FCC Test Report

Report No.: AGC08454190803FE02

FCC ID	:	2AUKT-ULTRALONG
APPLICATION PURPOSE	:	Class II Permissive Change
PRODUCT DESIGNATION	:	Pallet Tracker
BRAND NAME	:	N/A
MODEL NAME	:	Ultra Long, Ultra Wide, Ultra Wide QP, Ultra Medium, Ultra Thin, Ultra Short, Ultra B
APPLICANT	:	CHEP
DATE OF ISSUE	:	Sep. 24, 2019
STANDARD(S)	:	FCC Part 22H & 24E Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd.

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 24, 2019	Valid	Class II Permissive Change

Note: In this report, the test results refer to the Certificate number (172181287/AA/00), report with item (No. RXA1706-0199RF02R1/RXA1706-0199RF01R1),brand name (Quectel), model name (BG96), Hardware versi on (R1.0) and Software version (BG96MAR02A02M1G); Re-evaluate the radiated spurs of the complete machine using this module and compare the differences.

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1. VERIFICATION OF COMPLIANCE

Applicant	CHEP
Address	2901 Tasman Drive Suite 107 Santa Clara, CA 95054
Manufacturer	Minewing (Shenzhen) Electronics Integrated Co., Ltd
Address	Floor #2, Building H2, Hongfa-Tech Park, No 32 TonG Tau Road, ShiYan Town, Bao'An District, Shenzhen, China, 518108
Factory	Minewing (Shenzhen) Electronics Integrated Co., Ltd
Address	Floor #2, Building H2, Hongfa-Tech Park, No 32 TonG Tau Road, ShiYan Town, Bao'An District, Shenzhen, China, 518108
Product Designation	Pallet Tracker
Brand Name	N/A
Test Model	Ultra Long
Serial Model	Ultra Wide, Ultra Wide QP, Ultra Medium, Ultra Thin, Ultra Short, Ultra B
Difference Description	Number of Battery in each model are different, however, the supply voltage remains the same @ 3.0V
Date of test	Aug. 27, 2019~Sep. 24, 2019
Deviation	None
Condition of Test Sample	Normal

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance(Shenzhen) Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA-603-E-2016. The sample tested as described in this report is in compliance with the FCC Rules Part 22H and 24E.The test results of this report relate only to the tested sample identified in this report.

Prepared By

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Jeast Zhan
(Project Engineer)

Sep. 24, 2019

Reviewed By

Max Zhang

Max Zhang
(Reviewer)

Sep. 24, 2019

Approved By

Forrest Lei

Forrest Lei
(Authorized Officer)

Sep. 24, 2019

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Pallet Tracker
Frequency Bands:	☒GSM 850 ☒PCS1900 (U.S. Bands) ☒GSM 900 ☒DCS 1800 (Non-U.S. Bands)
Hardware Version	Rev 2.1
Software Version	01.02.0027
Antenna Type	PCB Antenna
Antenna gain	GSM850:1.95dBi; PCS1900: 2.50dBi;
Power Supply:	DC 3.8V
Single Card:	GSM Card Slot
GPRS Class	12
Extreme Vol. Limits:	DC3.23V to 4.35V (Normal: DC 3.8V)
Extreme Temp. Tolerance	-10℃ to + 40℃
*** Note: 1. The High Voltage DC4.35V and Low Voltage DC3.23V were declared by manufacturer 2. The EUT couldn't be operating normally with higher or lower voltage.	

***** Note:**1.The maximum power levels are GSM for MCS-4: GMSK link, only these modes were used for all tests.

2. We found out the test mode with the highest power level after we analyze all the data rates. So we chose worst caseas a representative.

2.2RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AUKT-ULTRALONG**, filing to comply with the FCC Part 22H&24E requirements.

2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-E-2016, and KDB 971168 D01 Power Means License Digital Systems V03R01.

2.4 TEST FACILITY

TestSite	Attestation of Global Compliance(Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong,China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

ALL TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.12, 2019	Jun.11, 2020
LISN	R&S	ESH2-Z5	100086	Aug. 26, 2019	Aug. 25, 2020
TEST RECEIVER	R&S	ESCI	10096	Jun.12, 2019	Jun.11, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.20, 2018	Dec.18, 2019
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2017	Sep.20, 2019
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.19, 2019	Sep.18, 2021
preamplifier	ChengYi	EMC184045SE	980508	Oct. 31, 2018	Oct. 30, 2019
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Mar. 01, 2018	Feb. 28, 2020
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.12, 2019	Jun.11, 2020
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2019
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.26, 2019	Sep.25, 2021
SIGNAL ANALYZER	Agilent	N9020A	MY52090123	Sep. 20, 2018	Sep. 19, 2019
SIGNAL ANALYZER	Agilent	N9020A	MY52090123	Sep. 18, 2019	Sep. 17, 2020
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Sep. 18, 2019	Sep. 17, 2020
Universal Radio Communication	R&S	CMU200	120237	Feb. 27, 2019	Feb. 26, 2020

