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CNAS L0310



FCC Maximum Permissible Exposure(MPE) Estimation Report

Product Name: LTE Module

Model: ME919Bs-567ab

Report No.: SYBH(Z-SAR)20190713004001-2

FCC ID: QISME919BS-567AB

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DATE	2019-07-31	2019-07-31

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1. The laboratory has passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01 & 2174.02 & 2174.03
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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	2019-07-31	Zhang Zufu

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1 EUT Description

Device Information:				
Product Name :		LTE Module		
Model :		ME919Bs-567ab		
FCC ID:		QISME919BS-567AB		
Device Type :		Mobile Device		
Device Phase:		Identical Prototype		
Exposure Category:		Uncontrolled environment/general population		
Hardware Version :		RM3ME919BSM31		
Software Version :		11.790.01.05.1419		
Antenna Type :		External Antenna		
Device Operating Configurations:				
Supporting Mode(s)		GSM850/1900,UMTSBand II/IV/V, LTEBand 2/4/5/7/12/13/29		
Test Modulation		GSM(GMSK/8PSK),UMTS(QPSK),LTE(QPSK/16QAM)		
Operating Range(s)	Frequency	Band	Tx (MHz)	Rx (MHz)
		GSM850	824-849	869-894
		GSM1900	1850-1910	1930-1990
		UMTS Band II	1850-1910	1930-1990
		UMTS Band IV	1710-1755	2110-2155
		UMTS Band V	824-849	869-894
		LTE Band 2	1850-1910	1930-1990
		LTE Band 4	1710-1755	2110-2155
		LTE Band 5	824-849	869-894
		LTE Band 7	2500-2570	2620-2690
		LTE Band 12	699-716	729-746
		LTE Band 13	777-787	746-756
		LTE Band 29	/	717-728

1.1 General Description

ME919Bs-567ab LTE/WCDMA (UMTS)/GSM/GPRS/EDGE multimode Wireless Module is subscriber equipment in the LTE /UMTS/GSM system. ME919Bs-567ab implement such functions as RF signal receiving/transmitting, LTE/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides LGA interface.

2 Test specification(s)

ANSI Std C95.1-1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)
KDB 447498 D01	General RF Exposure Guidance v06

3 Testing laboratory

Test Site	Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	NO.2 New City Avenue Songshan Lake Sci. & Tech. Industry Park, Dongguan, Guangdong, P.R.C
Telephone	+86 769 23830808
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State of accreditation	The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310 A2LA TESTING CERT #2174.01 & 2174.02 & 2174.03

4 Applicant and Manufacturer

Company Name	HUAWEI TECHNOLOGIES CO., LTD
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

5 Application details

Start Date of test	2019-07-31
End Date of test	2019-07-31

6 Ambient Condition

Ambient temperature	18°C – 25°C
Relative Humidity	30% – 70%

7 RF Exposure Requirements

An estimation of MPE in this application for product is used to ensure if it complies with the rules of the standard in the regulation list above.

Maximum permissible exposure (MPE) refers to the RF energy that is acceptable for human exposure. It is broken down into two categories, Occupational/controlled and General population/uncontrolled.

Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

A rough estimation of the expected exposure in power flux density on a given point can be made with the following equation:

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

EIRP = P * G

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. Therefore, the S of the device is calculated with R=20cm, and if it is below the limit S, then we can conclude the device complies with the rules.

7.1 FCC MPE Limits

We analysis if it comply with the limits for General population/uncontrolled exposure. The FCC MPE limits for field strength and power density are given in 47CFR 1.1310(Table below).These limits are generally based on recommended exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP), and also partly based on guidelines recommended by the American National Standards Institute (ANSI) in Section 4.1 of ANSI/IEEE C95.1.

