

PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT FCC PART 15.249 / ISED RSS-210 Zwave

Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 5/9-6/13/2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1805080100-08.A3L

FCC ID: IC:

A3LETWV525

649E-ETWV525

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type: Model / HVIN: EUT Type: Frequency Range: FCC Classification: FCC Rule Part(s): ISED Specification: Test Procedure(s): Certification ET-WV525 Indoor Access Point 908.4 – 923.1MHz Low Power Transceiver, Rx Verified (DXT) Part 15 Subpart C (15.249) RSS-210 Issue 9 ANSI C63.10-2013

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Indoor Access Point FCC ID: A3LETWV525**. The test data contained in this report pertains only to the emissions due to the EUT's Zwave transmitter.

Test Device Serial No.: 5HX3S, AWX3S, BNX3S, 6PX3S, 5HX3S

2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n/ac WLAN, 802.11a/n/ac UNII, Bluetooth (LE), Zigbee, Zwave

Frequency (MHz)	Data Rate (kbps)
908.4	9.6, 40
916	100
919.8	100
920.9	100
921.4	9.6, 40
921.7	100
923.1	100

Table 2-1. Frequency/ Channel Operations

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2 for antenna port conducted emissions test setups.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) was used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, $50\Omega/50\mu$ H Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.7. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section."

- The antennas of the EUT are permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

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5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	WL25-1	Conducted Cable Set (25GHz)	6/14/2017	Annual	6/14/2018	WL25-1
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
Keysight Technologies	N9038A	MXE EMI Receiver (3Hz-44GHz)	4/30/2018	Annual	4/30/2019	MY5640070
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	1/23/2018	Annual	1/23/2019	NMLC-2
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Rohde & Schwarz	TS-PR8	Preamplifer (30MHz-8GHz)	10/19/2017	Annual	10/19/2018	102324
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	1/22/2018	Annual	1/22/2019	N/A
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	8/14/2017	Biennial	8/14/2019	310233
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol Sciences	JB6	JB6 Antenna	9/27/2016	Biennial	9/27/2018	A082816

 Table 6-1. Annual Test Equipment Calibration Schedule

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TEST RESULTS 7.0

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LETWV525
IC:	<u>649E-ETWV525</u>
Method/System:	Low Power Transceiver, Rx Verified (DXT)
Number of Channels:	<u>7</u>

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	RSS-Gen [6.6]	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1046	RSS-Gen[6.12]	Transmitter Output Power	< 1 Watt	CONDOCTED	PASS	Section 7.3
15.249(a)(e)	RSS-210 [B.10]	Fundamental Field Strength Level	< 50 mV/m		PASS	Section 7.4
15.205, 15.209, 15.249(d)(e)	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)< 15.209 limits or 50dB below the level of the fundamental (RSS-Gen [8.9])RADIARW		PASS	Sections 7.5, 7.6	
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen [8.8])	LINE CONDUCTED	PASS	Section 7.7

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 0.2.8.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.

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7.2 Occupied Bandwidth Measurement §2.1049; RSS-Gen (6.6)

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The spectrum analyzers' "occupied bandwidth" measurement function was used to record the occupied bandwidth.

Frequency [MHz]	DataRate [kbps]	Measured Bandwidth [kHz]
908.4	9.6	88.1
908.4	40	87.6
916	100	111.9
919.8	100	109.1
920.9	100	108.9
921.4	9.6	87.4
921.4	40	87.2
921.7	100	110.9
923.1	100	109.6

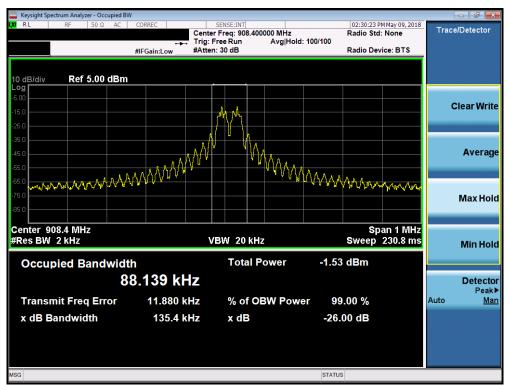
Table 7-2. Occupied Bandwidth Measurement



