Radio & Antenna Information- 5140-5150 MHz

A

CLASSIFICATION UNCLASSIFIED	PAGE of Pages

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO. QSX-VDR2-1100-05-04-05AB-LD-VP SOQPSK	**2. MANUFACTURER'S NAME** Quasonix, Inc.
3. TRANSMITTER INSTALLATION	**4. TRANSMITTER TYPE** Digital Telemetry
5. TUNING RANGE 4400.0 MHz to 4950.0 MHz, 5091.0 MHz to 5150.0 MHz	**6. METHOD OF TUNING** Synthesizer
7. RF CHANNELING CAPABILITY 0.500 MHz	**8. EMISSION DESIGNATOR(S) See Remarks.** SOQPSK mode 3M90G1DDN
9. FREQUENCY TOLERANCE ±20 PPM, maximum	
10. FILTER EMPLOYED *(X one)* ☒ a. YES ☐ b. NO	
11. SPREAD SPECTRUM *(X one)* ☐ a. YES ☒ b. NO	**12. EMISSION BANDWIDTH** *(X and complete as applicable)* ☐ CALCULATED ☒ MEASURED
13. MAXIMUM BIT RATE 28 Mbps for SOQPSK	**a. -3 dB** 1.75 MHz **b. -20 dB** 4.65 MHz
14. MODULATION TECHNIQUES AND CODING SOQPSK: Offset QPSK with premodulation filtering, no coding	**c. -40 dB** 7.15 MHz **d. -60 dB** 9.95 MHz **e. OC-BW** 3.90 MHz
	15. MAXIMUM MODULATION FREQUENCY See block 24.
16. PRE-EMPHASIS *(X one)* ☐ a. YES ☒ b. NO	**17. DEVIATION RATIO** 0.5 for SOQPSK
	18. PULSE CHARACTERISTICS
19. POWER	**a. RATE** NA
a. MEAN 5 W	**b. WIDTH** NA
b. PEP NA	**c. RISE TIME** NA
20. OUTPUT DEVICE Transistor, operated in class C	**d. FALL TIME** NA **e. COMP RATIO** NA
	21. HARMONIC LEVEL
22. SPURIOUS LEVEL **-68 dBc within ± 100 MHz, -80 dBc outside ±100 MHz**	**a. 2nd** **-57 dBc**
23. FCC TYPE ACCEPTANCE NO.	**b. 3rd** **-57 dBc**
	c. OTHER **-80 dBc**

24. REMARKS

In all modes and all bands, waveform filtering is applied in three steps:

- Digital premodulation filtering, scaled automatically with the bit rate.
- Multiple stages of LC and stripline filtering in the upconversion circuits.
- 7-pole Butterworth LPF after the final output stage.

Block 15: Maximum modulation frequency: SOQPSK: Fmax = 0.25 x bit rate

- All emission bandwidths in item 12, harmonic levels in item 21 and spurious levels in item 22 are measured values.
- The two different sets of emission bandwidths in item 12 are for PCM/FM and SOQPSK mode, respectively.
- For all modes, Emission Designator (Box 8) and Emission Bandwidths (Box 12) are for bit rate of 5 Mbps, and scale in direct proportion to bit rate.
- Transmit rate with LDPC encoding is 25/16 of the input rate.

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Part # 1055-034
Broadband Panel Antenna, 4.4 - 5.9 GHz, 15 dBi

Features:

- Broad Band Coverage
- 4.4 - 5.9 GHz
- 15 dBi
- Designed for C Band communication in the following markets:
  - Law Enforcement
  - Surveillance
  - UAV & UGV Ground Stations

Antenna Specifications

Parameter	Value	Units	Tolerance
Antenna Pattern	Directional Antenna		
Frequency Band	C		
Impedance	50	Ohms	
Minimum Frequency	4.4 / 4,400	GHz / MHz	
Maximum Frequency	5.9 / 5,900	GHz / MHz	
Frequency Bandwidth	1.5 / 1,500	GHz / MHz	
Maximum VSWR	1.5:1	Ratio	15 dB Return Loss
Gain	15	dBi	
Polarization	Vertical		
Maximum RF Input Power	50	Watts	
Horizontal (AZ) Beamwidth	55	Degrees	
Vertical (EL) Beamwidth	32	Degrees	