Tester					
Universal Radio Communication Tester	Agilent	8960	GB46200384	July 11,2019	July 10,2020
Power Splitter	Agilent	11636A	34	Jun.12, 2019	Jun.11, 2020
Attenuator	JFW	50FHC-006-50	N/A	Jun.12, 2019	Jun.11, 2020
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170		Mar. 01, 2018	Feb. 28, 2020
Horn Ant (18G-40GHz)	ETS	QWH_SL_18_40_K_SG		Mar. 01, 2018	Feb. 28, 2020
Power Splitter	Agilent	11636A	/	Sep.20, 2018	Sep.19, 2019
Power Splitter	Agilent	11636A	/	Sep. 18, 2019	Sep. 17, 2020
CMU200	R&S	120237	/	Feb. 27, 2019	Feb. 26, 2020
Artificial Mains Network ENV216	R&S	101242	/	July 11,2019	July 10, 2020
Filter Bank Notch 1(880-915MHz)	MICRO-TRONICS	010	/	Feb. 27, 2019	Feb. 26, 2020
Filter Bank Notch 2 (1710-1785MHz)	MICRO-TRONICS	009	/	Feb. 27, 2019	Feb. 26, 2020
Filter Bank Notch 3 (1920-1980MHz)	MICRO-TRONICS	008	/	Feb. 27, 2019	Feb. 26, 2020

2.6 SPECIAL ACCESSORIES

The battery wassupplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1 EUT CONFIGURATION

The EUTconfiguration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

3.3 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

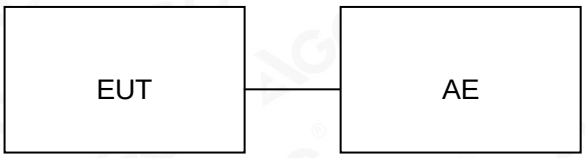


Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Remark
1	Pallet Tracker	Ultra Long	FCC ID: 2AUKT-ULTRALONG	EUT

***Note:All the accessories have been used during the test. The following "EUT" in setup diagram means EUT system.

4. SUMMARY OF TEST RESULTS

Item Number	Item Description		FCC Rules	Result
1	Spurious Emission	Radiated Spurious Emission	2.1051/22.917(a)/24.238(a)/ 27.53(h)	Pass