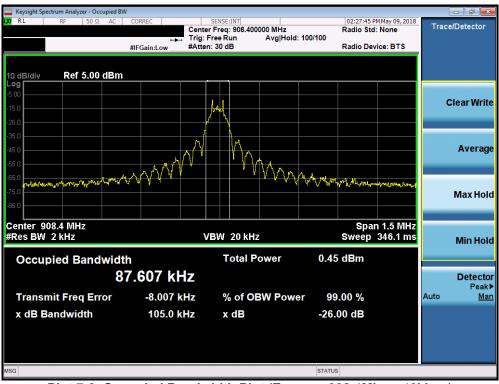
Figure 7-1. Test Instrument & Measurement Setup

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Plot 7-1. Occupied Bandwidth Plot (Zwave – 908.4Mhz – 9.6kbps)



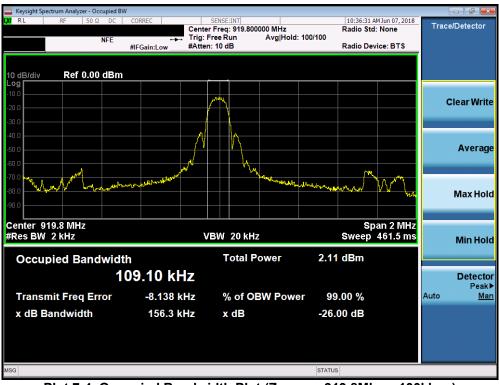
Plot 7-2. Occupied Bandwidth Plot (Zwave - 908.4Mhz - 40kbps)

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Plot 7-3. Occupied Bandwidth Plot (Zwave - 916Mhz - 100kbps)



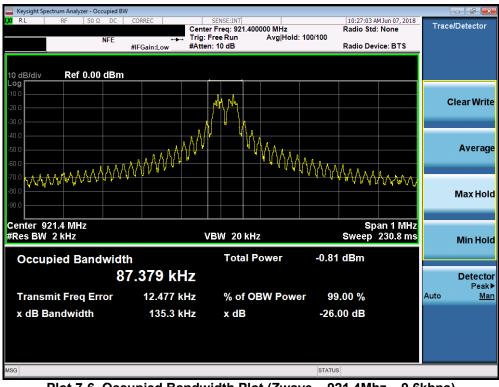


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Keysight Spectrum Analyzer - Occupied BV	1				
LXV RL RF 50Ω DC	CORREC	SENSE:INT er Freq: 920.900000 MHz	10:41:38 / Radio Sto	AM Jun 07, 2018	Trace/Detector
NFE	🛶 Trig:	Free Run Avg Hold	: 100/100		
	#IFGain:Low #Atte	en: 10 dB	Radio De	vice: BTS	
10 dB/div Ref 0.00 dBm					
-10.0					
-20.0	^{لس} م	Armenny			Clear Write
-30.0					
-40.0					
-50.0	_ ۷ تمر	¥ \			Average
-60.0		· \			
-70.0 Mmgml	Normarksing	* Multhow	unnorth		
-70.0 white man and man and a second			July Martine	the work of the second second	Max Hold
-90.0					Max Hold
Center 920.9 MHz #Res BW 2 kHz	1	VBW 20 kHz		an 1 MHz	
			Sweep	230.8 ms	Min Hold
Occupied Bandwidt	h	Total Power	1.59 dBm		
	08.86 kHz				Detecto
	00.00 KHZ				Peak
Transmit Freq Error	-7.723 kHz	% of OBW Powe	er 99.00 %		Auto <u>Ma</u>
x dB Bandwidth	153.5 kHz	x dB	-26.00 dB		
ISG			STATUS		

Plot 7-5. Occupied Bandwidth Plot (Zwave – 920.9Mhz – 100kbps)



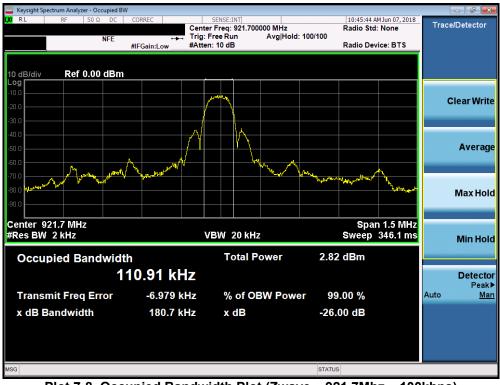


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Plot 7-7. Occupied Bandwidth Plot (Zwave – 921.4Mhz – 40kbps)





