

Report No.: SZEM191102028002

1 of 84 Page:

TEST REPORT

Application No.: SZEM1911020280CR(SGS SZ No.:T51910300019EM)

Applicant: Lucky Group (H.K.) Limited

Address of Applicant: Building B, Lucky Industrial Park, Hongjin Road, Hongmei Town, Dongguan,

Manufacturer: Shenzhen Eliteduce Technology CO., Ltd

Lucky Group (H.K.) Limited Supplier:

Buyer: Dave and Buster's

Equipment Under Test (EUT):

EUT Name: Spearker, Skull / Head Wireless

Model No.: 18126

Please refer to section 2 of this report which indicates which sample was

actually tested and which were electrically identical.

LBC90213, LBD90431 P.O. / Ref. No.:

Country of Origin: China **Country of Destination:** USA

FCC ID: 2ACO3-18126-1

47 CFR Part 15, Subpart C 15.247 Standard(s):

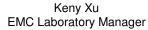
Date of Receipt: 2019-11-18

2019-11-19 to 2019-12-12 Date of Test:

2019-12-17 Date of Issue:

Pass* Test Result:

中国・深圳・科技园中区M-10栋一号厂房



Keny. Ku



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^{*} In the configuration tested, the EUT complied with the standards specified above.



Report No.: SZEM191102028002

Page: 2 of 84

	Revision Record						
Version	Chapter	Date	Modifier	Remark			
01		2019-12-17		Original			

Authorized for issue by:		
	Gebin Sun	
	Gebin Sun /Project Engineer	
	EvicFu	
	Eric Fu /Reviewer	



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Report No.: SZEM191102028002

Page: 3 of 84

Test Summary

Radio Spectrum Technical Requirement						
Item	Standard	Method	Requirement	Result		
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass		
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass		

Radio Spectrum Matt	Radio Spectrum Matter Part						
Item	Standard	Method	Requirement	Result			
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass			
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass			
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass			
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass			
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass			
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass			
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass			
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass			
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass			
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass			

Declaration of EUT Family Grouping:

Model No.: 18126

Only the black sample was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for the samples.



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Report No.: SZEM191102028002

Page: 4 of 84

Contents

1 COVER PAGE 2 TEST SUMMARY			Page
3 CONTENTS	1	COVER PAGE	1
4.1 DETAILS OF E. U.T. 4.2 DESCRIPTION OF SUPPORT UNITS	2	TEST SUMMARY	3
4.1 DETAILS OF E. U.T. 4.2 DESCRIPTION OF SUPPORT UNITS	3	CONTENTS	4
4.1 DETAILS OF E.U.T.			
4.2 DESCRIPTION OF SUPPORT UNITS	4		
4.3 MEASUREMENT UNCERTAINTY 4.4 TEST LOCATION. 4.5 TEST FACILITY 4.6 DEVIATION FROM STANDARDS. 4.7 ABNORMALITIES FROM STANDARD CONDITIONS. 5 EQUIPMENT LIST. 6 RADIO SPECTRUM TECHNICAL REQUIREMENT 6.1 ANTENNA REQUIREMENT 6.1.1 Test Requirement 6.1.2 Conclusion 6.2 OTHER REQUIREMENTS FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM HOPPING SEQUENCE 1. 6.2.1 6.2.2 Conclusion 7 RADIO SPECTRUM MATTER TEST RESULTS 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ) 7.1.1 E.U.T. Operation 7.1.2 Test Setup Diagram 7.1.3 Measurement Procedure and Data 7.2.1 E.U.T. Operation 7.2.2 Test Setup Diagram 7.3.3 20DB BANDWIDTH 2.2 7.3.3 7.4.1 E.U.T. Operation 2.2 7.3.3 7.4.2 Test Setup Diagram 2.3 2.2 7.4.1 E.U.T. Operation <td></td> <td></td> <td></td>			
4.4 TEST LOCATION. 4.5 TEST FACILITY. 4.6 DEVIATION FROM STANDARDS. 4.7 ABNORMALITIES FROM STANDARD CONDITIONS. 5 EQUIPMENT LIST		4.2 DESCRIPTION OF SUPPORT UNITS	6
4.5 TEST FACILITY. 4.6 DEVIATION FROM STANDARDS. 4.7 ABNORMALITIES FROM STANDARD CONDITIONS. 5 EQUIPMENT LIST			
4.6 DEVIATION FROM STANDARDS. 4.7 ABNORMALITIES FROM STANDARD CONDITIONS. 5 EQUIPMENT LIST			
4.7 ABNORMALITIES FROM STANDARD CONDITIONS			
5 EQUIPMENT LIST			
6 RADIO SPECTRUM TECHNICAL REQUIREMENT			
6.1 ANTENNA REQUIREMENT 1: 6.1.1 Test Requirement: 1. 6.1.2 Conclusion 1. 6.2 OTHER REQUIREMENTS FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM HOPPING SEQUENCE 1. 6.2.1 Test Requirement: 1. 6.2.2 Conclusion 1. 7 RADIO SPECTRUM MATTER TEST RESULTS 11 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz) 10 7.1.1 E.U.T. Operation 1 7.1.2 Test Setup Diagram 1 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 <	5	EQUIPMENT LIST	8
6.1 ANTENNA REQUIREMENT 1: 6.1.1 Test Requirement: 1. 6.1.2 Conclusion 1. 6.2 OTHER REQUIREMENTS FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM HOPPING SEQUENCE 1. 6.2.1 Test Requirement: 1. 6.2.2 Conclusion 1. 7 RADIO SPECTRUM MATTER TEST RESULTS 11 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz) 10 7.1.1 E.U.T. Operation 1 7.1.2 Test Setup Diagram 1 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 <	6	RADIO SPECTRUM TECHNICAL REQUIREMENT	13
6.1.1 Test Requirement: 1. 6.1.2 Conclusion 1. 6.2 OTHER REQUIREMENTS FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM HOPPING SEQUENCE 1. 6.2.1 Test Requirement: 1. 6.2.2 Conclusion 1. 7 RADIO SPECTRUM MATTER TEST RESULTS 1. 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ) 1. 7.1.1 E.U.T. Operation 1. 7.1.2 Test Setup Diagram 1. 7.1.3 Measurement Procedure and Data 1. 7.2.2 CONDUCTED PEAK OUTPUT POWER 2. 7.2.1 E.U.T. Operation 2. 7.2.2 Test Setup Diagram 2. 7.2.3 Measurement Procedure and Data 2. 7.3.1 E.U.T. Operation 2. 7.3.2 Test Setup Diagram 2. 7.3.3 Measurement Procedure and Data 2. 7.4.1 E.U.T. Operation 2. 7.4.2 Test Setup Diagram 2. 7.4.3 Measurement Procedure and Data 2. 7.4.3 Measurement Procedure and Data 2. 7.5.1 E.U.T. Operation 2. 7.5.2 Test Setup Diagram 2. 7.5.3 Measurement Procedure and Data 2. 7.5.3 Measureme	•		
6.1.2 Conclusion 1. 6.2 OTHER REQUIREMENTS FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM HOPPING SEQUENCE 1. 6.2.1 Test Requirement: 7. 6.2.2 Conclusion 1. 7 RADIO SPECTRUM MATTER TEST RESULTS 1. 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz) 1. 7.1.1 E.U.T. Operation 1. 7.1.2 Test Setup Diagram 1. 7.1.3 Measurement Procedure and Data 1. 7.2 CONDUCTED PEAK OUTPUT POWER 20 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure an			
6.2 OTHER REQUIREMENTS FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM HOPPING SEQUENCE 1- 6.2.1 Test Requirement: 1- 6.2.2 Conclusion 1- 7 RADIO SPECTRUM MATTER TEST RESULTS 10 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz). 11 7.1.1 E.U.T. Operation 1 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data. 1 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data. 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data. 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data. 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 <td></td> <td>•</td> <td></td>		•	
6.2.1 Test Requirement: 1. 6.2.2 Conclusion 1. 7 RADIO SPECTRUM MATTER TEST RESULTS 10 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz) 11 7.1.1 E.U.T. Operation 1 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2 CONDUCTED PEAK OUTPUT POWER 20 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4 CARRIER FREQUENCIES SEPARATION 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2			
6.2.2 Conclusion 1. 7 RADIO SPECTRUM MATTER TEST RESULTS 10 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz) 11 7.1.1 E.U.T. Operation 1 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2 CONDUCTED PEAK OUTPUT POWER 20 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4 CARRIER FREQUENCIES SEPARATION 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2			
7 RADIO SPECTRUM MATTER TEST RESULTS 10 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz) 11 7.1.1 E.U.T. Operation 1 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2 CONDUCTED PEAK OUTPUT POWER 20 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2			
7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz) 10 7.1.1 E.U.T. Operation 11 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2 CONDUCTED PEAK OUTPUT POWER 2 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2	7		
7.1.1 E.U.T. Operation 1 7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2 CONDUCTED PEAK OUTPUT POWER 20 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4 CARRIER FREQUENCIES SEPARATION 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5 HOPPING CHANNEL NUMBER 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2	•		
7.1.2 Test Setup Diagram 1 7.1.3 Measurement Procedure and Data 1 7.2 CONDUCTED PEAK OUTPUT POWER 2 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3 20DB BANDWIDTH 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4 CARRIER FREQUENCIES SEPARATION 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2			
7.1.3 Measurement Procedure and Data. 1 7.2 CONDUCTED PEAK OUTPUT POWER 20 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data. 2 7.3 20DB BANDWIDTH 20 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data. 2 7.4 CARRIER FREQUENCIES SEPARATION 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data. 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data. 2 7.5.3 Measurement Procedure and Data. 2		·	
7.2 CONDUCTED PEAK OUTPUT POWER 20 7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2		1 5	
7.2.1 E.U.T. Operation 2 7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3 20DB BANDWIDTH 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4 CARRIER FREQUENCIES SEPARATION 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2			
7.2.2 Test Setup Diagram 2 7.2.3 Measurement Procedure and Data 2 7.3 20DB BANDWIDTH 2 7.3.1 E.U.T. Operation 2 7.3.2 Test Setup Diagram 2 7.3.3 Measurement Procedure and Data 2 7.4 CARRIER FREQUENCIES SEPARATION 2 7.4.1 E.U.T. Operation 2 7.4.2 Test Setup Diagram 2 7.4.3 Measurement Procedure and Data 2 7.5.1 E.U.T. Operation 2 7.5.2 Test Setup Diagram 2 7.5.2 Test Setup Diagram 2 7.5.3 Measurement Procedure and Data 2 7.5.3 Measurement Procedure and Data 2			
7.3 20DB BANDWIDTH 22 7.3.1 E.U.T. Operation 2. 7.3.2 Test Setup Diagram 2. 7.3.3 Measurement Procedure and Data 2. 7.4 CARRIER FREQUENCIES SEPARATION 2. 7.4.1 E.U.T. Operation 2. 7.4.2 Test Setup Diagram 2. 7.4.3 Measurement Procedure and Data 2. 7.5.1 E.U.T. Operation 2. 7.5.2 Test Setup Diagram 2. 7.5.3 Measurement Procedure and Data 2. 7.5.3 Measurement Procedure and Data 2.			
7.3.1 E.U.T. Operation 2. 7.3.2 Test Setup Diagram 2. 7.3.3 Measurement Procedure and Data 2. 7.4 CARRIER FREQUENCIES SEPARATION 2. 7.4.1 E.U.T. Operation 2. 7.4.2 Test Setup Diagram 2. 7.4.3 Measurement Procedure and Data 2. 7.5.1 E.U.T. Operation 2. 7.5.2 Test Setup Diagram 2. 7.5.3 Measurement Procedure and Data 2. 7.5.3 Measurement Procedure and Data 2.			
7.3.2 Test Setup Diagram 2. 7.3.3 Measurement Procedure and Data 2. 7.4 CARRIER FREQUENCIES SEPARATION 2. 7.4.1 E.U.T. Operation 2. 7.4.2 Test Setup Diagram 2. 7.4.3 Measurement Procedure and Data 2. 7.5 HOPPING CHANNEL NUMBER 2. 7.5.1 E.U.T. Operation 2. 7.5.2 Test Setup Diagram 2. 7.5.3 Measurement Procedure and Data 2.			
7.3.3 Measurement Procedure and Data. 2. 7.4 CARRIER FREQUENCIES SEPARATION. 2. 7.4.1 E.U.T. Operation. 2. 7.4.2 Test Setup Diagram. 2. 7.4.3 Measurement Procedure and Data. 2. 7.5 HOPPING CHANNEL NUMBER. 2. 7.5.1 E.U.T. Operation. 2. 7.5.2 Test Setup Diagram. 2. 7.5.3 Measurement Procedure and Data. 2.			
7.4 CARRIER FREQUENCIES SEPARATION 25 7.4.1 E.U.T. Operation 26 7.4.2 Test Setup Diagram 26 7.4.3 Measurement Procedure and Data 26 7.5 HOPPING CHANNEL NUMBER 26 7.5.1 E.U.T. Operation 26 7.5.2 Test Setup Diagram 26 7.5.3 Measurement Procedure and Data 26			
7.4.1E.U.T. Operation2.7.4.2Test Setup Diagram2.7.4.3Measurement Procedure and Data2.7.5HOPPING CHANNEL NUMBER2.7.5.1E.U.T. Operation2.7.5.2Test Setup Diagram2.7.5.3Measurement Procedure and Data2.			
7.4.2 Test Setup Diagram2.7.4.3 Measurement Procedure and Data2.7.5 HOPPING CHANNEL NUMBER2.7.5.1 E.U.T. Operation2.7.5.2 Test Setup Diagram2.7.5.3 Measurement Procedure and Data2.			
7.4.3 Measurement Procedure and Data		•	
7.5 HOPPING CHANNEL NUMBER		, ,	
7.5.1 E.U.T. Operation			
7.5.2 Test Setup Diagram			
7.5.3 Measurement Procedure and Data2		- P	
		, ,	



