Test Report

Prepared for: Honeywell

Model: Aspire 350-3A

Description: Aircraft Earth Station

FCC ID: K6K-350-3A

To

FCC Part 1.1310

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	5/20/24	Greg Corbin	Original Document
2.0	6/12/2024	Greg Corbin	Revised HGA P/N and description in Table 1 on page 4
3.0	6/13/2024	Greg Corbin	Revised MPE calculation using rated maximum conducted output power on page 6

ANAB

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N/A

EUT Description
Model: Aspire 350-3A
Description: Aeronautical Earth Station
Serial Number: 136
Additional Information:

The Aspire 350-3A system is installed on aircraft to support aviation voice and datalink safety services communication as defined for existing Iridium Block 1 satellites as well as non-safety data services for cabin.
The Aspire 350-3A system contains 4 sub-system modules, SDU, SCM, LGA, HGA as listed in Table 1.

Table 1_Subsystem P/N and Descriptions

System Name	Honeywell Product Number	Description
Aspire 350-3A	90410181-001	Aspire 350-3A Aeronautical Earth Station
Subsystem Name	**Honeywell Part Number**	**Description**
SDU	90405928-001R	Satellite Data Unit
SCM	90405930-000	SDU Configuration Module
LGA	90406980	Low Gain Antenna
HGA	90412170	Non-Radiating High Gain Antenna

The Aspire 350-3A SDU contains 3 modems providing communication services to the aircraft.
2 modems LBT1 and LBT2 (LBT 9523N) are identical and support aviation voice and datalink safety services communication for the cockpit.
The 3rd modem, HCM (BCX 9810A) supplies non-safety data services to the cabin.

Table 2 - Transmit Frequency Range

Modem	TX Frequency Range (MHz
LBT1, LBT1 (cockpit service)	1616 - 1626 MHz
HCM (cabin service)	1618 - 1626 MHz

The following tables contain the emission designators, maximum conducted power levels at the provided test ports, antenna gain and maximum EIRP allowed.

Table 3 - Emission Designators for Aspire 350-3A Carriers

Carrier Type	Modulation	Symbol Rate (ksps)	Maximum Data Rate (kbps)	Nominated BW (kHz)	Emission Designation	Authorized BW (kHz)
B1	DE-QPSK	25	2.3	208	208KG7W	41.667
C1	QPSK	30	2.7	208	208KG7W	41.667
C2	QPSK	60	5.5	416	416KG7W	83.333
C8	QPSK	240	87.8	666	666KG7W	333.333
C8	16APSK	240	175.6	666	666KD7W	333.333
2C8	QPSK	480	175.6	1332	1M33G7W	666.667
2C8	16APSK	480	351.2	1332	1M33D7W	666.667

Table 4A - Transmit EIRP and Transmit RF Output Power Limits of the Safety Service with LBT 9523N modems

Carrier Type	Modulation	Nominal EIRP (dBW)	Nominal RF Output (dBm) at SDU Test Port (Antenna Gain = 3 dBic)	Maximum EIRP (Note 1) (dBW)
B1	DE-QPSK	6.4	33.4 +2.6/-3.4	9.0
Note 1: Maximum allowed output power is +36 dBm (9 dBW – 3 dBic, 0 dB cable loss)				

Table 4B - Transmit EIRP and Transmit RF Output Power Limits of the Cabin Service with HCM Modem – on HGA RF Test Port (Per DO-262F, Table F-11)

Carrier Type	Modulation	Nominal EIRP (dBW)	Nominal RF Output (dBm) at HGA Test Port (Note 1) (Antenna Gain = 8 dBic)	Maximum EIRP (Note 2) (dBW)
B1	DE-QPSK	5.0	21.0 ±1.0	10.5
C1	QPSK	4.0	20.0 ±1.0	9.5
C2	QPSK	3.0	19.0 ±1.0	8.5
C8	QPSK	9.0	25.0 ±1.0	14.5
2C8	QPSK	12.0	28.0 ±1.0	17.5
C8	16APSK	15.2	31.2 ±1.0	19.5
2C8	16APSK	18.2	34.2 ±1.0	22.5

Notes:

1) The HGA has 4 ports. The test port cable was attached to each port while measuring the HCM output power. The un-used ports were terminated into 50-ohm high power terminations. The output power for all 4 ports were summed together for the final output power.
2) EIRP Max is the maximum EIRP value allowed due to variation in antenna gain, temperature, and frequency per manufacturer internal specifications.