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Keysight Spectrum Analyzer - Occupied BW				d
XIRL RF 50Ω DC	CORREC	SENSE:INT er Freq: 923.100000 MHz	10:48:04 AM Jun 07, 2018 Radio Std: None	Trace/Detector
NFE	· · · · ·	Free Run Avg Hold: 10 n: 10 dB	00/100 Radio Device: BTS	
	#IFGain:Low #Atte	n: 10 dB	Radio Device: B I S	-
10 dB/div Ref 0.00 dBm				
-10.0		- Andrean		
-20.0	M			Clear Write
-30.0				
-40.0				
-50.0	/ ¥	¥_1		Average
-60.0	L He Per Prod	- John Marine		
-70.0 Mahuna have may	Installant and		wayn war fredh will acount of wing and a wing	
-80.0				Max Hold
-90.0				
Center 923.1 MHz			Span 1 MH:	
#Res BW 2 kHz	١	/BW 20 kHz	Sweep 230.8 m	
				IVIIII HOID
Occupied Bandwidth		Total Power	2.18 dBm	
10	9.57 kHz			Detector
Transmit Freq Error	-7.788 kHz	% of OBW Power	99.00 %	Peak≱ Auto Man
				Auto <u>IMar</u>
x dB Bandwidth	131.4 kHz	x dB	-26.00 dB	
ISG			STATUS	

Plot 7-9. Occupied Bandwidth Plot (Zwave – 923.1Mhz – 100kbps)

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7.3 Output Power Meausurement §2.1046; RSS-Gen[6.12]

Test Overview and Limits

The transmitter antenna terminal of the EUT is connected to the input of a spectrum analyzer. Measurements are made while the EUT is operating at maximum power and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

Test Procedure Used

ANSI C63.10-2013

Test Settings

- 1. RBW = 1MHz
- 2. VBW = 3MHz
- 3. Span ≥ 3 x RBW
- 4. Sweep = auto couple
- 5. Detector = Peak
- 6. Trace mode = max hold
- 7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

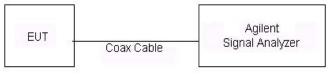


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None

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Frequency	Data Rate	_	nducted wer	
[MHz]	[Mbps]	[dBm]	[mW]	
908.4	9.6	-6.22	0.239	
908.4	40	-6.21	0.239	
916	100	-7.60	0.174	
919.8	100	-5.23	0.300	
920.9	100	-7.43	0.181	
921.4	9.6	-6.72	0.213	
921.4	40	-4.94	0.321	
921.7	100	-6.09	0.246	
923.1	100	-5.37	0.290	

 Table 7-3. Conducted Output Power Measurements (Zwave)

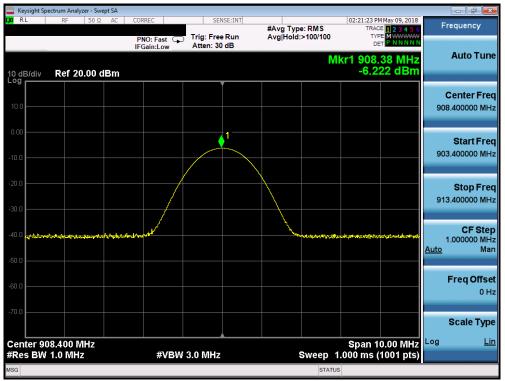


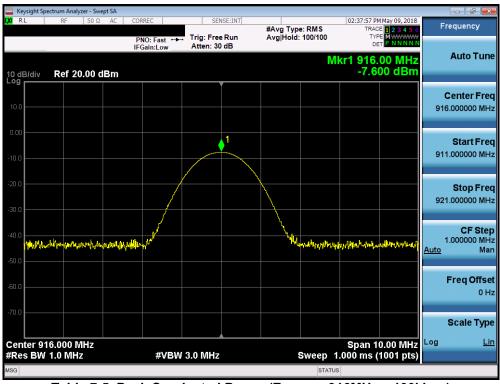
Table 7-4. Peak Conducted Power (Zwave – 908.4MHz – 9.6kbps)

