

FCC RF Test Report

APPLICANT	: Motorola Solutions Inc.
EQUIPMENT	: MSLB-MKZ900 400-512 4W LTE CBRS GNSS BT
	WiFi
BRAND NAME	: Motorola Solutions
MODEL NAME	: MSLB-MKZ900
MODEL NUMBER	: AAH90ZDU9RH1AN
FCC ID	: AZ489FT7133
STANDARD	: 47 CFR Part 2, 96
CLASSIFICATION	: Citizens Band End User Devices (CBE)
EQUIPMENT TYPE	: End User Equipment
TEST DATE(S)	: Jun. 22, 2021 ~ Jun. 23, 2021

We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

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History of this test report

Report No.	Version	Description	Issued Date
FG082805-02	01	Initial issue of report	Jul. 15, 2021



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
3.3	§2.1051 §96.41	Conducted Band Edge Measurement	Pass	Under limit 1.81 dB at 3705.14 MHz
3.4	§2.1051 §96.41	Conducted Spurious Emission	Pass	Under limit 5.49 dB at 3758.59 MHz
4.4	§2.1051 §96.41	Radiated Spurious Emission	Pass	Under limit 12.23 dB at 14466.00 MHz

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Motorola Solutions Inc.

8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322

1.2 Manufacturer

Motorola Solutions Malaysia Sdn. Bhd.

No. 2A, Medan Bayan Lepas, Mukim 12, S.W.D., 11900 Bayan Lepas Penang, Malaysia

1.3 Feature of Equipment Under Test

Product Feature							
Equipment	MSLB-MKZ900 400-512 4W LTE CBRS GNSS BT WiFi						
Brand Name	Motorola Solutions						
Model Name	MSLB-MKZ900						
Model Number:	AAH90ZDU9RH1AN						
FCC ID	AZ489FT7133						
Tx Frequency	LTE Band 48: 3552.5 MHz ~ 3697.5 MHz						
Rx Frequency	LTE Band 48: 3552.5 MHz ~ 3697.5 MHz						
Bandwidth	5MHz / 10MHz / 15MHz / 20MHz						
Maximum Output Power to Antenna	20.10 dBm						
Antenna Type	FPC Antenna						
Type of Modulation	QPSK / 16QAM						
	Conducted: N/A						
	Radiation: 352511260077177/352511260077185						
HW Version	P2B						
SW Version	I02.21.01.0029 (BP), D00.00.65 (AP)						
EUT Stage	Identical Prototype						

Remark:

- 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
- This is a variant report for MSLB-MKZ900, the change note could be referred to the MSLB-MKZ900_Product Equality Declaration which is exhibit separately. Based on the similarity between current and previous project, only the related cases of Conducted power / Conducted Spurious / Radiated Spurious Emission from original test report (Sporton Report Number FG082805A) were verified for the differences.



1.4 Testing Site

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (H	Kunshan) Inc.				
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone					
	TEL : +86-512-57900158					
	1777.100 012 07 0000		ECC Tost Firm			
Test Site No.	Sporton Site No.	FCC Designation No.	Registration No.			
	03CH04-KS TH01-KS	CN1257	314309			

1.5 Test Software

ltem	Site	Manufacturer	Name	Version	
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a	

1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- + ANSI C63.26-2015
- ANSI / TIA-603-E
- 47 CFR Part 2, 96
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 940660 D01 Part 96 CBRS v03
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.





2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

Testites	Dev		Bandwidth (MHz)			Modulation			RB #			Test Channel				
lest items	Ban	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	М	н
Max. Output Power	48	-	-	v	v	v	v	v	v	-	v	v	v	v	v	v
Conducted Band Edge	48	-	-	v	v	v	v	v	v	-	v		v	v		v
Conducted Spurious Emission	48	-	-	v	v	v	v	v		-	v			v	v	v
Radiated Spurious Emission	48		Worst Case v													
	1.	The mark	" v " me	ans tha	at this c	onfigura	ation is	chosen fo	r testing							
	2.	The mark	"-" mea	ins that	this ba	indwidtl	n is not	supported	l. 							
Remark	3.	he devid	e is inv	estigate	ed from	30MHz	z to 10 i	imes of fu	ndamenta	I signal for	r radiat	ed spu	rious ei	missior	i test u	nder
		different F	KB SIZE/	offset a	ind mod	dulation	is in ex	ploratory to	est. Subse	equently, o	nly the	worst	case er	nission	s are	
	Λ	eported.	ma ara	boood	on ondi	nooring		otion								
	4.	AII LEST ITE	ms are	uased	un engl	meenng	j evalua	auon.								

