

FCC - TEST REPORT

Report Number	: 68.950.15.287.	01	Date of Issue:	October 28, 2015	
Model	: Le Max				
Product Type	: TD LTE digital r	mobile phor	ne		
Applicant _	: Lemobile Inform	nation Techi	nology (Beijing)	Co., Ltd	
Address	: WENHUAYING	NORTH (N	lo.1, LINKONG 2	2nd St), GAOLIYING,	
-	SHUNYI DISTR	RICT, BEIJIN	NG, China		
Production Facility	: MAINTEK COMPUTER (SUZHOU) CO LTD				
Address	: NO. 233, JIN FENG ROAD, NEW DISTRICT, SUZHOU, CHINA				
Test Result	: Positive	□ Negativ	re		
Total pages including Appendices	: 42				

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Building 12&13, Zhiheng Wisdomland Business Park,

Nantou Checkpoint Road 2, Nanshan District,

Shenzhen City, 518052,

P. R. China

FCC Registration

on

Number:

Fax:

502708

Telephone:

86 755 8828 6998 86 755 8828 5299

Test Site 2

Company name:

Shenzhen Academy of Metrology and Quality Inspection

National Digital Electronic Product Testing Center

NETC Building, No.4 Tongfa Rd., Xili,

Nanshan, Shenzhen,

China

FCC Registration

97379(open area test site) and 274801(semi anechoic chamber).

Telephone:

Number:

+86 755 8692 8965

Fax:

+86 755 8600 9898-31396

Remark: All test items were performed at Site 2.



3 Description of the Equipment Under Test

Product: TD LTE digital mobile phone

Model no.: Le Max

FCC ID: 2AFWMLEMAX

Brand Name: Letv

Rating: DC 3.8V by Li-ion Battery or DC 5.0V/2A by adapter

Powered by external power supply:

Adaptor Input: 100-240VAC, 50/60Hz; 500mA

Adaptor Output: 5.0V, 2A

RF Transmission

Frequency:

2402-2480MHz

No. of Operated Channel: 40

Modulation: GFSK

Antenna Type: PIFA Antenna

Antenna Gain: 1.4dBi

Description of the EUT: The Equipment Under Test (EUT) is a Mobile Phone with

Bluetooth function which operated at 2.4GHz



4 Summary of Test Standards

	Test Standards
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES
10-1-2014 Edition	Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).



5 Summary of Test Results

	Technical Requireme	ents		
FCC Part 15 Subpart C	•			
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	10	Site 2	N/A
§15.247(b)(1)	Conducted peak output power	14	Site 2	Pass
§15.247(a)(2)	6dB bandwidth	16	Site 2	Pass
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth			N/A
§15.247(a)(1)	Carrier frequency separation			N/A
§15.247(a)(1)(iii)	Number of hopping frequencies			N/A
§15.247(a)(1)(iii)	Dwell Time			N/A
§15.247(e)	Power spectral density*	18	Site 2	Pass
§15.247(d)	Spurious RF conducted emissions	20	Site 2	Pass
§15.247(d)	Band edge	24	Site 2	Pass
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter and receiver	30	Site 2	Pass
§15.203	Antenna requirement	See note 2 Pas		Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an internal antenna, which gain is 1.4dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AFWMLEMAX complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed
- ☐ Not Performed

The Equipment Under Test

- - Fulfills the general approval requirements.
- ☐ **Does not** fulfill the general approval requirements.

Sample Received Date: September 6, 2015

Testing Start Date: September 7, 2015

Testing End Date: October 27, 2015

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by: Prepared by:

John Zhi EMC Project Manager

Johnshi

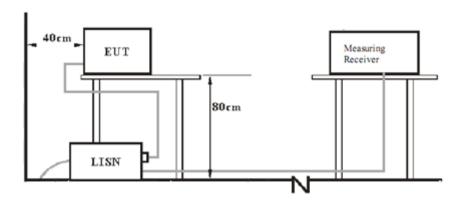
Alan Xiong EMC Project Engineer

Alem Xzong

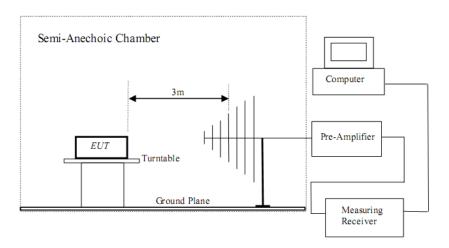


7 Test Setups

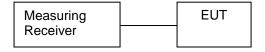
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups





8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)

The system was configured to non-hopping mode.