Table: Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/controlled Exposure				
Frequency Range(MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength(H)(A/m)	Power Density (S)(mW/cm ²)	Averaging Time (minute) E ² , H ² or S
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
1500-100,000	--	--	5	6
(B) Limits for General Population/uncontrolled Exposure				
Frequency Range(MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength(H)(A/m)	Power Density (S)(mW/cm ²)	Averaging Time (minute) E ² , H ² or S
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30
f=frequency in MHz			*Plane-wave equivalent power density	

8 RF Exposure Evaluation (FCC)

8.1 Calculation of Power Density for Single Chain Transmitters

Band	Antenna	Tune-up Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP (mW)	R (cm)	S (mW/cm ²)	Limit (mW/cm ²)	% of limit
GSM850 (CS)	External Antenna	34.00	2.50	36.50	558.35	20.00	0.11	0.55	20.24%
GSM850 1slot	External Antenna	34.00	2.50	36.50	558.35	20.00	0.11	0.55	20.24%
GSM850 2slot	External Antenna	32.00	2.50	34.50	704.60	20.00	0.14	0.55	25.53%
GSM850 3slot	External Antenna	31.00	2.50	33.50	839.52	20.00	0.17	0.55	30.44%
GSM850 4slot	External Antenna	29.00	2.50	31.50	706.27	20.00	0.14	0.55	25.59%
GSM1900 (CS)	External Antenna	31.00	2.50	33.50	279.84	20.00	0.06	1.00	5.57%
GSM1900 1slot	External Antenna	31.00	2.50	33.50	279.84	20.00	0.06	1.00	5.57%
GSM1900 2slot	External Antenna	29.00	2.50	31.50	353.13	20.00	0.07	1.00	7.03%
GSM1900 3slot	External Antenna	28.00	2.50	30.50	420.76	20.00	0.08	1.00	8.37%
GSM1900 4slot	External Antenna	26.00	2.50	28.50	353.97	20.00	0.07	1.00	7.05%
UMTS Band II	External Antenna	24.50	2.50	27.00	501.19	20.00	0.10	1.00	9.98%
UMTS Band IV	External Antenna	24.50	2.50	27.00	501.19	20.00	0.10	1.00	9.98%
UTMS Band V	External Antenna	25.00	2.50	27.50	562.34	20.00	0.11	0.55	20.39%
LTE Band 2	External Antenna	24.00	2.50	26.50	446.68	20.00	0.09	1.00	8.89%
LTE Band 4	External Antenna	24.00	2.50	26.50	446.68	20.00	0.09	1.00	8.89%
LTE Band 5	External Antenna	24.50	2.50	27.00	501.19	20.00	0.10	0.55	18.17%
LTE Band 7	External Antenna	23.50	2.50	26.00	398.11	20.00	0.08	1.00	7.92%
LTE Band 12	External Antenna	24.50	2.50	27.00	501.19	20.00	0.10	0.47	21.41%
LTE Band 13	External Antenna	24.50	2.50	27.00	501.19	20.00	0.10	0.52	19.26%

Note:

- 1)* based on the maximum tune-up tolerance limit declared by manufacturer
- 2) Additional MPE Evaluation is not required for downlink LTE CA and LTE Downlink 2x2 MIMO since the maximum tune-up output power with DL CA and LTE Downlink 2x2 MIMO and without DL CA are the same.

For GSM bands, the time-based average power considering the duty cycle should be used in MPE evaluation. To average the power, the division factor is as follows:

1Tx slot = 1 transmit time slot out of 8 time slots => power divided by (1/8) = > - 9.03dB

2Tx slots = 2 transmit time slot out of 8 time slots=> power divided by (2/8) = > - 6.02dB

3Tx slots = 3 transmit time slot out of 8 time slots=> power divided by (3/8) = > - 4.26dB

4Tx slots = 4 transmit time slot out of 8 time slots=> power divided by (4/8) = > - 3.01dB

According to the power density calculations with a distance from the point to the antenna 20cm above, we can conclude that the limit percentage of above supporting frequency bands calculation results are less than 1, therefore, the product meets the requirements.

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