RADIO TEST REPORT

Product	:	SYNCUP PETS
Model Name	:	TMUS-SUP-1
FCC ID	:	2ASXC-TMO-NBT-01
Test Regulation	:	FCC 47 CFR Part 24, Subpart E
Received Date	:	July 12, 2019
Test Date	:	July 12, 2019 ~ Aug 26, 2019
Issued Date	:	Aug. 27, 2019
Applicant	:	T-mobile Usa, Inc. 12920 Se 38th Street, Bellevue, Washington, United States, 98006
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Testing Laboratory
3398

The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.

REVISION HISTORY

Original Test Report No.: 4789092176-US-R2-V0

Rev.	Test report No.	Date	Page revised	Contents
Original	4789092176-US-R2-V0	Aug. 27, 2019	-	Initial issue

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1. Attestation of Test Results

APPLICANT:	T-mobile Usa, Inc. 12920 Se 38th Street, Bellevue, Washington, United States, 98006
MANUFACTURER	CyberTAN Technology Inc. No. 99, Park Avenue III Science-based Industrial Park Hsinchu Taiwan 308
EUT DESCRIPTION:	SYNCUP PETS
BRAND:	T-Mobile
MODEL:	TMUS-SUP-1
SAMPLE STAGE:	Engineering sample
DATE of TESTED:	July 12, 2019 ~ Aug 26, 2019

APPLICABLE STANDARDS	
STANDARD	**Test Results**
FCC 47 CFR PART 24	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Cindy Hsin Date : Aug. 27, 2019
Project Handler

Approved and Authorized By:

Stanley Wu Date : Aug. 27, 2019
Senior Project Engineer

2. Summary of Test Results

LTE 2		
FCC Clause	**Test Items**	**Result**
§ 2.1053 § 24.238	Radiated Spurious Emission	PASS

Note:

1. This CIIPC supplemental report was issued based on the original report with the report number 4789004574-US-R2-V0. The difference compared to the original report is the additional metal plate at the bottom of the product. Therefore, only Radiated Spurious Emissions tests were performed and recorded in this report. Refer to original report for other test data.

3. Test Methodology and Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB 971168 D01 Power Meas License Digital Systems v03r01, ANSI C63.26-2015 and ANSI/TIA-603-E.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398

5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Test Item	Measurement Frequency Range	K	U(dB)
Radiated Spurious Emission	30MHz ~ 1GHz	2	5.6dB
	1GHz ~ 18GHz	2	4.2dB
	18GHz ~ 40GHz	2	4.4dB

6. Equipment under Test

6.1. Description of EUT

Product	SYNCUP PETS
Brand Name	T-Mobile
Model Name	TMUS-SUP-1
Normal Voltage	5Vdc (adapter or host equipment) 3.7Vdc for battery
Voltage Operation Range	3.33~4.07Vdc
Hardware Version	V01
Software Version	0.31.10.14

Note :

1. This CIIPC supplemental report was issued based on the original report with the report number 4789004574-US-R2-V0. The difference compared to the original report is the additional metal plate at the bottom of the product. Therefore, only Radiated Spurious Emissions tests were performed and recorded in this report.

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
PSU Adapter	PHIHONG	AN05A-050E	I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5.0 Vdc, 1.0A
Battery	Joules Miles	GWB001-A1	3.7 Vdc, 430 mAh
Charging Dock	CyberTAN	N/A	N/A
Collar mount	CyberTAN	N/A	N/A
USB Cable	N/A	N/A	1 meter shielded cable without core
Bands	CyberTAN	N/A	N/A

The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

6.2. Technical Information

Frequency Bands	**■ LTE Band 2**	1850 MHz to 1910 MHz (Uplink) 1930 MHz to 1990 MHz (Downlink)
Sub-carrier spacing	15 kHz / 3.75kHz	
Modulation Mode	QPSK / BPSK	

Note 1: Accordance with manufacturer description, the product support both single tone and multi tone carrier for spacing 15 kHz , but just only support single tone carrier for 3.75 kHz spacing.

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Radiated Spurious Emission	966-2	23~26°C / 65~69%RH	120Vac / 60 Hz	Jul 12, 2019 ~ Aug 26, 2019	Will Chen

FCC Test Firm Registration Number: 498077

6.4. Description Of Available Antennas

Band	Antenna Type	Antenna Gain(dBi)
LTE Band 2	Internal	1.5

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

6.5. Test Mode Applicability and Tested Channel Detail

The following testing in NB-IOT is set based on the maximum RF Output Power.

Radiated measurements are performed by rotating the EUT in two different orthogonal (XZ axis) test planes, the worst case was found when positioned as the table below.