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power



9 Technical Requirement

9.1 Conducted Emission

Test Method

- 1. The EUT was placed on a table, which is 0.8m above ground plane
- 2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
- 3. Maximum procedure was performed to ensure EUT compliance
- 4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

According to §15.207, conducted emissions limit as below:

Frequency		QP Limit	AV Limit
M	Hz	dΒμV	dΒμV
0.150	-0.500	66-56*	56-46*
0.5	00-5	56	46
5-	30	60	50

Decreasing linearly with logarithm of the frequency



Conducted Emission

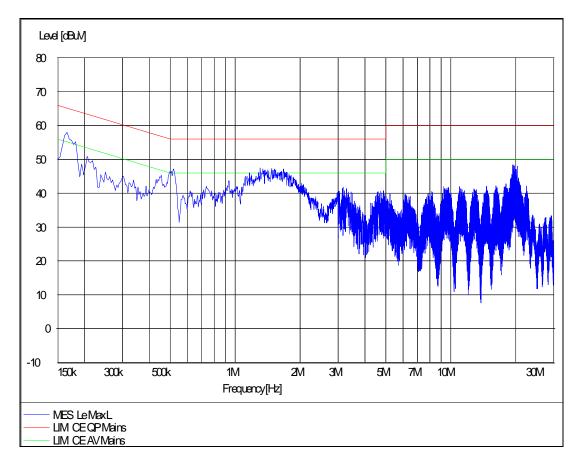
Product Type : TD LTE digital mobile phone

M/N : Le Max

Operating Condition : Charging and Transmitting

Test Specification : Line

Comment : AC 120V/60Hz





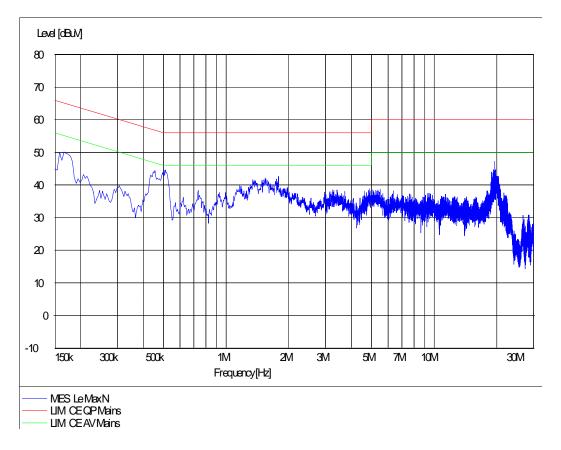
Conducted Emission

Product Type : TD LTE digital mobile phone

M/N : Le Max

Operating Condition : Charging and Transmitting

Test Specification : Neutral Comment : AC 120V/60Hz





Conducted Emission

Model No.: Le Max

	Frequency	Correction		Quasi-Peak		Average		
	(MHz)	Factor (dB)	Reading (dBμV)	Emission Level (dB _µ V)	Limits (dB _µ V)	Reading (dBμV)	Emission Level (dBµV)	Limits (dB _µ V)
	0.166	9.7	38.5	48.2	65.2	22.3	32.0	55.2
	0.518	9.8	32.4	42.2	56.0	22.9	32.7	46.0
Lina	1.342	9.8	31.6	41.4	56.0	21.0	30.8	46.0
Line	1.498	9.8	31.7	41.5	56.0	21.4	31.2	46.0
	1.670	9.8	30.9	40.7	56.0	20.6	30.4	46.0
	19.384	9.9	32.4	42.3	60.0	22.8	32.7	50.0
	0.446	9.7	29.7	39.4	56.9	22.9	32.6	46.9
	0.510	9.8	29.7	39.5	56.0	22.2	32.0	46.0
Mandaal	1.538	9.8	26.8	36.6	56.0	19.4	29.2	46.0
Neutral	19.512	9.9	27.6	37.5	60.0	21.7	31.6	50.0

REMARKS: 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)

- 2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)
- 3. The other emission levels were very low against the limit.



