

Spectrum Certification / Equipment Characteristics Cover Page

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APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	Classification UNCLASSIFIED - Special Handling	Date 08 Jan 2018	J/F 12/
DoD General Information			

To (U) ARMY Spectrum Management Office Defense Information System Agency (DISA) 6916 Cooper Avenue Fort Meade, Maryland 20755-7901	From (U) PEO Missiles and Space Martin Road, Bldg 5250 Room C230 Redstone Arsenal, AL 35898
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Application Title (U) Kinetic Drone Defeat Phase 2

System Nomenclature: (U) W15QKN-17-9-0016
Type: Commercial
Manufacturer:

Stage of Allocation (U) 2 - Experimental **Intended for Operational Inventory** (U) Yes

Frequency Requirements For more information see [Station Details \(Page 2\)](#)

#	Frequency	Emission	Power	Service / Station Class	Equipment
1 (U)	430 - 450 MHz 6750 - 8000 MHz	600MF3N 40K0F1D	Mean: 10 W	Aeronautical Mobile / FAT Land Mobile / FL	Ground Station <--> UAS Tx 1 Ant 1 , 2 Tx 2 Ant 3 Rx 1 Ant 1 , 2 Rx 2 Ant 3

Target Starting Date for Subsequent Stages
 Stage 2: (U) NA Stage 3: Stage 4:

Extent of Use (U) Intermittent
Remarks (U)
 active for 1-2 hrs per day.

Geographical Area for
 Stage 2: (U) Yuma Proving Ground, Arizona
 Stage 3: (U) NA, Unknown
 Stage 4: (U) NA, Unknown

Number of Units
 Stage 2: (U) 2 Stage 3: Stage 4:

Number of Units Operating Simultaneously in the Same Environment (U) 1

Number of Mobile Units (U) 2

Superseded J/F 12s (U) NA	Related J/F 12s (U) NA
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System Purpose and Concepts
 (U) Flight Termination System (for flight test range use only, not tactically deployed).

Wartime Use (U) No

TSPR **Emergency Use** (U) No

Information Transfer Requirements
 (U) Digital data using GFSK modulation

DoD General Information

Estimated Initial Cost of the System (U) \$1,000

Target Date for

Application Approval: (U) 19 Jan 2018

System Activation: (U) 20 Jan 2018

System Termination: (U) 19 Jan 2023

System Relationship and Essentiality

(U) Point-to-point radio system to reinforce safe operation of armed air vehicle on flight test range. Provides independent ability to terminate flight of operational armed air vehicle.

Replacement Information

(U) Original implementation. Not replacing any other existing system.

Related Analysis and/or Test Data

(U) NAvail

NTIA Coordination Required Yes

ITU Waiver (U) No

Originating MILDEP (U) AR

Other Using MILDEPs

Names and Telephone Numbers

Program Manager (U)

Name: Guthre Wallace

Commercial: 256-655-3081

DSN:

Email: guthre.s.wallace.civ@mail.mil

Project Engineer (U)

Name: Chris Troudt

Commercial: 520-434-6325

DSN:

Email: Christopher.D.Troudt@raytheon.com

Station Details

Name: (U) Ground Station

Type: (U) Land

Location(s): (U) Yuma Proving Ground, Arizona

Description:

Name: (U) UAS

Type: (U) Airborne

Location(s): (U) Yuma Proving Ground, Arizona

Description: (U) Aircraft

Frequency Requirement Details

Frequency Requirement 1

Tx 1 - Ant 1

Tx 1 - Ant 2

Tx 2 - Ant 3

Remarks

Transmitter Equipment Characteristics #1

Nomenclature: (U) EzUHF Transmitter
Type: Commercial
Manufacturer: (U) Immersion RC

Transmitter Installation
Installation Type: (U) Land Fixed
Potential Platform: (U) UAS Ground Station

Transmitter Type: (U) FM and FSK Communications

Tuning Range
 (U) 430 - 450 MHz
 This is a summary of Tuning Ranges in the modes.

Method of Tuning: (U) Synthesizer PLL
 This Tuning Method is used by every mode.

Frequency Tolerance: (U) 15 ppm
 This Frequency Tolerance is used by every mode.