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Keysight Spectrum Ar							- # #
RL RF	50 Ω AC	PNO: Fast	SENSE: Trig: Free Ru	#Avg Ty	pe: RMS d:>100/100	02:25:28 PM May 09, 2018 TRACE 1 2 3 4 5 6 TYPE M	Frequency
		IFGain:Low	Atten: 30 dE			ьет <u>Р N N N N</u> kr1 908.39 MHz	
10 dB/div Ref	20.00 dBm					-6.213 dBm	
10.0			Ĺ				Center Fre 908.400000 MH
0.00							
							Start Fre 903.400000 MH
-10.0							500.400000 mil
-20.0							Stop Fre 913.400000 MH
-30.0							
-40.0 allelyman of m	ptransfer domestication	Jack formula and a start		¥	www.lplan.	when the second states and the second s	CF Ste 1.000000 MH Auto Ma
-50.0							
-60.0							Freq Offs 0 H
70.0							Coole Tra
						0	Scale Typ
Center 908.400 #Res BW 1.0 M		#VBW	/ 3.0 MHz		Sweep 1	Span 10.00 MHz .000 ms (1001 pts)	
ISG					STATUS	3	

Plot 7-10. Peak Conducted Power (Zwave - 908.4MHz - 40kbps)



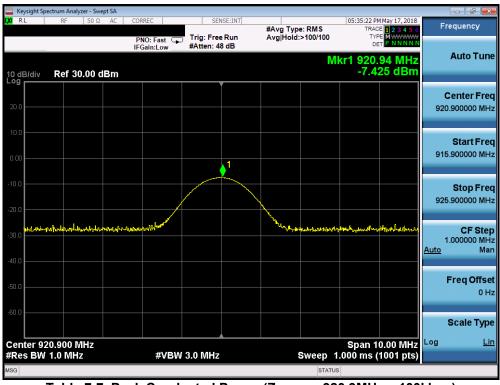


FCC ID: A3LETWV525		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager					
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	pectrum Analyze	r - Swept SA									
LXU RL	RF	50 Ω AC	CORREC		NSE:INT	#Avg Typ Avg Hold		TRAC	4 May 17, 2018 E 1 2 3 4 5 6 PE M M M M M M T P N N N N N	F	requency
10 dB/div	Ref 30.0	00 dBm	IFGain:Low	#Atten: 4	8 dB		М	kr1 919.			Auto Tune
20.0											Center Fred 9.800000 MHz
0.00					● ¹					914	Start Fred 4.800000 MH:
-10.0										924	Stop Fred 4.800000 MH:
-30.0	edmannerververver	-ll-lvhplathi	in the second second second			T. Annowald	hannan Nava	huhunnen	₩₽₩₽ ₩₽₩₩₽₩₽₩₽	Auto	CF Step 1.000000 MH: Mar
-50.0											Freq Offse 0 H
-60.0											Scale Type
	19.800 MH / 1.0 MHz	IZ	#VBV	V 3.0 MHz			Sweep 1	Span 1 .000 ms (0.00 MHz 1001 pts)	Log	Lir
MSG							STATUS				

Table 7-6. Peak Conducted Power (Zwave – 919.8MHz – 100kbps)



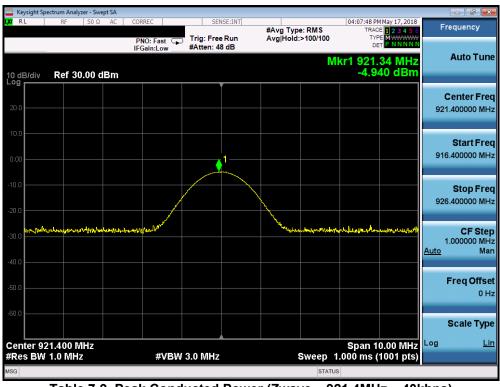


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	Spectrum Analyz	er - Swept SA									
L <mark>XI</mark> RL	RF	50 Ω AC			NSE:INT	#Avg Typ Avg Hold		TRAC	May 17, 2018	Fr	equency
10 dB/div	Ref 30	.00 dBm	PNO: Fas IFGain:Lo			, traji lolu		kr1 921.	40 MHz 22 dBm		Auto Tune
20.0											Center Freq 1.400000 MHz
0.00					1					916	Start Fred 5.400000 MH;
-10.0						× ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~				926	Stop Fred 5.400000 MH:
-30.0	untasyapesti	had the second	What have a start of the second			And a start	aleren ander	munulun Minu	Ult ^a WMMHH1604	Auto ¹	CF Step 1.000000 MH Mar
-50.0											Freq Offse 0 H
-60.0											Scale Type
	021.400 M V 1.0 MHz		_#\	/BW 3.0 MHz			Sween_1	Span 1 1.000 ms (0.00 191112	Log	<u>Lir</u>
#Res DV			#\	70VV 3.0 WIN2			Sweep		noor pis)		

