquiti devices.

Network Map

Monitor Device Status

Mass Firmware Upgrade

Web UI Access

Manage Groups of Devices

Task Scheduling



www.ubnt.com/aircontrol

* When RocketDish is paired with Rocket M

Specifications

05

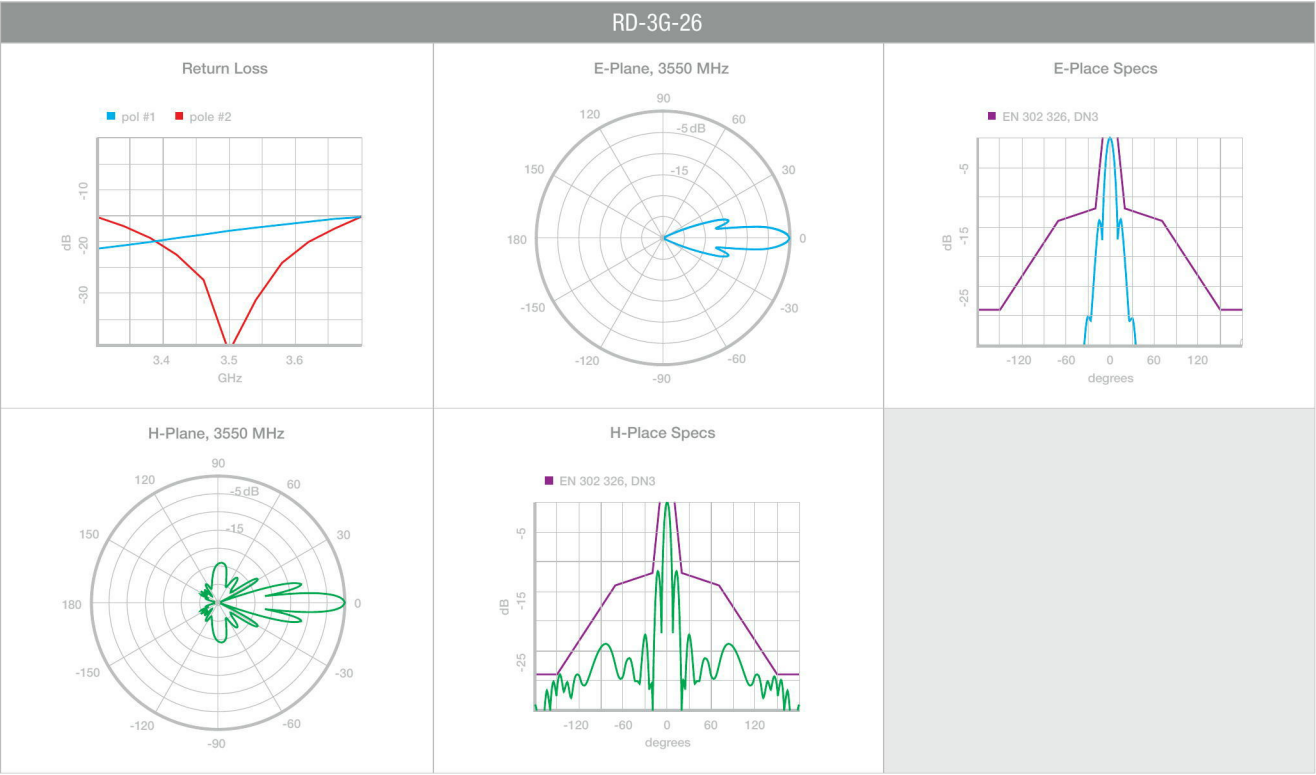
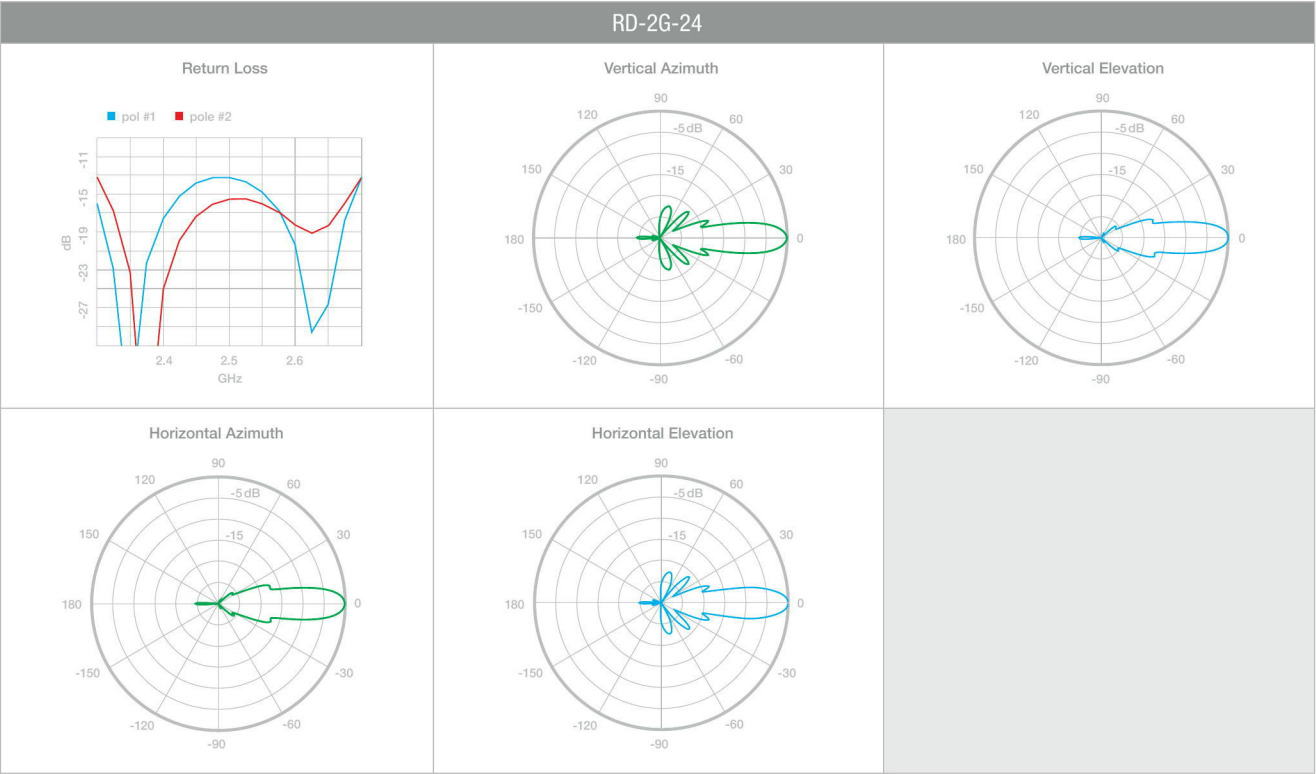
Antenna Characteristics				
	RD-2G-24	RD-3G-26	RD-5G-30	RD-5G-34
Frequency Range	2.3-2.7 GHz	3.3-3.8 GHz	5.1-5.8 GHz	
Gain	24 dBi	26 dBi	30 dBi	34 dBi
Hpol Beamwidth	3.8 deg. (Rx Dish) 6.6 deg. (Tx Dish)	7 deg. (6 dB)	5 deg. (3 dB)	3 deg. (3 dB)
Vpol Beamwidth	3.8 deg. (Rx Dish) 6.6 deg. (Tx Dish)	7 deg. (6 dB)	5 deg. (6 dB)	3 deg. (6 dB)
F/B Ratio	-50 dB (Rx Dish) -65 dB (Tx Dish)	-33 dB	-34 dB	-42 dB
Max VSWR	1.6:1	1.4:1		
Dimensions	648 mm diameter			1050 mm diameter
Weight	9.8 kg			13.5 kg
Wind Survivability	120 mph			125 mph
Wind Loading	113 lb @ 100 mph			256 lb @ 100 mph
Polarization	Dual Linear			
Cross-pol Isolation	35 dB min			
ETSI Specification	EN 302 326 DN2			
Mounting	Universal pole mount, Rocket M bracket, and weatherproof RF jumpers included			

