MPE/RF EXPOSURE EVALUATION

ISED RSS-102 Issue 5

Report No.: HPEN155-U5_ISED_MPE Rev A

Company: Hewlett Packard Enterprise Company

Evaluation of: ASIN0304

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Calculations for RF Exposure Evaluation

Power Density = Pd (W/m^2) = EIRP/($4*\pi*d^2$)
EIRP = P * G
P = Peak output power (W)
G = Antenna numeric gain (numeric)
d = Separation distance (m)
Numeric Gain = 10 ^ (G (dBi)/10)
Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is $0.02619\ f^{0.6834}$ W/m^2.

The calculations in the table below use the highest conducted power values together with the antenna gain specified for the EUT. These calculations represent worst case in terms of the exposure levels.

Freq. Band (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated Power Density (W/m^2) @ 20cm	Power Density Limit (W/m^2)	Min Calculated safe distance for Limit (cm)
2400.0 - 2483.5 (BLE)	1.9	1.55	6.98	4.99	0.015	5.35	1.07
2400.0 - 2483.5 (Wi-Fi)	5.00	3.16	21.42	138.68	0.872	5.37	8.06
5150.0 - 5250.0	7.30	5.37	21.86	153.46	1.640	9.01	8.53
5250.0 – 5350.0	7.30	5.37	21.92	155.60	1.662	9.13	8.53
5470.0 – 5725.0	7.30	5.37	22.31	170.22	1.819	9.39	8.80
5725.0 - 5850.0	7.30	5.37	21.61	144.88	1.548	9.69	7.99

The ASIN0304 model contains a pre certified LTE radio module Canada ISED ID 10244A-201906EG21G,

Licensed Frequency Bands

MPE measurement results for licensed bands was provided through 3rd Party
Test Report: SGS-CSTC HR/2019/10016E-0102 Date: 7th May 2019

Simultaneous Operation LTE + BLE + Wi-Fi Assessment

Assessment of worst case exposure conditions with the 3 radios transmitting simultaneously.

Freq. Band (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density Limit (W/m^2) E_{ref}	Power Density (W/m^2)	E_i/E_{ref}
2400.0 - 2483.5 (BLE)	1.9	1.55	6.98	4.99	5.35	0.015	0.003
5470.0 – 5725.0	7.30	5.37	22.31	170.22	9.39	1.819	0.194
LTE B13 779.5	4.45	2.79	27.30	537.03	2.48	2.977	1.200
						Summation of Ratio:	1.397

The Total Evaluation was calculated using the formula:

$$\sum_{i=1}^{n} Ei/_{Eref} \leq 1$$

Where
Ei: calculated E-field Strength for transmitter
Eref: E-field strength related limit

The summation of E_i/E_{ref} >1; i.e. minimum separation distance has to be greater than 20 cm.

Simultaneous Operation LTE + BLE + Wi-Fi Assessment for minimum safe distance of 24 cm
Assessment of worst case exposure conditions with the 3 radios transmitting simultaneously.

Freq. Band (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density Limit (W/m^2) E_{ref}	Power Density (W/m^2)	E_i/E_{ref}
2400.0 - 2483.5 (BLE)	1.9	1.55	6.98	4.99	5.35	0.011	0.002
5470.0 – 5725.0	7.30	5.37	22.31	170.22	9.39	1.263	0.134
LTE B13 779.5	4.45	2.79	27.30	537.03	2.48	2.067	0.834
						Summation of Ratio:	0.970

The Total Evaluation was calculated using the formula:

$$\sum_{i=1}^{n} Ei/_{Eref} \leq 1$$

Where
Ei: calculated E-field Strength for transmitter
Eref: E-field strength related limit

Minimum Safe Distance = 0.24 m

Specification - RF Exposure Evaluation Limits

RSS 102 issue 5 table 4: Limit = $0.02619\ f^{0.6834}$ W/m^2

RSS-102 Issue 5

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m_2)	Reference Period (minutes)
0.003-0.1	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142\ f^{0.3417}$	$0.008335\ f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158\ f^{0.5}$	$4.21 \times 10^{-4}\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

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