



RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2108020924AT
Applicant: DT Research, Inc.
Address of Applicant: 3RD FL NO 36 WUQUAN 7TH RD WUGU DISTRICT, NEW TAIPEI, Taiwan
Manufacturer: DT Research, Inc.
Address of Manufacturer: 2000 Concourse Drive, San Jose, CA 95131, USA
Factory: DT Research, Inc. Taiwan Branch
Address of Factory: 6F., No.36 Wuquan 7 th Rd., Wugu Dist. New Taipei City 248 Taiwan
Equipment Under Test (EUT):
EUT Name: Industrial Micro PC/Medical Micro PC
Model No.: 139CSXXX, X is -, any alphanumeric or blank.
139MXXX, X is -, any alphanumeric or blank. ♣
♣ Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Trade Mark: 
Standard(s) : 47 CFR Part 2.1091
47 CFR Part 1.1310,
47 CFR Part 1.1307
Date of Receipt: 2021-08-12
Date of Evaluation: 2021-08-13 to 2021-09-01
Date of Issue: 2021-09-02

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Kobe Jian

EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-09-02		Original

Authorized for issue by:				
				
		Curry Wu/Project Engineer		
				
		Ricky Liu/Reviewer		



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2 Evaluation Summary

Radio Spectrum Technical Requirement				
Item	Standard	Requirement	Method	Result
RF Exposure	47 CFR Part 2.1091 47 CFR Part 1.1310 47 CFR Part 1.1307	47 CFR Part 1.1310	47 CFR Part 1.1310	PASS

Remark:

Model No.:139CSXXX, X is -, any alphanumeric or blank.

139MXXX, X is -, any alphanumeric or blank.

Only the model 139CS was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on model no., colour and the difference as below:

Model No.	139CS	139M
Product Name:	Industrial Micro PC	Medical Micro PC
Adapter:	AC Adapter2 Model: EA10951E-190 AC Input: AC 100-240V, 50/60Hz, 2.5A DC Output: DC 19V, 4.73A, 90.0W	Medical AC Adapter1 Model: EM10681V AC Input: AC 100-240V, 50/60Hz, 2.0-1.0A DC Output: DC 19V, 3.78A



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4 General Information

4.1 Details of E.U.T.

Power supply:	AC Adapter2
	Model: EA10951E-190
	AC Input: AC 100-240V, 50/60Hz, 2.5A
	DC Output: DC 19V, 4.73A, 90.0W
Test voltage:	AC 120V, 60Hz or AC 230V, 50Hz
	Note: Both nominal AC 120V, 60Hz and AC 240 V, 50Hz are required for testing in accordance with FCC KDB174176, this report only shows the results of the worst test result(AC 120V, 60Hz);
Cable(s):	DC cable:143cm with a ferrite core
Internal Source:	More than 108MHz
For Bluetooth Classic:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	Bluetooth V5.0
Spectrum Spread	Frequency Hopping Spread Spectrum(FHSS)
Technology:	
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	Dipole Antenna
Antenna Gain:	2.38dBi
For Bluetooth LE:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0
Channel Spacing:	2MHz
Modulation Type:	GFSK
Number of Channels:	40
Antenna Type:	Dipole Antenna
Antenna Gain:	2.38dBi
For 802.11b/g/n:	
Operation Frequency:	802.11b/g/n/ax(HT20): 2412MHz to 2472MHz



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 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

802.11n/ax(HT40): 2422MHz to 2462MHz
802.11b: DSSS (CCK, DQPSK, DBPSK)
802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Modulation Type: 802.11n(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11ax(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Channel Numbers: 802.11b/g, 802.11n/ax HT20: 13 Channels
802.11n/ax HT40: 9 Channels
Antenna Type: Dipole Antenna
Antenna Gain: Antenna1: 2.38dBi, Antenna2: 2.38dBi
Note: MIMO for 802.11n/ax.