9.2 Conducted peak output power

Test Method

- Use the following spectrum analyzer settings:
 Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2. Add a correction factor to the display.
- 3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

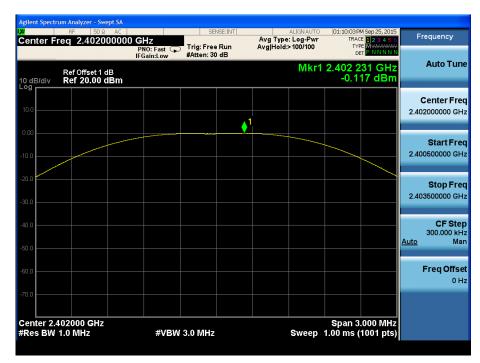
Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

Frequency Range	Limit	Limit
MHz	W	dBm
2400-2483.5	≤1	≤30

Bluetooth Mode BLE modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result	
Low channel 2402MHz	-0.117	Pass	
Middle channel 2442MHz	2.638	Pass	
High channel 2480MHz	1.053	Pass	











9.3 6dB Bandwidth

Test Method

- 1. Use the following spectrum analyzer settings: RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \geq 6 dB.
- 3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

<u>Limit [kHz]</u>	
≥500	

Test result

Frequency MHz	6dB bandwidth MHz	Result
Top channel 2402MHz	0.6832	Pass
Middle channel 2442MHz	0.6730	Pass
Bottom channel 2480MHz	0.6749	Pass





2442MHz







9.39.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

- Set analyzer center frequency to DTS channel center frequency. RBW=100kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto,
 - Trace= max hold.
- 2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
- 3. Repeat above procedures until other frequencies measured were completed.

Limit

<u>Limit [</u> dBm]	
≤8	

Test result

Power spectral					
Frequency	density	Result			
MHz	dBm				
Low channel 2402MHz	-0.388	Pass			
Middle channel 2442MHz	2.487	Pass			
High channel 2480MHz	0.790	Pass			





2442MHz







9.49.5 Spurious RF conducted emissions

Test Method

- Use the following spectrum analyzer settings:
 Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
 RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
- 3. The level displayed must comply with the limit specified in this Section. Submit these plots.
- 4. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

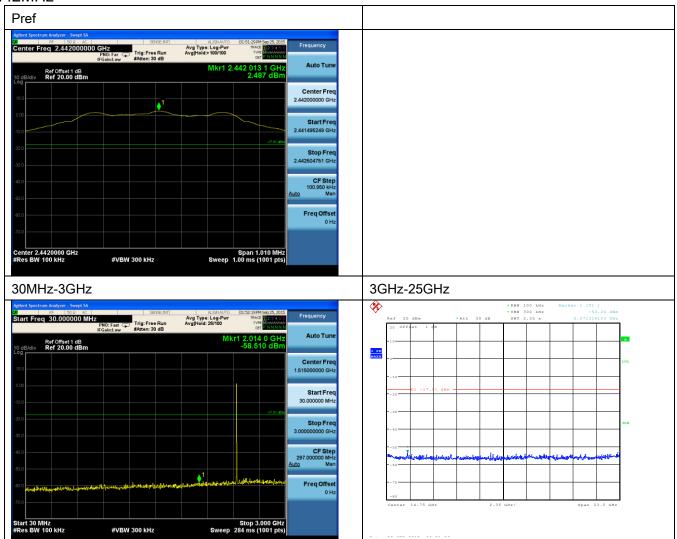


Spurious RF conducted emissions





Spurious RF conducted emissions





Spurious RF conducted emissions





9.59.6 Band edge testing

Test Method

- 1 Use the following spectrum analyzer settings: Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

