



Maximum Permissible Exposure Report

1. Product Information

FCC ID	: 2ACHBP300PLUS
EUT	: GNSS Tablet
Test Model	: P300 Plus
Ratings	: Input: D 12V / DC 24V
Hardware Version	: /
Software Version	: /
Bluetooth	
Frequency Range	: 2402MHz~2480MHz
Channel Number	: 79 channels for Bluetooth V4.2(DSS) 40 channels for Bluetooth V4.2(DTS)
Channel Spacing	: 1MHz for Bluetooth V4.2(DSS) 2MHz for Bluetooth V4.2(DTS)
Modulation Type	: GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V4.2(DSS) GFSK for Bluetooth V4.2(DTS)
Bluetooth Version	: V4.2
Antenna Description	: FPC Antenna, -5.4dBi (Max.)
WIFI(2.4G Band)	
Frequency Range	: 2412MHz~2462MHz
Channel Spacing	: 5MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Modulation Type	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: FPC Antenna, -5.4dBi(Max.)
LTE	
Support Band	: ☒ E-UTRA Band 2(U.S.-Band) ☒ E-UTRA Band 4(U.S.-Band) ☒ E-UTRA Band 5(U.S.-Band) ☒ E-UTRA Band 7(U.S.-Band) ☒ E-UTRA Band 12(U.S.-Band) ☒ E-UTRA Band 13(U.S.-Band) ☒ E-UTRA Band 14(U.S.-Band) ☒ E-UTRA Band 17(U.S.-Band) ☒ E-UTRA Band 25(U.S.-Band) ☒ E-UTRA Band 26(U.S.-Band) ☒ E-UTRA Band 41(U.S.-Band) ☒ E-UTRA Band 66(U.S.-Band) ☒ E-UTRA Band 71(U.S.-Band)
LTE Release Version	: R10
Type Of Modulation	: QPSK/16QAM
Antenna Description	: FPC Antenna -3.7dBi (max.) For E-UTRA Band 2 -3.7dBi (max.) For E-UTRA Band 4 -6.7dBi (max.) For E-UTRA Band 5 -3.4dBi (max.) For E-UTRA Band 7 -0.99dBi (max.) For E-UTRA Band 12 -0.4dBi (max.) For E-UTRA Band 13 -0.4dBi (max.) For E-UTRA Band 14 -1.06dBi (max.) For E-UTRA Band 17 -3.7dBi (max.) For E-UTRA Band 25 -6.7dBi (max.) For E-UTRA Band 26 -3.4dBi (max.) For E-UTRA Band 41 -3.7dBi (max.) For E-UTRA Band 66 -2.29dBi (max.) For E-UTRA Band 71



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Power Class	: Class 3
Exposure category	: General population/uncontrolled environment
EUT Type	: Production Unit
Device Type	: Mobile Devices

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 C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz 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/Uncontrolled 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



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*=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

EUT can only use antennas certificated as follows provided by manufacturer;

Internal/External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Antenna	FPC Antenna	2400-2500MHz	-5.4dBi	BT/WIFI Antenna
Antenna	FPC Antenna	1850-1910MHz	-3.7dBi	Band 2
Antenna	FPC Antenna	1710-1750MHz	-3.7dBi	Band 4
Antenna	FPC Antenna	824-849MHz	-6.7dBi	Band 5
Antenna	FPC Antenna	2500-2570MHz	-3.4dBi	Band 7
Antenna	FPC Antenna	699-716MHz	-0.99dBi	Band 12
Antenna	FPC Antenna	779-787MHz	-0.4dBi	Band 13
Antenna	FPC Antenna	790-798MHz	-0.4dBi	Band 14
Antenna	FPC Antenna	706-716MHz	-1.06dBi	Band 17
Antenna	FPC Antenna	1850-1915MHz	-3.7dBi	Band 25
Antenna	FPC Antenna	814-829MHz	-6.7dBi	Band 26
Antenna	FPC Antenna	2496-2690MHz	-3.4dBi	Band 41
Antenna	FPC Antenna	1710-1780MHz	-3.7dBi	Band 66
Antenna	FPC Antenna	663-698MHz	-2.29dBi	Band 71

6. Conducted Power

[BT]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK	00	2402	-0.03
	39	2441	0.27
	79	2480	-0.79
$\pi/4$ -DQPSK	00	2402	0.59
	39	2441	0.97
	79	2480	0.06
8-DPSK	00	2402	0.93
	39	2441	1.32
	79	2480	0.39

