Hearing Aid Compatibility (HAC) RF Emissions Test Report

APPLICANT	:	Hot Pepper Mobile Inc.
PRODUCT NAME	:	Smart Phone
MODEL NAME	:	HPPL60A
BRAND NAME	:	Hot Pepper
FCC ID	:	2A33N-L60C
STANDARD(S)	:	FCC 47 CFR Part 20(20.19) ANSI C63.19-2011
RECEIPT DATE	:	2021-12-10
TEST DATE	:	2022-04-08
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DIRECTORY

Change History		
Version	**Date**	**Reason for Change**
1.0	2023-11-03	First edition

1. Attestation of Testing Summary

Air Interface	Frequency Band	E-field M-Rating
GSM CMRS Voice	GSM850	M4
	GSM1900	M4
VoLTE	Band 41	M4
HAC Rate Category: M4		

Note:

1. It is compliance with HAC limits for this device that specified in FCC 47 CFR Part 20.19 and ANSI C63.19.
2. When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

2. Technical Information

Note: Provide by Applicant.

2.1. Applicant and Manufacturer Information

Applicant:	Hot Pepper Mobile Inc.
Applicant Address:	350 10th Ave 1000 Ste San Diego CA 92101-8705
Manufacturer:	Hot Pepper Mobile Inc.
Manufacturer Address:	350 10th Ave 1000 Ste San Diego CA 92101-8705

2.2. Equipment under Test (EUT) Description

Product Name:	Smart Phone
EUT IMEI:	(N/A, marked 1# by test site)
Hardware Version:	AA20_P2
Software Version:	HPP-L60A-3.0.6
Frequency Bands:	GSM 850: 824 MHz ~ 849 MHz GSM 1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz WLAN 2.4GHz: 2412 MHz ~ 2462 MHz WLAN 5.2GHz: 5180 MHz ~ 5240 MHz WLAN 5.3GHz: 5260 MHz ~ 5320 MHz WLAN 5.5GHz: 5500 MHz ~ 5720 MHz WLAN 5.8GHz: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Modulation Mode:	GSM/GPRS: GMSK

	EDGE: 8PSK WCDMA: QPSK, 16QAM LTE: QPSK, 16QAM, 64QAM 802.11b: DSSS 802.11a/g/n-HT20/HT40/ac-VHT20/40/80: OFDM BR+EDR: GFSK(1Mbps), π/4-DQPSK(2Mbps), 8-DPSK(3Mbps) Bluetooth LE: GFSK
VoLTE Mode:	Support
VoWi-Fi Mode:	Support
VoIP Mode:	Support
SIM Cards Description:	GSM+WCDMA+LTE

Note:

1. This report was updated based on the original report SZ21120041S02, Model: HPPL60A, FCC ID: 2A33N-L60A, both of them are different from the following:
   a) Add LTE B13 by change software version.
   b) Changed Camera.
   c) Changed the RAM.
   d) Changed the FCC ID: 2A33N-L60C.
   Therefore LTE band 13 requires an RF emissions test evaluation and its latest results will be recorded in this report. The other test results in this report still refer to the test results in the original test report.
2. For more detailed description, please refer to specification or user manual supplied by the applicant and/or manufacturer.

2.3. Photographs of the EUT

Note: Please refer to the External Photos for the Photos of the EUT

2.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title	Method determination /Remark
1	FCC 47 CFR Part 20(20.19)	Hearing aid-compatible mobile handsets.	No deviation
2	ANSI C63.19-2011	American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids	No deviation
3	KDB 285076 D01v06r04	HAC Guidance	No deviation
Note 1: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.			