EUT Operation during Tests

The SDU was mounted in a test tray with several multi-conductor cables interfacing it to the HGA, SCM and the test rack provided by the manufacturer.
The LBT1 and LBT2 modem outputs were provided via RF cables that are part of the multi-conductor cables coming from the tray assembly. The cable insertion loss for the LBT1 and LBT2 RF cables was accounted for in the measurements.

The HCM modem output was provided via a test port on the HGA assembly.

HCM Output antenna type is steered. The HGA uses four radiating elements connected to each of the four RF ports to create different beams which are steered in different directions based on the angle which has the best signal reception from the Satellite.

HGA is intended to be installed on fuselage of aircrafts at a distance of more than 1 meter from anybody standing on the body of the aircraft. The boresight of the antenna is always pointed to an LEO Satellite in the sky and the front to back gain of the HGA is ≥6dB.

The HGA assembly includes a bandpass filter. The manufacturer provided frequency vs insertion loss test data that included the gain / loss characteristics of the filter and radiating elements. This data was included in the output power and spurious emissions calculations.

The system is powered by 28 vdc provided by a separate DC power supply.

MPE Evaluation

The EUT is a mobile device used in an Uncontrolled Exposure environment.

Limits Uncontrolled Exposure 47 CFR 1.1310 Table 1, (B)	0.3-1.234 MHz:	Limit [mW/cm²] = 100
	1.34-30 MHz:	Limit [mW/cm²] = (180/f²)
	30-300 MHz:	Limit [mW/cm²] = 0.2
	300-1500 MHz:	Limit [mW/cm²] = f/1500
	1500-100,000 MHz	Limit [mW/cm²] = 1.0

Test Data

The highest output power Per the maximum allowed EIRP specification provided by the manufacturer on page 5 was used for the worse case calculations for each band.
MPE is provided for both the LBT output and the HCM output.

$S = \frac{P * G}{4\pi r^2}$
Power Density (S) mw/cm^2

LBT Output

Note: Maximum conducted output power used is the manufacturer declared maximum power at the antenna port.

Test Frequency, MHz	1616
Power, Conducted, mW (P)	3981.1
Antenna Gain Isotropic	3
Antenna Gain Numeric (G)	2
Antenna Type	patch
Distance (R)	20 cm

Power Density (S) =1.584 mw/cm^2
Limit = (from above table) = 1.0 mw/cm^2

The EUT Power Density is over the limit at 20 cm when used with the 3 dBi antenna so the minimum safe distance was calculated.

Minimum Safe Distance Evaluation

Test Frequency, MHz	1616
Power, Conducted, mW (P)	3981.1
Antenna Gain Isotropic	3 dBi
Antenna Gain Numeric (G)	2.0
Antenna Type	patch
Limit (L)	1

R=√(PG/4πL)			
Distance (R) cm	Power mW (P)	Numeric Gain (G)	Limit (L)
25.2	3981.1	2.0	1.0

The minimum safe distance with the 3 dBi antenna is 25.2 cm.

HCM Output

Note: Maximum conducted output power used is the manufacturer declared maximum power at the antenna port.

Test Frequency, MHz	1618
Power, Conducted, mW (P)	3311
Antenna Gain Isotropic	8
Antenna Gain Numeric (G)	6.31
Antenna Type	steered
Distance (R)	20 cm

Power Density (S) =4.157 mw/cm^2
Limit = (from above table) = 1.0 mw/cm^2

The EUT Power Density is over the limit at 20 cm when used with the 8 dBi antenna so the minimum safe distance was calculated.

Minimum Safe Distance Evaluation

Test Frequency, MHz	1618
Power, Conducted, mW (P)	3311
Antenna Gain Isotropic	8 dBi
Antenna Gain Numeric (G)	6.31
Antenna Type	steered
Limit (L)	1

R=√(PG/4πL)			
Distance (R) cm	Power mW (P)	Numeric Gain (G)	Limit (L)
40.8	3311	6.31	1.0

The minimum safe distance with the 8 dBi antenna is 40.8 cm.

Note: Max output power used is the manufacturer declared maximum power.

END OF TEST REPORT