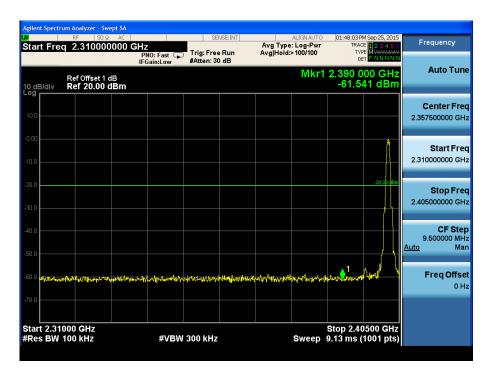
Limit:

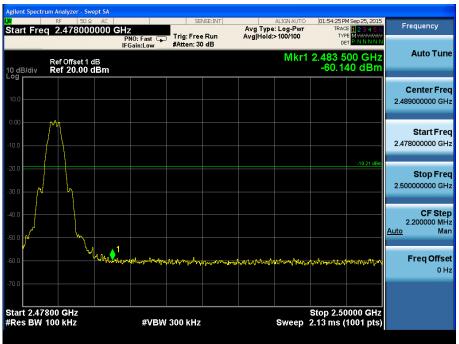
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).



Band edge testing

BLE Modulation Test Result:







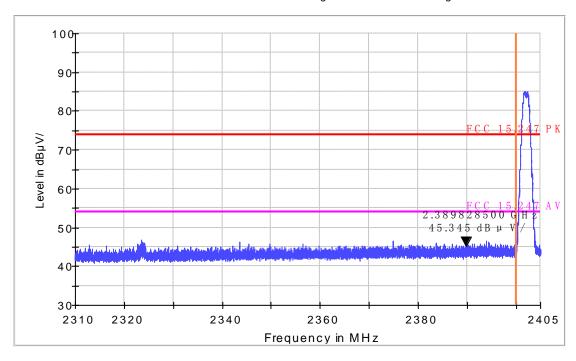
Band edge testing

BLE CH0

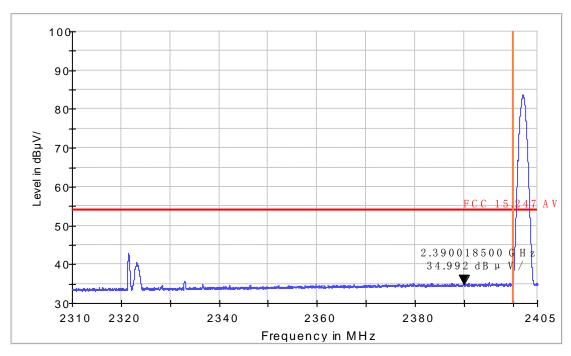
Radiated Bandedge

Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-PK



FCC Electric Field Strength 2.4GHz Bandedge-AV

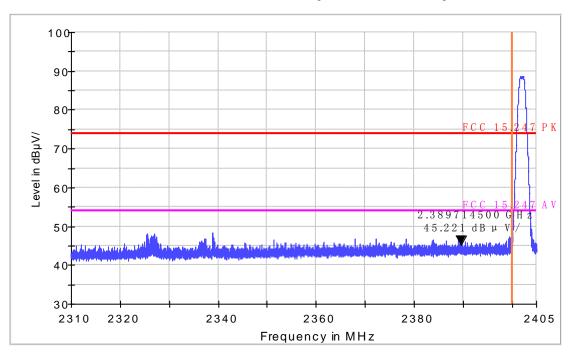




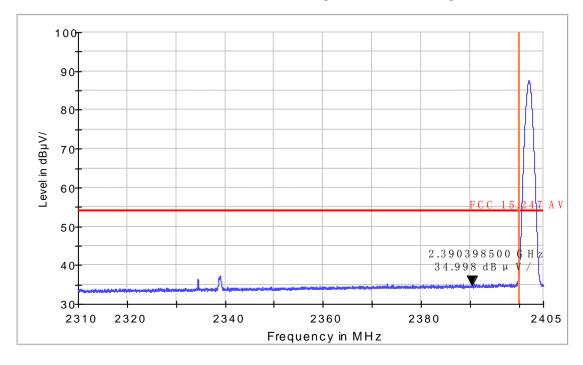
Band edge testing

Vertical

FCC Electric Field Strength 2.4GHz Bandedge-PK



FCC Electric Field Strength 2.4GHz Bandedge-AV





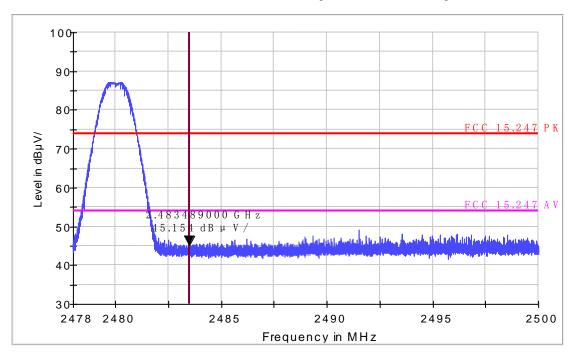
Band edge testing

BLE CH39

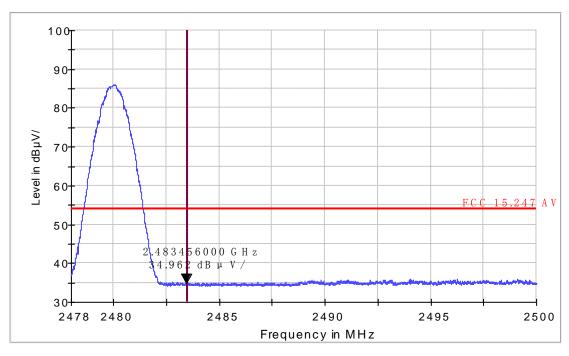
Radiated Bandedge

Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-PK



FCC Electric Field Strength 2.4GHz Bandedge-AV

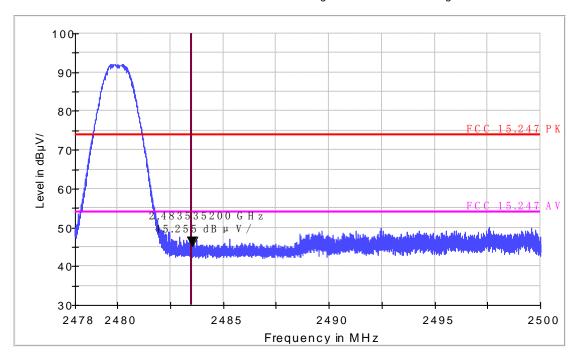




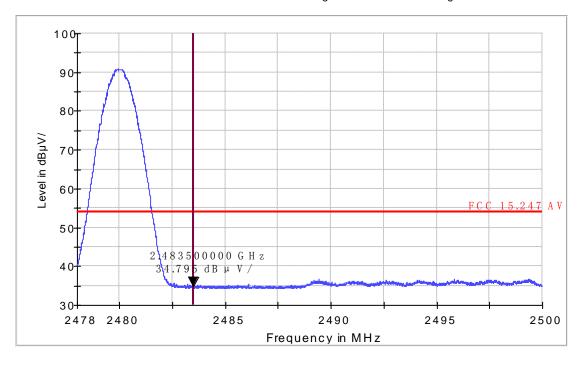
Band edge testing

Vertical

FCC Electric Field Strength 2.4GHz Bandedge-PK



FCC Electric Field Strength 2.4GHz Bandedge-AV





9.69.7 Spurious radiated emissions for transmitter

Test Method

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 3. Use the following spectrum analyzer settings:

 Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak,

 Trace = max hold
- 4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency	Field Strength	Field Strength	Detector
MHz	uV/m	dBμV/m	
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK



Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

Radiated Emission Test Data 9k Hz-30MHz

Frequency MHz	Cable Loss(dB)	Antenna Factor(dB)	Readings(d BµV/m)	Level(dBµ V/m)	Polarity(H/V)	Turntable Angle(de g)	Antenna Height(m)	Limits(dBµV/m)	Margin(d B)

30MHz-1GHz

Worst case is shown below for 30MHz-1GHz only.

The emissions don't show in following result tables are more than 20dB below the limits.