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Parameter	Value	Units	Tolerance
Ground Plane Required	No		
Color	White		
Mount Style	Panel		
RF Connector Type	Type-N(f)		
IP Rating	IP64 when RF connectors are terminated with mating connectors		
Operating Temperature Range	-40 to +185	°F	(-40 to +85 °C)
Product Length	10.180 / 258.572	inches / mm	±0.13"
Product Width	7.180 / 182.372	inches / mm	±0.13"
Product Height	2.830 / 71.882	inches / mm	±0.13"
Product Weight	16.00 / 453.59	oz / grams	

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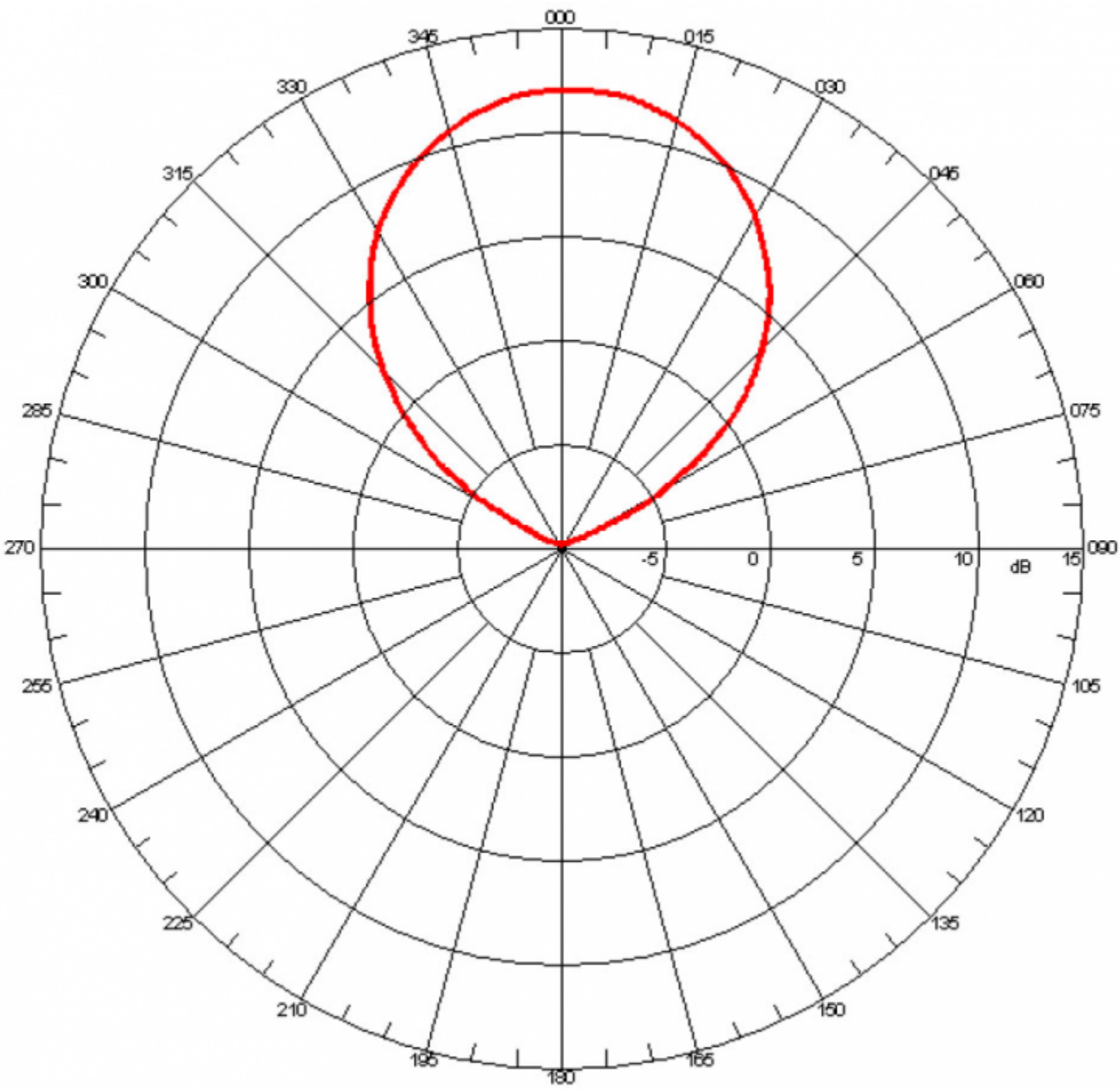