RocketDish does not include Rocket M (sold separately)

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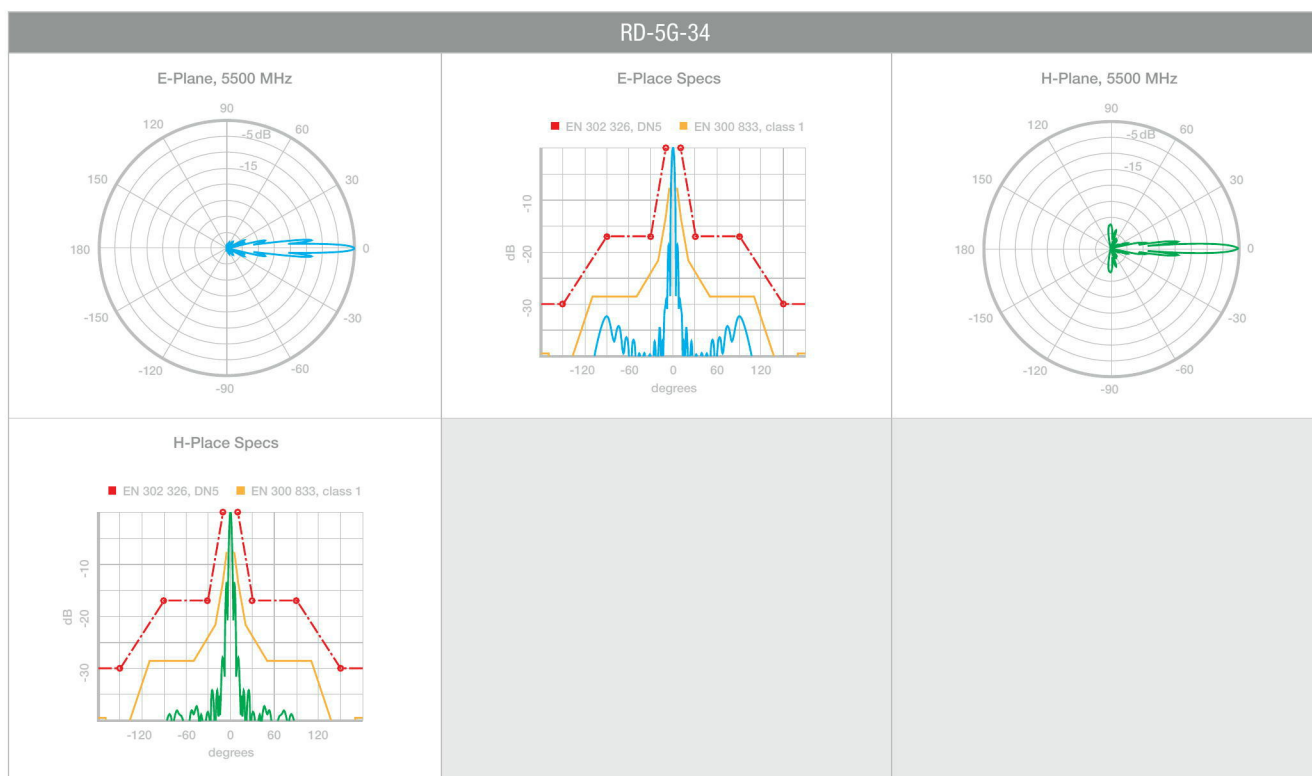
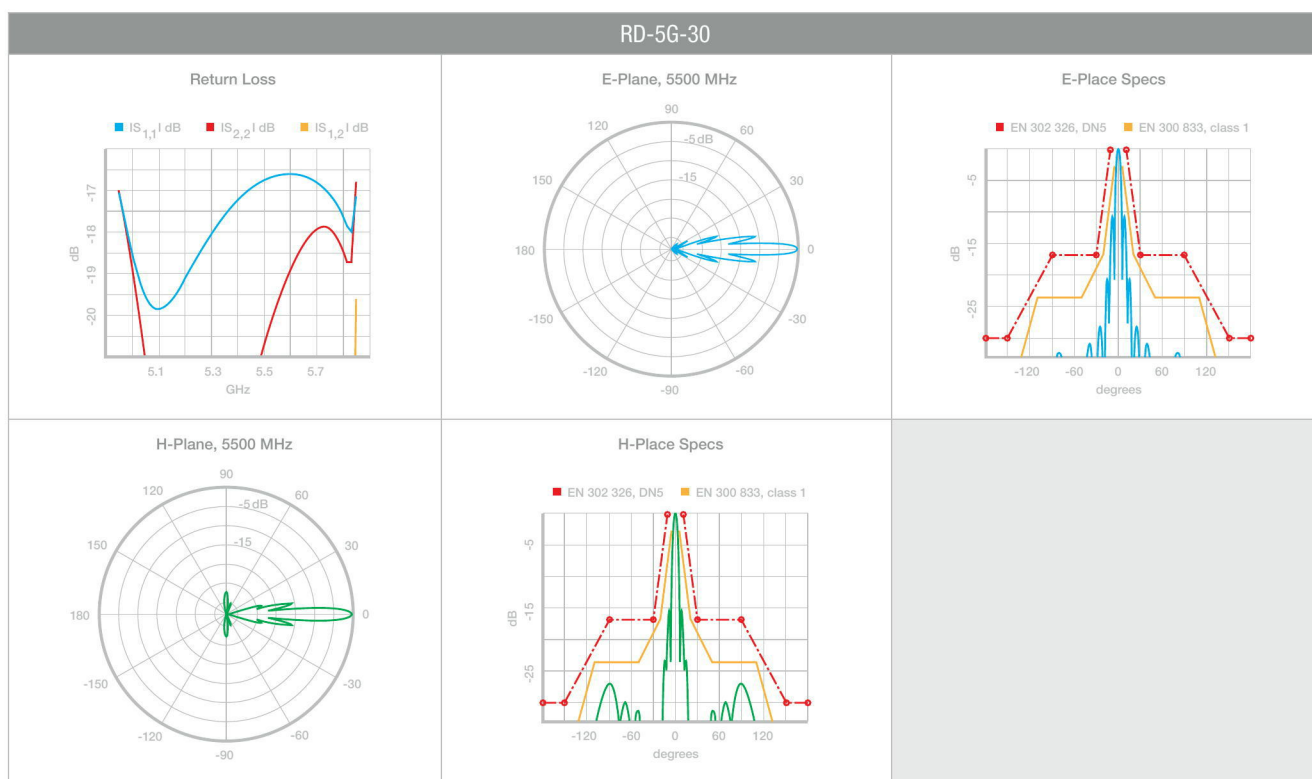
 www.ubnt.com