Radiated Emission Test Data 30MHz-1GHz

Frequency MHz	Cable Loss(d B)				Polarity (H/V)	Turntable Angle(deg)	Antenna Height(m)	Limits (dBµV/ m)	Margin(dB)
74.709	1.0	8.7	12.4	22.1	V	17	2.0	40.0	17.9
179.679	1.6	9.0	13.0	23.6	V	351	2.0	43.5	19.9
187.454	1.5	9.7	13.6	24.8	V	23	2.0	43.5	18.7
201.062	1.6	10.6	11.7	23.9	V	345	2.0	43.5	19.6
251.603	1.9	12.1	10.5	24.5	V	50	2.0	46.0	21.5
290.48	2.0	12.7	10.7	25.4	V	294	2.0	46.0	20.6
31.943	0.6	12.3	16.9	29.8	Н	45	3.0	40.0	10.2
37.775	0.7	12.3	18.1	31.1	Н	336	2.0	40.0	8.9
72.765	1.0	8.7	13.9	23.6	Н	16	2.0	40.0	16.4
78.597	1.0	7.8	15.6	24.4	Н	249	2.0	40.0	15.6
154.408	1.4	8.3	20.4	30.1	Н	71	1.0	43.5	13.4
171.903	1.5	9.0	17.2	27.7	Н	341	1.0	43.5	15.8



Radiated Emission

EUT Information

EUT Model Name: Le Max

Operation mode: Changing and Transmitting

Test Voltage: Comment:

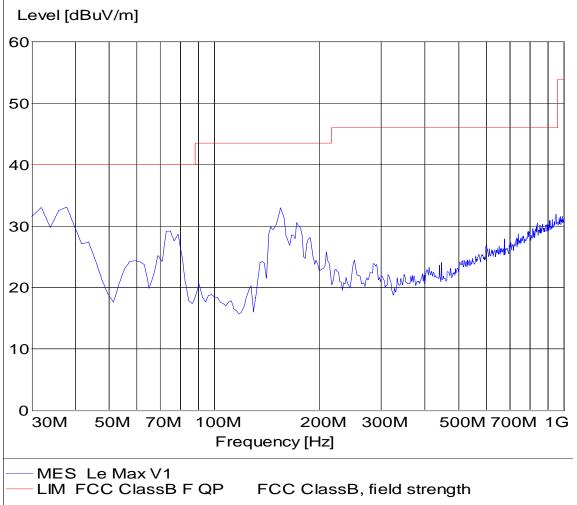
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Vertical

Operator Name: Comment:





Radiated Emission

EUT Information

EUT Model Name: Le Max

Operation mode: Changing andTransmitting

Test Voltage: Comment:

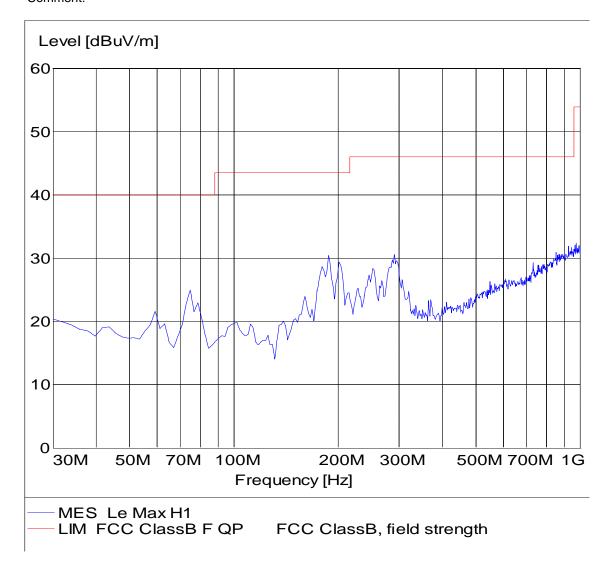
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Horizontal

Operator Name: Comment:





1GHz-18GHz BLE CH0

Radiated Emission

EUT Information

EUT Model Name: Le Max Operation mode: BLE CH0

Test Voltage: Comment:

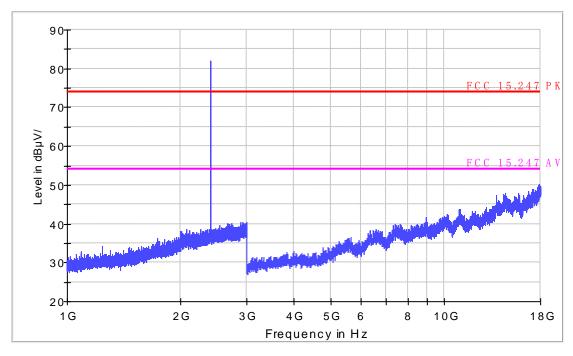
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Horizontal