Azimuth Pattern

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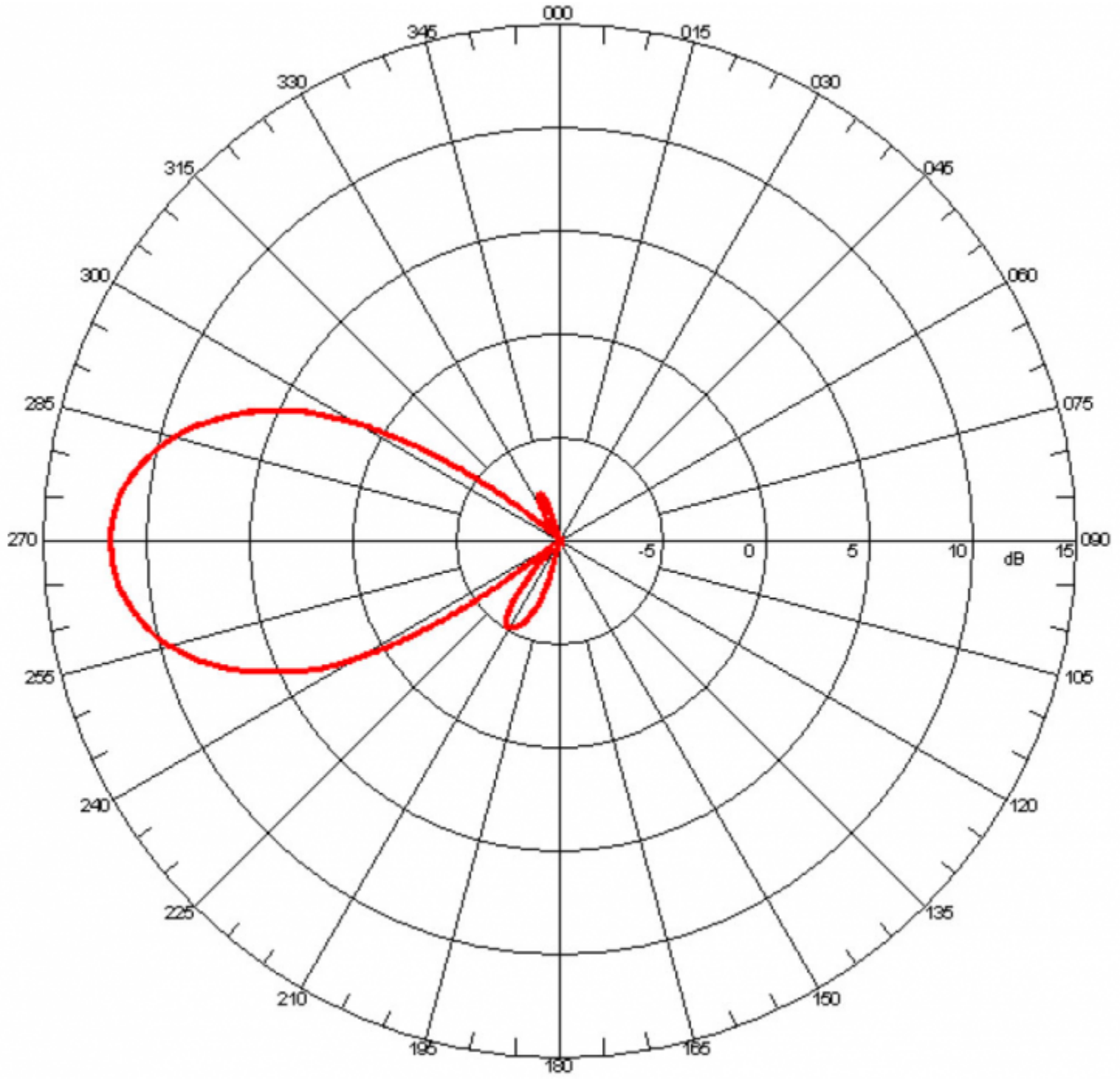

