

FCC TEST REPORT

Reference No. : GPWL2009001750EG

Applicant : Franklin Technology Inc.

Equipment Under Test (EUT) :

Product Name : Mobile Hotspot

Model Name : RT410

FCC Authorization Type : Certificate of Conformity

Applied Standards : FCC Part 15 Subpart B,
ANSI C 63.4:2014

FCC ID : XHG-RT410

Date of Receipt : September 11, 2020

Date of Test : October 27, 2020

Date of Issue : November 23, 2020

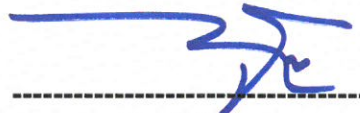
Test Results : Complied

Tested by :



Kevin Jo

Reviewed by :



Paul Kang

This test report does not assure KOLAS accreditation.

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

Remarks :

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Revision History

Revision	Report Number	Description
0	F690501-RF-EMG000359	Initial
1	F690501-RF-EMG000359-1	Added information in clause1.3 and 1.4.
2		

1. General Information

1.1 Client Information

Applicant : Franklin Technology Inc.
- Address of Applicant : 906(Gasan-Dong, JEI Platz), 186, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea.(08502)

Manufacturer : Franklin Technology Inc.
- Address of Manufacturer : 906(Gasan-Dong, JEI Platz), 186, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea.(08502)

1.2 Test Laboratory

Name and Address : SGS Korea Co., Ltd.
- Giheung 1 Laboratory : 35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
- Giheung 2 Laboratory : 23, Giheungdanji-ro 24beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
- Gunpo Laboratory : 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 15807, Republic of Korea.

FCC Registration No. : KR0150
IC Registration No. : 7837B

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1.3 General Information of E.U.T.

Classification	Description
Product Name	Mobile Hotspot
Model Name	RT410
Serial No.	None
EMI Classification	Class B
Test Voltage	120 V~, 60 Hz
Rated Voltage	3.8 Vd.c.(Min : 3.40 Vd.c., Max : 4.35 Vd.c.), Max. DC Current : 2.450 A
Highest Internal Frequency	5 825 MHz
Device Capabilities	* WCDMA B2/4/5 * LTE B2/4/5/12/25/26/41/66/71 * WLAN 2.4GHz, 5GHz
H/W Version	P1
S/W Version	RT410F21.FR.1609
Operating temperature	(-)10 °C ~ 55 °C

1.4 Operating Modes and Conditions

Operating Mode	Operating Condition
1) Charging + LTE Band 2 Idle	Charging status and connect to LTE Band 2 Idle status

Note : For all supported bands, LTE Band 2 showed the most worst case as a result of measurement

1.5 Auxiliary Equipments

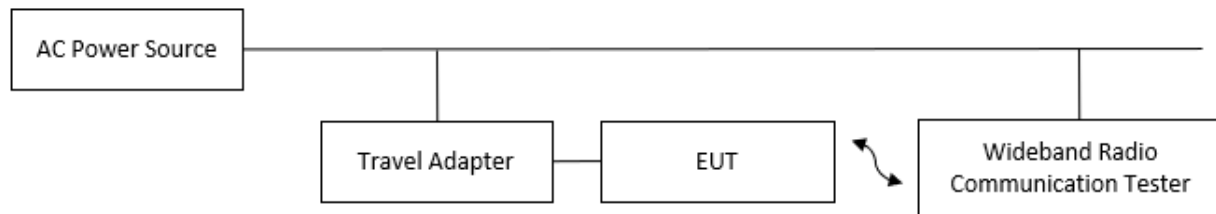
Description	Model	Serial No.	Manufacturer	FCC ID
Wideband Radio Communication Tester	CMW 500	-	-	-

1.6 Cable List

Start		END		Cable Spec.		Used core
Name	I/O Port	Name	I/O Port	Length	Shield	
AC Power Source	AC OUT	Travel Adapter	AC IN	-	-	-
		Wideband Radio Communication Tester		-	-	-
Travel Adapter	DC OUT	EUT	DC IN	1.0	Unshield	No.
EUT	-	Wideband Radio Communication Tester	-	-	-	-

1.7 System Configurations

Description	Model	Serial No.	Manufacturer
Main Board	RT410 P1 2020.08.11.	-	-
Battery	-	-	-
Travel Adapter	-	-	-

1.8 Test System Layout**1.9 Modifications**

There was no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 Subpart B	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Standards	Results
Conducted Emission	FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014	Complied
Radiated Emission	FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014	Complied

Note : Test methods of all test items are performed according to the basic standards in this table.