[BLE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK	00	2402	-0.44
	19	2440	0.62
	39	2480	-0.05



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[2.4G WLAN]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
IEEE 802.11b	1	2412	15.08
	6	2437	15.61
	11	2462	15.97
IEEE 802.11g	1	2412	14.42
	6	2437	14.82
	11	2462	14.51
IEEE 802.11n HT20	1	2412	14.41
	6	2437	13.74
	11	2462	14.01
IEEE 802.11n HT40	3	2422	12.17
	6	2437	12.62
	9	2462	13.24

7. Manufacturing Tolerance

[BT]

GFSK(Peak)			
Channel	Channel 00	Channel 39	Channel 78
Target (dBm)	0	0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
$\pi/4$ -DQPSK(Peak)			
Channel	Channel 00	Channel 39	Channel 78
Target (dBm)	0	0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
8-DPSK(Peak)			
Channel	Channel 00	Channel 39	Channel 78
Target (dBm)	0	1.0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[BLE]

GFSK(Peak)			
Channel	Channel 00	Channel 19	Channel 39
Target (dBm)	0	0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[2.4G WLAN]

IEEE 802.11b(Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	15.0	15.0	15.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g(Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	14.0	14.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n20(Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	14.0	13.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n40(Peak)			
Channel	Channel 03	Channel 06	Channel 09
Target (dBm)	12.0	12.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

<LTE>maximum output power including tune up tolerance from modular SC600Y-NA (FCC ID: XMR2019SC600NA) MPE report No. HR20195000606;





Test Mode		Maximum Conducted Output Power including Tune up Tolerance (dBm)
LTE	Band 2	25.00
	Band 4	25.00
	Band 5	25.00
	Band 7	25.00
	Band 12	25.00
	Band 13	25.00
	Band 14	25.00
	Band 17	25.00
	Band 25	25.00
	Band 26	25.00
	Band 41	25.00
	Band 66	25.00
	Band 71	25.00

8. Measurement Results

8.1 Standalone MPE Evaluation

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, $r=20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[BT]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	1.0	1.2589	-5.4	0.2884	0.0001	1.0000
$\pi/4$ -DQPSK	1.0	1.2589	-5.4	0.2884	0.0001	1.0000
8-DPSK	2.0	1.5849	-5.4	0.2884	0.0001	1.0000

[BLE]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	1.0	1.2589	-5.4	0.2884	0.0001	1.0000

[2.4GWLAN]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11b	16.0	39.8107	-5.4	0.2884	0.0023	1.0000
IEEE 802.11g	15.0	31.6228	-5.4	0.2884	0.0018	1.0000
IEEE 802.11n HT20	15.0	31.6228	-5.4	0.2884	0.0018	1.0000
IEEE 802.11n HT40	14.0	25.1189	-5.4	0.2884	0.0014	1.0000

[LTE]

Band/Mode	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
Band 2	25.00	316.2278	-3.7	0.4266	0.0268	1.000
Band 4	25.00	316.2278	-3.7	0.4266	0.0268	1.000
Band 5	25.00	316.2278	-6.7	0.2138	0.0135	0.5660
Band 7	25.00	316.2278	-3.4	0.4571	0.0288	1.0000
Band 12	25.00	316.2278	-0.99	0.7962	0.0501	0.4770
Band 13	25.00	316.2278	-0.4	0.9120	0.0574	0.5250
Band 14	25.00	316.2278	-0.4	0.9120	0.0574	0.5053
Band 17	25.00	316.2278	-1.06	0.7834	0.0493	0.4893
Band 25	25.00	316.2278	-3.7	0.4266	0.0268	1.0000



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Band 26	25.00	316.2278	-6.7	0.2138	0.0135	0.566
Band 41	25.00	316.2278	-3.4	0.4571	0.0288	1.0000
Band 66	25.00	316.2278	-3.7	0.4266	0.0268	1.0000
Band 71	25.00	316.2278	-2.29	0.5902	0.0371	0.4113

Remark:

1. Output power including turn-up tolerance;
2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

8.2 Simultaneous Transmission MPE Evaluation

The sample support one BT&2.4GWIFI, another one LTE transmit antenna, so need consider simultaneous transmission;

PMR cannot work with LTE at the same time

Simultaneous transmission MPE

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Σ of MPE ratios ≤ 1.0

Mode	WLAN MPE _{ratio}	LTE MPE _{ratio}	Σ MPE ratios	Limit	Results
2.4GWIFI+LTE	0.0023	0.1136	0.1159	1.0	PASS

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-----



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