2.2 Connection Diagram of Test System

	System Simulator		
[EUT		



2.3 Support Unit used in test configuration

I	tem	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
	1.	LTE Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 8.22 dB.

Example :

 $Offset(dB) = RF \ cable \ loss(dB).$

= 8.22 (dB)

2.5 Frequency List of Low/Middle/High Channels

	LTE Band 48 Channel and Frequency List										
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest							
20	Channel	55340	55990	56640							
20	Frequency	3560.0	3625.0	3690.0							
45	Channel	55315	55990	56665							
15	Frequency	3557.5	3625.0	3692.5							
10	Channel	55290	55990	56690							
10	Frequency	3555.0	3625.0	3695.0							
5	Channel	55265	55990	56715							
5	Frequency	3552.5	3625.0	3697.5							



3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Conducted Band-Edge and Conducted Spurious Emission



Spectrum Analyzer

3.1.4 Test Result of Conducted Test

Please refer to Appendix A.



3.2 Conducted Output Power

3.2.1 Description of the Conducted Output Power Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

3.2.2 Test Procedures

- 1. The transmitter output port was connected to the system simulator.
- 2. Set EUT at maximum power through the system simulator.
- 3. Select lowest, middle, and highest channels for each band and different modulation.
- 4. Measure and record the power level from the system simulator.



3.3 Conducted Band Edge

3.3.1 Description of Conducted Band Edge Measurement

Part 96.41 (e) (1) (i)

For CBSD the emission limits outside the fundamental are as follows: Within 0 MHz to 10 MHz above and below the assigned channel ≤ -13 dBm/MHz Greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz

Part 96.41 (e) (1) (ii)

For End User Devices the emission limits outside the fundamental are as follows:

Within 0 MHz to B MHz above and below the assigned channel \leq -13 dBm/MHz

Greater than B MHz above and below the assigned channel ≤ -25 dBm/MHz

where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device.

Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

Part 96.41 (e) (2)

For CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz

3.3.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

- 1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
- 2. The band edges of low and high channels for the highest RF powers were measured.
- 3. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
- 4. Beyond the 1 MHz band from the band edge, RBW=1MHz was used
- 5. Offset has included the duty factor for LTE Band 48. Duty factor =10 log (1/x), where x is the measured duty cycle.
- 6. Set spectrum analyzer with RMS detector.
- 7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.



3.4 Conducted Spurious Emission

3.4.1 Description of Conducted Spurious Emission Measurement

96.41 (e)(2)

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

3.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

- 1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
- The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. The middle channel for the highest RF power within the transmitting frequency was measured.
- 4. The conducted spurious emission for the whole frequency range was taken.
- 5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
- 6. Set spectrum analyzer with RMS detector.
- 7. Taking the record of maximum spurious emission.
- 8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 9. The limit line is -40dBm/MHz.



4 Radiated Test Items

4.1 Measuring Instruments

See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz





4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix B.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least -40dBm / MHz.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

- 1. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
- 2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
- 4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
- 5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
- 6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
- A horn antenna was substituted in place of the EUT and was driven by a signal generator. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain ERP (dBm) = EIRP - 2.15
- 8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is -40dBm/MHz



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Nov. 01, 2020	Jun. 22, 2021	Oct. 31, 2021	Conducted (TH01-KS)
Temperature &hu midity chamber	Hongzhan	LP-150U	H2014011 440	-40~+150°C 20%~95%RH	Jul. 03, 2020	Jun. 22, 2021	Jul. 02, 2021	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY551502 44	10Hz-44G,MAX 30dB	Apr. 13, 2021	Jun. 23, 2021	Apr. 12, 2022	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Jun. 07, 2021	Jun. 23, 2021	Jun. 06, 2022	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1356	1GHz~18GHz	Apr. 18, 2021	Jun. 23, 2021	Apr. 17, 2022	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Jan. 06, 2021	Jun. 23, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Jun. 23, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GG A	060728	18~40GHz	Jan. 07, 2021	Jun. 23, 2021	Jan. 06, 2022	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Jan. 06, 2021	Jun. 23, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY572801 06	500MHz~26.5G Hz	Oct. 14, 2020	Jun. 23, 2021	Oct. 13, 2021	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Jun. 23, 2021	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 23, 2021	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 23, 2021	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required