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2.1 Test Results

Test Items	Basic Standards	Test Results
Conducted Emission	FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014	Complied
Radiated Emission	FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014	Complied

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 MHz ~ 30 MHz	9 kHz	-
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m & 3 m
	Above 1 GHz	1 MHz	3 m

Note : 10 m method of radiated emission measurement is only applied to Class A equipment over the frequency range of 30 MHz ~ 1 GHz. Except this, 3 m method is applied to Class B equipment over the frequency range of 30 MHz ~ 1 GHz and Class A and Class B equipment above 1 GHz.

2.2.2 Test Limits

-Conducted Emission Limits at Mains Port

Frequency Range	Limits(dB(μ V))		Class
	Quasi-peak	Average	
0.15 MHz ~ 0.5 MHz	79	66	Class A
0.5 MHz ~ 30 MHz	73	60	
0.15 MHz ~ 0.5 MHz	66 to 56	56 to 46	Class B
0.5 MHz ~ 5 MHz	56	46	
5 MHz ~ 30 MHz	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

-Radiated Emission Limits below 1 GHz

Frequency Range	Limits(dB(μ V/m))	Class
	Quasi-peak	
30 MHz ~ 88 MHz	39.1	Class A (10m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.4	
960 MHz ~ 1 GHz	49.5	
30 MHz ~ 88 MHz	40.0	Class B (3m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.0	
960 MHz ~ 1 GHz	54.0	

-Radiated Emission Limits above 1 GHz (3m method)

Frequency Range	Limits(dB(μ V/m))		Class
	Average	Peak	
Above 1 GHz	59.5	79.5	Class A
Above 1 GHz	54.0	74.0	Class B

Note : The limits of class A equipment is extrapolated using an extrapolation factor of 20 dB/decade because it was measured at 3 m distance not 10 m distance.

2.3 Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and C-Average detector and using the software of EMC32(Version V8.52.0 from R&S). The final test data was measured using a Quasi-Peak detector and C-Average detector.

2.3.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Cal Due. Date
Two-Line V-Network	ENV216	R & S	100190	2021.05.08
Test Receiver	ESCI 7	R & S	100911	2021.02.19
Wideband Radio Communication Tester	CMW500	R & S	144032	2021.05.06
Shield Room	-	SY CORPORATION	-	-

Note : The calibration period of every equipment is 1 year.

2.3.2 Test Site

Shield Room in Gunpo Laboratory

2.3.3 Environment Conditions and data

- Conducted Emission at AC Mains Port

Temperature (Minimum 21.2, Maximum 21.8) °C,
Humidity (Minimum 32.0, Maximum 35.0) % R.H.,
Atmospheric Pressure (Minimum 100.1, Maximum 100.1) kPa

Test Date : October 27, 2020

Freq. (MHz)	LISN (dB)	CL (dB)	Line (P/N)	Q/P				C-A/V			
				Limit (dB μ V)	Level (dB μ V)	Result (dB μ V)	Margin (dB)	Limit (dB μ V)	Level (dB μ V)	Result (dB μ V)	Margin (dB)
0.16	9.80	0.05	N	65.36	32.55	42.40	22.96	55.36	15.85	25.70	29.66
0.16	9.70	0.05	H	65.36	34.25	44.00	21.36	55.36	21.15	30.90	24.46
0.19	9.80	0.06	N	63.86	30.94	40.80	23.06	53.86	13.74	23.60	30.26
0.19	9.78	0.06	H	63.86	31.76	41.60	22.26	53.86	19.96	29.80	24.06
0.23	9.80	0.06	N	62.60	29.64	39.50	23.10	52.60	13.94	23.80	28.80
0.23	9.74	0.06	H	62.45	29.20	39.00	23.45	52.45	20.80	30.60	21.85
0.26	9.70	0.07	H	61.37	27.83	37.60	23.77	51.37	20.83	30.60	20.77
0.42	9.80	0.13	N	57.41	29.27	39.20	18.21	47.41	18.57	28.50	18.91
0.46	9.80	0.14	N	56.66	31.06	41.00	15.66	46.66	13.96	23.90	22.76
0.46	9.70	0.14	H	56.66	39.56	49.40	7.26	46.66	29.36	39.20	7.46
0.49	9.70	0.15	H	56.24	40.65	50.50	5.74	46.24	31.65	41.50	4.74
0.49	9.80	0.16	N	56.10	31.04	41.00	15.10	46.10	14.54	24.50	21.60

