



RF EXPOSURE REPORT

REPORT NO.: SA971230L08

MODEL NO.: Libra 5816 SS

ACCORDING: FCC Guidelines for Human Exposure

IEEE C95.1

APPLICANT: GIL Technology Co., Ltd

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RF EXPOSURE MEASUREMENT (MOBILE DEVICE)

1. INTRODUCTION

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Fully Anechoic Chamber (FAC) calibrated for antenna measurement in BV ADT, and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

2. RF EXPOSURE LIMIT

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FREQUENCY RANGE (MHz)	ELECTRIC FIELD STRENGTH (V/m)	MAGNETIC FIELD STRENGTH (A/m)	POWER DENSITY (mW/cm ²)	AVERAGE TIME (minutes)
(A) LIMITS FOR OCCUPATIONAL / CONTROL EXPOSURES				
300-1500	F/300	6
1500-100,000	5	6
(B) LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE				
300-1500	F/1500	30
1500-100,000	1.0	30

F = Frequency in MHz



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3. FRIIS FORMULA

Friis transmission formula : $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

$\pi = 3.1416$

R = distance between observation point and center of the radiator in cm

If we know the maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the MPE value at distance r .

Ref.: David K. Cheng, *Field and Wave Electromagnetics*, Second Edition,

Page 640, Eq. (11-133).

4. EUT OPERATING CONDITION

The software provided by Manufacturer enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 50cm away from the body of the user. Warning statement to the user for keeping at least 50cm or more separation distance with the antenna should be included in users manual. So, this device is classified as **Mobile Device**.



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6. TEST RESULTS

6.1 ANTENNA GAIN

The maximum Gain measured in Fully Anechoic Chamber is 17.5dBi or 56.234 (numeric).

6.2 OUTPUT POWER INTO ANTENNA & RF EXPOSURE VALUE AT DISTANCE 50cm:

FOR INTERNAL ANTENNA:

For Channel bandwidth: 5MHz

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5729.0	322.107	25.08	0.577	1.000
Middle	5788.0	319.154	25.04	0.571	1.000
High	5846.0	322.849	25.09	0.578	1.000

For Channel bandwidth: 10MHz

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5732.5	502.343	27.01	0.899	1.000
Middle	5788.0	508.159	27.06	0.910	1.000
High	5842.5	511.682	27.09	0.916	1.000

For Channel bandwidth: 15MHz

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5734.0	506.991	27.05	0.908	1.000
Middle	5788.0	508.159	27.06	0.910	1.000
High	5841.0	503.501	27.02	0.901	1.000

For Channel bandwidth: 20MHz

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5736.5	505.825	27.04	0.905	1.000
Middle	5788.0	504.661	27.03	0.903	1.000
High	5838.5	510.505	27.08	0.914	1.000



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FOR EXTERNAL ANTENNA:**For Channel bandwidth: 5MHz**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5729.0	405.509	26.08	0.577	1.000
Middle	5788.0	401.791	26.04	0.571	1.000
High	5846.0	403.645	26.06	0.574	1.000

For Channel bandwidth: 10MHz

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5732.5	403.645	26.06	0.574	1.000
Middle	5788.0	404.576	26.07	0.575	1.000
High	5842.5	401.791	26.04	0.571	1.000

For Channel bandwidth: 15MHz

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5734.0	402.717	26.05	0.573	1.000
Middle	5788.0	404.576	26.07	0.575	1.000
High	5841.0	400.867	26.03	0.570	1.000

For Channel bandwidth: 20MHz

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
Low	5736.5	403.645	26.06	0.574	1.000
Middle	5788.0	401.791	26.04	0.571	1.000
High	5838.5	404.576	26.07	0.575	1.000