For 802.11a/n/ac/ax:

Operation Frequency:

Band	Mode	Frequency Range(MHz)	Number of channels
UNII Band I	802.11a/n/ax(HT20)	5180-5240	4
	802.11n/ax(HT40)	5190-5230	2
	802.11ac/ax(HT80)	5210	1
	802.11ac/ax(HT160)	5250	1
UNII Band II-A	802.11a/n/ax(HT20)	5260-5320	4
	802.11n/ax(HT40)	5270-5310	2
	802.11ac/ax(HT80)	5290	1
UNII Band II-C	802.11a/n/ax(HT20)	5500-5720	12
	802.11n/ax(HT40)	5510-5710	6
	802.11ac/ax(HT80)	5530-5690	3
	802.11ac/ax(HT160)	5570	1
UNII Band III	802.11a/n/ax(HT20)	5745-5825	5
	802.11n/ax(HT40)	5755-5795	2
	802.11ac/ax(HT80)	5775	1

Modulation Type: 802.11a: OFDM (64QAM,16QAM, QPSK, BPSK)
802.11n: OFDM (256QAM, 64QAM,16QAM, QPSK, BPSK)
802.11ac: OFDM (256QAM, 64QAM,16QAM, QPSK, BPSK)
802.11ax: OFDM (1024QAM, 256QAM, 64QAM,16QAM, QPSK, BPSK)



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EMC-TRF-03 Rev 1.0

DFS Function: Slave without radar detection
 TPC Function: Not support
 Antenna Type: Dipole Antenna
 Antenna Gain: Antenna1: 5.22dBi, Antenna2: 5.22dBi
 Note: MIMO for 802.11n/ac/ax.

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
 198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
 Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059



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4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

- **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.5 Deviation from Standards

None

4.6 Abnormalities from Standard Conditions

None



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5 Radio Spectrum Technical Requirement

5.1 RF Exposure

5.1.1 Requirement

In accordance with 47 CFR FCC Part 2.1091, this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

According to 47 CFR FCC Part 1310, the criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in Part1.1307(b).

TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density



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5.1.2 Method

According to IEEE C95.3:2002 section 5.5.1.1, the power density S at a point on the axis at a distance d from a transmitting antenna is given by the Friis free-space transmission formula:

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

S = power density (mW/cm²)

P = the net power delivered to the antenna (mW)

G = gain of the antenna in linear scale

d = distance between observation point and center of the radiator (cm)

From the maximum EUT RF output power, as well as the gain of the used antenna, according to the RF power density limit stated in above table, the minimum distance between the antenna and human body will be calculated.



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5.1.3 Conclusion For Bluetooth

1. According to the the test report GZCR210802092402, the tested maximum conducted power for Bluetooth is 10.69dBm = 0.01172W = 11.72mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 2.38dBi for single antenna, the Directional gain is 5.39dBi.
3. The limit of Power Density (S)(mW/cm²) = 1mW/cm²

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm ²)	Power Density at R=20cm (mW/cm ²)
3.46	11.72	1	0.0081

For Bluetooth LE

1. According to the the test report GZCR210802092403, the tested maximum conducted power for Bluetooth LE is 9.03dBm = 0.008W = 8.00mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 2.38dBi for single antenna, the Directional gain is 5.39dBi.
3. The limit of Power Density (S)(mW/cm²) = 1mW/cm²

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm ²)	Power Density at R=20cm (mW/cm ²)
3.46	8.00	1	0.0055

For 2.4G WiFi

1. According to the the test report GZCR210802092404, the tested maximum conducted power for 2x2 MIMO is 29.95dBm = 0.988W = 988.55mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 2.38dBi for single antenna, the Directional gain is 5.39dBi.
3. The limit of Power Density (S)(mW/cm²) = 1mW/cm²

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm ²)	Power Density at R=20cm (mW/cm ²)
3.46	29.95	1	0.6803



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For 5G WiFi

1. According to the the test report GZCR210802092405, the tested maximum conducted power for 2x2 MIMO is 19.64dBm = 0.09204W = 92.04mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 5.22dBi for single antenna, the Directional gain is 8.23dBi.
3. The limit of Power Density (S)(mW/cm²) = 1mW/cm²

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm ²)	Power Density at R=20cm (mW/cm ²)
6.65	92.04	1	0.1218

Note: the 2.4G WLAN/Bluetooth antenna and 5G WLAN antenna cannot synchronous transmission at the same time.

5.2 EUT Constructional Details

Refer to Appendix - external and internal photos for GZCR2108020924AT.

- End of the Report -



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