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TEST REPORT

REPORT NUMBER: I22W00060-MPE-Rev2

ON

Type of Equipment:	tracker
Type of Designation:	AT-NG5
Manufacturer:	Micron Electronics LLC.
Brand Name:	PRIME
FCC ID:	ZKQ-P61G

ACCORDING TO

FCC CFR 47 Part 2.1091 《Radiofrequency radiation exposure evaluation: mobile devices》
FCC CFR 47 Part1.1310 《Radiofrequency radiation exposure limits》

Chongqing Academy of Information and Communication Technology

Month date, year

Jan,10,2023

Signature

Xiang Luoyong

Director

Note:
The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of Chongqing Academy of Information and Communications Technology.

Revision Version

Report Number	Revision	Date	Memo
I22W00060-MPE	00	2022-9-16	Initial creation of test report
I22W00060-MPE-Rev1	01	2022-9-26	First change of test report
I22W00060-MPE-Rev2	02	2023-1-10	First change of test report
Note：This version has updated All frequency bands tune up power,then recalculated the power density value.			

CONTENTS

Chongqing Academy of Information and Communication Technology
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1. Test Laboratory

1.1. Testing Location

Company Name:	Chongqing Academy of Information andCommunications Technology
Address:	Building C, Technology Innovation Center, No.8, Yuma Road, Chayuan New Area, Nan'an District, Chongqing, People's Republic of China
Postal Code:	401336
Telephone:	0086-23-88069965
Fax:	0086-23-88608777

1.2. Testing Environment

Normal Temperature:	21.3℃
Relative Humidity:	65.0%

1.3. Project Data

Testing Start Date:	2022-9-16
Testing End Date:	2022-9-16

1.4. Signature

2023-1-10

Fu Bohao
(Prepared this test report)   **Date**

2023-1-10

Wang Lili
(Reviewed this test report)   **Date**

2023-1-10

Xiang Luoyong
Director of the laboratory
(Approved this test report)   **Date**

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2. Client Information

2.1. Applicant Information

Company Name:	Micron Electronics LLC.
Address /Post:	1001 Yamato Road, Suite 400, Boca Raton, FL 33431, USA
Country:	USA
Telephone:	+1 888 538 3489
Fax:	--
Email:	pcheng@micron-electronics.com
Contact Person:	Ping Cheng

2.2. Manufacturer Information

Company Name:	Micron Electronics LLC.
Address /Post:	1001 Yamato Road, Suite 400, Boca Raton, FL 33431, USA
Country:	USA
Telephone:	+1 888 538 3489
Fax:	--
Email:	pcheng@micron-electronics.com
Contact Person:	Ping Cheng

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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description:	tracker
Model name:	AT-NG5
GSM Frequency Band:	GSM850/1900
LTE CAT-M1 Frequency Band:	B2/B4/B5/B12/B13/B26
LTE NB-IoT Frequency Band:	B2/B4/B5/B12/B13/B26
Note：Photographs of EUT are shown in ANNEX A of this test report.	

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
S4	355197370060068	A513_V1	P61V01.01B03.I01	2022-7-14

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

EUT ID*	SN	Description
NA	NA	NA

*AE ID: is used to identify the test sample in the lab internally.

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4. Reference Documents

4.1. Applicable Standards

The MPE report was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 2.1091.

FCC CFR 47 Part 2.1091: Radiofrequency radiation exposure evaluation: mobile devices

4.2. Test Limits

Systems operating under the provisions of this section shall be operated in a mannerthat ensures that the public is not exposed to radio frequency energy level in excesslimit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2Subpart J, section 2.1091 this device has been defined as a mobile device whereby adistance of 0.2m normally can be maintained between the user and the device.

MPE for the upper tier (people in controlled environments)

Frequency Range [MHz]	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) 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
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	$(180/f^2)$*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100000	--	--	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

For the DUT, the limits for the general public when an RF safety program is unavailable.

5. Test Results

5.1. RF Power Output

Frequency Band	Highest Averaged Power Output(dBm)	Highest Frame-Averaged Output Power (dBm)	Antenna Gain(dBi)
GSM850	30.70	21.67	3.46
GSM1900	31.00	21.97	1.50
GPRS850 4TS	30.70	27.69	3.46
GPRS1900 4TS	31.00	27.99	1.50
EGPRS850 4TS	30.70	27.69	3.46
EGPRS1900 4TS	31.00	27.99	1.50
CAT-M1 Band 2	24.50	24.50	1.50
CAT-M1 Band 4	23.00	23.00	1.40
CAT-M1 Band 5	23.00	23.00	3.46
CAT-M1 Band12	23.00	23.00	2.36
CAT-M1 Band 13	23.00	23.00	1.32
CAT-M1 Band 26 （814M~824M）	23.00	23.00	3.04
CAT-M1 Band 26 （824M~849M）	23.00	23.00	3.46

Notes:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

2）According to the conducted power as above, the measurements are performed with 1Txslots for 850MHz and 1900MHz.