3. Air Interface and Operating Mode

Air Interface	Band	Transport Type	Simultaneous Transmitter	Name of Voice Service	Power Reduction
GSM	GSM850	VO	Wi-Fi & BT	CMRS Voice	No
	GSM1900				No
	EDGE850	VD	Wi-Fi & BT	Google duo	No
	EDGE1900				No
WCDMA (UMTS)	Band II	VO	Wi-Fi & BT	CMRS Voice	No
	Band IV				No
	Band V				No
	HSPA	VD	Wi-Fi & BT	Google duo	No
FDD-LTE	Band 2	VD	Wi-Fi & BT	VoLTE & Google duo	No
	Band 4				No
	Band 5				No
	Band 12				No
	Band 13				No
	Band 25				No
	Band 26				No
	Band 41				No
	Band 66				No
	Band 71				No
Wi-Fi	2450	DT	GSM,UMTS, LTE	Wi-Fi Calling & Google duo	No
	5200 (U-NII-1)				No
	5300 (U-NII-2A)				No
	5500 (U-NII-2C)				No
	5800 (U-NII-3)				No
BT	2450	DT	GSM,UMTS, LTE	N/A	No

Where:
VO=Voice Only
DT=Digital Transport only
VD=CMRS and IP Voice Service over Digital Transport
BT=Bluetooth
* Ref Lev in accordance with 7.4.2.1 of ANSI C63.19-2011 and the July 2012 VoLTE interpretation
** Ref Lev −20 dBm0
*** Ref Lev XYNet established by KDB Inquiry NNNNNN @ −16 dBm0

Note:

1) Air Interface/Band MHz: List of all air interfaces and bands supported by the handset.
2) Type: For each air interface, indicate the type of voice transport mode:
   i. VO = legacy Cellular Voice Service, from Table 7.1 in 7.4.2.1 of ANSI C63.19-2011;
   ii. DT = Digital Transport only (no voice);
   iii. VD = IP Voice Service over Digital Transport.
3) Simultaneous Transmitter: Indicate any air interface/bands that operate in simultaneous or concurrent service transmission mode.
4) Name of Voice Service: See Q4 in 285076 D03 HAC FAQ for further clarification.
   a) Ref Lev in accordance with 7.4.2.1 of ANSI C63.19-2011 and the July 2012 VoLTE interpretation
   b) ** Ref Lev −20 dBm0
   c) *** Ref Lev XYNet established by KDB Inquiry NNNNNN @ −16 dBm0
5) LTE-FDD Band 71: The frequency range of LTE-FDD Band 71 is out of ANSI C63.19-2011, therefore RF Emission for VoLTE of LTE Band 71 is not required.

4. Modulation Interference Factor

The HAC Standard ANSI C63.19-2011 defines a new scaling using the Modulation Interference Factor (MIF).For any specific fixed and repeatable modulated signal, a modulation interference factor (MIF, expressed in dB) may be developed that relates its interference potential to its steady-state rms signal level or average power level.

This factor is a function only of the audio-frequency amplitude modulation characteristics of the signal and is the same for field-strength and conducted power measurements. It is important to emphasize that the MIF is valid only for a specific repeatable audio-frequency amplitude modulation characteristic. Any change in modulation characteristic requires determination and application of a new MIF.