Band	Axis
LTE Band 2	X-plane

Following channel(s) was (were) selected for the final test as listed below.

LTE Band 2

Test item	Sub-carrier Spacing (kHz)		Modulation		Test Channel			Tone	
	3.75	15	QPSK	BPSK	L	M	H	1	100%
Radiated Spurious Emissions	V	-	V	-	V	V	V	V	-

Note:

1. The mark “V” means that this configuration is chosen for testing.
2. The mark “-” means that this configuration is not testing.

7. Test Equipment

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Interval**
Spectrum Analyzer	Keysight	N9010A	MY56070827	Nov. 8, 2018	1 year
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	Nov. 8, 2018	1 year
Loop Antenna	ETS lindgren	6502	00213440	Dec. 11, 2018	1 year
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck	VULB 9168 & N-6-05	774 & AT-N0538	Jan. 14, 2019	1 year
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck	VULB 9168 & N-6-05	773 & AT-N0539	Jan. 14, 2019	1 year
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	Jan. 25, 2019	1 year
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01686	Jan. 16, 2019	1 year
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	Jan.16, 2019	1 year
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	759	Nov. 13, 2018	1 year
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	Jan. 30, 2019	1 year
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	Jan. 29, 2019	1 year
Preamplifier (18-40GHz)	EMCI	EMC184040SE E	980426	May. 8, 2019	1 year
Signal Generator	Keysight	N5173B	MY53271122	Jan. 14,2019	1 year
RF Cable (9 KHz~18 GHz)	UltraPhase & EMC Instrument	A1K50-UP0358-A1K50-1500&EMC106-NM-SM-2500/7000	170111-4&170219/170102	Jan. 29,2019	1 year
RF Cable (18 GHz~40 GHz)	UltraPhase	K1K50-UP0264-K1K50-2500/2500/600	170214-2/170214-6/170111-1	Jan. 29,2019	1 year

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Interval**
Spectrum Analyzer	Keysight	N9010A	MY56070834	Nov. 8, 2018	1 year
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	161254	Dec. 5, 2018	1 year
Temperature &Humidity Test Chamber	GIANT FORCE	GTH-150-40-CP-AR	MAA1701-010	Apr. 3, 2019	1 year

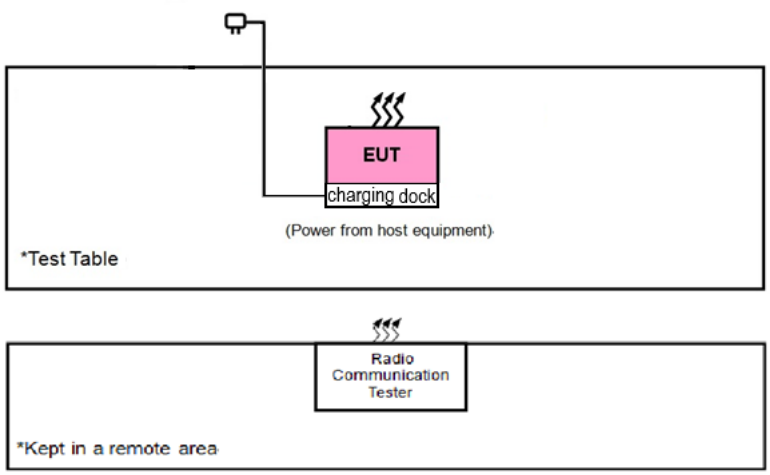
UL Software		
Description	**Name**	**Version**
Radiated measurement	AUDIX_E3	9.0

8. Description of Test Setup

Support Equipment

Item	Equipment	Brand Name	Model Name	S/N
N/A	N/A	N/A	N/A	N/A

Setup Diagram for Test



9. Test Results

9.1. Radiated Spurious Emission

Requirements

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to –13 dBm.

Test procedure

1. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
2. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.

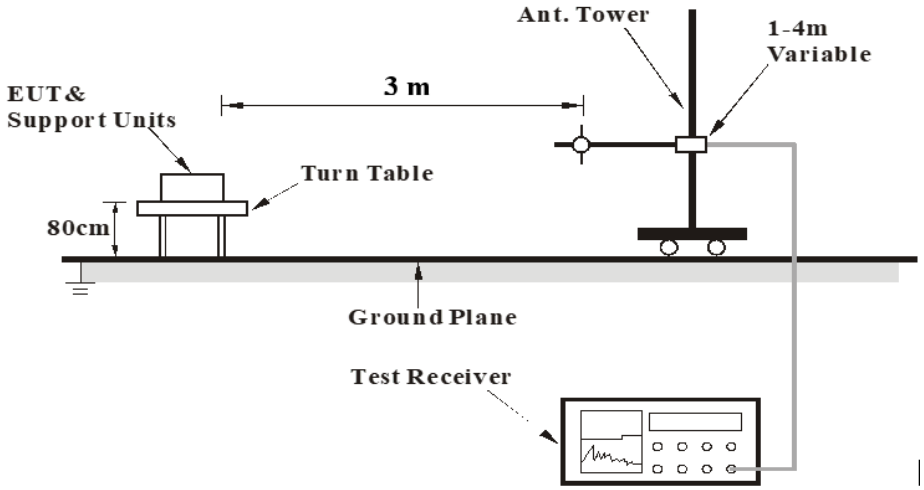
   EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

   E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15 dBi.