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Report No.: SZEM191102028002

Page: 5 of 84

	7.6.1	E.U.T. Operation	26
	7.6.2	Test Setup Diagram	
	7.6.3	Measurement Procedure and Data	26
7	7.7 C	CONDUCTED BAND EDGES MEASUREMENT	27
	7.7.1	E.U.T. Operation	28
	7.7.2	Test Setup Diagram	28
	7.7.3	Measurement Procedure and Data	28
7	7.8 C	CONDUCTED SPURIOUS EMISSIONS	29
	7.8.1	E.U.T. Operation	30
	7.8.2	Test Setup Diagram	
	7.8.3	Measurement Procedure and Data	
7	7.9 F	RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS	
	7.9.1	E.U.T. Operation	
	7.9.2	Test Setup Diagram	
	7.9.3	Measurement Procedure and Data	
7	'.10 F	RADIATED SPURIOUS EMISSIONS	
	7.10.1		
	7.10.2	· oot ootap = rag. a	
	7.10.3	Measurement Procedure and Data	41
8	PHOT	OGRAPHS	50
8	3.1 T	EST SETUP	50
8	3.2 E	EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)	50
9	APPE	NDIX	51
ç).1 A	APPENDIX 15.247	51-84



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Report No.: SZEM191102028002

Page: 6 of 84

General Information

Details of E.U.T.

Power Supply:	Rechargeable battery DC3.7V, Charged by DC5V
Cable:	USB cable:45cm unshielded
	AUX IN cable:50cm unshielded
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	Integral
Antenna Gain:	-0.85dBi

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
AC/DC Adapter	SGS	DC 5V	REF. No.SEA0500

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 10 ⁻⁸
2	Duty cycle	± 0.37%
3	Occupied Bandwidth	± 3%
4	Conduction emission	± 3.0dB (150kHz to 30MHz)
5	RF conducted power	± 0.75dB
6	RF power density	± 2.84dB
7	Conducted Spurious emissions	± 0.75dB
0	Dediated Courieus emission test	± 4.5dB (Below 1GHz)
8	Radiated Spurious emission test	± 4.8dB (Above 1GHz)
9	Temperature test	± 1 ℃
10	Humidity test	± 3%
11	Supply voltages	± 1.5%
12	Time	± 3%



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Report No.: SZEM191102028002

Page: 7 of 84

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Fax: +86 755 2671 0594 Tel: +86 755 2601 2053

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

4.7 **Abnormalities from Standard Conditions**

None



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Page: 8 of 84

Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2019-06-13	2022-06-12	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM024-01	2019-07-11	2020-07-10	
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019-09-24	2020-09-23	
LISN	ETS-LINDGREN	3816/2	SEM007-02	2019-04-01	2020-03-31	
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019-04-01	2020-03-31	

Conducted Peak Output Power						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12	
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23	
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10	
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A	
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23	
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06	
Electric Field Probe	WANDEL &	EMR-20	EMC0907	2019-05-21	2020-05-20	
(100KHz-3GHz)	GOLTERMANN	LIVIN-20	EIVICU907	2019-05-21	2020-05-20	
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07	

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06



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Page: 9 of 84

Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

Carrier Frequencies Separation									
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12				
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23				
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23				
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A				
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10				
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A				
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23				
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23				
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06				
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20				
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07				

Hopping Channel Number								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12			
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23			
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23			
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A			
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10			
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A			
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23			
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23			
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06			
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20			
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07			

Dwell Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23



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Report No.: SZEM191102028002

Page: 10 of 84

Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

Conducted Band Edges Measurement									
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12				
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23				
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23				
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A				
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10				
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A				
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23				
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23				
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06				
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20				
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07				

Conducted Spurious Emissions								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12			
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23			
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23			
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A			
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10			
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A			
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23			
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23			



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Report No.: SZEM191102028002

Page: 11 of 84

Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

Radiated Emissions which fall in the restricted bands								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12			
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A			
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10			
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11			
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12			
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16			
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23			
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31			
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31			
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23			
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21			

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2019-09-24	2020-09-23
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10



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Report No.: SZEM191102028002

Page: 12 of 84

Radiated Spurious Emis					T
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

General used equipment							
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date		
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25		
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25		
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25		
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03		



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Report No.: SZEM191102028002

Page: 13 of 84

Radio Spectrum Technical Requirement 6

Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -0.85dBi.

Antenna location: Refer to Internal photos





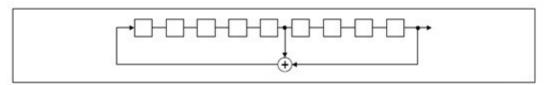
Report No.: SZEM191102028002

Page: 14 of 84

6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

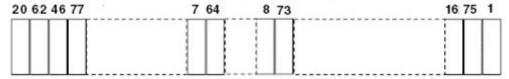
6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- > Number of shift register stages: 9
- > Length of pseudo-random sequence: 29 -1 = 511 bits



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Report No.: SZEM191102028002

Page: 15 of 84

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.





Report No.: SZEM191102028002

Page: 16 of 84

7 **Radio Spectrum Matter Test Results**

Conducted Emissions at AC Power Line (150kHz-30MHz)

47 CFR Part 15, Subpart C 15.207 Test Requirement Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Francisco (AALI-)	Conducted limit(dBμV)						
Frequency of emission(MHz)	Quasi-peak	Average					
0.15-0.5	66 to 56*	56 to 46*					
0.5-5	56	46					
5-30	60	50					
*Decreases with the logarithm of the frequency.							



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Page: 17 of 84

7.1.1 E.U.T. Operation

Operating Environment:

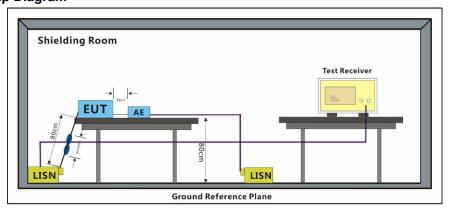
Temperature: Atmospheric Pressure: 1015 mbar 24.3 °C Humidity: 51.2 % RH

Test mode c:Charge + TX non-Hop mode Keep the EUT in charging and continuously

transmitting mode with GFSK modulation, π/4DQPSK modulation. All modes have

been tested and only the data of worst case is recorded in the report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50µH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor



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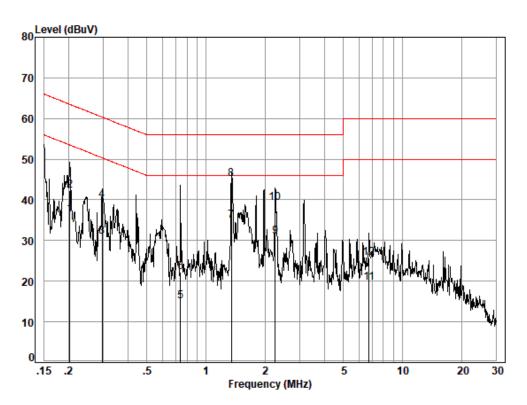
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Report No.: SZEM191102028002

Page: 18 of 84

Mode:c; Line:Live Line



: Shielding Room

Condition: Line Job No. : 20280CR

Test mode: c

		Cable	LISN	Read		Limit	0ver	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.20	0.02	9.51	26.85	36.38	53.49	-17.11	Average
2	0.20	0.02	9.51	32.66	42.19	63.49	-21.30	QP
3	0.30	0.04	9.55	21.47	31.06	50.37	-19.31	Average
4	0.30	0.04	9.55	30.41	40.00	60.37	-20.37	QP
5	0.74	0.08	9.63	5.29	15.00	46.00	-31.00	Average
6	0.74	0.08	9.63	12.44	22.15	56.00	-33.85	QP
7	1.34	0.12	9.64	25.21	34.97	46.00	-11.03	Average
8	1.34	0.12	9.64	35.31	45.07	56.00	-10.93	QP
9	2.25	0.16	9.65	21.21	31.02	46.00	-14.98	Average
10	2.25	0.16	9.65	29.47	39.28	56.00	-16.72	QP
11	6.77	0.17	9.72	9.74	19.63	50.00	-30.37	Average
12	6.77	0.17	9.72	15.73	25.62	60.00	-34.38	QP



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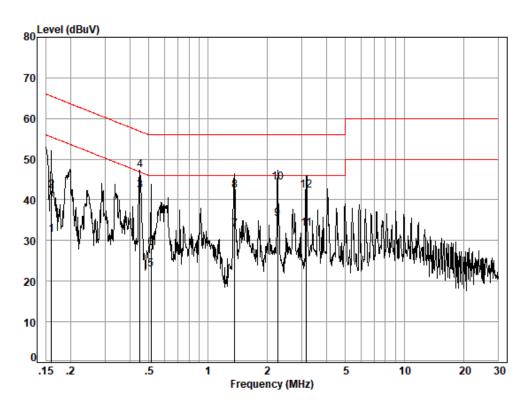
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Report No.: SZEM191102028002

Page: 19 of 84

Mode:c; Line:Neutral Line



: Shielding Room

Condition: Neutral Job No. : 20280CR

Test mode: c

		Cable	LISN	Read		Limit	0ver	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9.43	21.90	31.34	55.47	-24.13	Average
2	0.16	0.01	9.43	32.95	42.39	65.47	-23.08	QP
3	0.45	0.06	9.56	32.63	42.25	46.85	-4.60	Average
4	0.45	0.06	9.56	37.69	47.31	56.85	-9.54	QP
5	0.51	0.06	9.58	13.25	22.89	46.00	-23.11	Average
6	0.51	0.06	9.58	18.54	28.18	56.00	-27.82	QP
7	1.37	0.12	9.68	22.86	32.66	46.00	-13.34	Average
8	1.37	0.12	9.68	32.48	42.28	56.00	-13.72	QP
9	2.26	0.16	9.70	25.43	35.29	46.00	-10.71	Average
10	2.26	0.16	9.70	34.38	44.24	56.00	-11.76	QP
11	3.17	0.16	9.73	23.13	33.02	46.00	-12.98	Average
12	3.17	0.16	9.73	32.49	42.38	56.00	-13.62	QP



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Report No.: SZEM191102028002

Page: 20 of 84

7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1) Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)				
	1 for ≥50 hopping channels				
902-928	0.25 for 25≤ hopping channels <50				
	1 for digital modulation				
	1 for ≥75 non-overlapping hopping channels				
2400-2483.5	0.125 for all other frequency hopping systems				
	1 for digital modulation				
5725-5850	1 for frequency hopping systems and digital modulation				



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Page: 21 of 84

7.2.1 E.U.T. Operation

Operating Environment:

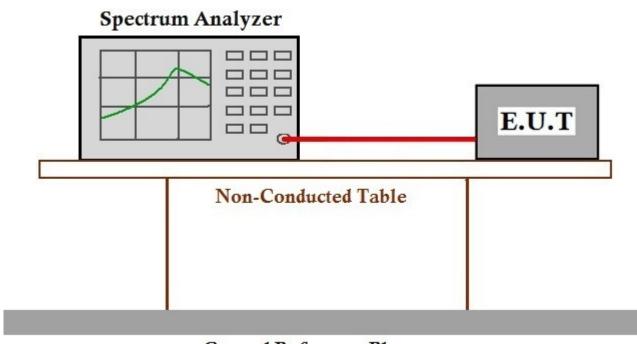
Temperature: 22.3 °C Humidity: 52.8 % RH Atmospheric Pressure: 1015 mbar

b:TX non-Hop mode Keep the EUT in continuously transmitting mode with GFSK Test mode

modulation, π/4DQPSK modulation. All modes have been tested and only the

data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



Ground Reference Plane

7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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Report No.: SZEM191102028002

Page: 22 of 84

7.3 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1) Test Method: ANSI C63.10 (2013) Section 7.8.7

7.3.1 E.U.T. Operation

Operating Environment:

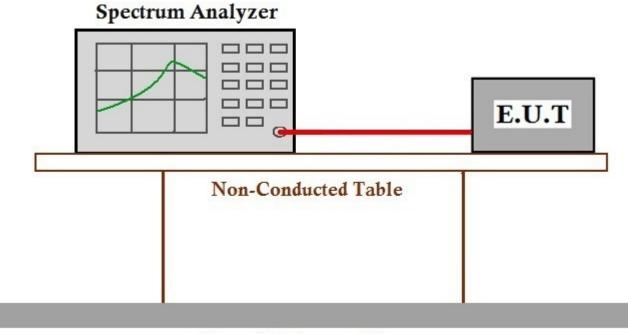
Temperature: 22.3 °C Humidity: 52.8 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX non-Hop mode Keep the EUT in continuously transmitting mode with GFSK

modulation, π/4DQPSK modulation. All modes have been tested and only the

data of worst case is recorded in the report.

