MPE CALCULATIONS - FCC

1.0 APPLICANT:

DATE:	2/21/2018
NAME OF APPLICANT:	HONEYWELL INTERNATIONAL INC.
FCC ID:	CFS8DL6OCC

2.0 FCC RULES CONCERNING MAXIMUM PERMISSIBLE RF EXPOSURE:

§ CFR 47 1.1310 Radiofrequency radiation exposure limits.

The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, ''Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation.''

NOTE TO INTRODUCTORY PARAGRAPH:
These limits are generally based on recommended exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP) in ''Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,'' NCRP Report No. 86, Sections 17.4.1, 17.4.1.1, 17.4.2 and 17.4.3. Copyright NCRP, 1986, Bethesda, Maryland 20814. In the frequency range from 100 MHz to 1500 MHz, exposure limits for field strength and power density are also generally based on guidelines recommended by the American National Standards Institute (ANSI) in Section 4.1 of ''IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,''
ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers.

3.0 UUT POWER OUTPUT / ANTENNA GAIN / SEPARATION DISTANCE

The maximum output power from Exhibit 5-1 is measured as 18.53 dBm.
The duty cycle from Exhibit 3 is 6.98%, or 23.1 dB
The max antenna gain between the two antenna is 2.0 dBi
Assumed separate distance is 20cm

3.1 MPE CALCULATIONS:

FCC GENERAL POPULATION / UNCONTROLED EXPOSURE LIMITS:
FOR 300 MHz to 1,500 MHz use F / 1500 mW/cm^2;
FOR 1,500 to 100,000 MHz use 1 mW/cm^2

EQUATIONS:
MAX AVG EIRP (mW) = $10^{\{(\text{MAX COND PWR. + ANT GAIN + DUTY FACTOR})/10)\}}$
THE FRIIS TRANSMISSION EQUATION = EIRP X DUTY CYCLE / (4 X PI X 20 CM^2)

BANDS AND FCC IDs

BAND	FCC ID
2445MHz	CFS8DL6OCC

BAND:	CH No:	FREQ(Mhz)	TRP dbm	MAX COND. PWR (dBm)	ANTENNA GAIN(db):	DUTY FACTOR (dB)	MAX AVG EIRP (mW)	FRISS mW/CM^2 :	EXP LIMIT mW/CM^2 :	% OF LIMIT:
2445MHz	N/A	2445	N/A	18.53	2	23.10	0.553	0.0001101	1	0.0110

MAXIMUM MPE OF THE RF6 MODULE AS % OF LIMIT IS: 0.0110

4.0 RESULTS:

TEST RESULT: PASS
In the configuration tested the EUT complied with the standards specified above.

MPE CALCULATIONS - IC

1.0 APPLICANT:

DATE:	2/21/2018
NAME OF APPLICANT:	HONEYWELL INTERNATIONAL INC.
IC NUMBER:	573F-6OCC

2.0 IC RULES CONCERNING MAXIMUM PERMISSIBLE RF EXPOSURE:

RSS-102 § 2.5.2 Exemption Limits for Routine Evaluation - RF Exposure Evaluation.

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10^{-2} $f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

3.0 UUT POWER OUTPUT AND ANTENNA GAIN

The maximum output from Exhibit 5-1 is measured as 18.52 dBm.
The duty cycle from Exhibit 3 is 6.98%, or 23.1 dB
The max antenna gain between the two antennas is 2.0 dBi
The max time-averaged EIRP per 2.0 above is 1.31 x 10^{-2} x $2445^{0.6834}$ (W) = 2.709W = 2709 mW.
The power density at 20cm corresponding to 2709 mW EIRP is N/(4 x π x d^2) or 2679/(4*π*20^2) = **0.538 mW/cm^2**

3.1 MPE CALCULATIONS:

IC GENERAL POPULATION / UNCONTROLED EXPOSURE LIMITS:
FROM 300 MHz to 6 GHz use (1.31 x 10^{-2}) x f $^{0.6834}$ for max EIRP(W)

EQUATIONS:
MAX AVG EIRP (mW) = $10^{\{(\text{MAX COND PWR. + ANT GAIN + DUTY FACTOR})/10\}}$
THE FRIIS TRANSMISSION EQUATION = EIRP X DUTY CYCLE / (4 X PI X 20 cm^2)

BANDS AND IC NUMBERS

BAND	IC NUMBER:
2445MHz	573F-6OCC

BAND:	CH No:	FREQ(Mhz)	TRP dbm	MAX COND. PWR (dBm)	ANTENNA GAIN(db):	DUTY FACTOR (dB)	MAX AVG EIRP (mW)	FRISS mW/CM^2 :	EXP LIMIT mW/CM^2 :	% OF LIMIT:
2445MHz	N/A	2445	N/A	18.53	2	23.10	0.553	0.0001101	0.538	0.0205

MAXIMUM MPE OF THE RF6 MODULE AS % OF LIMIT IS: 0.0205

4.0 RESULTS:

TEST RESULT: PASS

In the configuration tested the EUT complied with the standards specified above.