3) Disclaimers：The Highest Power Output and antenna gain in the above table are provided by the customer

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Frequency Band	Highest Averaged Power Output(dBm)	Highest Frame-Averaged Output Power (dBm)	Antenna Gain(dBi)
NB-IoT Band 2	22.00	22.00	1.50
NB-IoT Band 4	22.00	22.00	1.40
NB-IoT Band 5	22.00	22.00	3.46
NB-IoT Band 12	22.00	22.00	2.36
NB-IoT Band 13	22.00	22.00	1.32
NB-IoT Band 26 （814M~824M）	22.00	22.00	3.04
NB-IoT Band 26 （824M~849M）	22.00	22.00	3.46

Notes:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

2）According to the conducted power as above, the measurements are performed with 1Txslots for 850MHz and 1900MHz.

3) Disclaimers：The Highest Power Output and antenna gain in the above table are provided by the customer

5.2. Calculation Information

For conservative evaluation consideration, only maximum power of each frequency band based on the tighter limits respectively are used to calculate the boundary power density.

Based on the FCC KDB 447498 D01 and 47 CFR §2.1091, the DUT is evaluated as a mobile device.

$$S = \frac{PG}{4\pi d^2}$$

Where
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

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5.3. Results

Frequency range	Limit(mW/cm^2)	Results(mW/cm^2)	Verdict
GSM850	0.55	0.06	PASS
GSM1900	1.00	0.04	PASS
GPRS850 4TS	0.55	0.26	PASS
GPRS1900 4TS	1.00	0.18	PASS
EGPRS850 4TS	0.55	0.26	PASS
EGPRS1900 4TS	1.00	0.18	PASS
CAT-M1 Band 2	1.00	0.08	PASS
CAT-M1 Band 4	1.00	0.05	PASS
CAT-M1 Band 5	0.55	0.09	PASS
CAT-M1 Band12	0.47	0.07	PASS
CAT-M1 Band 13	0.52	0.05	PASS
CAT-M1 Band 26 （814MHz~824MHz）	0.54	0.08	PASS
CAT-M1 Band 26 （824MHz~849MHz）	0.55	0.09	PASS
NB-IoT Band 2	1.00	0.04	PASS
NB-IoT Band 4	1.00	0.04	PASS
NB-IoT Band 5	0.55	0.07	PASS
NB-IoT Band 12	0.47	0.05	PASS
NB-IoT Band 13	0.52	0.04	PASS
NB-IoT Band 26 （814MHz~824MHz）	0.54	0.06	PASS
NB-IoT Band 26 （824MHz~849MHz）	0.55	0.07	PASS

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5.4. Result of GSM 850

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.20 MHz～848.80 MHz; The maximum conducted is 21.67 dBm. The maximum gain is 3.46 dBi. Therefore, maximum limit for general public RF exposure: 824.20/1500=0.55 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

   P= input power of the antenna（mW）
   G = antenna gain（numeric）
   r = distance to the center of radiation of antenna (in meter)=20 cm
   S=0.06 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm² limit for uncontrolled exposure.

5.5. Result of GSM 1900

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.20 MHz～1909.80MHz; The maximum conducted is 21.97 dBm. The maximum gain is 1.50 dBi. Therefore, maximum limit for general public RF exposure: 1.00 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

   P= input power of the antenna（mW）
   G = antenna gain（numeric）
   r = distance to the center of radiation of antenna (in meter)=20 cm
   S=0.04 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 1.00 mW/cm² limit for uncontrolled exposure.

5.6. Result of GPRS 850 4TS

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.20 MHz～848.80 MHz; The maximum conducted is 27.69 dBm. The maximum gain is 3.46 dBi. Therefore, maximum limit for general public RF exposure: 824.20/1500=0.55 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

   P= input power of the antenna（mW）
   G = antenna gain（numeric）
   r = distance to the center of radiation of antenna (in meter)=20 cm
   S=0.26 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm² limit for uncontrolled exposure.

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5.7. Result of GPRS 1900 4TS

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.20 MHz～1909.80MHz; The maximum conducted is 27.99 dBm. The maximum gain is 1.50 dBi. Therefore, maximum limit for general public RF exposure: 1.00 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain （numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.18 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.00 mW/cm^2 limit for uncontrolled exposure.

5.8. Result of EGPRS 850 4TS

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.20 MHz～848.80 MHz; The maximum conducted is 27.69 dBm. The maximum gain is 3.46 dBi. Therefore, maximum limit for general public RF exposure: 824.20/1500=0.55 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain （numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.26mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm^2 limit for uncontrolled exposure.

5.9. Result of EGPRS 1900 4TS

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.20 MHz～1909.80MHz; The maximum conducted is 27.99 dBm. The maximum gain is 1.50 dBi. Therefore, maximum limit for general public RF exposure: 1.00 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain （numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.18 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.00 mW/cm^2 limit for uncontrolled exposure.

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5.10. Result of CAT-M1 Band 2

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0 MHz～1909.9MHz; The maximum conducted is 24.50dBm. The maximum gain is 1.50 dBi. Therefore, maximum limit for general public RF exposure: 1.00 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.08 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.00 mW/cm^2 limit for uncontrolled exposure.