7.3.2 Test Setup Diagram



Ground Reference Plane

7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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Report No.: SZEM191102028002

Page: 23 of 84

7.4 Carrier Frequencies Separation

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1) Test Method: ANSI C63.10 (2013) Section 7.8.2

Limit: 2/3 of the 20dB bandwidth base on the transmission power is less than

0.125W

7.4.1 E.U.T. Operation

Operating Environment:

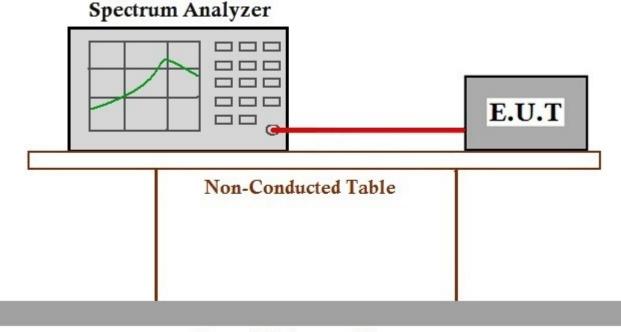
Humidity: 52.9 % RH Temperature: 22.3 °C Atmospheric Pressure: 1015 mbar

Test mode a:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK

modulation, $\pi/4DQPSK$ modulation. All modes have been tested and only the

data of worst case is recorded in the report.

7.4.2 Test Setup Diagram



Ground Reference Plane

7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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Report No.: SZEM191102028002

Page: 24 of 84

7.5 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
002 029	50 for 20dB bandwidth <250kHz
902-928	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

7.5.1 E.U.T. Operation

Operating Environment:

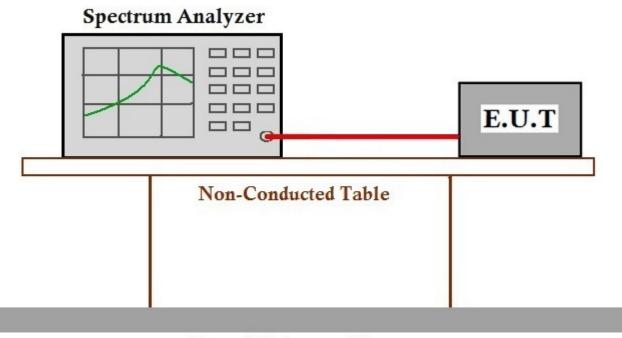
Temperature: 22.3 °C Humidity: 52.9 % RH Atmospheric Pressure: 1015 mbar

Test mode a:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK

modulation, $\pi/4DQPSK$ modulation. All modes have been tested and only the

data of worst case is recorded in the report.

7.5.2 Test Setup Diagram



Ground Reference Plane

7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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Report No.: SZEM191102028002

Page: 25 of 84

7.6 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
902-928	0.4S within a 10S period(20dB bandwidth≥250kHz)
0400 0400 5	0.4S within a period of 0.4S multiplied by the number
2400-2483.5	of hopping channels
5725-5850	0.4S within a 30S period



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Report No.: SZEM191102028002

Page: 26 of 84

7.6.1 E.U.T. Operation

Operating Environment:

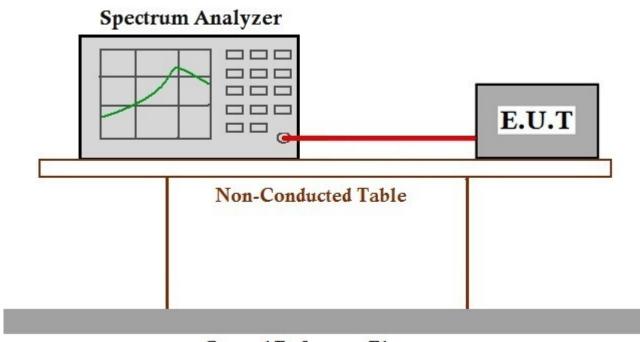
Temperature: 22.3 °C Atmospheric Pressure: 1015 mbar Humidity: 53 % RH

Test mode a:TX Hop mode Keep the EUT in frequency hopping mode with GFSK

modulation, π/4DQPSK modulation. All modes have been tested and only the

data of worst case is recorded in the report.

7.6.2 Test Setup Diagram



Ground Reference Plane

7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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Report No.: SZEM191102028002

Page: 27 of 84

7.7 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d) Test Method: ANSI C63.10 (2013) Section 7.8.6

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c)



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Report No.: SZEM191102028002

Page: 28 of 84

7.7.1 E.U.T. Operation

Operating Environment:

Humidity: 53.1 % RH Temperature: 22.3 °C Atmospheric Pressure: 1015 mbar

Pretest these a:TX Hop mode Keep the EUT in frequency hopping mode with GFSK modes to find modulation, $\pi/4DQPSK$ modulation. All modes have been tested and only the

data of worst case is recorded in the report. the worst case:

> b:TX non-Hop mode Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation. All modes have been tested and only the

data of worst case is recorded in the report.

The worst case for final test:

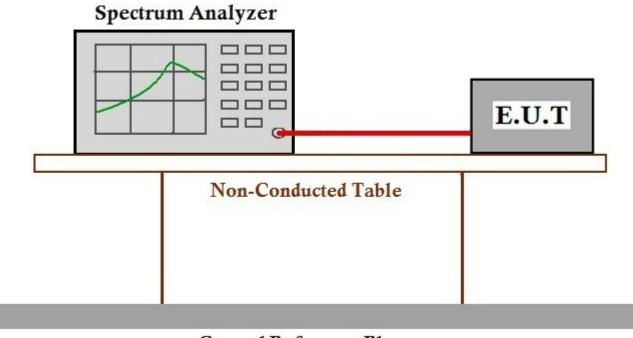
a:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4DQPSK$ modulation. All modes have been tested and only the

data of worst case is recorded in the report.

b:TX non-Hop mode Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation. All modes have been tested and only the

data of worst case is recorded in the report.

7.7.2 Test Setup Diagram



Ground Reference Plane

7.7.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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Report No.: SZEM191102028002

Page: 29 of 84

7.8 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d) Test Method: ANSI C63.10 (2013) Section 7.8.8

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c)



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Report No.: SZEM191102028002

Page: 30 of 84

7.8.1 E.U.T. Operation

Operating Environment:

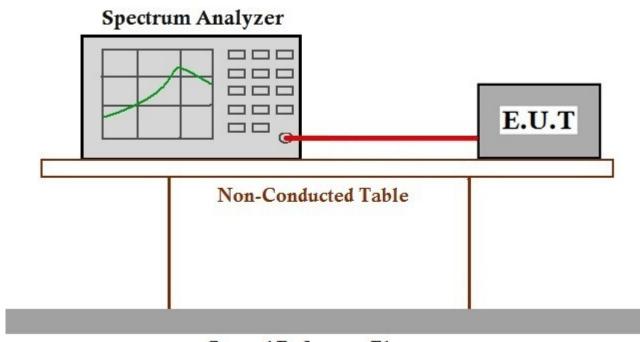
Temperature: 22.3 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

b:TX non-Hop mode Keep the EUT in continuously transmitting mode with GFSK Test mode

modulation, π/4DQPSK modulation. All modes have been tested and only the

data of worst case is recorded in the report.

7.8.2 Test Setup Diagram



Ground Reference Plane

7.8.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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Report No.: SZEM191102028002

Page: 31 of 84

7.9 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)			
0.009-0.490	2400/F(kHz)	300			
0.490-1.705	24000/F(kHz)	30			
1.705-30.0	30	30 3			
30-88	100				
88-216	150	3			
216-960	200	3			
Above 960	500	3			

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Average value:

-	Average value=Peak value + PDCF		
Calculate Formula:	PDCF=20 log(Duty cycle)		
	Duty cycle= T on time / T period		
	Ton time =2.877ms		
Took data:	T period =100ms		
Test data:	Duty cycle=2.877%		
	PDCF value= -30.82dB		



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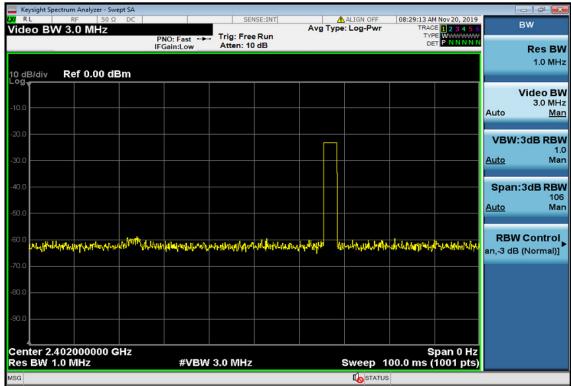
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Page: 32 of 84







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Report No.: SZEM191102028002

Page: 33 of 84

7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C 46.9 % RH Atmospheric Pressure: 1015 mbar Humidity:

Pretest these modes to find the worst case: b:TX non-Hop mode Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4DQPSK$ modulation. All modes have been tested and only the

data of worst case is recorded in the report.

c:Charge + TX non-Hop mode Keep the EUT in charging and continuously transmitting mode with GFSK modulation, π/4DQPSK modulation. All modes have

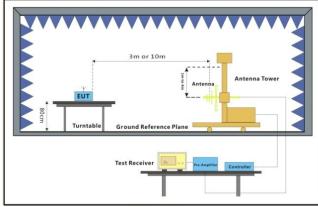
been tested and only the data of worst case is recorded in the report.

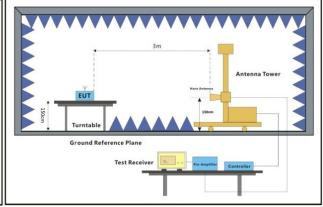
The worst case for final test:

c:Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, $\pi/4DQPSK$ modulation. All modes have

been tested and only the data of worst case is recorded in the report.

7.9.2 Test Setup Diagram





30MHz-1GHz Above 1GHz



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Report No.: SZEM191102028002

Page: 34 of 84

7.9.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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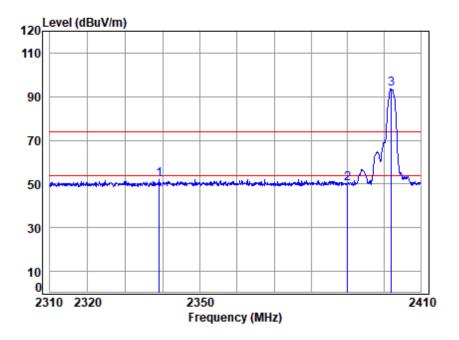
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Report No.: SZEM191102028002

Page: 35 of 84

Mode:c; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20280CR

Mode : 2402 Band edge

Note : BT

		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
										_
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2339.061	5.41	28.43	40.95	59.24	52.13	74.00	-21.87	peak	
2	2390.000	5.47	28.52	40.97	57.37	50.39	74.00	-23.61	peak	
3 *	2402.000	5.49	28.54	40.98	100.34	93.39	74.00	19.39	peak	



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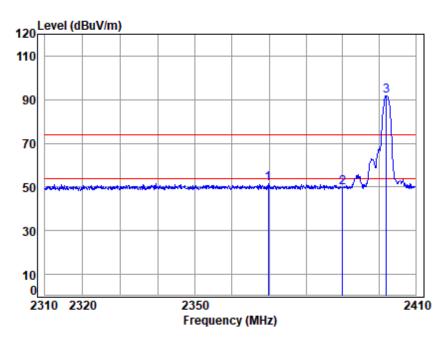
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Report No.: SZEM191102028002

Page: 36 of 84

Mode:c; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site : chamber Condition: 3m VERTICAL : 20280CR Job No

Mode : 2402 Band edge

Note : BT

> 1 2 3

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2369.792 2390.000								•
2402.000								•



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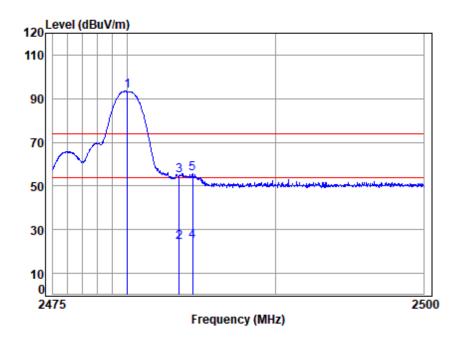
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Report No.: SZEM191102028002

Page: 37 of 84

Mode:c; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 20280CR Job No

Mode : 2480 Band edge

Note : BT

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 *	2480.000	5.59	28.67	41.01	100.13	93.38	74.00	19.38	peak
2	2483.500	5.60	28.67	41.01	30.73	23.99	54.00	-30.01	Average
3	2483.500	5.60	28.67	41.01	61.55	54.81	74.00	-19.19	peak
4	2484.396	5.60	28.67	41.01	31.45	24.71	54.00	-29.29	Average
5	2484.396	5.60	28.67	41.01	62.27	55.53	74.00	-18.47	peak