Measurement Uncertainty : 3.38 dB (The confidential level is about 95%, $k=2$)

Note : • Line (H) : Hot • Line (N) : Neutral
• CL: Cable Loss • LISN : LISN Factor
• Result = Level + CL + LISN • Margin = Limit – Result

See Appendix A (Conducted Emission at AC Mains Port)

2.4 Radiated Emission

The initial preliminary exploratory scans were performed at 3 m distance over the measuring frequency range(30 MHz to 18 GHz) using a max hold mode incorporating a Peak detector and using the software of EP5RE(Version Ver5.3.70 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 GHz at 3 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

2.4.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Cal Due. Date
Horn Antenna	HF906	R & S	100326	2021.02.14
Signal Conditioning Unit	SCU 18	R & S	10117	2021.06.10
Test Receiver	ESU26	R & S	100109	2021.02.18
Bilog Antenna	VULB9163	SCHWARZBECK	396	2021.03.21
Amplifier	8447F	HP	2944A03909	2021.08.06
Wideband Radio Communication Tester	CMW500	R & S	144032	2021.05.06
3m SEMI-ANECHOIC CHAMBER	-	SY CORPORATION	-	-

Note : The Bilog Antenna calibration period is 2 years, but the other equipment calibration period are 1 year.

2.4.2 Test Site

3m SEMI-ANECHOIC CHAMBER Gunpo Laboratory (Below 1 GHz, Above 1 GHz)

2.4.3 Environment Conditions and data

Radiated Emission Test

- Below 1 GHz

Temperature (Minimum 21.3, Maximum 21.9) °C,
Humidity (Minimum 33.0, Maximum 36.0) % R.H.,
Atmospheric Pressure (Minimum 100.2, Maximum 100.2) kPa

Test Date : October 27, 2020

- Above 1 GHz

Temperature (Minimum 21.3, Maximum 21.9) °C,
Humidity (Minimum 33.0, Maximum 36.0) % R.H.,
Atmospheric Pressure (Minimum 100.2, Maximum 100.2) kPa

Test Date : October 27, 2020

Radiated Emission Test Data

- Below 1 GHz (3 m method)

Freq. (MHz)	Reading (dB μ V)	Pol. (H/V)	A (°)	H (cm)	AF (dB/m)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
92.53	40.20	V	8	100	16.57	1.78	28.01	30.54	43.50	12.96
94.99	39.70	V	203	100	17.02	1.80	28.01	30.51	43.50	12.99
108.89	30.50	V	118	300	16.74	1.92	27.96	21.20	43.50	22.30
171.66	37.60	V	332	100	14.87	2.43	27.67	27.23	43.50	16.27
178.41	37.20	V	332	100	15.25	2.48	27.63	27.30	43.50	16.20
542.24	31.10	H	279	100	24.03	4.42	28.93	30.62	46.00	15.38

Measurement Uncertainty (Horizontal) : 5.01 dB (The confidential level is about 95%, $k=2$)

Measurement Uncertainty (Vertical) : 5.38 dB (The confidential level is about 95%, $k=2$)

Note: • AF = Antenna Factor
• Pol.(H) = Horizontal
• Margin = Limit – F/S
• A : Angle
• CL = Cable Loss
• Pol.(V) = Vertical
• F/S = Level + AF + CL – Amp.
• H : Height
• F/S = Field Strength
• Amp. = Amplifier Gain

- Above 1 GHz (3 m method)

Freq. (MHz)	Level (dB μ V)		Pol. (H/V)	A (°)	H (cm)	AF (dB)	CL (dB)	Amp. (dB)	CF (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Peak	C-AV										
1211.08	45.00	-	H	4	200	25.07	7.23	45.49	0.00	31.81	74.00	42.19
1211.08	-	31.80	H	4	200	25.07	7.23	45.49	0.00	18.61	54.00	35.39
1447.67	45.90	-	V	151	100	25.19	7.98	45.38	0.00	33.69	74.00	40.31
1447.67	-	31.60	V	151	100	25.19	7.98	45.38	0.00	19.39	54.00	34.61
1461.13	45.30	-	H	172	100	25.22	7.99	45.37	0.00	33.14	74.00	40.86
1461.13	-	32.00	H	172	100	25.22	7.99	45.37	0.00	19.84	54.00	34.16
2375.58	42.90	-	V	158	200	28.06	10.22	45.31	0.00	35.87	74.00	38.13
2375.58	-	29.20	V	158	200	28.06	10.22	45.31	0.00	22.17	54.00	31.83
2686.54	42.80	-	H	13	200	28.85	11.16	45.11	0.00	37.70	74.00	36.30
2686.54	-	39.90	H	13	200	28.85	11.16	45.11	0.00	34.80	54.00	19.20
16518.87	41.60	-	V	274	100	41.44	28.91	45.21	0.00	66.74	74.00	7.26
16518.87	-	25.80	V	274	100	41.44	28.91	45.21	0.00	50.94	54.00	3.06
17267.58	41.10	-	V	284	100	42.37	29.18	45.51	0.00	67.14	74.00	6.86
17267.58	-	24.90	V	284	100	42.37	29.18	45.51	0.00	50.94	54.00	3.06
17697.54	40.30	-	V	2	100	43.70	29.63	45.68	0.00	67.95	74.00	6.05
17697.54	-	23.30	V	2	100	43.70	29.63	45.68	0.00	50.95	54.00	3.05