Table 7-8. Peak Conducted Power (Zwave – 921.4MHz – 9.6kbps)



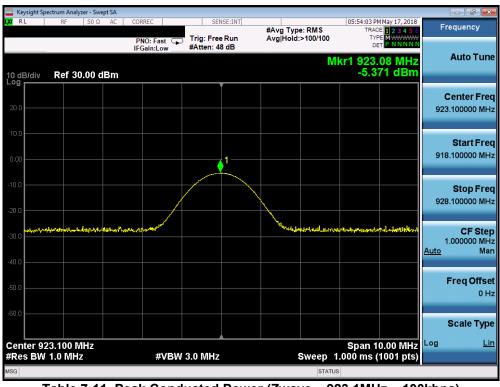


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	pectrum Analyze	r - Swept SA									
LXI RL	RF	50 Ω AC	CORREC		Run	#Avg Typ Avg Hold		TRACE	May 17, 2018	Fi	equency
10 dB/div	Ref 30.	00 dBm	IFGain:Low	#Atten: 48	3 dB		М	kr1 921.			Auto Tune
20.0											Center Fred
0.00					1					916	Start Free
-10.0										926	Stop Free 5.700000 MH
-30.0	Jacod Jacob Street St	مرين ويوني مرين ميرون مرين مرين مرين مرين مرين مرين مرين مرين	Mr. Mr. M. J. Marker and Start and Star			and the second of the second o	a <mark>h</mark> undan dan dan dan dan dari dari dari dari dari dari dari dari	mbuchMarilutur	-lige-mb-dritter	Auto	CF Stej 1.000000 MH Ma
-50.0											Freq Offse 0 H
											Scale Type
	21.700 MH	IZ	#VBW	3.0 MHz			Sweep 1	Span 10 /) 000 ms.).00 MHz 1001 pts)	Log	Lir
MSG							STATUS	3			

Table 7-10. Peak Conducted Power (Zwave – 921.7MHz – 100kbps)





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7.4 Fundamental Field Strength Level Measurement §15.249(a)(e); RSS-210 (B.10)

Measurement is made while the EUT is operating in non-hopping transmission mode. The field strengths shown below were measured using a spectrum analyzer. Peak field strength measurements are performed in the analyzers' swept spectrum mode using a peak detector with RBW = 1MHz and VBW = 3MHz.

The maximum permissible peak field strength level is 50mV/m (93.98dB μ V/m).

Frequency [MHz]	Data Rate [kbps]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Corrected Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
908.40	9.6	Peak	Н	169	36	-47.53	31.32	90.79	90.79	93.98	-3.19
908.40	40	Peak	Н	169	36	-47.41	31.32	90.91	90.91	93.98	-3.07
916.00	100	Peak	н	174	15	-48.38	31.38	90.00	90.00	93.98	-3.98
919.80	100	Peak	Н	178	140	-47.91	31.47	90.56	90.56	93.98	-3.42
920.90	100	Peak	н	174	141	-47.70	31.49	90.79	90.79	93.98	-3.19
921.40	9.6	Peak	н	174	141	-47.93	31.50	90.57	90.57	93.98	-3.41
921.40	40	Peak	н	174	141	-47.84	31.50	90.66	90.66	93.98	-3.32
921.70	100	Peak	Н	178	142	-47.58	31.50	90.92	90.92	93.98	-3.06
923.10	100	Peak	Н	178	133	-47.82	31.53	90.71	90.71	93.98	-3.27

Table 7-12. Field Strength Measurements

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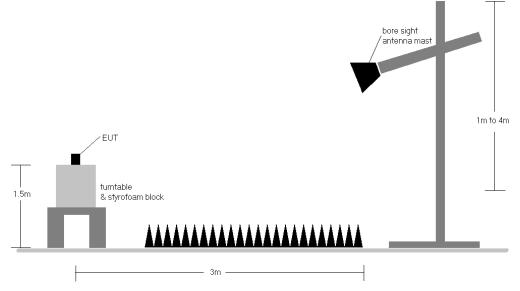


Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-13. Radiated Limits

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.