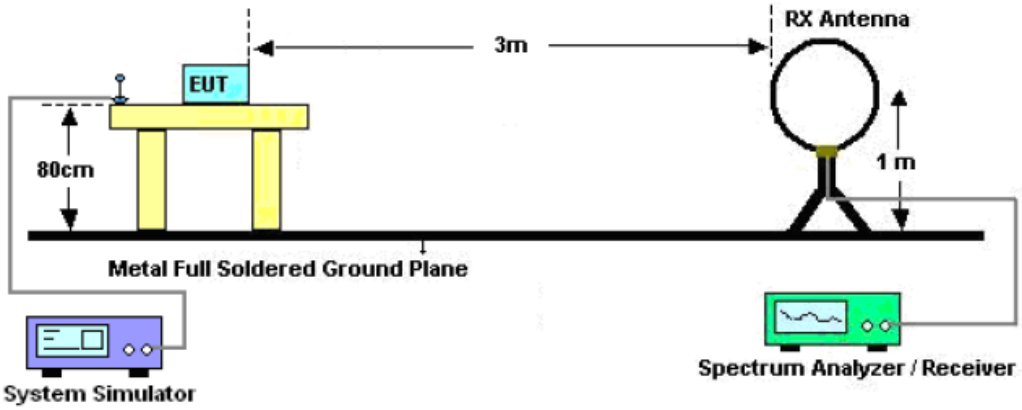
6. RADIATED SPURIOUS EMISSION

6.1MEASUREMENT METHOD

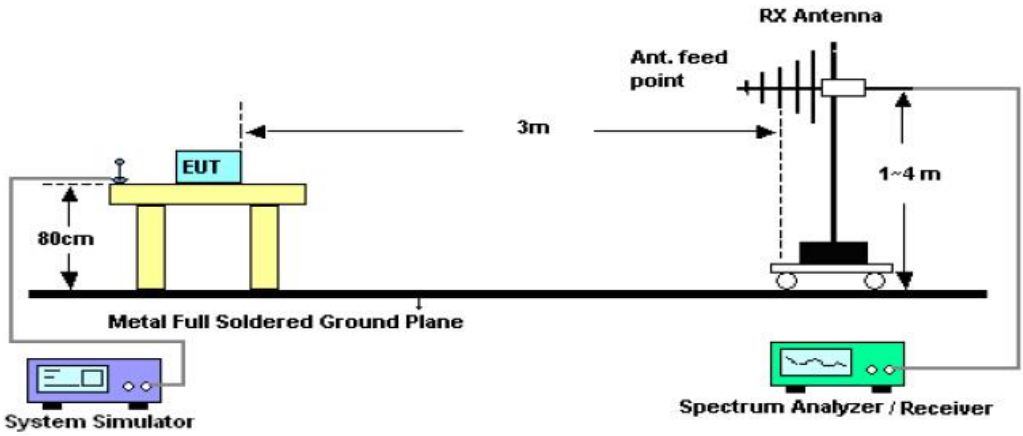
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

6.2 TEST SETUP

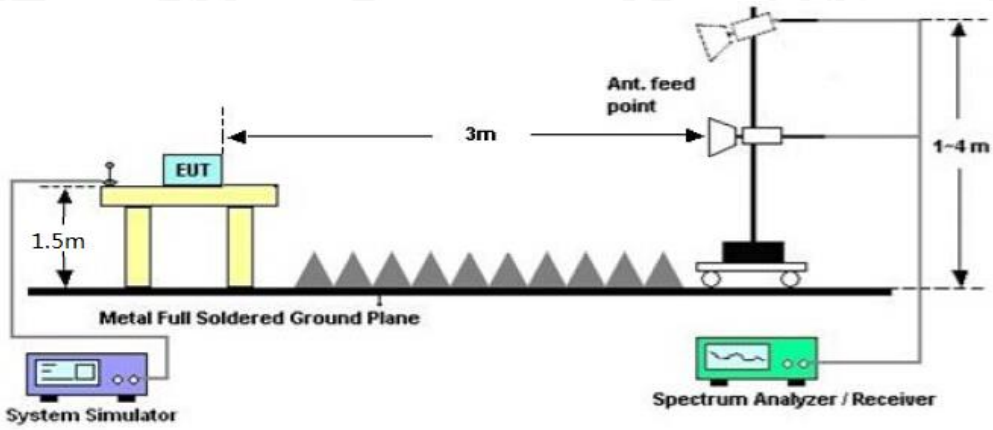
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



6.3 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Note:only result the worst condition of each test mode:

6.4 MEASUREMENT RESULT

GPRS 850:

The Worst Test Results for Channel 251/848.8 MHz				
Frequency (MHz)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Comment
1967.60	-49.46	-13	-36.46	Horizontal
3056.17	-36.24	-13	-23.24	Horizontal
6739.25	-38.79	-13	-25.79	Horizontal
1967.60	-49.23	-13	-36.23	Vertical
3426.04	-37.92	-13	-24.92	Vertical
6534.14	-38.10	-13	-25.10	Vertical

PCS 1900:

The Worst Test Results for Channel 810/1909.8MHz				
Frequency (MHz)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Comment
1456.52	-48.86	-13	-35.86	Horizontal
3819.60	-36.11	-13	-23.11	Horizontal
7456.18	-39.83	-13	-26.83	Horizontal
1462.12	-49.27	-13	-36.27	Vertical
3819.60	-38.76	-13	-25.76	Vertical
6946.19	-38.70	-13	-25.70	Vertical