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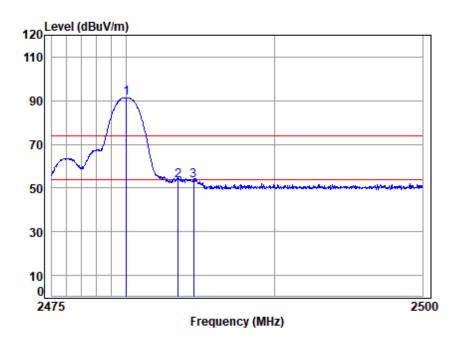
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Report No.: SZEM191102028002

Page: 38 of 84

Mode:c; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m VERTICAL : 20280CR Job No

Mode : 2480 Band edge

Note : BT

> 1 2 3

Freq			Preamp Factor					
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
* 2480.000 2483.500 2484.545	5.60	28.67	41.01	60.01	53.27	74.00	-20.73	peak



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Report No.: SZEM191102028002

Page: 39 of 84

7.10 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209 Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



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Report No.: SZEM191102028002

Page: 40 of 84

7.10.1 E.U.T. Operation

Operating Environment:

Humidity: 55 % RH Temperature: 23 °C Atmospheric Pressure: 1015 mbar

Pretest these modes to find the worst case: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4DQPSK$ modulation. All modes have been tested and only the

data of worst case is recorded in the report.

c:Charge + TX non-Hop mode Keep the EUT in charging and continuously transmitting mode with GFSK modulation, π/4DQPSK modulation. All modes have

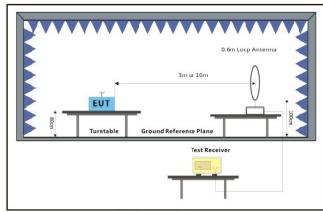
been tested and only the data of worst case is recorded in the report.

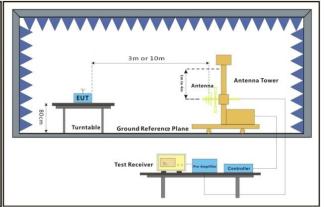
The worst case for final test:

c:Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, $\pi/4DQPSK$ modulation. All modes have

been tested and only the data of worst case is recorded in the report.

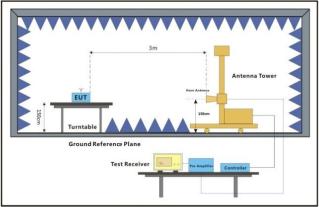
7.10.2 Test Setup Diagram





Below 30MHz

30MHz-1GHz



Above 1GHz



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Report No.: SZEM191102028002

Page: 41 of 84

7.10.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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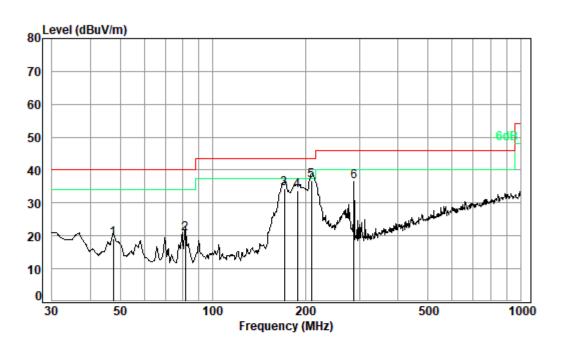
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Page: 42 of 84

30MHz~1GHz

QP value:

Mode: c; Polarization: Horizontal



Condition: 3m HORIZONTAL

Job No. : 20280CR

Test mode: c

	mouc. c							
		Ant	Cable	Read		Limit	0ver	
	Freq	Factor	Loss	Level	Level	Line	Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	47.49	14.96	0.75	31.07	19.17	40.00	-20.83	QP
2	81.50	12.17	1.10	34.98	20.75	40.00	-19.25	QP
3	170.79	15.72	1.35	44.94	34.49	43.50	-9.01	QP
4	188.41	16.16	1.38	43.73	33.74	43.50	-9.76	QP
5 pp	209.31	16.83	1.46	46.19	36.95	43.50	-6.55	QP
6	287.99	19.13	1.85	43.11	36.55	46.00	-9.45	OP



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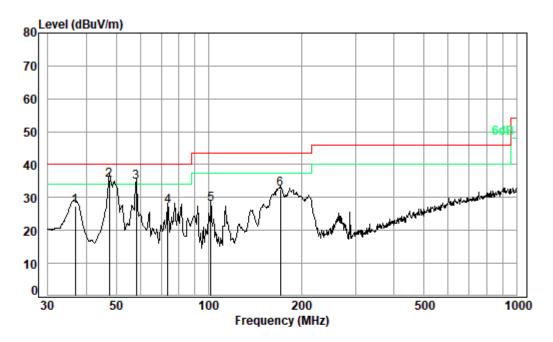
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Report No.: SZEM191102028002

Page: 43 of 84

Mode: c; Polarization: Vertical



Condition: 3m VERTICAL Job No. : 20280CR

Test mode: c

	Freq	Ant Factor			Level			Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	36.77	18.97	0.60	35.47	27.40	40.00	-12.60	QP
2 pp	47.49	14.96	0.75	47.26	35.36	40.00	-4.64	QP
3	58.20	13.37	0.80	47.94	34.54	40.00	-5.46	QP
4	73.62	12.50	0.91	41.54	27.43	40.00	-12.57	QP
5	101.64	13.92	1.21	40.35	27.97	43.50	-15.53	QP
6	170.79	15.72	1.35	42.85	32.40	43.50	-11.10	OP



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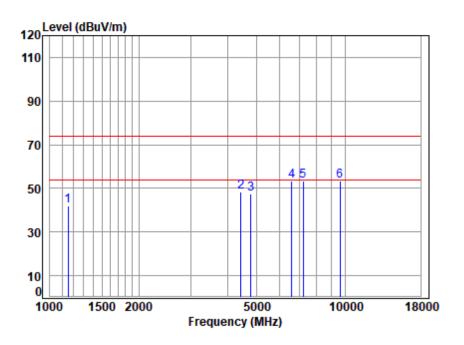


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Page: 44 of 84

Above 1GHz

Mode:c; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20280CR

Mode : 2402 TX RSE

Note : BT

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
	4450 440		04.37	40.04	F2 40	44 77	74.00	20.02	
1	1152.148	4.22	24.3/	40.24	53.42	41.//	74.00	-32.23	peak
2	4430.628	7.48	33.48	42.50	49.77	48.23	74.00	-25.77	peak
3	4804.000	7.89	33.97	42.77	48.57	47.66	74.00	-26.34	peak
4	6583.209	11.30	35.65	41.91	48.46	53.50	74.00	-20.50	peak
5	7206.000	10.08	36.07	41.58	48.64	53.21	74.00	-20.79	peak
6	9608 000	10 75	37 67	38 57	13 19	53 3/	7/ 00	20 66	noak



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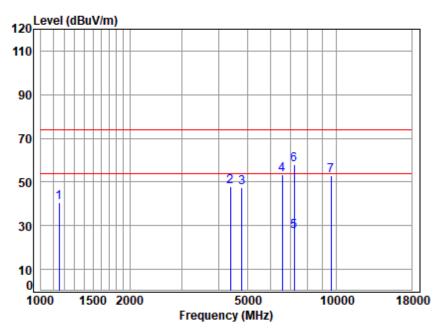
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Report No.: SZEM191102028002

Page: 45 of 84

Mode:c; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site : chamber Condition: 3m VERTICAL : 20280CR Job No

: 2402 TX RSE Mode

Note : BT

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1152.148	4.22	24.37	40.24	52.04	40.39	74.00	-33.61	peak
2	4379.699	7.43	33.39	42.46	49.75	48.11	74.00	-25.89	peak
3	4804.000	7.89	33.97	42.77	48.57	47.66	74.00	-26.34	peak
4	6564.209	11.35	35.64	41.92	48.48	53.55	74.00	-20.45	peak
5	7206.000	10.08	36.07	41.58	22.73	27.30	54.00	-26.70	Average
6	7206.000	10.08	36.07	41.58	53.55	58.12	74.00	-15.88	peak
7	9608.000	10.75	37.67	38.57	43.12	52.97	74.00	-21.03	peak



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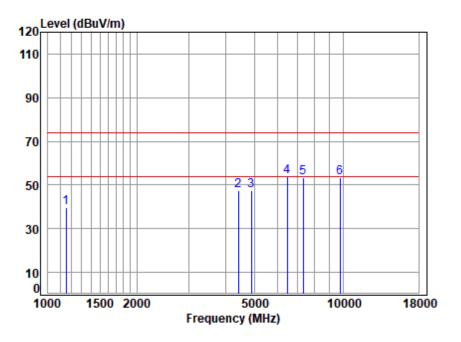
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Report No.: SZEM191102028002

Page: 46 of 84

Mode:c; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

: 20280CR Job No

Mode : 2441 TX RSE

Note : BT

	_			Preamp					
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Kemark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1152.148	4.22	24.37	40.24	51.40	39.75	74.00	-34.25	peak
2	4417.841	7.47	33.46	42.49	49.07	47.51	74.00	-26.49	peak
3	4882.000	7.97	34.06	42.82	48.24	47.45	74.00	-26.55	peak
4	6470.026	11.48	35.57	41.97	48.92	54.00	74.00	-20.00	peak
5	7323.000	10.05	36.16	41.52	48.64	53.33	74.00	-20.67	peak
6	9764,000	10.82	37.76	38.34	43.06	53.30	74.00	-20.70	neak



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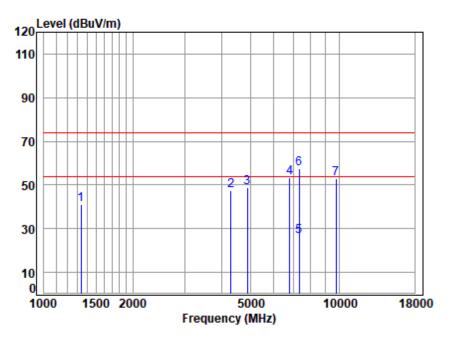
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Report No.: SZEM191102028002

Page: 47 of 84

Mode:c; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Site : chamber Condition: 3m VERTICAL : 20280CR Job No

Mode : 2441 TX RSE

Note : BT

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1335.141	4.93	25.17	40.39	51.14	40.85	74.00	-33.15	peak
2	4304.400	7.34	33.26	42.40	49.22	47.42	74.00	-26.58	peak
3	4882.000	7.97	34.06	42.82	49.55	48.76	74.00	-25.24	peak
4	6795.879	10.69	35.78	41.79	48.66	53.34	74.00	-20.66	peak
5	7323.000	10.05	36.16	41.52	21.91	26.60	54.00	-27.40	Average
6	7323.000	10.05	36.16	41.52	52.73	57.42	74.00	-16.58	peak
7	9764.000	10.82	37.76	38.34	42.81	53.05	74.00	-20.95	peak



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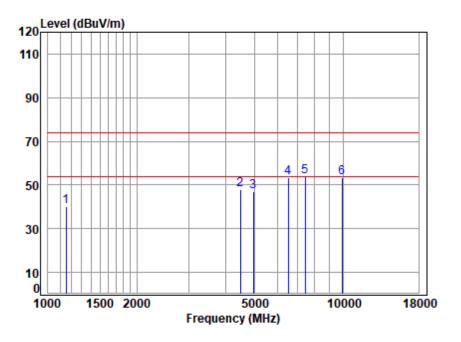
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Report No.: SZEM191102028002

Page: 48 of 84

Mode:c; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 20280CR Job No

Mode : 2480 TX RSE

Note : BT

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1152.148	4.22	24.37	40.24	51.88	40.23	74.00	-33.77	peak
2	4495.125	7.55	33.59	42.55	49.24	47.83	74.00	-26.17	peak
3	4960.000	8.05	34.15	42.87	47.62	46.95	74.00	-27.05	peak
4	6526.373	11.46	35.62	41.94	48.42	53.56	74.00	-20.44	peak
5	7440.000	10.02	36.25	41.46	48.87	53.68	74.00	-20.32	peak
6	9920,000	10.90	37.85	38.12	42.69	53.32	74.00	-20.68	peak



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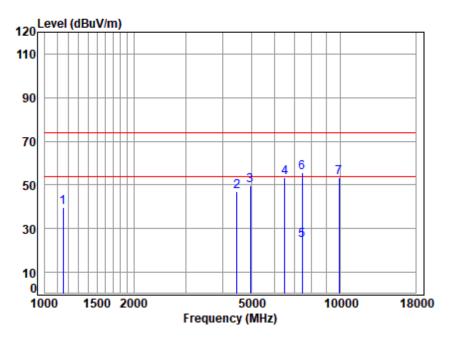
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Report No.: SZEM191102028002

Page: 49 of 84

Mode:c; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m VERTICAL : 20280CR Job No