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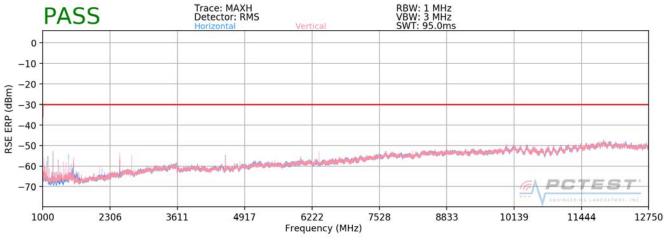
- ο Avg. Field Strength Level [dBµV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m] + Duty Cycle Correction [dB]
- ο Pk. Field Strength Level [dBμV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- o AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- ο Margin [dB] = Field Strength Level [dBμV/m] Limit [dBμV/m]

Test Notes

- 1. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. There were no non-harmonic emissions detected whose levels were within 20dB of the applicable limits so only harmonic emissions data is shown in this section.
- 2. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-13. Per 15.249(d) and RSS-210 (B.10), the radiated emissions limits from 15.209 and RSS-Gen Section 8.10 were used since they were less than the limit of 50dB of attenuation from the measured fundamental field strength level.
- 3. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz.
- 4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- 5. This unit was tested while powered by an AC power source.
- 6. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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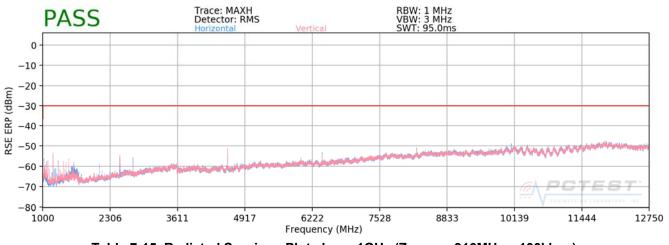


Table 7-15. Radiated Spurious Plot above 1GHz (Zwave – 916MHz – 100kbps)

FCC ID: A3LETWV525		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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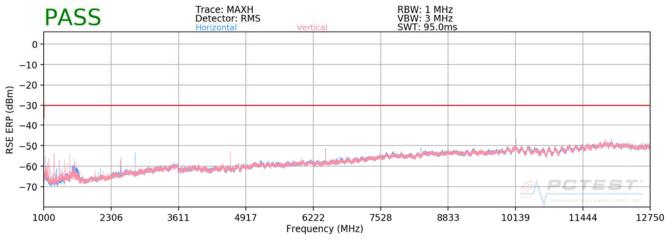


Table 7-16. Radiated Spurious Plot above 1GHz (Zwave – 923.1MHz – 100kbps)

FCC ID: A3LETWV525		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Corrected Field Strength [dBuV/m]	Limit [dBµV/m]	Margin [dB]
1816.80	Peak	V	-	-	-61.92	-4.61	40.47	40.47	53.98	-13.51
2725.20	Peak	V	133	169	-56.95	-1.90	48.15	48.15	53.98	-5.83
3633.60	Peak	V	392	16	-62.98	2.60	46.62	46.62	53.98	-7.36
4542.00	Avg	V	208	211	-63.23	2.12	45.89	45.89	53.98	-8.08
4542.00	Peak	V	208	211	-53.91	2.12	55.21	55.21	73.98	-18.76
5450.40	Peak	V	-	-	-66.28	5.55	46.27	46.27	53.98	-7.71
6358.80	Peak	V	147	333	-63.31	5.60	49.29	49.29	53.98	-4.69
7267.20	Peak	V	-	-	-66.45	8.59	49.14	49.14	53.98	-4.84
8175.60	Avg	V	121	44	-74.64	9.72	42.08	42.08	53.98	-11.90
8175.60	Peak	V	121	44	-65.30	9.72	51.42	51.42	73.98	-22.56
9084.00	Avg	V	-	-	-78.55	11.69	40.14	40.14	53.98	-13.84
9084.00	Peak	V	-	-	-67.32	11.69	51.37	51.37	73.98	-22.61