Filter Employed (U) NA

Output Device
Type: (U) Transistor **Name:** (U) NA

FCC Type Acceptance No.: (U) NA

Pre-Emphasis: (U) No

Mode 1 - (U) 40K0F1D **Name:** [See Remark 1 \(Page 3\)](#)

Tuning Range	Tuning Step	Num Channels	Lowest Usable Channel	Min. Separation	Num Frequencies
(U) 430 - 450 MHz	(U) 500 kHz	(U) 8	(U) 431 MHz	(U) 1 MHz	

Method of Tuning: (U) Synthesizer PLL

Emission Bandwidth Emission Bandwidth Source: Measured

- 3 dB: (U) 30 kHz
- 20 dB: (U) 40 kHz
- 40 dB: (U) 60 kHz
- 60 dB: (U) 400 kHz

Occupied Bandwidth: (U) 40 kHz Occupied Bandwidth Source: Measured

Modulation Type: (U) Digital

Power Mean High: (U) 2 W

- Mean Low: (U) NA
- PEP Low: (U) NA
- Carrier Low: (U) NA
- PEP High:
- Carrier High:

Baseband Signal Type: (U) FSK

Max. Modulation Frequency: (U) NA Min.: (U) NA

Modulation

- Digital Modulation Type: (U) FSK
- Max. Bit Rate: (U) 30 kbps

Spread Spectrum

- Spread Spectrum Type: (U) Frequency hopped
- Frequency Range: (U) 430 - 450 MHz
- Number of Frequencies: (U) NA

Frequency Tolerance: (U) 15 ppm

Harmonic Level

- 2nd Harmonic: (U) -40 dB
- 3rd Harmonic: (U) -60 dB
- Other Harmonic: (U) -60 dB

Spurious Emission: (U) -60 dB

Remarks
 Remark 1 (Mode 1):
 (U) Number of Frequencies: Spread spectrum uses "extreme hopping" mode for channel hopping patterns within tuning range.

Transmitter Equipment Characteristics #2

Nomenclature: (U) TSC 287000

Type: Commercial

Manufacturer: (U) TECHNOLOGY SERVICE CORP.

Transmitter Installation

Installation Type: (U) Air

Potential Platform: (U) Unmanned Aircraft System (UAS)

Transmitter Type: (U) FM CW

Tuning Range

(U) 6750 - 8000 MHz

This is a summary of Tuning Ranges in the modes.

Method of Tuning: (U) Oscillator Voltage Controlled

This Tuning Method is used by every mode.

Frequency Tolerance: (U) 25 ppm

This Frequency Tolerance is used by every mode.

Filter Employed

Output Device

Type: (U) Transistor

Name: (U) Monolithic Microwave Integrated Circuit

FCC Type Acceptance No.: (U) NA

Pre-Emphasis: (U) No

Mode 1 - (U) 600MF3N		Name:		See Remark 1 (Page 4)		
Tuning Range	Tuning Step	Num Channels	Lowest Usable Channel	Min. Separation	Num Frequencies	
(U) 6750 - 8000 MHz	(U) NA	(U) NA	(U) 6.75 GHz	(U) NA	(U) NA	
Method of Tuning: (U) Oscillator Voltage Controlled						
Emission Bandwidth		Emission Bandwidth Source: Calculated				
-3 dB:	(U) 608 MHz					
-20 dB:	(U) 615 MHz					
-40 dB:	(U) 669 MHz					
-60 dB:	(U) 1.054 GHz					
Occupied Bandwidth: (U) 601 MHz		Occupied Bandwidth Source: Calculated				
Modulation Type: (U) Digital						
Power	Mean Low:	(U) NA	Mean High:	(U) 10 W		
	PEP Low:	(U) NA	PEP High:			
	Carrier Low:	(U) NA	Carrier High:			
Baseband Signal Type: (U) FM-CW						
Max. Modulation Frequency: (U) 585 MHz		Min.:				
Frequency Tolerance: (U) 25 ppm						
Harmonic Level						
2nd Harmonic:	(U) -60 dB					
3rd Harmonic:	(U) -60 dB					
Other Harmonic:	(U) -60 dB					
Spurious Emission: (U) -60 dB						

Remarks

Remark 1 (Mode 1):

- (U) Remark 1 (Nomenclature 1):
- (U) Technology Service Corporation Terminal Guidance Seeker TSC 287000
- Remark 2 (Mode 1):
- (U) Item 12a-d: This is an FM-CW waveform that is either on or off.
- Item 21c: Harmonics greater than the third (3rd) are not capable of being accurately measured with existing laboratory equipment.

