

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 3, 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.

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The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full

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Revision History

Revision	Report Number	Description
0	F690501-RF-EMG000359	Initial
1		
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
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

1.5 Auxiliary Equipments

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

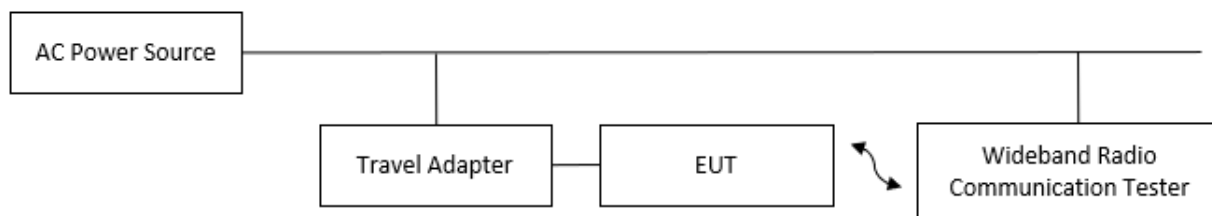
1.6 Cable List

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.

EMISSION

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
• CL: Cable Loss
• Result = Level + CL + LISN
• Line (N) : Neutral
• LISN : LISN Factor
• 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%, $k=2$)

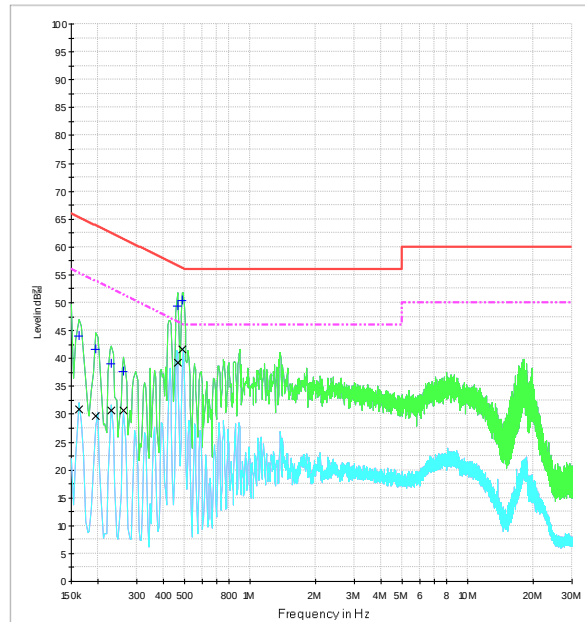
Measurement Uncertainty (Vertical) : 5.35 dB (The confidential level is about 95%, $k=2$)

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

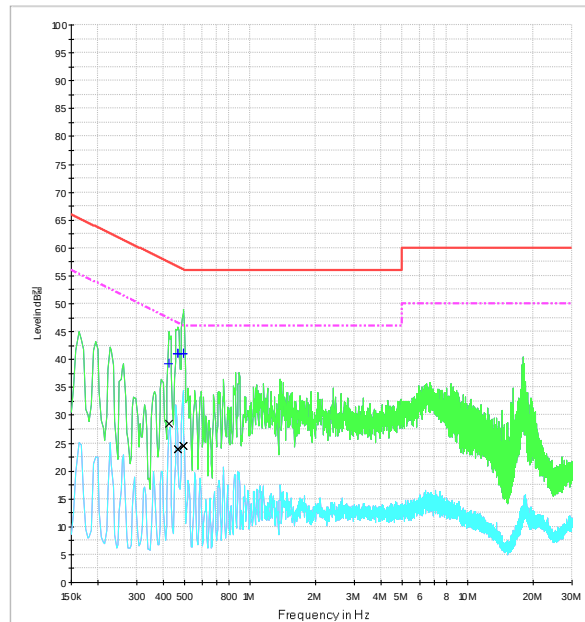
See Appendix B (Radiated Emission)