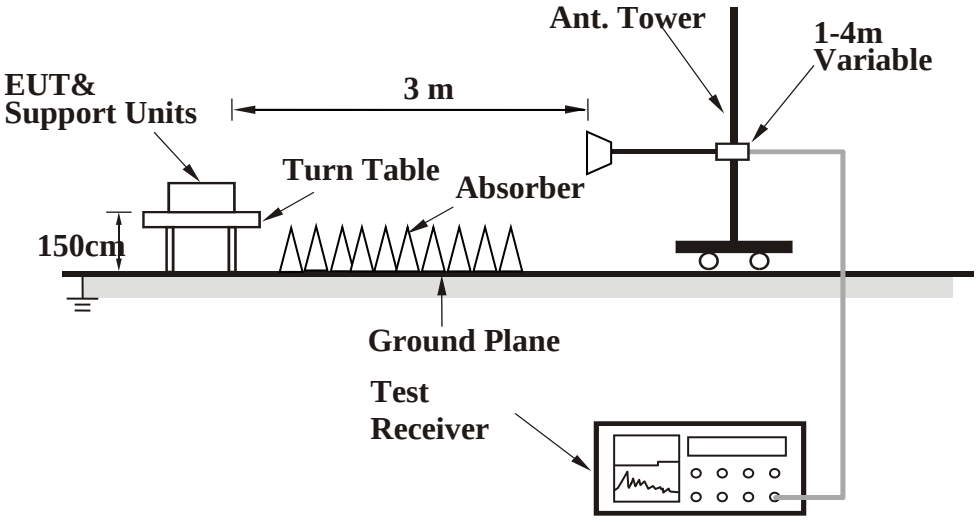
Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

Test Setup

<Frequency Range 30 MHz ~ 1 GHz >



<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations

Test Results

- Sweep the whole frequency band through the range from 30MHz to the 10th harmonic of the carrier.
- The spurious emissions within 30-1000MHz were found more than 20dB below the permissible value is not required to be report.

LTE Band 2

EUT Test Condition		Measurement Detail	
Sub-carrier spacing	3.75 kHz	**Frequency Range**	Above 1 GHz
Channel	Low Channel		

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA. Reading (dBm)	S.G. Value (dBm)	Correction Factor (dB)	Polarization (H/V)
3700.2	-58.47	-13	-45.47	-63.28	-69.25	10.78	H
5550.3	-52.12	-13	-39.12	-60.28	-63.72	11.60	H
3700.2	-58.06	-13	-45.06	-62.77	-68.84	10.78	V
5550.3	-50.59	-13	-37.59	-58.79	-62.19	11.60	V

Remarks:

1. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).
2. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Sub-carrier spacing	3.75 kHz	**Frequency Range**	Above 1 GHz
Channel	Middle Channel		

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA. Reading (dBm)	S.G. Value (dBm)	Correction Factor (dB)	Polarization (H/V)
3760	-57.32	-13	-44.32	-62.29	-68.05	10.73	H
5640	-49.44	-13	-36.44	-57.73	-61.00	11.56	H
3760	-55.70	-13	-42.70	-60.62	-66.43	10.73	V
5640	-46.80	-13	-33.80	-55.11	-58.36	11.56	V

Remarks:

1. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).
2. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Sub-carrier spacing	3.75 kHz	**Frequency Range**	Above 1 GHz
Channel	High Channel		

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA. Reading (dBm)	S.G. Value (dBm)	Correction Factor (dB)	Polarization (H/V)
3819.8	-57.94	-13	-44.94	-63.08	-68.57	10.63	H
5729.7	-49.14	-13	-36.14	-57.56	-60.68	11.54	H
7639.6	-49.40	-13	-36.40	-62.27	-58.54	9.145	H
3819.8	-54.88	-13	-41.88	-60.00	-65.51	10.63	V
5729.7	-46.71	-13	-33.71	-55.13	-58.25	11.54	V
7639.6	-46.15	-13	-33.15	-59.58	-55.29	9.15	V

Remarks:

1. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).
2. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
3. The other emission levels were very low against the limit.