Operator Name: Comment:





Radiated Emission

EUT Information

EUT Model Name: Le Max Operation mode: BLE CH0

Test Voltage: Comment:

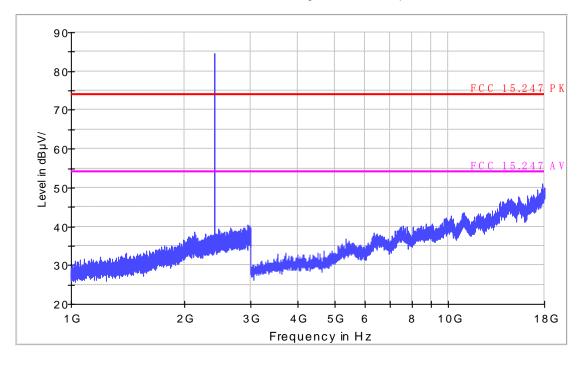
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Vertical

Operator Name: Comment:





BLE CH20

Radiated Emission

EUT Information

EUT Model Name: Le Max Operation mode: BLE CH20

Test Voltage: Comment:

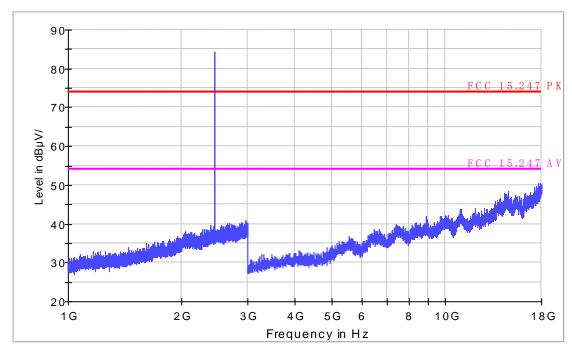
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Horizontal

Operator Name: Comment:





Radiated Emission

EUT Information

EUT Model Name: Le Max Operation mode: BLE CH20

Test Voltage: Comment:

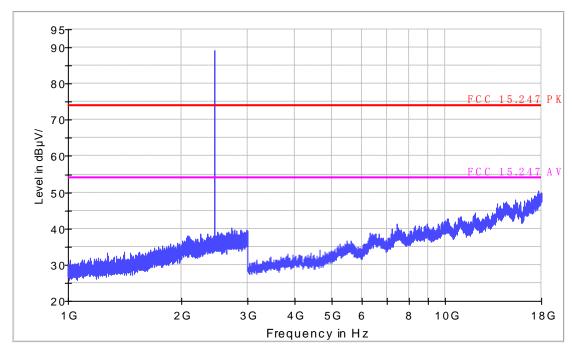
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Vertical

Operator Name: Comment:





BLE CH39

Radiated Emission

EUT Information

EUT Model Name: Le Max Operation mode: BLE CH39

Test Voltage: Comment:

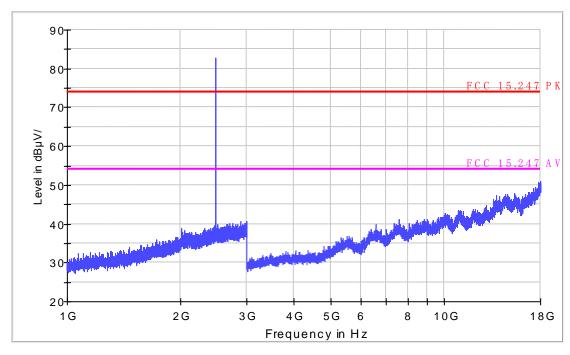
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Horizontal

Operator Name: Comment:





Radiated Emission

EUT Information

EUT Model Name: Le Max Operation mode: BLE CH39

Test Voltage: Comment:

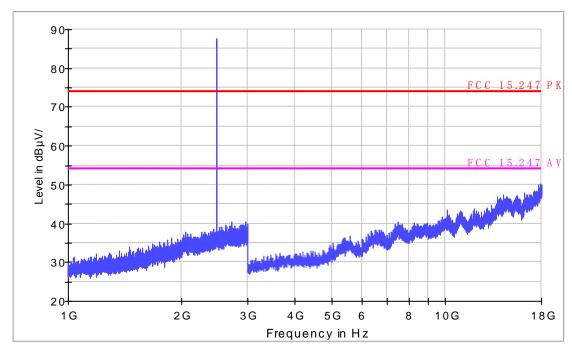
Common Information

Test Site: SMQ EMC Lab.