Specifications (cont.)



Specifications (cont.)

07



TOUGH Cable

OUTDOOR CARRIER CLASS SHIELDED

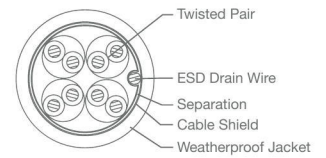
Protect your networks from the most brutal environments with Ubiquiti's industrial-grade shielded ethernet cable, TOUGH Cable.

Increase Performance Dramatically improve your ethernet link states, speeds, and overall performance with Ubiquiti TOUGH Cables.

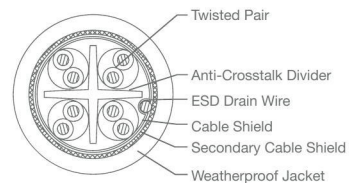
Extreme Weatherproof TOUGH Cables have been built to perform even in the harshest weather and environments.

Eliminate ESD Attacks Protect your networks from devastating ESD Attacks, TOUGH Cables eliminate ESD attacks and ethernet hardware damage.

Extended Cable Support TOUGH Cables have been developed to have increased power handling performance for extended cable run lengths.



LEVEL 1
SHIELDING PROTECTION



LEVEL 2
SHIELDING PROTECTION

Bulletproof your networks

TOUGH Cable is currently available in two versions: Level 1 Shielding Protection and Level 2 Shielding Protection.

Level 1 is a Category 5e (100Mbps Ethernet Support) Outdoor Carrier Class Shielded Cable.

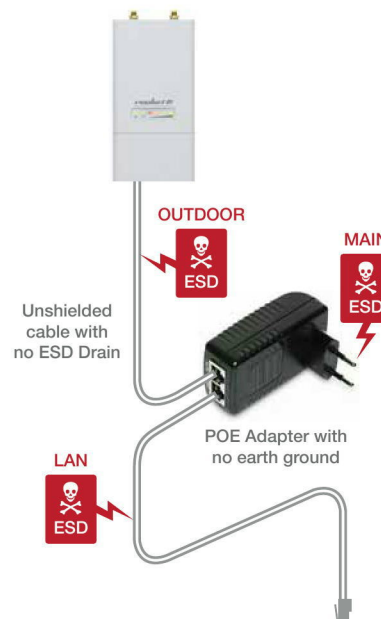
Level 2 is a Category 6 (1Gbps Ethernet Support) Outdoor Carrier Class Shielded Cable that is also capable of providing enhanced Category 5e performance.

Additional Information:

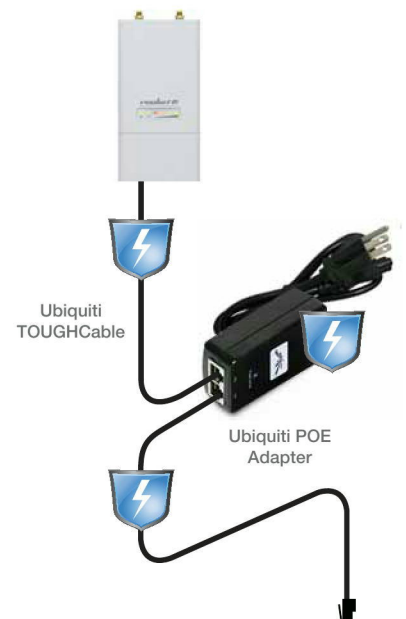
- 24 AWG copper conductor pairs
- ESD Drain Wire: 26 AWG integrated ESD Drain wire to prevent ESD attacks & damage.
- PVC outdoor rated jacket
- 0.35um foil shield
- Multi-Layered Shielding
- 1000ft (304.8m) length

Learn more:
www.ubnt.com/toughcable

ESD Attacks are overwhelmingly the leading cause for device failures. The diagram below illustrates the areas vulnerable to ESD Attacks in a defenseless network.



By using a grounded Ubiquiti POE adapter (included) along with Ubiquiti TOUGH Cable (sold separately), you can effectively eliminate ESD Attacks.





TERMS OF USE: The Ubiquiti radio device must be professionally installed. Shielded ethernet cable and earth grounding must be used as conditions of product warranty. It is the installers responsibility to follow local country regulations including operation within legal frequency channels, output power, and Dynamic Frequency Selection (DFS) requirements.

For further information, please visit www.ubnt.com.

All specifications in this document are subject to change without notice.

RD-DS-08-24-11

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