Elevation Pattern

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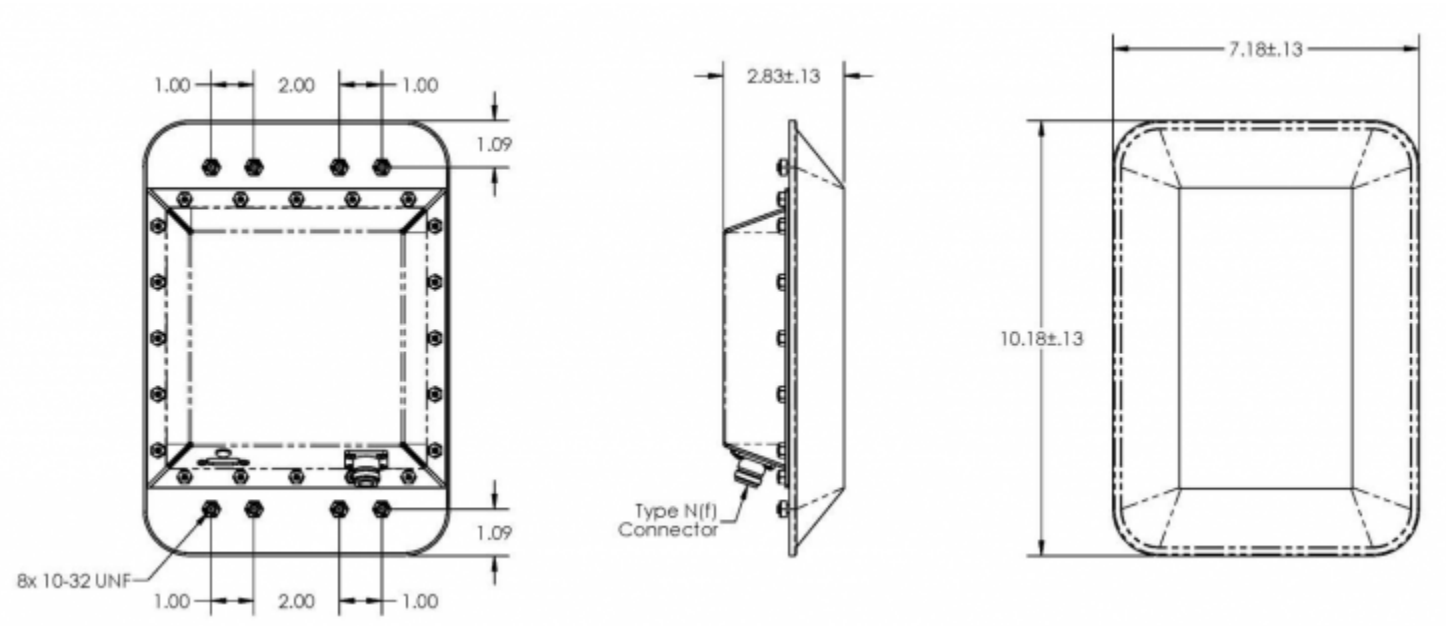

Engineering Drawing

Dimensions are in inches

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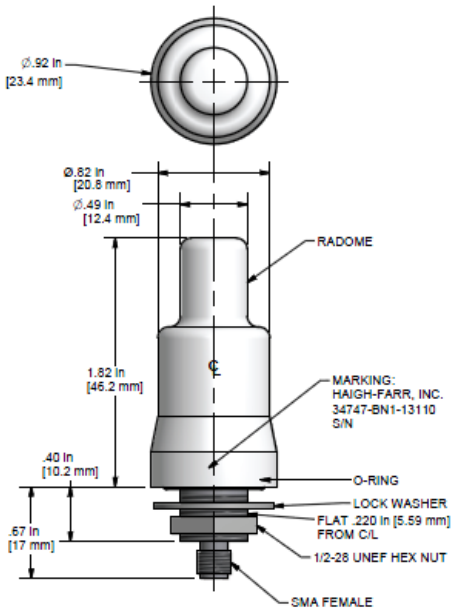
THE WORLD LEADER IN HIGH PERFORMANCE WRAPAROUND™ ANTENNAS.

BROADBAND BUTTON ANTENNA P/N BN1-13110

Model BN1-13110 is designed to operate at telemetry frequencies within L-, S-, and C-Band. Over the frequency ranges 1.4-2.7 GHz and 4.0-5.5 GHz, it provides both low VSWR and excellent omnidirectional pattern coverage.