Environment Conditions:

Antenna Polarization: Vertical

Operator Name: Comment:

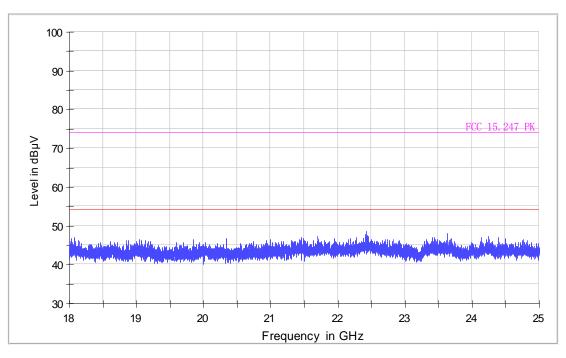




18-26.5GHz No Peak found in pre-scan, only worst case result is listed in this report.

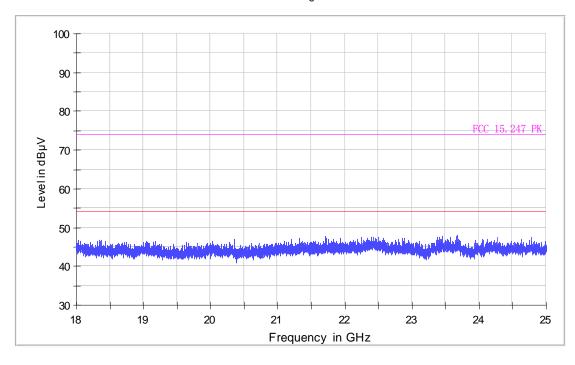
Horizontal

FCC Electric Field Strength 18-26.5GHz



Vertical

FCC Electric Field Strength 18-26.5GHz





10 Test Equipment List

List of Test Instruments

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Dec.19, 2014	1 Year
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.18, 2015	1 Year
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Nov.18, 2015	1 Year
	Radiated Emissions Cable set	HUBER+SUHN ER		Jan.19, 2015	1 Year
SB8501/09	EMI Test Receiver	Rohde & Schwarz	ESU40	Mar.19, 2015	1 Year
SB8501/04	Bilog Antenna	Schwarzbeck	VULB9163	Mar.19, 2015	1 Year
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan.19, 2015	1 Year
SB5392/02	Horn Antenna	Amplifier Research	AT4560	May.15, 2015	1 Year
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Oct.09, 2014	2 Years
SB3345	Loop Antenna	Schwarzbeck	FMZB1516	Jan.20, 2015	2 Years
SB3437	Power meter	Rohde & Schwarz	NRVD	Jul.03,2015	1 Year
SB3437/01	Power sensor	Rohde & Schwarz	URV5-Z2	Jul.03,2015	1 Year
SB9721/02	Signal Analyzer	Agilent	N9020A	Jan.05, 2015	1 Year
	Radiated Emissions Cable set	HUBER+SUHN ER		Jan.19, 2015	1 Year
	Radiated Emissions Cable set	HUBER+SUHN ER		Jan.19, 2015	1 Year
SB8501/17	Preamplifier	Rohde & Schwarz	SCU-18	Mar.27, 2015	1 Year
SB8501/16	Preamplifier	Rohde & Schwarz	SCU-26	Mar.27, 2015	1 Year
SB9059	Preamplifier	Rohde & Schwarz	SCU-40	May.12, 2015	1 Year



11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz	3.50dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	4.5dB
Uncertainty for Radiated Emission in 3m chamber 1000MHz-26500MHz	4.6dB
Uncertainty for Conducted RF test	Power level test involved: 2.04dB Frequency test involved:1.1×10 ⁻⁷