Maximum Permissible Exposure Report

1 PRODUCT INFORMATION

EUT	: LotteryLink
Model Number	: PI1IGTLL000100
Model Declaration	: N/A
Test Model	: PI1IGTLL000100
Power Supply	: 5V DC
Hardware version	: V3.0
Software version	: V1.0.0.0

2 EVALUATION METHOD

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3 LIMIT

3.1 Refer evaluation method

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.
FCC CFR 47 part2 2.1091: Radiofrequency radiation exposure evaluation: mobile devices

3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	$(900/f^2)$*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	$(180/f^2)$*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density

4 MPE CALCULATION METHOD

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S=power density
P=power input to antenna
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

5 ANTENNA INFORMATION

Antenna Gain and type refer to Antenna specification

6 CONDUCTED POWER

2.4G Band:
Bluetooth(BDR+EDR)

TestMode	Antenna	Channel	Result[dBm]
DH5	Ant1	2402	3.32
		2441	2.75
		2480	2.70
2DH5	Ant1	2402	5.75
		2441	5.29
		2480	4.70
3DH5	Ant1	2402	6.29
		2441	5.87
		2480	5.27

Bluetooth(BLE)

TestMode	Antenna	Channel	Result[dBm]
BLE_1M	Ant1	2402	1.34
		2440	1.26
		2480	2.66
BLE_2M	Ant1	2402	1.18
		2440	2.58
		2480	3.12

WiFi 2.4GHz Band

TestMode	Antenna	Channel	Result[dBm]
802.11b	Ant1	2412	16.95
		2437	17.46
		2462	17.44
802.11g	Ant1	2412	17.06
		2437	17.55
		2462	17.60
802.11n (HT20)	Ant1	2412	17.09
		2437	17.44
		2462	17.61
802.11ax (HEW20)	Ant1	2412	17.37
		2437	17.84
		2462	17.84

5G Band
UNII-1 Band

TestMode	Antenna	Channel	Result[dBm]
802.11a	Ant1	5180	13.58
		5200	13.66
		5240	13.22
802.11n (HT20)	Ant1	5180	13.25
		5200	13.59
		5240	13.19
802.11n (HT40)	Ant1	5190	13.45
		5230	13.65
802.11ac (VHT20)	Ant1	5180	13.12
		5200	13.57
		5240	13.13
802.11ac (VHT40)	Ant1	5190	13.50
		5230	13.63
802.11ac (VHT80)	Ant1	5210	12.90
802.11ax (HEW20)	Ant1	5180	13.46
		5200	13.67
		5240	13.35
802.11ax (HEW40)	Ant1	5190	13.37
		5230	13.56
802.11ax (HEW80)	Ant1	5210	13.48

UNII-3 Band

TestMode	Antenna	Channel	Result[dBm]
802.11a	Ant1	5745	12.11
		5785	12.97
		5825	12.35
802.11n (HT20)	Ant1	5745	12.22
		5785	12.90
		5825	12.57
802.11n (HT40)	Ant1	5755	12.26
		5795	12.59
802.11ac (VHT20)	Ant1	5745	12.10
		5785	12.79
		5825	12.40
802.11ac (VHT40)	Ant1	5755	12.19
		5795	12.61
802.11ac (VHT80)	Ant1	5775	11.46
802.11ax (HEW20)	Ant1	5745	12.25
		5785	12.82
		5825	12.41
802.11ax (HEW40)	Ant1	5755	12.00
		5795	12.78
802.11ax (HEW80)	Ant1	5775	12.56

7 MANUFACTURING TOLERANCE

Bluetooth(BDR+EDR)

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	3.0	2.5	2.0
Tolerance ±(dB)	1.0	1.0	1.0
π/4-DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	5.5	5.0	4.0
Tolerance ±(dB)	1.0	1.0	1.0
8-DPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	6.0	5.5	5.0
Tolerance ±(dB)	1.0	1.0	1.0

Bluetooth(BLE)

GFSK(1Mbps) (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.0	1.0	2.0
Tolerance ±(dB)	1.0	1.0	1.0
GFSK(2Mbps) (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.0	2.5	3.0
Tolerance ±(dB)	1.0	1.0	1.0

WiFi 2.4GHz Band – Antenna 1

IEEE 802.11b(Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.5	17.0	17.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g(Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.5	17.0	17.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20(Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.5	17.0	17.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11ax HEW20(Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	17.0	17.5	17.5
Tolerance ±(dB)	1.0	1.0	1.0