Haigh-Farr Button antennas are designed for applications where size and weight are critical. They utilize well-proven materials and methods of construction, providing a solid package and requiring only one "D" hole installed in the vehicle for mounting. Superb protection is obtained through the use of a high-impact, high-temperature radome, with excellent properties in environments containing moisture and contaminants.



ELECTRICAL:

Frequency Bands:	1.4-2.7 GHz and 4.0-5.5 GHz
Power:	>30W Average
VSWR:	<1.6:1 typical, 2:1 max over operating bands
Input Impedance:	50 Ohms nominal
Polarization:	Linear, vertical
Radiation Pattern:	Omni-directional

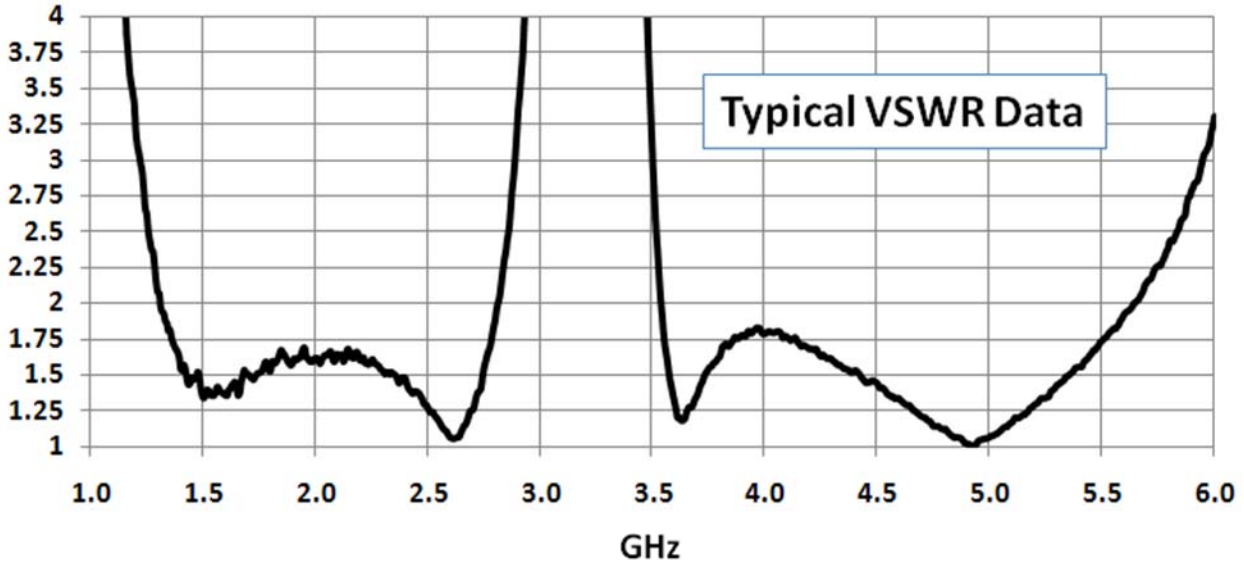
MECHANICAL:

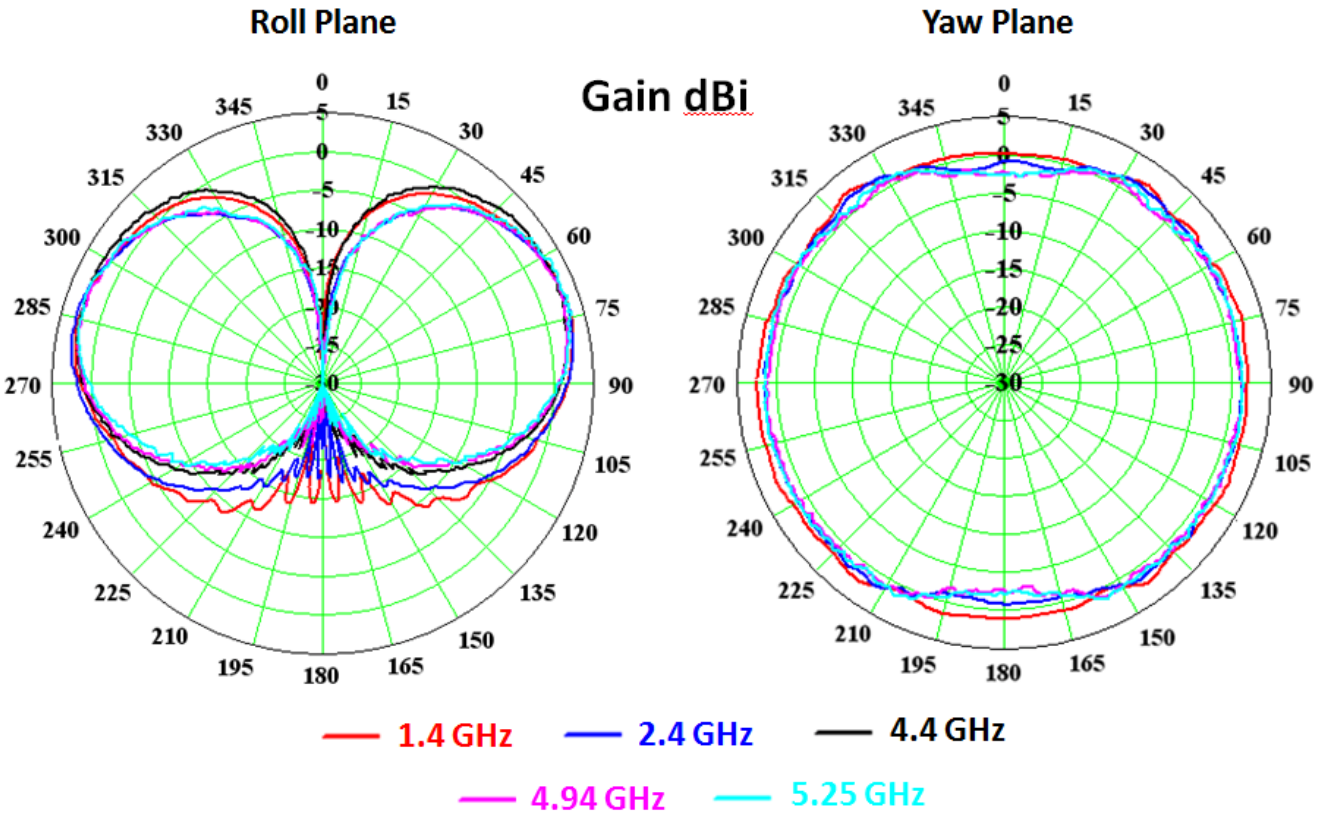
Connector:	SMA Female Standard (TNC Optional)
Dimensions:	See above drawing
Weight:	1.9 oz (55 gm)
Finish:	All exposed metallic surfaces are passivated stainless steel
Environmental:	Typical for supersonic airborne applications
Mounting:	Through "D" hole in vehicle and secured using lock washer and nut

DESIGN CAPABILITY

Haigh-Farr has an over 40 year history of designing and producing exceptionally rugged, high-performance antennas. If you don't find an antenna meeting your requirements in our standard list of products, Haigh-Farr has the experience and modeling capability to customize a solution. Adaptations of existing designs can be done with very short lead times. Contact Haigh-Farr for a review of your antenna requirements.

Haigh-Farr, Inc. 43 Harvey Road, Bedford NH 03110
Tel: 603-644-6170 Fax: 603-644-6190
E-mail: sales@haigh-farr.com Web Site: www.haigh-farr.com





Note: Measured on a 40" diameter, 6' long cylindrical ground plane. Fins and other protrusions on the vehicle will perturb the radiation pattern. The extent of any perturbations cannot be fully determined until radiation patterns are either calculated or measured on a model of the vehicle. Haigh-Farr offers engineering services, which include the calculation of radiation patterns on a specific vehicle.

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FCC FORM 442 - FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR NEW OR MODIFIED RADIO STATION UNDER PART 5 OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER THAN BROADCAST)

Approved by OMB 3060 - 0065 Expires 09/30/98

Applicant's Name (company): AeroVironment, Inc. **File No.:**

Mailing Address

Attention: Bart Decker, Flight Standards Dir
Street Address: 85 Moreland Road
P.O. Box:
City: Simi Valley
State: CA
Country:
Zip Code: 93065
E-Mail Address: Decker@avinc.com

Application Purpose

Application is for:

For Modification indicate below

File No.: **Callsign:**
WK2FXQ

Government Contract

Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? If "YES", include as an exhibit a narrative statement describing the government project, agency and contract number. No

Foreign Government Use

Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? If "YES", include the contract number and the name of the foreign government concerned as an exhibit. No