Measurement Uncertainty (Horizontal) : 5.33 dB (The confidential level is about 95%, $k=2$)

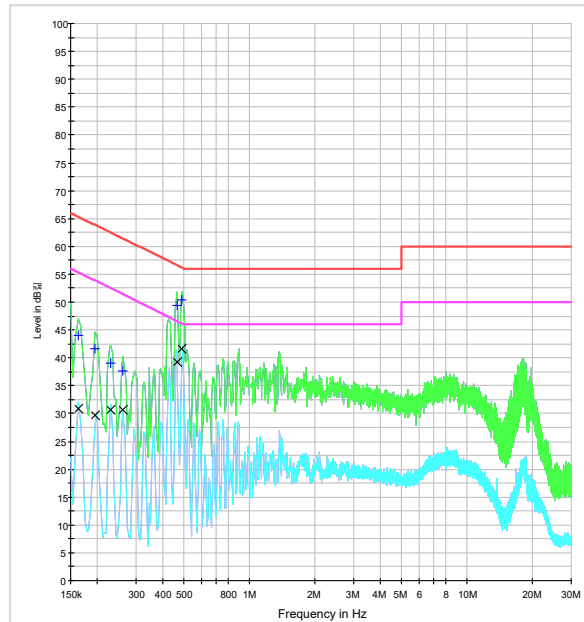
Measurement Uncertainty (Vertical) : 5.35 dB (The confidential level is about 95%, $k=2$)

Note: • AF = Antenna Factor
• Pol.(H) = Horizontal
• Margin = Limit – F/S
• A : Angle
• CL = Cable Loss
• Pol.(V) = Vertical
• F/S = Level + AF + CL – Amp.
• H : Height
• F/S = Field Strength
• Amp. = Amplifier Gain

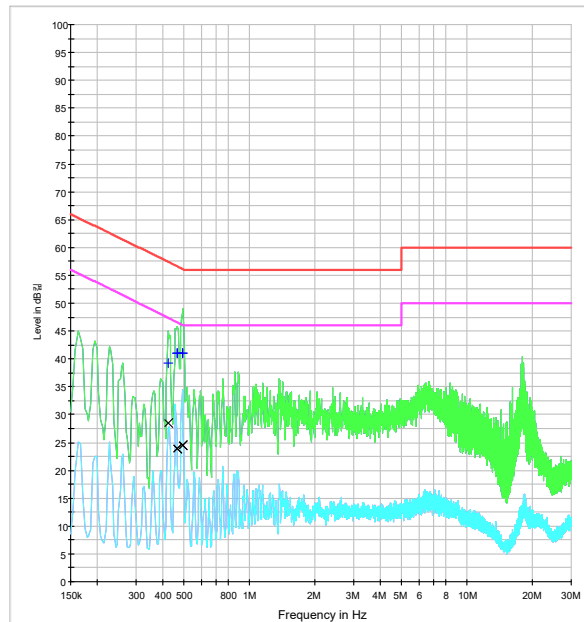
See Appendix B (Radiated Emission)

