



Radio Frequency Exposure Evaluation Report

For:

Rosemount Aerospace Inc.

Model Name:
8730L1-5

Product Description:

Aircraft Interface Device

FCC ID: 2AEAK8730L1-5
IC ID: 12766A-8730L15

Per:

CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report number: EMC_UTCAE-018-16501_FCC_IC_MPE

DATE: November 18, 2016



CETECOM Inc.

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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated, respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
Rosemount Aerospace Inc.	Aircraft Interface Device	8730L1-5

Report reviewed by: TCB Evaluator

November 18,
2016

Compliance

James Donnellan
(Senior EMC Engineer)

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Responsible for the Report:

November 18,
2016

Compliance

Kris Lazarov
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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	6370 Nancy Ridge Drive San Diego, CA 92121 U.S.A.
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Project Manager:	Laith Saman
Project Engineer:	James Donnellan

2.2 Identification of the Client / Manufacturer

Applicant's Name:	Rosemount Aerospace Inc.
Street Address:	14300 Judicial Road
City/Zip Code	Burnsville, MN 55306
Country	USA

3 Equipment under Assessment

Model #:	8730L1-5
HW Version :	08730-0427-0005/K
SW Version :	08730-0459-0002
FCC-ID :	2AEAK8730L1-5
HVIN:	8730L1-5
PMN:	Aircraft Interface Device
Product Description:	Aircraft Interface Device
Regulatory Band:	802.11: Nominal band: 2400 – 2483.5 MHz Cellular: WCDMA/UMTS FDD BAND II : 1852.4MHz – 1907.6MHz WCDMA/UMTS FDD BAND IV : 1712.4MHz – 1752.6MHz WCDMA/UMTS FDD BAND V : 826.4MHz – 846.6MHz LTE BAND 25/2 : 1852.5MHz – 1912.3MHz LTE BAND 4 : 1710.7MHz – 1754.3MHz LTE BAND 26/5 : 814.5MHz – 846.5MHz LTE BAND 7 : 2502.5MHz – 2567.5MHz LTE BAND 12 : 699.7MHz – 715.3MHz LTE BAND 13 : 779.5MHz – 784.5MHz LTE BAND 30 : 2307.5MHz – 2312.5MHz LTE BAND 41 : 2498.5 – 2687.5MHz
Integrated Module Info:	802.11: SparkLAN, WUBA-171GN, FCC-ID RYK-WUBA171GN, IC-ID 6158A-WUBA171GN Cellular: Sierra Wireless MC7455, FCC ID: 2AEAK8730L1-5, IC ID: 12766A-8730L15
Antenna Type:	802.11: Laird WTS2450 External Two-Way Radio Antenna 2.1dBi Cellular: Dipole Blade Omnidirectional Antenna (DBA6927C1-FSMAF) with peak gain of 0.5dBi (698-960 MHz) and 2.2dBi (1710-2700) MHz

Maximum Conducted Output Power from modular grant:	802.11: 29.5dBm for modulation and bandwidth which is not specified in module grant or report Cellular: UMTS II 0.225W = 23.52 dBm UMTS IV 0.221W = 23.44dBm UMTS V 0.224W = 23.50dBm LTE 2/25 0.251W = 24.0dBm LTE 4 0.249W = 23.96dBm LTE 5/26 0.249W = 23.96dBm LTE 7 0.196W = 22.92dBm LTE 12 0.251W = 24.00dBm LTE 13 0.247W = 23.93dBm LTE 30 0.197W = 22.94dBm LTE 41 0.142W = 21.52dBm
Power Supply:	No Power supply is part of the sales package.
Rated Operating Voltage Range:	Vmin: 18V dc/ Vnom: 28V dc / Vmax: 32.2V dc
Operating Temperature Range:	Tlow: -40° C/Tnom: 25° C/ Tmax: 55° C
Sample Revision:	☐ Prototype; ☒ Production; ☐ Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	$f \text{ (MHz)} / 1500$	30
1500 – 100.000	1.0	30

IC

300 – 6000	$0.02619 \times f \text{ (MHz)}^{0.6834}$	6
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4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.109(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9);

IC

300MHz ≤ operating frequency < 6 GHz: excluded if EIRP < $0.0131 \times f \text{ (MHz)}^{0.6834}$ W

4.3 EMC Output Power Limits (ERP/EIRP) acc. to FCC part 22/24 / IC RSS-132, RSS-133 (to be additionally taken into account for maximum antenna gain considerations)

part 22: 7W ERP / 38.5dBm (IC: 11.5W / 40.6dBm EIRP)

part 24: 2W EIRP / 33.0dBm

Per KDB 447498 D01 FCC allows calculative estimation of RF exposure for mobile applications when routine environmental evaluation categorical exclusion applies and also for fixed applications.

When categorical exclusion cannot be claimed for mobile applications MPE measurement is required for TCB approval.

RSS-102 of Industry Canada does generally not require RF exposure evaluation for fixed or mobile applications which stay below the given exclusion limits.

4.4 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm² or W/m²)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

5 Evaluations

5.1 Analysis to Exclude Routine RF Exposure Evaluation for Stand Alone Operation, Single and Multi transmitter compliance

Values for maximum cellular conducted output power taken from data sheet of module + tune up, as these were higher than and the ones reported in cellular module grant.

Values for maximum 802.11 modules taken from grant as these were higher than the ones from modular data sheet + tune-up.

Values of gains are taken from respective data sheets.

Calculations are made for 20cm.

[illegible]

band	lowest frequency [MHz]	FCC EIRP limit	IC EIRP limit in W	IC EIRP limit in dBm	FCC power density limit [mW/cm/cm]	IC power density limit [mW/cm/cm]	maximum conducted power + tuneup	GAIN	EIRP	Delta to IC limit which is worst case	Exempt	EIRP Power Density in [mW]	Power Density in 20cm distance in [mW/cm/cm]	single transmitter ratio to worst case IC	worst case multiple transmitter ratio	Limit
WiFi 2.4	2400	36.900	2.67	34.27	1	0.53	29.5	2.1	31.60	-2.67	Yes	1445.44	0.287561	0.538	0.781	1

Conclusion:

- The equipment is exempted from FCC and IC RF exposure routing evaluation and is meeting the requirement for simultaneous transmission at 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Report prepared by
November 18, 2016	EMC_UTCAE-018- 16501_FCC_IC_MPE	Initial Release	James Donnellan