UNII-1 Band – Antenna 1

IEEE 802.11a (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	13.0	12.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.5	13.0	12.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	13.0	12.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11axVHT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	12.5	13.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Average)			
Channel	Channel 38	Channel 46	--
Target (dBm)	13.0	12.5	--
Tolerance ±(dB)	1.0	1.0	--
IEEE 802.11ac VHT40 (Average)			
Channel	Channel 38	Channel 46	--
Target (dBm)	13.0	13.0	--
Tolerance ±(dB)	1.0	1.0	--
IEEE 802.11ax VHT40 (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	12.5	12.5	
Tolerance ±(dB)	1.0	1.0	
IEEE 802.11ac VHT80 (Average)			
Channel	Channel 42	--	--
Target (dBm)	13.0	--	--
Tolerance ±(dB)	1.0	--	--
IEEE 802.11ax VHT80 (Average)			
Channel	Channel 42		
Target (dBm)	13.0		
Tolerance ±(dB)	1.0		

UNII-3 Band – Antenna 1

IEEE 802.11a (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.5	12.5	11.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.5	12.5	12.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.5	12.0	11.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11axVHT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	12.0	11.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Average)			
Channel	Channel 151	Channel 159	--
Target (dBm)	12.0	11.0	--
Tolerance ±(dB)	1.0	1.0	--
IEEE 802.11ac VHT40 (Average)			
Channel	Channel 151	Channel 159	--
Target (dBm)	11.5	12.0	--
Tolerance ±(dB)	1.0	1.0	--
IEEE 802.11ax VHT40 (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	12.0	11.5	
Tolerance ±(dB)	1.0	1.0	
IEEE 802.11ac VHT80 (Average)			
Channel	Channel 155	--	--
Target (dBm)	12.0	--	--
Tolerance ±(dB)	1.0	--	--
IEEE 802.11ax VHT80 (Average)			
Channel	Channel 155		
Target (dBm)	12.0		
Tolerance ±(dB)	1.0		

8 MEASUREMENT RESULTS

8.1 Standalone MPE

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, r =20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

Bluetooth(BDR+EDR)

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
GFSK	4.0	2.51	4.25	2.66	0.0013	1.0000
π/4-DQPSK	6.5	4.47	4.25	2.66	0.0024	1.0000
8-DPSK	7.0	5.01	4.25	2.66	0.0027	1.0000

Bluetooth(BLE)

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
GFSK(1Mbps)	3.0	2.00	4.25	2.66	0.0011	1.0000
GFSK(2Mbps)	4.0	2.51	4.25	2.66	0.0013	1.0000

WiFi 2.4GHz Band – Ant 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
IEEE 802.11b	18.0	63.10	4.25	2.66	0.0334	1.0000
IEEE 802.11g	18.0	63.10	4.25	2.66	0.0334	1.0000
IEEE 802.11n HT20	18.0	63.10	4.25	2.66	0.0334	1.0000
IEEE 802.11ax VHT20	18.5	70.79	4.25	2.66	0.0375	1.0000

UNII-1 Band – Ant 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
IEEE 802.11a	14.0	25.12	6.09	4.06	0.0203	1.0000
IEEE 802.11n HT20	14.0	25.12	6.09	4.06	0.0203	1.0000
IEEE 802.11ac VHT20	14.0	25.12	6.09	4.06	0.0203	1.0000
IEEE 802.11ax VHT20	14.0	25.12	6.09	4.06	0.0203	1.0000
IEEE 802.11n HT40	14.0	25.12	6.09	4.06	0.0203	1.0000
IEEE 802.11ac VHT40	14.0	25.12	6.09	4.06	0.0203	1.0000
IEEE 802.11ax VHT40	13.5	22.39	6.09	4.06	0.0181	1.0000
IEEE 802.11ac VHT80	14.0	25.12	6.09	4.06	0.0203	1.0000
IEEE 802.11ax VHT80	14.0	25.12	6.09	4.06	0.0203	1.0000

UNII-3 Band – Ant 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
IEEE 802.11a	13.5	22.39	4.77	3.00	0.0134	1.0000
IEEE 802.11n HT20	13.5	22.39	4.77	3.00	0.0134	1.0000
IEEE 802.11ac VHT20	13.0	19.95	4.77	3.00	0.0119	1.0000
IEEE 802.11ax VHT20	13.0	19.95	4.77	3.00	0.0119	1.0000
IEEE 802.11n HT40	13.0	19.95	4.77	3.00	0.0119	1.0000
IEEE 802.11ac VHT40	13.0	19.95	4.77	3.00	0.0119	1.0000
IEEE 802.11ax VHT40	13.0	19.95	4.77	3.00	0.0119	1.0000
IEEE 802.11ac VHT80	13.0	19.95	4.77	3.00	0.0119	1.0000
IEEE 802.11ax VHT80	13.0	19.95	4.77	3.00	0.0119	1.0000

Remark:
1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

9 CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

----------THE END OF REPORT----------