Mode : 2480 TX RSE

Note : BT

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1152.148	4.22	24.37	40.24	51.48	39.83	74.00	-34.17	peak
2	4469.214	7.53	33.55	42.53	48.58	47.13	74.00	-26.87	peak
3	4960.000	8.05	34.15	42.87	50.50	49.83	74.00	-24.17	peak
4	6488.754	11.52	35.59	41.96	48.26	53.41	74.00	-20.59	peak
5	7440.000	10.02	36.25	41.46	19.90	24.71	54.00	-29.29	Average
6	7440.000	10.02	36.25	41.46	50.72	55.53	74.00	-18.47	peak
7	9920.000	10.90	37.85	38.12	42.61	53.24	74.00	-20.76	peak



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Report No.: SZEM191102028002

Page: 50 of 84

Photographs 8

Test Setup

Refer to Setup Photos

8.2 EUT Constructional Details (EUT Photos)

Refer to EUT external and internal photos



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Report No.: SZEM191102028002

Page: 51 of 84

Appendix 9

9.1 Appendix 15.247

1.20 dB Bandwidth

Test Mode	Test Channel	EBW[MHz]	Limit[MHz]	Verdict
DH5	2402	0.954		PASS
DH5	2441	0.951		PASS
DH5	2480	0.954		PASS
2DH5	2402	1.317		PASS
2DH5	2441	1.320		PASS
2DH5	2480	1.317		PASS



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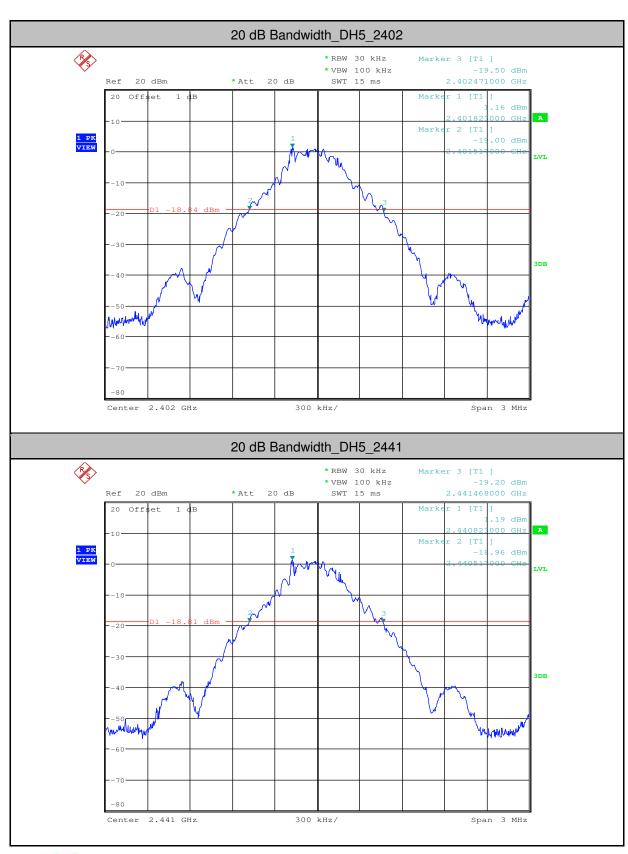
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Page: 52 of 84





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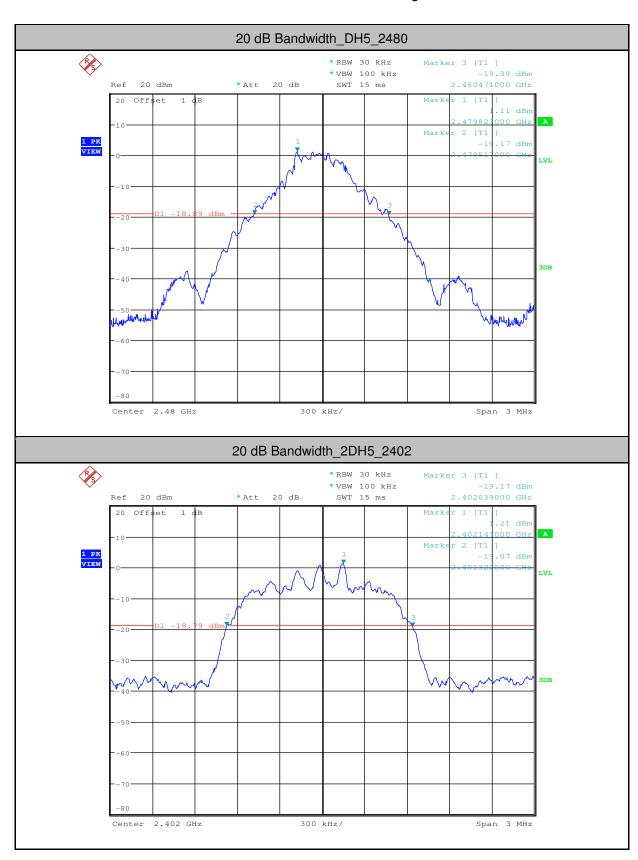
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Page: 53 of 84





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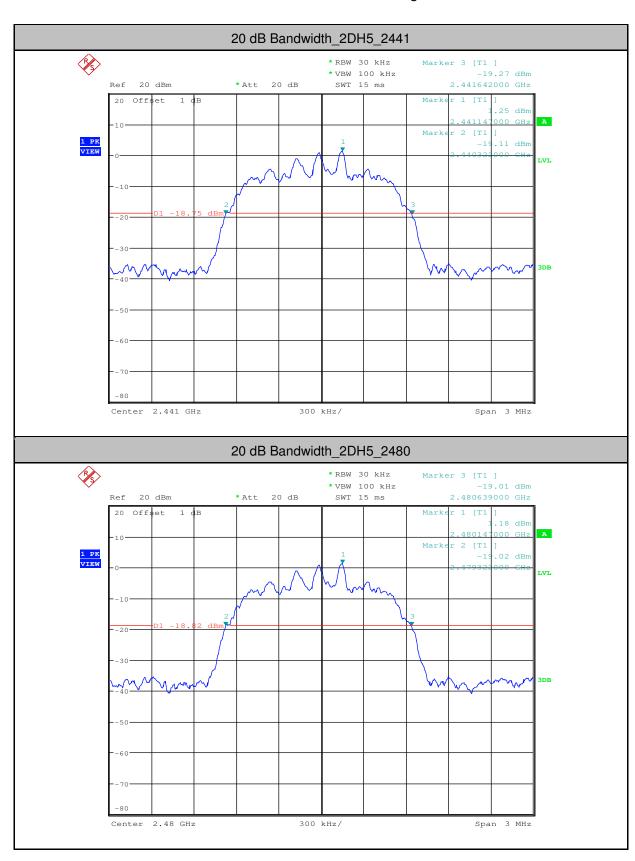
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Page: 54 of 84





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Report No.: SZEM191102028002

Page: 55 of 84

2.Conducted Peak Output Power

Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
DH5	2402	4.21	<=20.97	PASS
DH5	2441	4.2	<=20.97	PASS
DH5	2480	4.15	<=20.97	PASS
2DH5	2402	4.61	<=20.97	PASS
2DH5	2441	4.67	<=20.97	PASS
2DH5	2480	4.63	<=20.97	PASS



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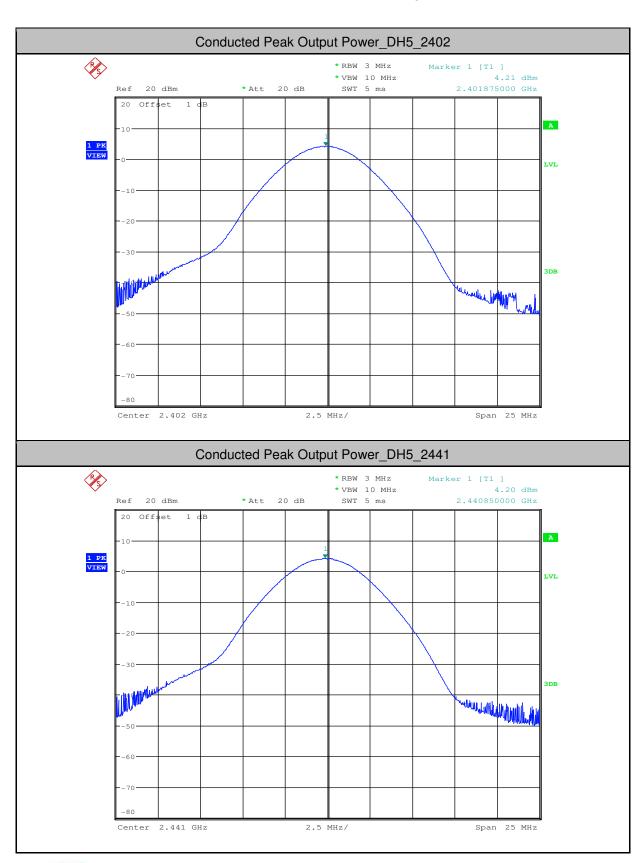
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Report No.: SZEM191102028002

Page: 56 of 84





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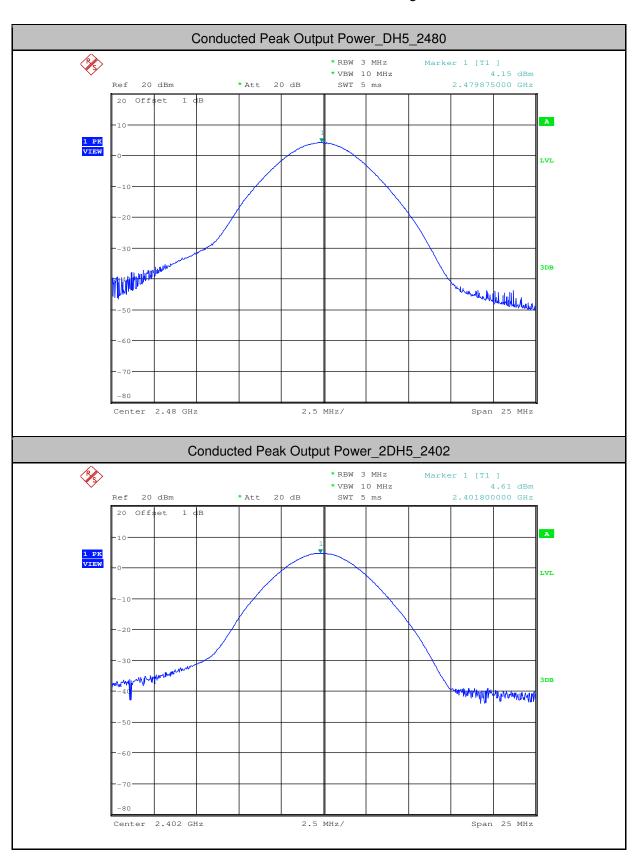
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Page: 57 of 84





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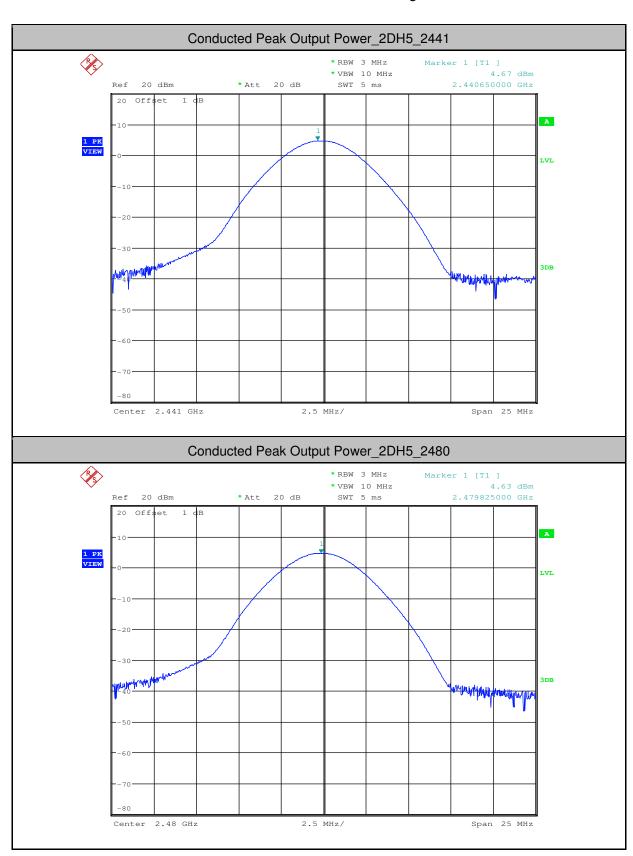
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Report No.: SZEM191102028002

Page: 58 of 84





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Report No.: SZEM191102028002

Page: 59 of 84

3. Carrier Frequency Separation

Test Mode	Test Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	2441	0.996	>=0.64	PASS
2DH5	2441	1.002	>=0.88	PASS