Appendix A : Conducted Emission at AC Mains Port

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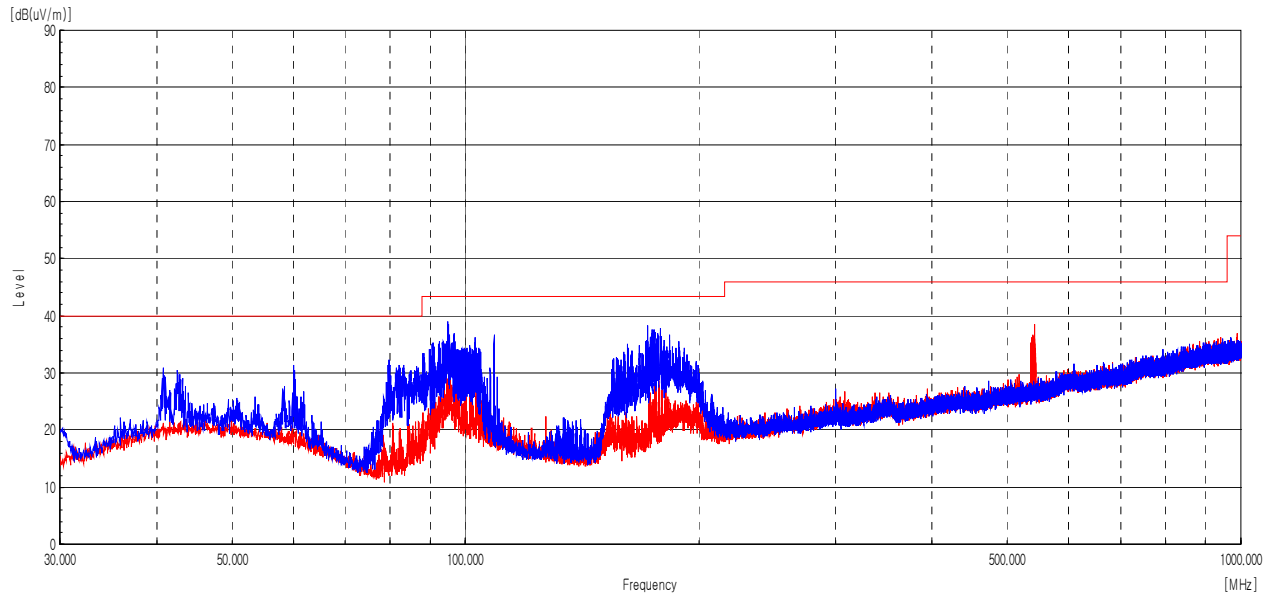


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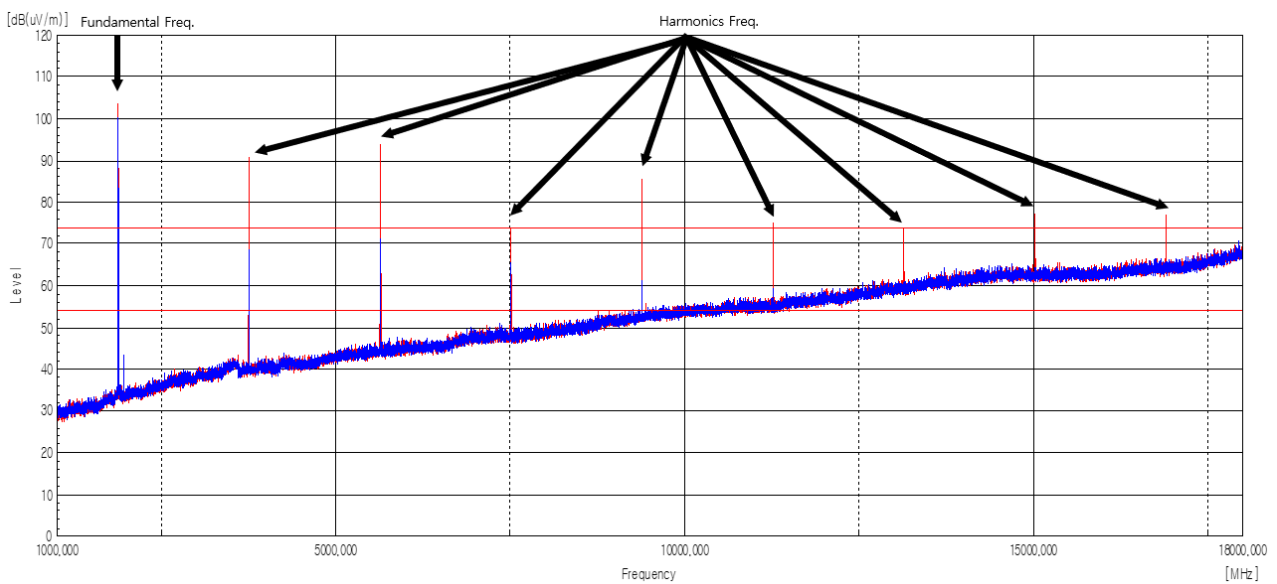


Appendix B : Radiated Emission

Below 1 GHz



Above 1 GHz



- End of the Report -