Receiver Equipment Characteristics #1

Nomenclature: (U) EzUHF 8 Channel Diversity Receiver

Type: Commercial

Manufacturer: (U) Immersion RC

Receiver Installation

Installation Type: (U) Unmanned Aircraft System (UAS)

Potential Platform: (U) Aircraft

Receiver Type (U) Other

Tuning Range

(U) 430 MHz

This is a summary of Tuning Ranges in the modes.

Method of Tuning: (U) Synthesizer PLL

This Tuning Method is used by every mode.

Frequency Tolerance: (U) 15 ppm

This Frequency Tolerance is used by every mode.

Preselection Type: (U) Front end bandpass filter

Conducted Emissions:

FCC Type Acceptance No.: (U) NA

De-Emphasis:

Mode 1 - (U) 40K0F1D

Name:

[See Remark 1 \(Page 5\)](#)

Tuning Range	Tuning Step	Num Channels	Lowest Usable Channel	Min. Separation	Num Frequencies
(U) 430 MHz	(U) 450 MHz				

Method of Tuning: (U) Synthesizer PLL

Max. Post Detection Frequency: (U) NA Min.: (U) NA

Max. Bit Rate: (U) 30 kbps

Frequency Tolerance: (U) 15 ppm

Sensitivity

Level: (U) -112 dBm

Criteria Type: (U) S/N

Criteria Level: (U) 5.5

Noise Figure: (U) 5 dB

IF Frequency

1st Stage:

2nd Stage:

3rd Stage:

Oscillator Tuned

1st Stage:

2nd Stage:

3rd Stage:

IF Selectivity	1st Stage	2nd Stage	3rd Stage
-3 dB:			
-20 dB:			
-60 dB:			
Source:			

RF Selectivity

-3 dB: (U) 400 kHz

-20 dB: (U) 650 kHz

-60 dB: (U) 1.4 MHz

Source: Calculated

Image Rejection: (U) NA

Spurious Rejection: (U) 60 dB

Remarks

Remark 1 (Mode 1):

(U) Lowest Usable Channel: 431 MHz
 Min Separation: 1 MHz
 Number Frequencies: NA; Frequency hopping.

Receiver Equipment Characteristics #2

Nomenclature: (U) Terminal Guidance Seeker Receiver: TSC 287000

Type: Commercial

Manufacturer: (U) TECHNOLOGY SERVICE CORP.

Receiver Installation

Installation Type: (U) Unmanned Aircraft System (UAS)

Potential Platform: (U) Unmanned Aircraft System (UAS)

Receiver Type (U) Homodyne

Tuning Range

(U) 6750 - 8000 MHz

This is a summary of Tuning Ranges in the modes.

Method of Tuning: (U) Oscillator Voltage Controlled

This Tuning Method is used by every mode.

Frequency Tolerance: (U) 25 ppm

This Frequency Tolerance is used by every mode.

Preselection Type: (U) NA

Conducted Emissions:

FCC Type Acceptance No.: (U) NA

De-Emphasis: (U) No

Mode 1 - (U) 600MF3N Name: [See Remark 1 \(Page 6\)](#)

Tuning Range	Tuning Step	Num Channels	Lowest Usable Channel	Min. Separation	Num Frequencies
(U) 6750 - 8000 MHz	(U) NA	(U) NA	(U) NA	(U) NA	(U) NA

Method of Tuning: (U) Oscillator Voltage Controlled

Max. Post Detection Frequency: (U) 1.3 MHz Min.: (U) 150 kHz

Max. Bit Rate: (U) NA

Frequency Tolerance: (U) 25 ppm

Sensitivity

Level: (U) -120 dBm

Criteria Type: (U) S/N

Criteria Level: (U) 20

Noise Figure: (U) 2 dB

Noise Temperature: (U) 290 kelvins

IF Frequency

1st Stage:

2nd Stage:

3rd Stage:

Oscillator Tuned

1st Stage:

2nd Stage:

3rd Stage:

IF Selectivity	1st Stage	2nd Stage	3rd Stage
-3 dB:			
-20 dB:			
-60 dB:			
Source:			

RF Selectivity

-3 dB: (U) 1 MHz

-20 dB: (U) 1.2 MHz

-60 dB: (U) 1.5 MHz

Source: Calculated

Image Rejection: (U) 0 dB

Spurious Rejection: (U) 60 dB

Remarks

Remark 1 (Mode 1):

(U) Remark 1 (Nomenclature 1):
(U) Technology Service Corporation

Remark 2 (Mode 1):
(U) Item 10 & 12: There is no intermediate frequency.
The system is a Homodyne (direct Conversion) receiver with a baseband filter that has break points at 1 MHz (-3dB), 1.2 MHz (-20 dB) and 1.5 MHz (-60 dB).