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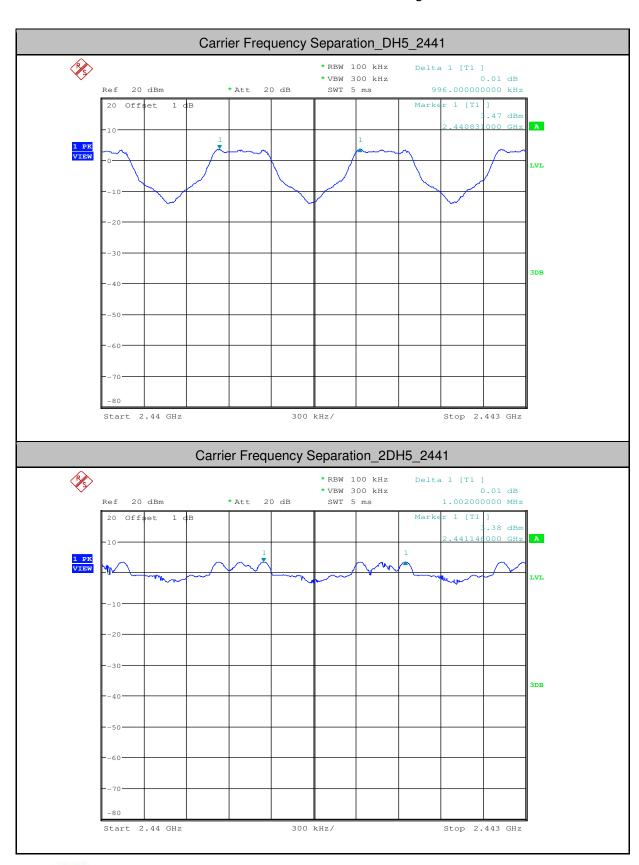
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Report No.: SZEM191102028002

Page: 60 of 84





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Report No.: SZEM191102028002

Page: 61 of 84

4.Dwell Time

Test Mode	Test Channel	Burst Width[ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit[s]	Verdict
DH1	2402	0.37	320	0.118	<0.4	PASS
DH3	2402	1.64	110	0.18	<0.4	PASS
DH5	2402	2.87	60	0.172	<0.4	PASS
2DH1	2402	0.38	320	0.122	<0.4	PASS
2DH3	2402	1.64	110	0.18	<0.4	PASS
2DH5	2402	2.88	50	0.144	<0.4	PASS



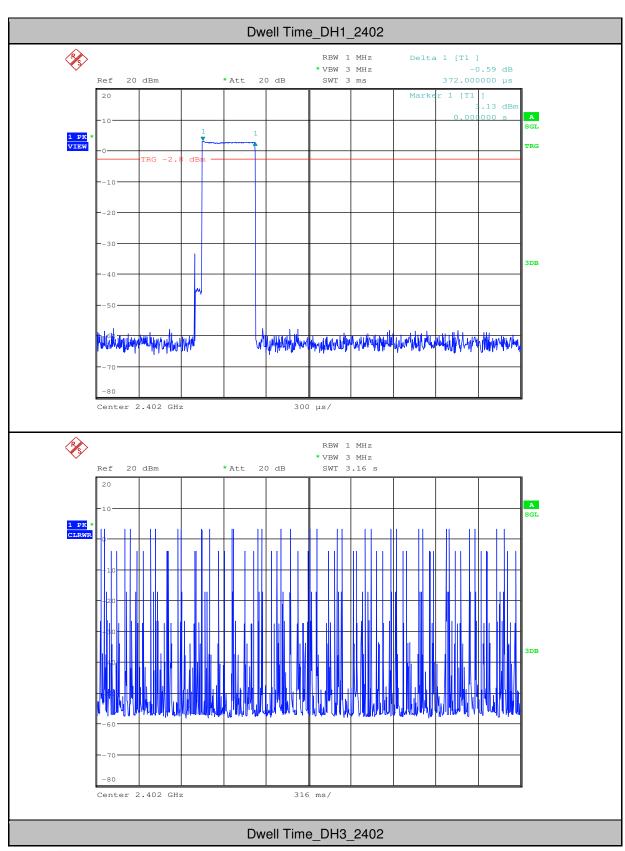
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Report No.: SZEM191102028002

Page: 62 of 84





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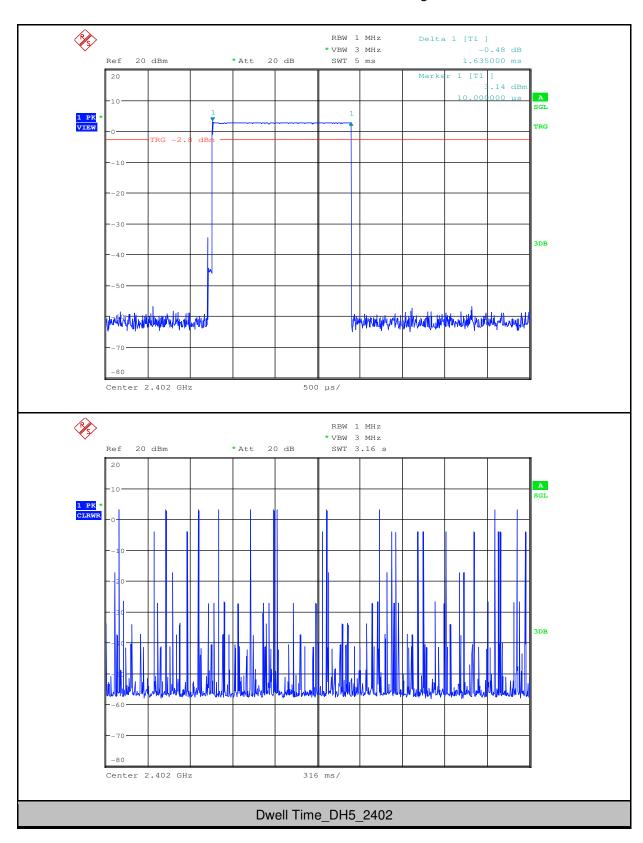
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Report No.: SZEM191102028002

Page: 63 of 84





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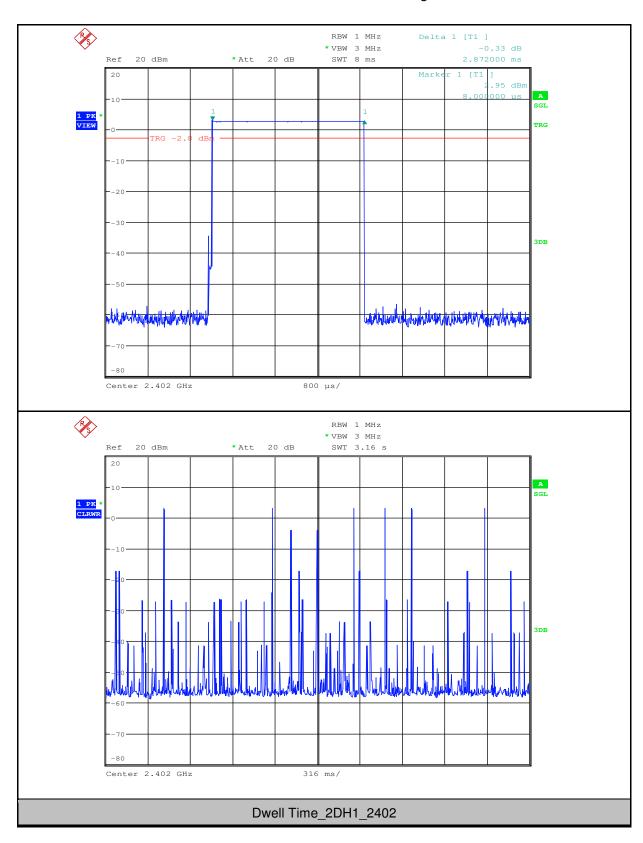
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Page: 64 of 84





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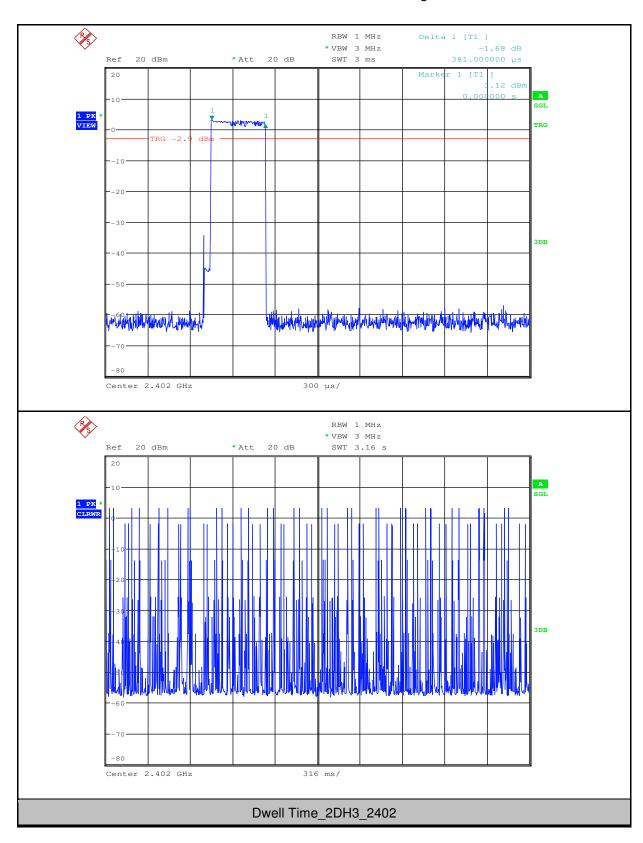
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Page: 65 of 84





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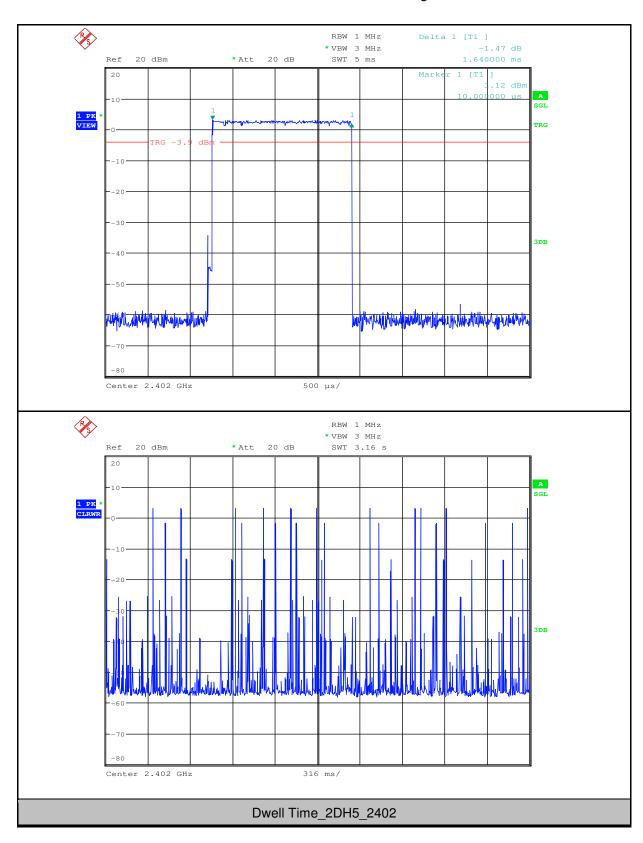
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Report No.: SZEM191102028002

Page: 66 of 84





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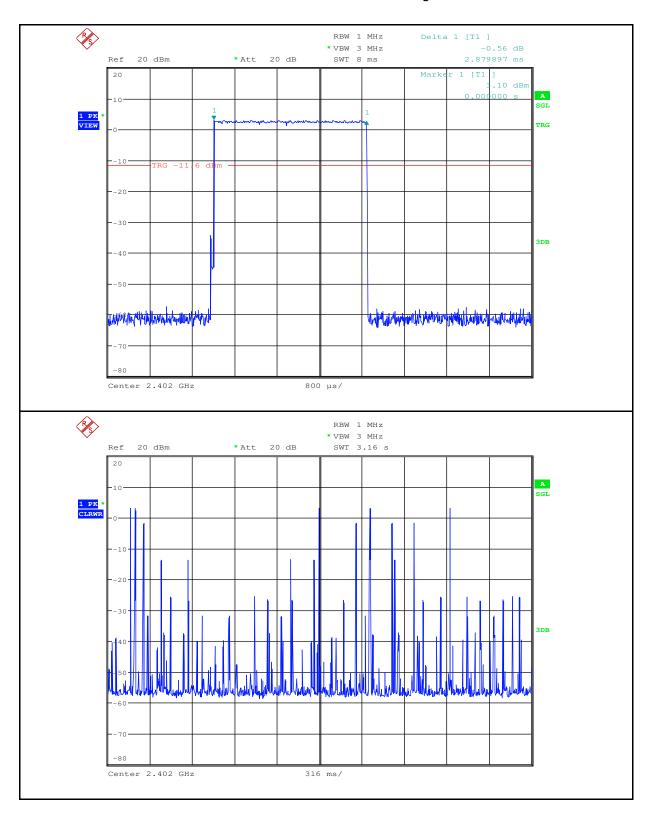
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Page: 67 of 84





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Report No.: SZEM191102028002

Page: 68 of 84

5. Hopping Channel Number

Test Mode	Test Channel	Number of Hopping Channel[N]	Limit[N]	Verdict
DH5	2402	79	>=15	PASS
2DH5	2402	79	>=15	PASS



