Prüfbericht-Nr.: *Test report no.:*	CN2205TH(FCC-MPE) 001	**Auftrags-Nr.:** *Order no.*:	238538787	Seite 1 von 11 *Page 1 of 11*
Kunden-Referenz-Nr.: *Client reference no.:*	N/A	**Auftragsdatum:** *Order date:*	2022-01-17	
Auftraggeber: *Client:*	Emplus Technologies, Inc 8F, No.535, Zhongzheng Rd., Xindian Dist, New Taipei City 231, Taiwan			
Prüfgegenstand: *Test item:*	IVT01			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	IVT01			
Auftrags-Inhalt: *Order content*:	FCC Certification			
Prüfgrundlage: *Test specification:*	IEEE Std C95.1 47 CFR §2.1091 47 CFR §1.1310 KDB 447498 D01			
Wareneingangsdatum: *Date of sample receipt:*	2022-01-18			
Prüfmuster-Nr.: *Test sample no:*	A003202360-003			
Prüfzeitraum: *Testing period:*	2022-03-04 - 2022-05-13			
Ort der Prüfung: *Place of testing:*	EMC/RF Taipei Testing Site			
Prüflaboratorium: *Testing laboratory:*	Taipei Testing Laboratories			
Prüfergebnis*: *Test result*:*	Pass			

überprüft von: *compiled by:*		**genehmigt von:** authorized by:	
Datum: *Date:* 2022-09-13	Ethan Shao	**Ausstellungsdatum:** *Issue date:* 2022-09-13	Brenda Chen
Stellung / *Position:*	Assistant Project Engineer	**Stellung** / *Position:*	Senior Project Manager

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Contents

HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN2205TH(FCC-MPE) 001	Original Release	2022-09-13

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix EP - Photographs of EUT

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2 Test Sites

2.1 Test Facilities

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)

3 General Product Information

3.1 Product Function and Intended Use

The EUT is IVT01. It contains WLAN compatible enabling the user to communicate data through wireless interface.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Basic Information of EUT

Item	EUT Information
Kind of Equipment/Test Item	IVT01
Type Identification	IVT01
FCC ID	NCI-IVT01
IMEI	864688040154582

Technical Specification of EUT

Item	EUT Information
Operating Frequency	BT/BLE: 2402 ~ 2480 MHz WLAN 2.4G: 2412 ~ 2462 MHz WLAN 5G: 5180 ~ 5240 MHz; 5745 ~ 5825 MHz LTE Band 2: 1850 ~ 1910 MHz LTE Band 4: 1710 ~ 1755 MHz LTE Band 5: 824 ~ 849MHz LTE Band 12: 699 ~ 716 MHz LTE Band 13: 777 ~ 787 MHz LTE Band 14: 788 ~ 798MHz LTE Band 25: 1850 ~ 1915 MHz LTE Band 26: 814 ~ 849 MHz LTE Band 41: 2496 ~ 2690MHz LTE Band 66: 1710 ~ 1780MHz LTE Band 71: 663 ~ 698MHz
Modulation	BT: GFSK, π/4-DQPSK, 8DPSK BLE: GFSK 802.11b: DSSS-DBPSK, DQPSK, CCK 802.11g, 802.11a, 802.11n HT20, 802.11n HT40: OFDM-BPSK, QPSK, 16QAM, 64QAM 802.11ac VHT20, 802.11ac VHT40, 802.11ac VHT80: OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM LTE: QPSK / 16QAM
Operation Voltage	12Vdc
Antenna Information	Refer to Note as below

Note:

ANT	Antenna Type	Gain (dBi)					
		2402~2480 MHz	2412~2462 MHz	5180~5240 MHz	5260~5320 MHz	5500~5700 MHz	5745~5825 MHz
-	PCB	2.28	-	-	-	-	-
1	PCB	-	2.84	2.34	2.34	2.88	2.86
2	PCB	-	2.69	2.63	2.58	2.49	2.60
Max Peak Gain (dBi)		2.28	2.84	2.63	2.58	2.88	2.86
CDD Mode	Power Directional Gain =	-	2.84	2.63	2.58	2.88	2.86
	PSD Directional Gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ =	-	5.78	5.50	5.47	5.70	5.74

<LTE>

ANT	Antenna Type	Gain (dBi)						
		699~716 MHz	777~787 MHz	788~798 MHz	814~849 MHz	1710~ 1780MHz	1850~ 1915MHz	2496~ 2690MHz
Main	PCB	2.4	2.4	2.4	2.78	2.75	2.11	2.47
Aux	PCB	2.16	2.16	2.16	2.60	1.77	2.46	2.64

4 Maximum Permissible Exposure Evaluation

4.1 Introduction

This Standard specifies requirements for, and provides guidance on, assessing compliance with the exposure limits of radiofrequency (RF) safety standards such as IEEE Std C95.1. This includes methodologies for making an assessment (by measurement or computation) of human exposure to ambient RF fields and induced body currents in the frequency range of 0 kHz to 300 GHz.