Receiver Equipment Characteristics #2

Antenna Equipment Characteristics #1

Nomenclature: (U) ZDADJ430-9YG

Type: Commercial

Manufacturer: (U) ZDA Communications US LLC

Antenna Type: (U) Yagi-Unidirectional Array

Frequency Range

(U) 430 - 450 MHz

This is a summary of Frequency Ranges in the modes.

Phased Array

Number of Main Beams:

Elements:

Sidelobes

1st Vertical Side Lobe Attenuation: (U) 10 dB

1st Vertical Side Lobe Elevation: (U) 52 deg

1st Horizontal Side Lobe Attenuation: (U) 10 dB

1st Horizontal Side Lobe Azimuth: (U) 45 deg

Antenna Dimensions

Vertical:

Horizontal:

Diameter:

Mode 1

Name:

Function: (U) Transmit Only

Frequency Range: (U) 430 - 450 MHz

Gain: (U) 9 dBi

Front-to-back Ratio:

Polarization Type: (U) Horizontal linear

Scan Characteristics

Vertical

Type:

Min. Elevation Angle:

Max. Elevation Angle:

Scan Rate:

Scan Speed:

Sector Blanking:

Horizontal

Type:

Sector:

Scan Rate:

Scan Speed:

Horizontal Beamwidth: (U) 68 deg

Vertical Beamwidth: (U) 52 deg

Remarks

Antenna Equipment Characteristics #2

Nomenclature: (U) ANT-433MR

Type: Commercial

Manufacturer: (U) LPRS

Antenna Type: (U) Whip

Frequency Range

(U) 430 - 470 MHz

This is a summary of Frequency Ranges in the modes.

Phased Array

Number of Main Beams:

Elements:

Sidelobes

1st Vertical Side Lobe Attenuation: (U) NA dB

1st Vertical Side Lobe Elevation: (U) NA deg

1st Horizontal Side Lobe Attenuation: (U) NA dB

1st Horizontal Side Lobe Azimuth: (U) NA deg

Antenna Dimensions

Vertical:

Horizontal:

Diameter:

Mode 1

Name:

Function: (U) Receive Only

Frequency Range: (U) 430 - 470 MHz

Gain: (U) 3 dBi

Front-to-back Ratio:

Polarization Type: (U) Horizontal linear

Scan Characteristics

Vertical

Horizontal

Type:

Type:

Min. Elevation Angle:

Sector:

Max. Elevation Angle:

Scan Rate:

Scan Rate:

Scan Speed:

Scan Speed:

Sector Blanking:

Horizontal Beamwidth: (U) 360 deg

Vertical Beamwidth: (U) 360 deg

Remarks

Antenna Equipment Characteristics #3

Nomenclature: (U) Terminal Guidance Seeker Antenna: TSC 287000

Type: Commercial

Manufacturer: (U) TECHNOLOGY SERVICE CORP.

Antenna Type: (U) Dipole

Frequency Range

(U) 6750 - 8000 MHz

This is a summary of Frequency Ranges in the modes.

Phased Array

Number of Main Beams:

Elements:

Sidelobes

1st Vertical Side Lobe Attenuation: (U) NA dB

1st Vertical Side Lobe Elevation: (U) NA deg

1st Horizontal Side Lobe Attenuation: (U) NA dB

1st Horizontal Side Lobe Azimuth: (U) NA deg

Antenna Dimensions

Vertical:

Horizontal:

Diameter:

Mode 1

Name:

Function: (U) Transmit-Receive

Frequency Range: (U) 6750 - 8000 MHz

Gain: (U) 7 dBi

Front-to-back Ratio:

Polarization Type: (U) Linear

Scan Characteristics

Vertical

Type:

Min. Elevation Angle:

Max. Elevation Angle:

Scan Rate:

Scan Speed:

Sector Blanking:

Horizontal

Type:

Sector:

Scan Rate:

Scan Speed:

Horizontal Beamwidth: (U) 50 deg

Vertical Beamwidth: (U) 80 deg

Remarks

Remark 1 (Antenna):

(U) This Antenna is part of the Transmitter 2 and Receiver 2.