5.11. Result of CAT-M1 Band 4

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0 MHz～1754.9MHz; The maximum conducted is 23.00 dBm. The maximum gain is 1.40 dBi. Therefore, maximum limit for general public RF exposure: 1.00 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.05 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.00 mW/cm^2 limit for uncontrolled exposure.

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5.12. Result of CAT-M1 Band 5

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.0 MHz～848.9 MHz; The maximum conducted is 23.00 dBm. The maximum gain is 3.46 dBi. Therefore, maximum limit for general public RF exposure: 824.00/1500=0.55 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.09 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm² limit for uncontrolled exposure.

5.13. Result of CAT-M1 Band 12

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 699.00 MHz～715.90 MHz; The maximum conducted is 23.00 dBm. The maximum gain is 2.36 dBi. Therefore, maximum limit for general public RF exposure: 699.00/1500=0.47 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.07 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 0.47 mW/cm² limit for uncontrolled exposure.

5.14. Result of CAT-M1 Band 13

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 777.00 MHz～786.90 MHz; The maximum conducted is 23.00 dBm. The maximum gain is 1.32 dBi. Therefore, maximum limit for general public RF exposure: 777.00/1500=0.52 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.07 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 0.52 mW/cm² limit for uncontrolled exposure.

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5.15.　　Result of CAT-M1 Band 26（814.00 MHz～824.00 MHz）

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 814.00 MHz～824.00 MHz; The maximum conducted is 23.00 dBm. The maximum gain is 3.46 dBi. Therefore, maximum limit for general public RF exposure: 814/1500=0.54 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.08 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 0.54 mW/cm² limit for uncontrolled exposure.

5.16.　　Result of CAT-M1 Band 26（824.00 MHz～849.00 MHz）

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.00 MHz～849.00 MHz; The maximum conducted is 23.00 dBm. The maximum gain is 3.04 dBi. Therefore, maximum limit for general public RF exposure: 824/1500=0.55 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.09 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm² limit for uncontrolled exposure.

5.17.　　Result of NB-IoT Band 2

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0 MHz～1909.9MHz; The maximum conducted is 22.00 dBm. The maximum gain is 1.50 dBi. Therefore, maximum limit for general public RF exposure: 1.00 mW/cm².

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain（numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.04 mW/cm²

Therefore, at 20 cm the spectral power density is less than the 1.00 mW/cm² limit for uncontrolled exposure.

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5.18.　Result of NB-IoT Band 4

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0 MHz～1754.9MHz; The maximum conducted is 22.00 dBm. The maximum gain is 1.40 dBi. Therefore, maximum limit for general public RF exposure: 1.00 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

　　P= input power of the antenna（mW）

　　G = antenna gain（numeric）

　　r = distance to the center of radiation of antenna (in meter)=20 cm

　　S=0.04 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.00 mW/cm^2 limit for uncontrolled exposure.

5.19.　Result of NB-IoT Band 5

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.0 MHz～848.9 MHz; The maximum conducted is 22.00 dBm. The maximum gain is 3.46 dBi. Therefore, maximum limit for general public RF exposure: 824.00/1500=0.55 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

　　P= input power of the antenna（mW）

　　G = antenna gain（numeric）

　　r = distance to the center of radiation of antenna (in meter)=20 cm

　　S=0.07 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm^2 limit for uncontrolled exposure.

5.20.　Result of NB-IoT Band 12

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 699.00 MHz～715.90 MHz; The maximum conducted is 22.00 dBm. The maximum gain is 2.36 dBi. Therefore, maximum limit for general public RF exposure: 699.00/1500=0.47 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

　　P= input power of the antenna（mW）

　　G = antenna gain（numeric）

　　r = distance to the center of radiation of antenna (in meter)=20 cm

　　S=0.05 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.47 mW/cm^2 limit for uncontrolled exposure.

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5.21.   Result of NB-IoT Band 13

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 777.00 MHz～786.90 MHz; The maximum conducted is 22.00 dBm. The maximum gain is 1.32 dBi. Therefore, maximum limit for general public RF exposure: 777.00/1500=0.52 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain （numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.04 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.52 mW/cm^2 limit for uncontrolled exposure.

5.22.   Result of NB-IoT Band 26（814.00 MHz～824.00 MHz）

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 814.00 MHz～824.00 MHz; The maximum conducted is 22.00 dBm. The maximum gain is 3.46 dBi. Therefore, maximum limit for general public RF exposure: 814/1500=0.54 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain （numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.06mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.54 mW/cm^2 limit for uncontrolled exposure.

5.23.   Result of NB-IoT Band 26（824.00 MHz～849.00 MHz）

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.00 MHz～849.00 MHz; The maximum conducted is 22.00 dBm. The maximum gain is 3.04 dBi. Therefore, maximum limit for general public RF exposure: 824/1500=0.55 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（mW）

G = antenna gain （numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=0.07mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm^2 limit for uncontrolled exposure.

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ANNEX A: EUT photograph

See the document" 4G Module Photos".

END OF REPORT