Table 7-17. Radiated Measurements

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Mode:	Zwave
Worst Case Data Rate:	100kbps
Measurement Distance:	3 Meters
Operating Frequency:	916MHz
Operating Frequency:	916MHz

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Corrected Field Strength [dBuV/m]	Limit [dBµV/m]	Margin [dB]
1832.00	Peak	V	-	-	-52.91	-4.77	49.32	49.32	53.98	-4.66
2748.00	Peak	V	182	286	-60.23	-2.12	44.65	44.65	53.98	-9.32
3664.00	Peak	V	156	197	-63.54	1.64	45.10	45.10	53.98	-8.88
4580.00	Avg	V	131	229	-61.42	3.38	48.96	48.96	53.98	-5.02
4580.00	Peak	V	131	229	-57.77	3.38	52.61	52.61	73.98	-21.36
5496.00	Peak	V	219	183	-64.55	5.14	47.59	47.59	53.98	-6.38
6412.00	Peak	V	241	348	-63.04	6.25	50.21	50.21	53.98	-3.77
7328.00	Peak	V	-	-	-67.15	9.25	49.10	49.10	53.98	-4.88
8244.00	Avg	V	382	103	-72.19	11.10	45.91	45.91	53.98	-8.07
8244.00	Peak	V	382	103	-64.41	11.10	53.69	53.69	73.98	-20.29
9160.00	Avg	V	-	-	-79.13	11.85	39.72	39.72	53.98	-14.26
9160.00	Peak	V	-	-	-67.34	11.85	51.51	51.51	73.98	-22.47

Table 7-18. Radiated Measurements

FCC ID: A3LETWV525		MEASUREMENT REPORT (CERTIFICATION)	AMSUNG	Approved by: Quality Manager
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Zwave
100kbps
3 Meters
923.1MHz

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Corrected Field Strength [dBuV/m]	Limit [dBµV/m]	Margin [dB]
1846.20	Peak	V	165	156	-63.53	-4.70	38.77	38.77	53.98	-15.21
2769.30	Peak	V	156	225	-55.32	-2.86	48.82	48.82	53.98	-5.16
3692.40	Peak	V	297	331	-64.32	2.05	44.73	44.73	53.98	-9.25
4615.50	Peak	V	144	248	-60.95	2.77	48.82	48.82	53.98	-5.16
5538.60	Peak	V	-	-	-66.52	5.33	45.81	45.81	53.98	-8.17
6461.70	Avg	V	362	181	-66.67	6.64	46.97	46.97	53.98	-7.01
6461.70	Peak	V	362	181	-61.19	6.64	52.45	52.45	73.98	-21.53
7384.80	Peak	V	-	-	-66.83	9.20	49.37	49.37	53.98	-4.61
8307.90	Avg	V	370	194	-70.11	10.26	47.15	47.15	53.98	-6.83
8307.90	Peak	V	370	194	-64.89	10.26	52.37	52.37	73.98	-21.61
9231.00	Avg	V	-	-	-78.94	11.94	40.00	40.00	53.98	-13.98
9231.00	Peak	V	-	-	-66.27	11.94	52.67	52.67	73.98	-21.31

Table 7-19. Radiated Measurements

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7.6 Radiated Spurious Emissions Measurements – Below 1GHz §15.209; RSS-210 (B.10), RSS-Gen (8.9)

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-20 per Section 15.209.

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-20. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Quasi-Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 120kHz (for emissions from 30MHz 1GHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

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Test Setup

The EUT and measurement equipment were set up as shown in the diagrams below.