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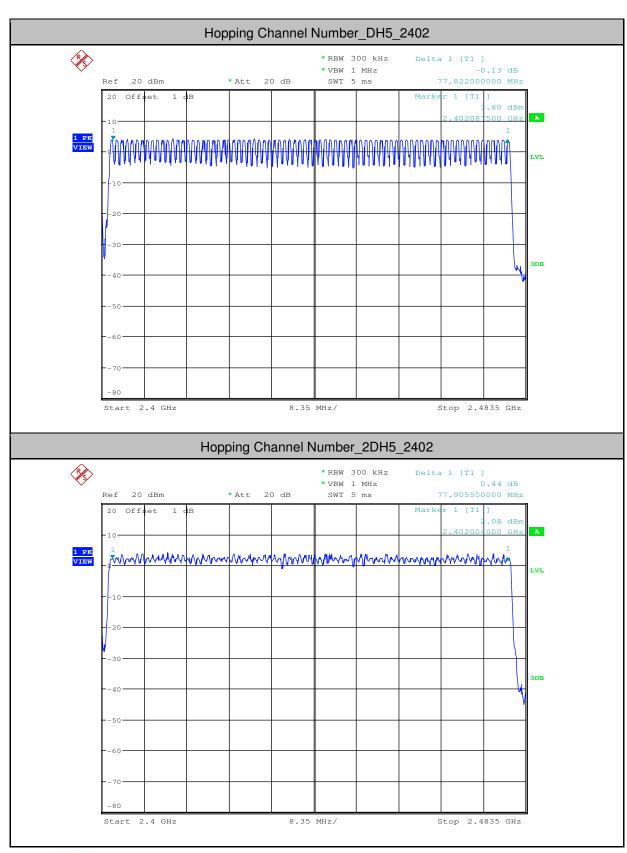
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Page: 69 of 84





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Report No.: SZEM191102028002

Page: 70 of 84

6.Band-edge for RF Conducted Emissions

Test Mode	Test Channel	Hopping	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit[dBm]	Verdict
DH5	2402	On	3.110	-49.553	<-16.89	PASS
DH5	2402	Off	3.360	-50.705	<-16.64	PASS
DH5	2480	On	3.430	-40.812	<-16.57	PASS
DH5	2480	Off	2.870	-40.218	<-17.13	PASS
2DH5	2402	On	3.320	-51.279	<-16.68	PASS
2DH5	2402	Off	3.430	-53.197	<-16.57	PASS
2DH5	2480	On	3.180	-45.712	<-16.82	PASS
2DH5	2480	Off	3.320	-39.667	<-16.68	PASS



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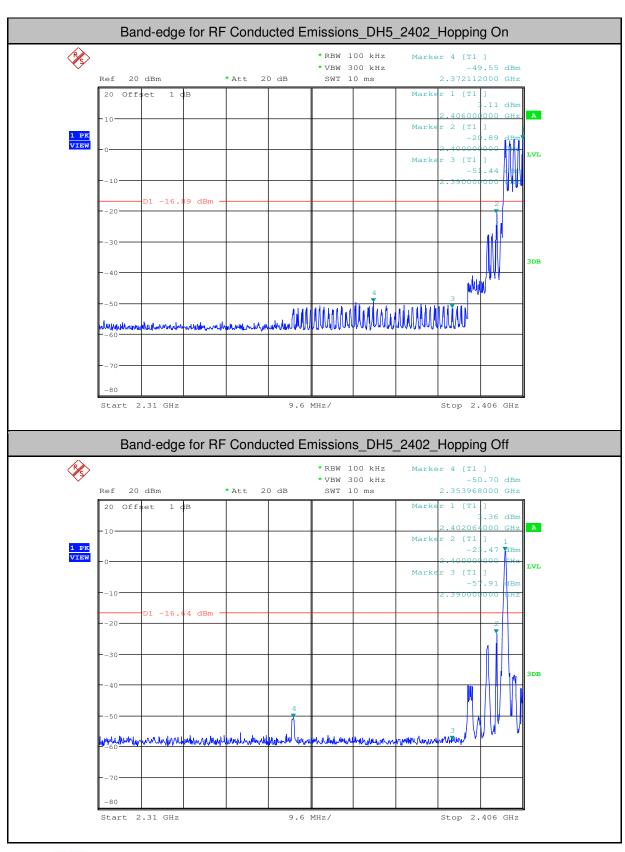
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Report No.: SZEM191102028002

Page: 71 of 84





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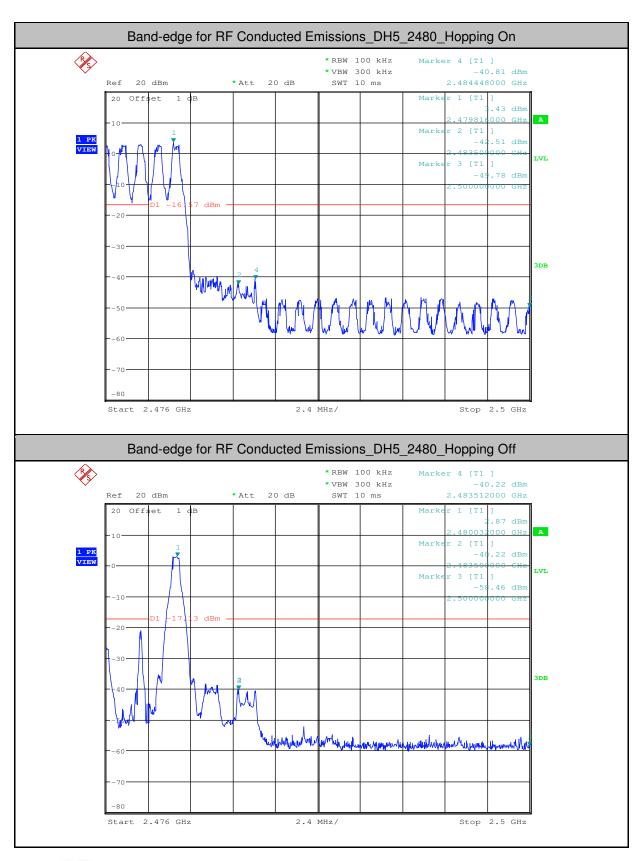
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Report No.: SZEM191102028002

Page: 72 of 84





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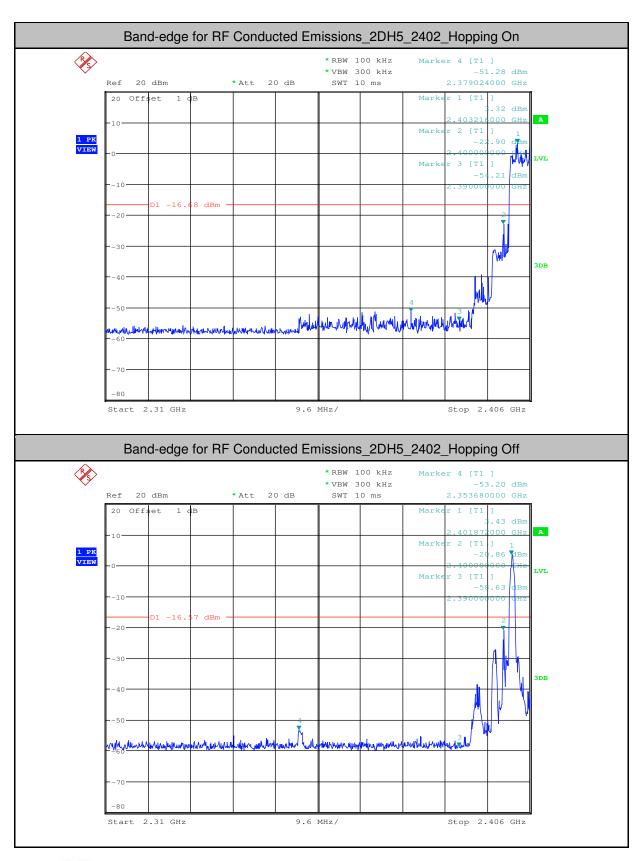
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Report No.: SZEM191102028002

Page: 73 of 84





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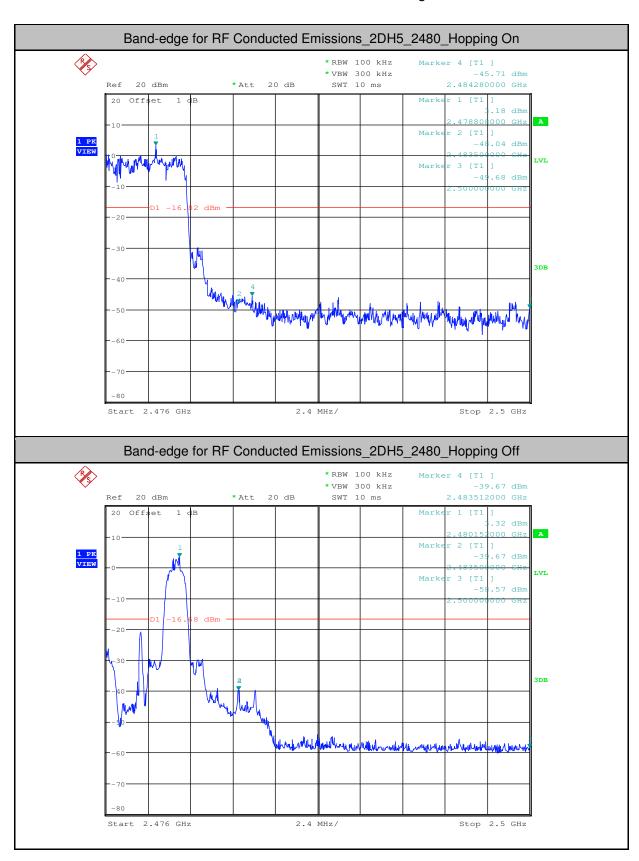
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Page: 74 of 84





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Report No.: SZEM191102028002

Page: 75 of 84

7.RF Conducted Spurious Emissions

Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref[dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
DH5	2402	30	10000	100	300	3.29	-40.690	<-16.71	PASS
DH5	2402	10000	25000	100	300	3.29	-65.550	<-16.71	PASS
DH5	2441	30	10000	100	300	3.38	-41.360	<-16.62	PASS
DH5	2441	10000	25000	100	300	3.38	-65.460	<-16.62	PASS
DH5	2480	30	10000	100	300	3.35	-39.650	<-16.65	PASS
DH5	2480	10000	25000	100	300	3.35	-65.890	<-16.65	PASS
2DH5	2402	30	10000	100	300	3.35	-45.390	<-16.65	PASS
2DH5	2402	10000	25000	100	300	3.35	-65.850	<-16.65	PASS
2DH5	2441	30	10000	100	300	3.49	-46.890	<-16.51	PASS
2DH5	2441	10000	25000	100	300	3.49	-65.810	<-16.51	PASS
2DH5	2480	30	10000	100	300	3.22	-45.370	<-16.78	PASS
2DH5	2480	10000	25000	100	300	3.22	-65.600	<-16.78	PASS



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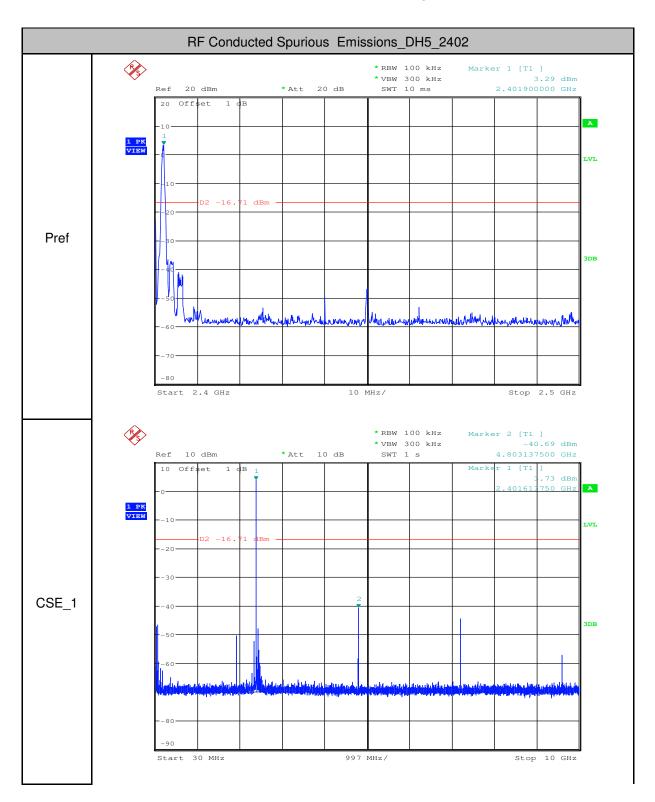
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Report No.: SZEM191102028002