This Standard may also be used as a guide for making low-level environmental exposure assessments in areas around RF sources listed above, as well as other sources such as Wi-Fi devices.

4.2 Reference Levels

Where appropriate, the reference levels are derived from the basic restrictions by mathematical modelling and by extrapolation from the results of laboratory investigations at specific frequencies. They are given for the condition of maximum coupling of the field to the exposed individual, thereby providing maximum protection.

According to FCC 1.1310, 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 1.1307(b).

The FCC MPE limits from 47 CFR §1.1310 are shown in the table below

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm^2]	Average 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 –

(1) f is the frequency in MHz.

(2) Provided that basic restrictions are met and adverse indirect effects can be excluded, field strength values can be exceeded. For the specific case of occupational exposures at frequencies up to 100 kHz, the derived electric fields can be increased by a factor of 2 under conditions in which adverse indirect effects from contact with electrically charged conductors can be excluded.

(3) For frequencies between 100 kHz and 10 GHz, the quantities Seq, E2 and H2 are averages over any 6 minutes.

(4) For frequencies exceeding 10 GHz, Seq, the quantities E2 and H2 are averages over any 68/f 1.05 minutes (f in GHz).

4.3 Classification of the Assessment Methods

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.

MPE Calculation Method according to KDB 447498 D04 Interim General RF Exposure Guidance v01

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 of § 1.1307(b)(1)(i)(C) to support an exemption from further evaluation from 300 kHz through 100 GHz.

The table applies to any RF source (i.e., single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least λ/2π. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			**Minimum Distance**			**Threshold ERP**
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R^2
1.34	–	30	35.6 m	–	1.6 m	3,450 R^2/f^2
30	–	300	1.6 m	–	159 mm	3.83 R^2
300	–	1,500	159 mm	–	31.8 mm	0.0128 $R^2 f$
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R^2
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

5 Test Results

5.1 MPE-based Exemption

The Calculated at a distance of 20 cm are shown as below:

Band	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (mW)	Antenna Gain (dBi)	ERP (mW)	ERP Limit (mW)	Pass / Fail
BT	2480	6	3.98	2.28	4.10	768	Pass
BLE	2480	-1.5	0.71	2.28	0.73	768	Pass
WiFi 2.4GHz	2437	18	63.10	2.84	73.96	768	Pass
WiFi 5GHz	5825	20	100.00	2.86	117.76	768	Pass
LTE Band 2 / Band25	1915	23	199.53	2.46	214.29	768	Pass
LTE Band 5 / Band26	836.5	25	316.23	2.78	365.59	428.29	Pass
LTE Band 4 / Band66	1780	23	199.53	2.75	229.09	768	Pass
LTE Band 12	716	24	251.19	2.40	266.07	366.59	Pass
LTE Band 13	787	23	199.53	2.40	211.35	402.94	Pass
LTE Band 14	798	22	158.49	2.40	167.88	408.58	Pass
LTE Band 41	2690	25	316.23	2.64	354.00	768	Pass
LTE Band 71	698	22	158.49	2.40	167.88	357.38	Pass

Conclusion
The device complies with the FCC exposure requirements since the maximum transmitter power density is below the FCC limit.

Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR shall be used to determine exemption for simultaneous transmission according to Formula repeated from § 1.1307(b)(3)(ii)(B)

$$\sum_{i=1}^{a}\frac{P_i}{P_{\mathrm{th},i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{\mathrm{th},j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

The formula of calculated the MPE is:
CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

WLAN 2.4G + Bluetooth + LTE Band 5 / Band26: 0.0242 + 0.0013 + 0.1194 = 0.1449

WLAN 5G + Bluetooth + LTE Band 5 / Band26: 0.0385 + 0.0013 + 0.1194 = 0.1592
Therefore the maximum calculations of above situations are less than the "1" limit.