Research Project

Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project)? If "YES", include as an exhibit the following information:

a. **A description of the nature of the research project being conducted.**
b. **A showing that the communications facilities requested are necessary for the research project involved.**
c. **A showing that existing communications facilities are inadequete.**

No

Exhibit Information

If all the answers to Items 4, 5, 6 are "NO", include as an exhibit a narrative statement describing in detail

the following items:

a. **The complete program of research and experimentation proposed including description of equipment and theory of operation.**
b. **The specific objectives sought to be accomplished.**
c. **How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art, or is along line not already investigated.**

Estimated Duration

Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application: 12 Months

Environmental Impact

Would a commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact? If "YES", include as an exhibit an Environmental Assessment as required by Section 1.1311. No

Manufacturer

List below transmitting equipment to be installed (if experimental, so state) if additional rows are required, please submit equipment list as an exhibit :

Manufacturer	Model Number	No. Of Units	Experimental
Quansonix	QSXVDR211000504	2	No

Station ID

Is the equipment listed in Item 10 capable of station identification pursuant to Section 5.115? No

Applicant Type

Applicant is: Corporation

Foreign Government

Is applicant a foreign government or a representative of a foreign government? No

License Denied or Revoked

Has applicant or any party to this application had any FCC station license or permit revoked or any application for permit, license or renewal denied by this Commission?
If "YES", include as an exhibit a statement giving call sign of license or permit revoked and relate circumstances. No

Owner and Operator

Will applicant be owner and operator of the station? Yes

Contact Information

Give the following information of person who can best handle inquiries pertaining to this application: First Name: John
Last Name: Logan

Title: attorney
Phone Number: 2027875621
E-Mail Address: johnelogan@jelogan.com

Drug Abuse Question

APPLICANT ANTI-DRUG ABUSE CERTIFICATION: By checking "YES", the individual applicant certifies that he or she is eligible for this license. This requires that he or she is not subject to a denial of federal benefits, including FCC benefits, as a result of a drug offense conviction pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862. A non-individual applicant, e.g., corporation. partnership or other unincorporated association, certifies that no party to the application is subject to a denial of federal benefits, pursuant to that section. For definition of a "party" for these purposes, see 47CFR 1.2002(b). Yes

Certification

THE APPLICANT CERTIFIES THAT:

a. **Copies of the FCC Rule Parts 2 and 5 are on hand; and**
b. **Adequete financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and**
c. **All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and**
d. **Grant of the authorization requested herein will not be construed as a finding on the part of the Commission:**
    1. **that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and**
    2. **that the applicant will be authorized to operate on any basis other than experimental, and**
    3. **that the Comission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.**

THE APPLICANT FURTHER CERTIFIES THAT:

e. **All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and**
f. **The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and**
g. **The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.**

Name of Applicant: AeroVironment, Inc.
Signature (Authorized person filing form): Earl Cox
Signature Date (Authorized person filing form):
Title of Person Signing Application: Senior Engineer
Classification: Authorized employee

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(A)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974 AND THE PAPERWORK REDUCTION ACT OF 1980

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specified by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered by the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to 47 CFR 0.459 of the FCC Rules and Regulations. Your response is required to obtain this authorization.

Public reporting burden for this collection of information is estimated to average four (4) hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this

burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0065), Washington DC 20554. DO NOT send completed applications to this address. Individuals are not required to respond to this collection unless it displays a currently valid OMD control number.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

	City	State	Latitude	Longitude	Mobile	Street (or other indication of location)	County	Radius of Operation
0	Truth or Consequences	NM	North 32 59 31	West 106 58 17	Airborne UAV operations 100km of center, 24.4 km AGL	Near Co Road A021	Sierra	100.00 km

Datum: NAD 83

Is a directional antenna (other than radar) used? Yes

Exhibit submitted: Yes

(a) Width of beam in degrees at the half-power point:

(b) Orientation in horizontal plane (degrees from True North):

(c) Orientation in vertical plane (degrees from horizontal):

Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building? Yes

(a) Overall height above ground to tip of antenna in meters: 24.4 km

(b) Elevation of ground at antenna site above mean sea level in meters: 1404

(c) Distance to nearest aircraft landing area in kilometers: 0

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft: None

Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	5140.00000000-5150.00000000 MHz	MO	5.000000 W 5.000000 W	M	2.00000000 %	3M90G1D	SO-QPSK