Page: 76 of 84





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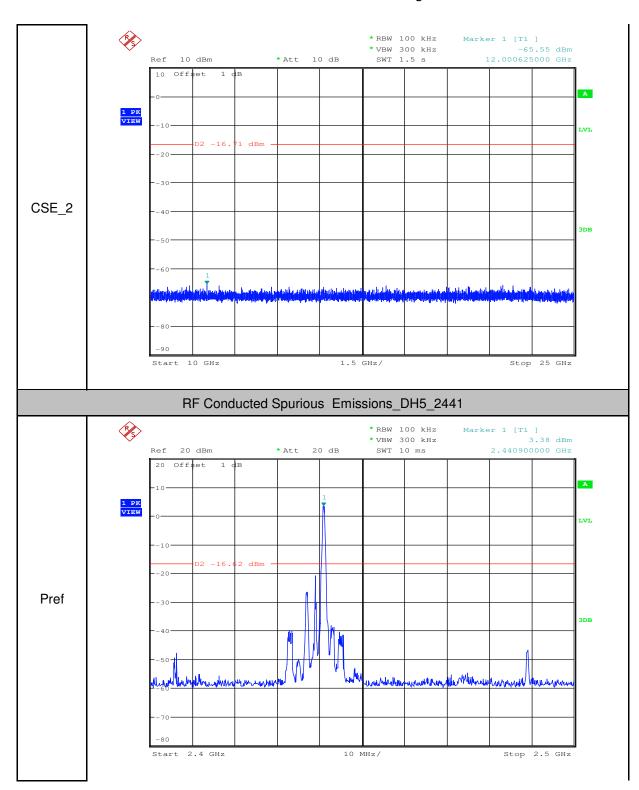
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Page: 77 of 84





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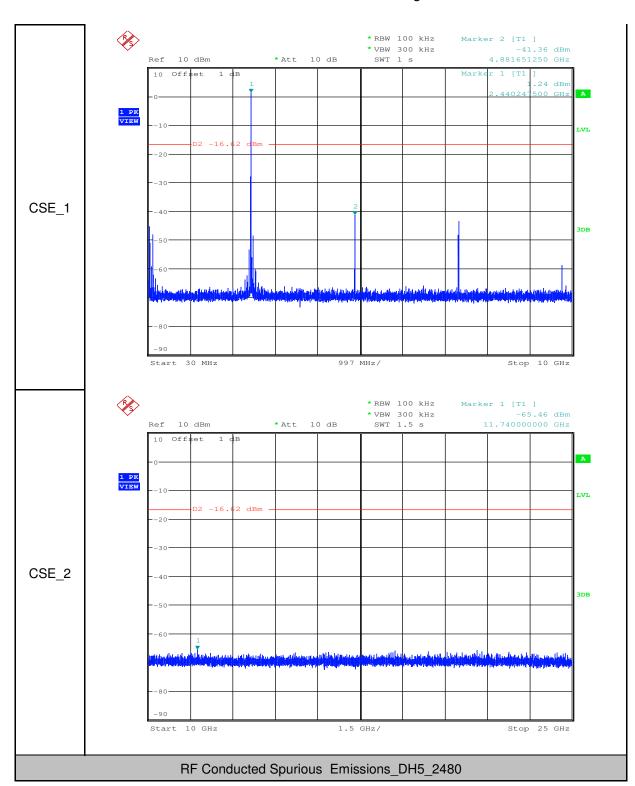
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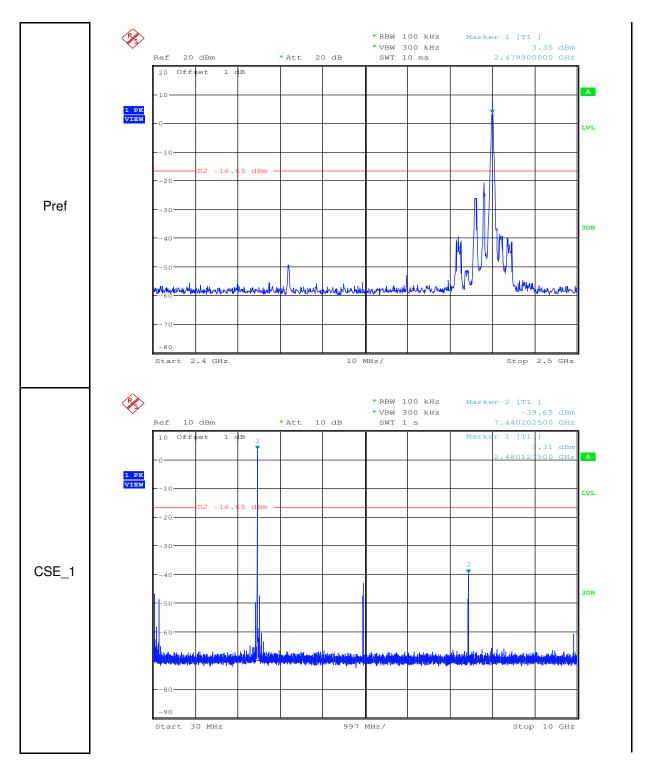
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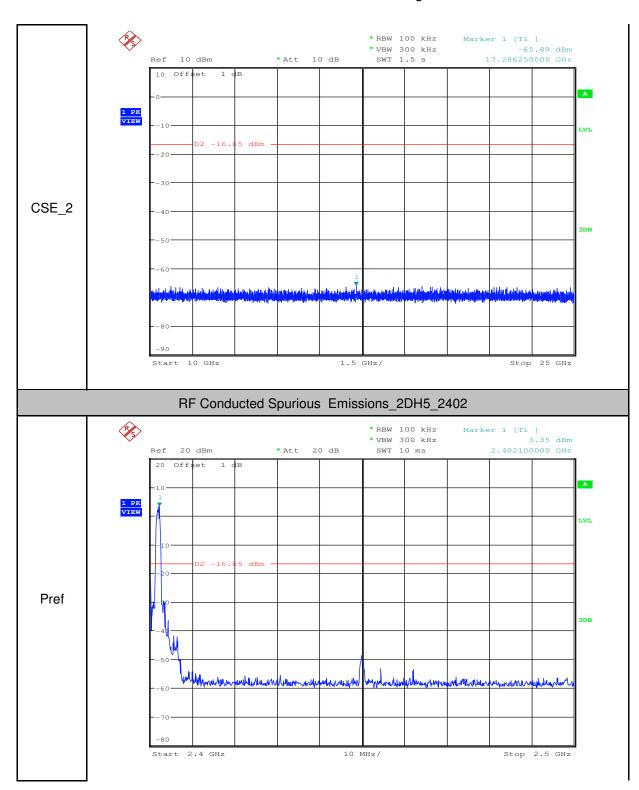
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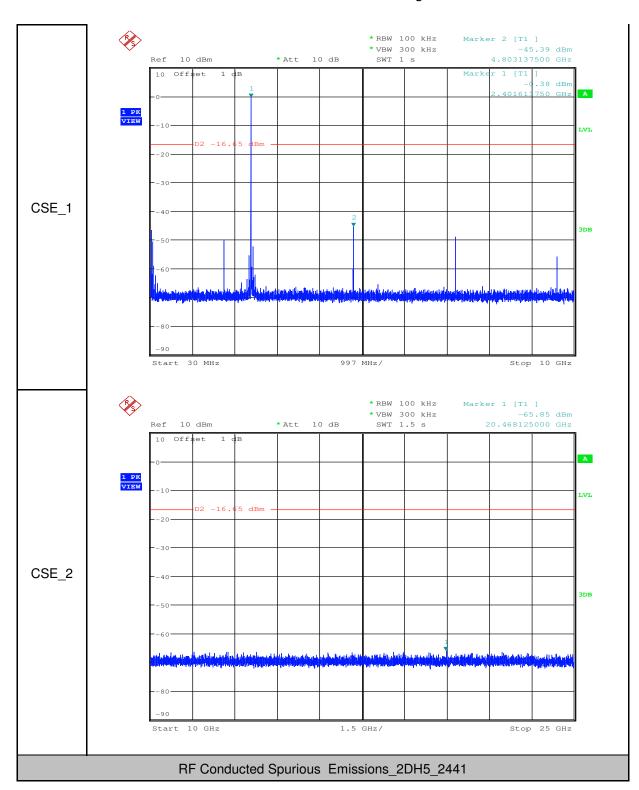
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Report No.: SZEM191102028002

Page: 81 of 84





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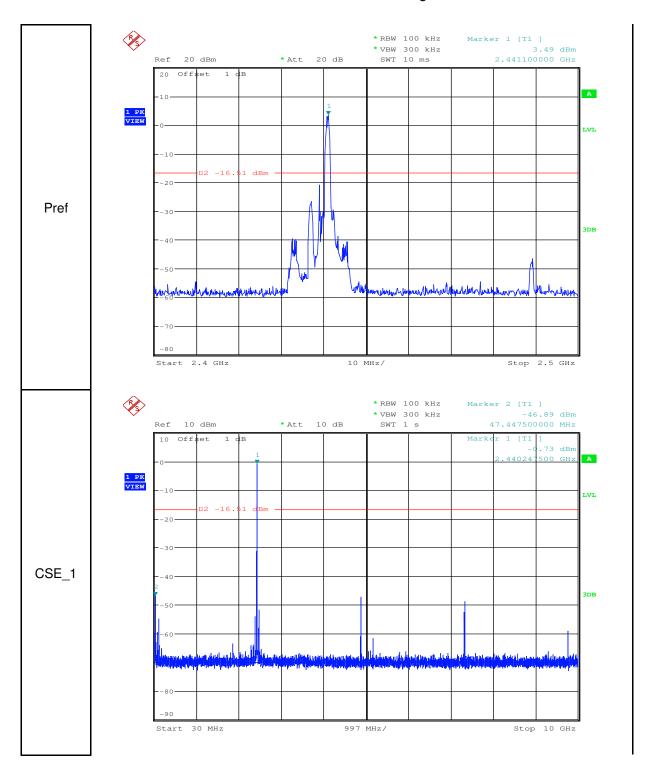
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Report No.: SZEM191102028002

Page: 82 of 84





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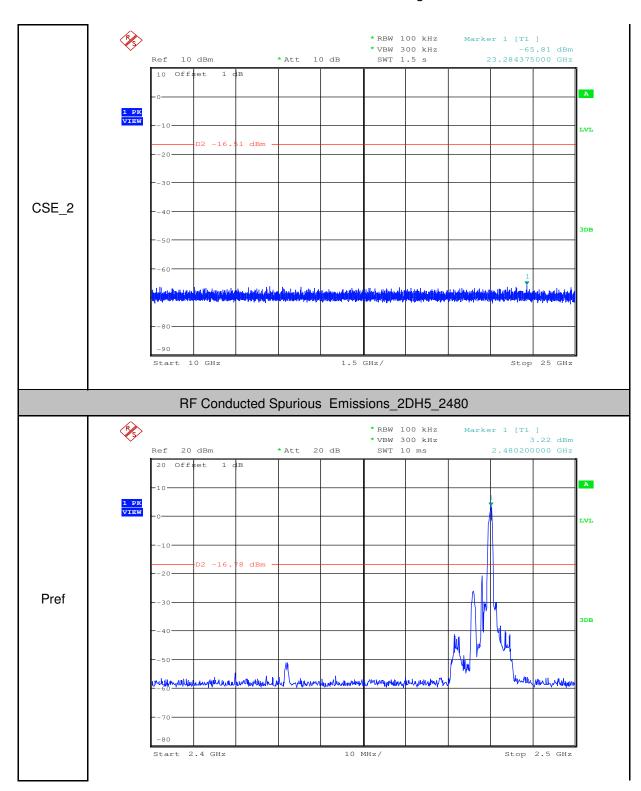
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Page: 83 of 84





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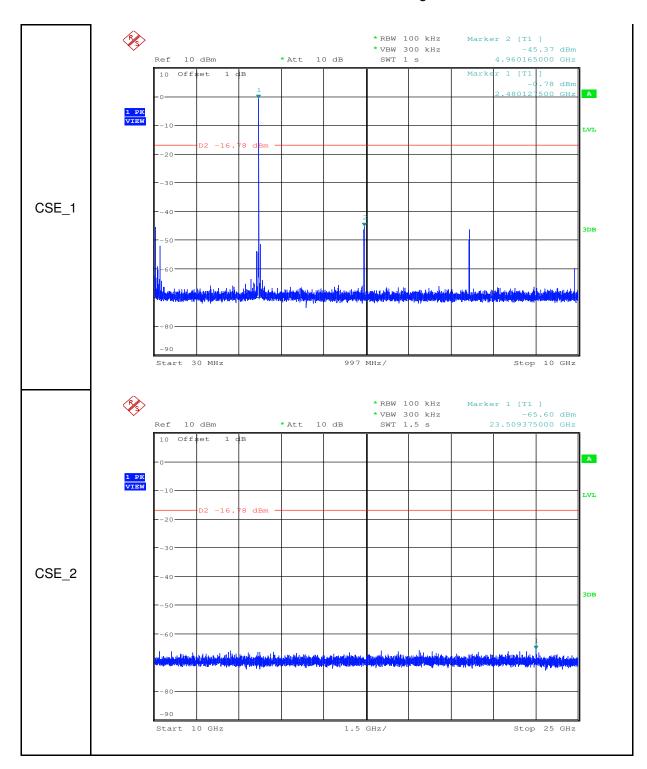
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Page: 84 of 84



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