6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of	2 2dD
Confidence of 95% (U = 2Uc(y))	3.3UD

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of	2 0 d D
Confidence of 95% (U = 2Uc(y))	2.000

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of	
Confidence of 95% (U = 2Uc(y))	2.8dB

Uncertainty of Conducted Measurement

Conducted Power	0.56dB
Conducted emission	0.92dB



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

BW [MHz]	Modulation	RB Size	RB Offset	Power Low	Power Middle	Power High
				Ch. / Freq.	Ch. / Freq.	Ch. / Freq.
Channel			55340	55990	56640	
	Frequen	cy (MHz)		3560	3625	3690
20	QPSK	1	0	20.06	19.98	19.39
20	QPSK	1	49	19.96	19.69	19.36
20	QPSK	1	99	19.92	19.76	19.24
20	QPSK	50	0	19.86	19.82	19.28
20	QPSK	50	24	19.87	19.71	19.31
20	QPSK	50	50	19.82	19.69	19.24
20	QPSK	100	0	19.77	19.64	19.28
20	16QAM	1	0	19.43	19.36	18.93
20	16QAM	1	49	19.25	19.22	18.85
20	16QAM	1	99	19.14	19.05	18.84
20	16QAM	50	0	19.06	18.86	18.67
20	16QAM	50	24	18.88	18.92	18.73
20	16QAM	50	50	18.86	18.77	18.72
20	16QAM	100	0	18.79	18.64	18.66
Channel		55315	55990	56665		
	Frequen	cy (MHz)		3557.5	3625	3692.5
15	QPSK	1	0	20.06	19.85	19.29
15	QPSK	1	37	19.85	19.73	19.17
15	QPSK	1	74	19.83	19.82	19.06
15	QPSK	36	0	19.88	19.75	18.82
15	QPSK	36	20	19.76	19.65	18.76
15	QPSK	36	39	19.72	19.81	18.72
15	QPSK	75	0	19.84	19.78	18.85
15	16QAM	1	0	19.28	19.36	18.54
15	16QAM	1	37	19.11	18.92	18.69
15	16QAM	1	74	19.08	19.06	18.45
15	16QAM	36	0	18.82	18.85	18.53
15	16QAM	36	20	18.71	18.89	18.34
15	16QAM	36	39	18.79	18.95	18.39
15	16QAM	75	0	18.64	18.85	18.42
	Cha	nnel		55290	55990	56690
Frequency (MHz)		3555	3625	3695		
10	QPSK	1	0	19.97	19.95	19.31
10	QPSK	1	25	19.93	19.82	19.05
10	QPSK	1	49	19.95	19.84	19.09
10	QPSK	25	0	19.74	19.76	19.18
10	QPSK	25	12	19.82	19.62	19.16
10	QPSK	25	25	19.74	19.68	19.25
10	QPSK	50	0	19.92	19.63	19.22

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10	16QAM	1	0	19.11	19.06	18.36
10	16QAM	1	25	19.22	19.02	18.44
10	16QAM	1	49	19.33	18.93	18.46
10	16QAM	25	0	19.05	18.87	18.24
10	16QAM	25	12	19.25	18.82	18.33
10	16QAM	25	25	19.06	18.74	18.21
10	16QAM	50	0	19.02	18.80	18.19
Channel			55265	55990	56715	
Frequency (MHz)			3552.5	3625	3697.5	
5	QPSK	1	0	20.03	20.01	19.30
5	QPSK	1	12	19.94	19.77	19.07
5	QPSK	1	24	20.01	19.79	19.11
5	QPSK	12	0	20.07	19.74	17.11
5	QPSK	12	7	19.95	19.88	19.28
5	QPSK	12	13	20.10	19.76	19.26
5	QPSK	25	0	20.07	19.96	19.22
5	16QAM	1	0	19.32	19.05	18.45
5	16QAM	1	12	19.25	19.01	18.43
5	16QAM	1	24	19.32	19.03	18.36
5	16QAM	12	0	19.18	18.89	18.28
5	16QAM	12	7	19.11	18.76	18.22
5	16QAM	12	13	19.20	18.99	18.34
5	16QAM	25	0	19.24	18.94	18.36



Conducted Band Edge



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