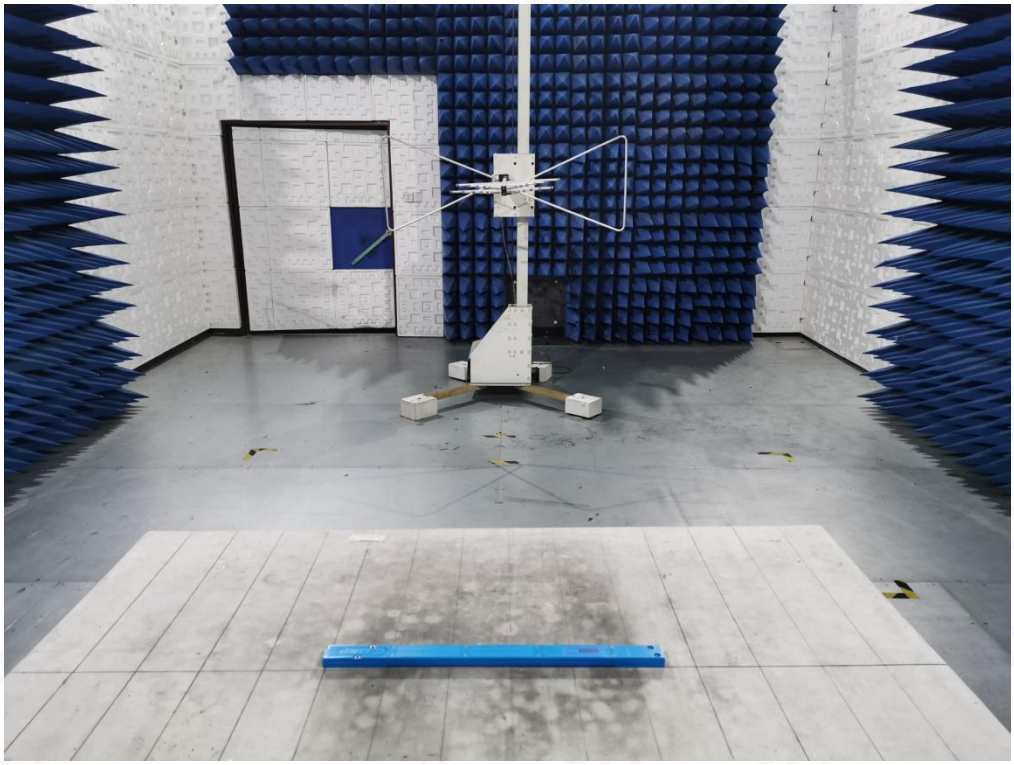
RESULT: PASS

Note:

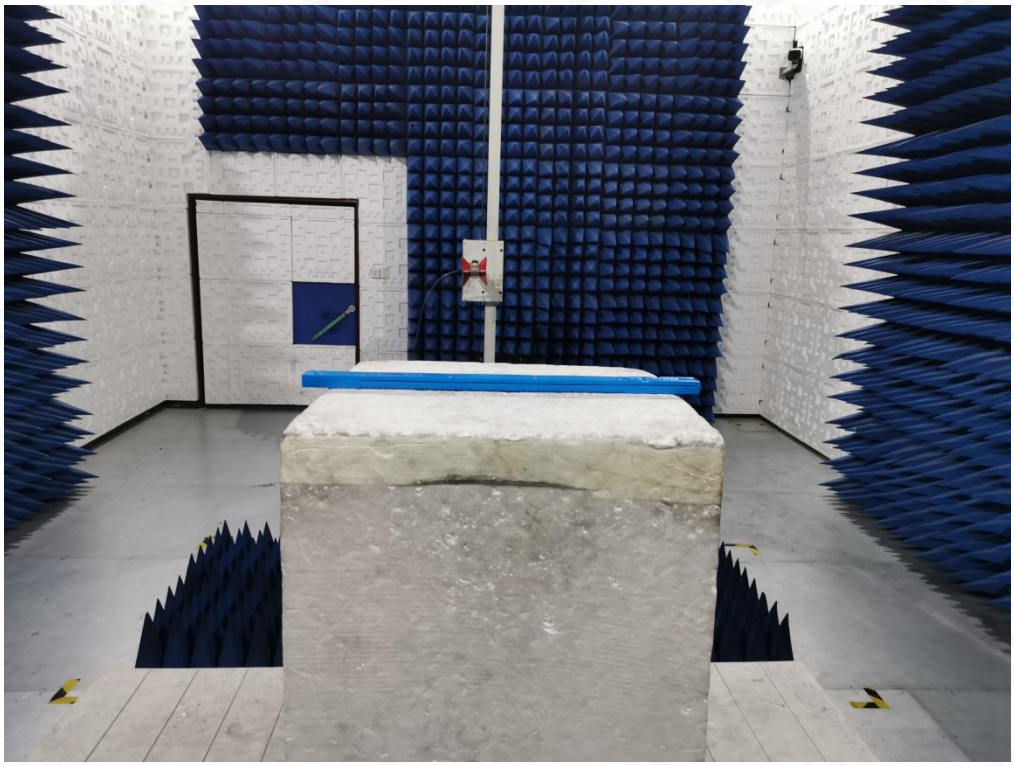
1. Margin = Emission Level -Limit
2. Below 30MHZ no Spurious found and Above is the worst mode data

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP



RADIATED EMISSION ABOVE 1G TEST SETUP



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