The Modulation Interference factor (MIF, in dB) is added to the measured average E-field (in dBV/m) and converts it to the RF Audio Interference level (in dBV/m). This level considers the audible amplitude modulation components in the RF E-field. CW fields without amplitude modulation are assumed to not interfere with the hearing aid electronics. Modulations without time slots and low fluctuations at low frequencies have low MIF values, TDMA modulations with narrow transmission and repetition rates of few 100 Hz have high MIF values and give similar classifications as ANSI C63.19-2011. ER3D, EF3D and EU2D E-field probes have a bandwidth <10 kHz and can therefore not evaluate the RF envelope in the full audio band. DASY52 is therefore using the indirect measurement method according to ANSI C63.19-2011 which is the primary method. These near field probes read the averaged E-field measurement. Especially for the new high peak-to-average (PAR) signal types, the probes shall be linearized by PMR calibration in order to not overestimate the field reading. Probe Modulation Response (PMR) calibration linearizes the probe response over its dynamic range for specific modulations which are characterized by their UID and result in an uncertainty specified in the probe calibration certificate. The MIF is characteristic for a given waveform envelope and can be used as a constant conversion factor if the probe has been PMR calibrated. The evaluation method for the MIF is defined in ANSI C63.19-2011 section D.7. An RMS demodulated RF signal is fed to a spectral filter (similar to an A weighting filter) and forwarded to a temporal filter acting as a quasi-peak detector. The averaged output of these filtering is scaled to a 1 kHz 80% AM signal as reference. MIF measurement requires additional instrumentation and is not well suited for evaluation by the end user with reasonable uncertainty. It may alliteratively be determined through analysis and simulation, because it is constant and characteristic for a communication signal. DASY52 uses well-defined signals for PMR calibration. The MIF of these signals has been determined by simulation and it is automatically applied. The MIF measurement uncertainty is estimated as follows, declared by HAC equipment provider SPEAG, for modulation frequencies from slotted waveforms with fundamental frequency and at least 2 harmonics within 10 kHz:

0.2 dB for MIF	0.5 dB for MIF	1 dB for MIF
-7dB to +5 dB	-13dB to +11 dB	> -20 dB

MIF values applied in this test report were provided by the HAC equipment provider of SPEAG, and the worst values for all air in terface are listed below to be determine the Low-power Exemption.

UID	Communication System Name	MIF(dB)
10021	GSM-FDD(TDMA,GMSK)	3.63
10025	EDGE-FDD (TDMA, 8PSK, TN 0)	3.75
10460	UMTS-FDD(WCDMA, AMR)	-25.43
10225	UMTS-FDD (HSPA+)	-20.39
10169	LTE-FDD(SC-FDMA,1RB,20MHz,QPSK)	-15.63
10170	LTE-FDD(SC-FDMA,1RB,20MHz,16-QAM)	-9.76
10179	LTE-FDD(SC-FDMA,1RB,20MHz,64-QAM)	-9.93
10181	LTE-FDD(SC-FDMA,1RB,15MHz,QPSK)	-15.63
10175	LTE-FDD(SC-FDMA,1RB,10MHz,QPSK)	-15.63
10177	LTE-FDD(SC-FDMA,1RB,5MHz,QPSK)	-15.63
10184	LTE-FDD(SC-FDMA,1RB,3MHz,QPSK)	-15.62
10187	LTE-FDD(SC-FDMA,1RB,1.4MHz,QPSK)	-15.62
10172	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	-1.62
10173	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	-1.44
10174	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	-1.54
10240	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	-1.62
10237	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	-1.62
10234	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	-1.62
10231	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	-1.62
10228	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	-1.62
10061	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	-2.02
10077	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	0.12
10427	IEEE 802.11n (HT Greeneld, 150 Mbps, 64-QAM)	-13.44
10069	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	-3.15
10616	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	-5.57

5. Conducted Power

The maximum tune-up power of LTE Band 13 was recorded in the annex E of SZ23080104S01.

6. Low-power Exemption

Air Interface	Max Tune-up Limit (dBm)	Worst Case MIF (dB)	Power + MIF(dB)	C63.19 Test Required
LTE Band 13	24.50	-9.76	14.74	No

Note:

1. According to ANSI C63.19 2011-version, for the air interface technology of a device is exempt from testing when its average antenna input power plus its MIF is ≤17 dBm for any of its operating modes.
2. For all of bands, the worst case of maximum tune-up limit will be test RF emission, therefore WCDMA and FDD-LTE mode is not necessary for testing.
3. For GSM mode, only GSM voice will be tested for the low power exemption.
4. HAC RF rating is M4 for the air interface which meets the low power exemption.

7. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual “root-sum-squares” (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances. Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed tolie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is showed in Table 12.1.

Annex A General Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL. 3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
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2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL. 3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

The FCC designation number is CN1192, the test firm registration number is 226174.

****** END OF MAIN REPORT ******