Appendix A : Conducted Emission at AC Mains Port

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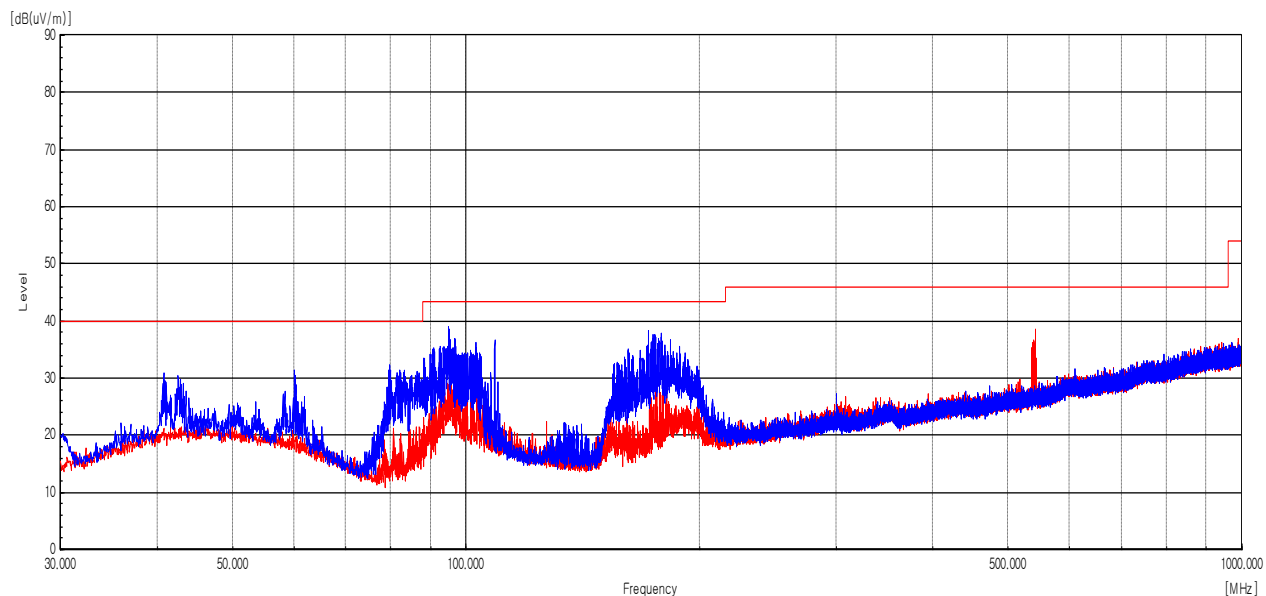


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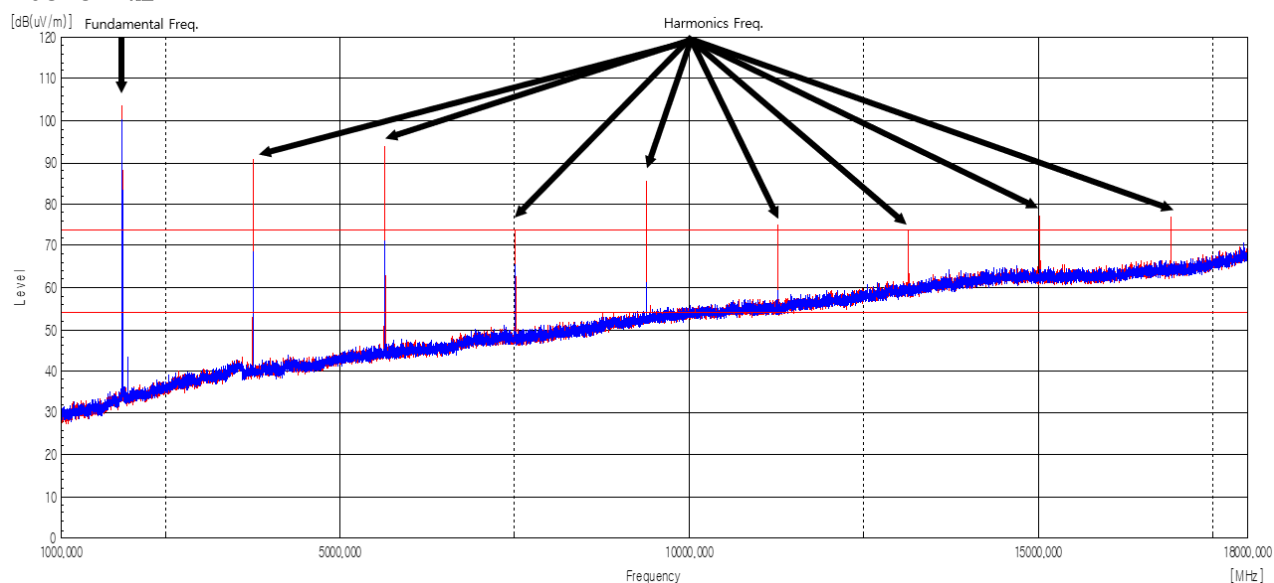


Appendix B : Radiated Emission

Below 1 GHz



Above 1 GHz



- End of the Report -