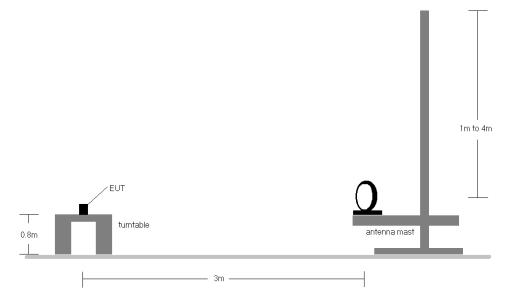
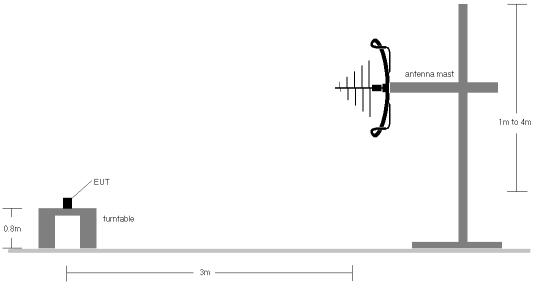
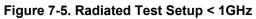


Figure 7-4. Radiated Test Setup < 30Mhz





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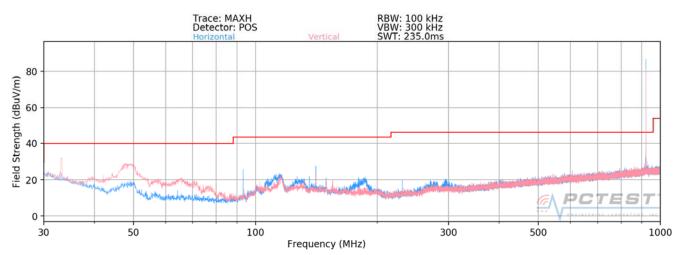


- 1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-20.
- 2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
- 3. This unit was tested while powered by an AC power source.
- 4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 5. Emissions were measured at a 3 meter test distance.
- 6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
- 7. No spurious emissions were detected within 20dB of the limit below 30MHz.
- 8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
- The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

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Radiated Spurious Emissions Measurements (Below 1GHz) §15.209; RSS-210 (B.10), RSS-Gen (8.9)





Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Corrected Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
49.34	Quasi-Peak	V	138	18	-54.93	-22.36	29.71	29.71	40.00	-10.29

Table 7-21. Radiated Spurious Emissions below 1GHz

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7.7 Line Conducted Measurement Data §15.207; RSS-Gen (8.8)

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below, per §15.207 and RSS-Gen (8.8).

Frequency of emission	Conducted	Limit (dBµV)
(MHz)	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

Table 7-22. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

Average Field Strength Measurements

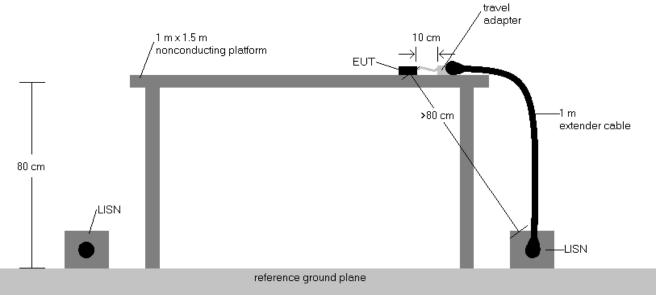
- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

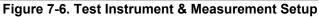
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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.





Test Notes

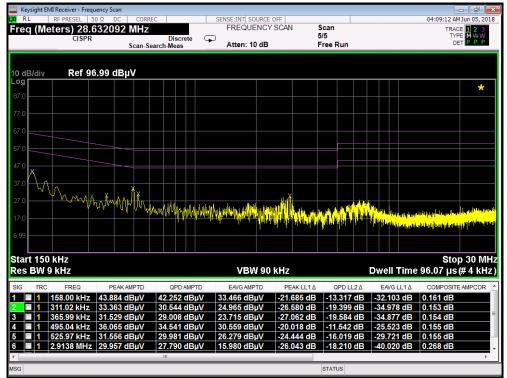
- All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
- 2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207 and RSS-Gen (8.8).
- 3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- 4. QP/AV Level (dB μ V) = QP/AV Analyzer/Receiver Level (dB μ V) + Corr. (dB)
- 5. Margin (dB) = QP/AV Limit (dB μ V) QP/AV Level (dB μ V)
- 6. Traces shown in plot are made using a peak detector.
- 7. Deviations to the Specifications: None.

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rt 150 kH s BW 9 kH TRC 1 158 1 214 1 261	HZ FREQ .69 kHz .00 kHz .99 kHz	44.3 34.0 34.9	EAK AM 34 dE 16 dE 00 dE	РТD 3µV 3µV	4	2.02 0.82 1.65	24 d 27 d 57 d	ΒμV ΒμV ΒμV	34 23 24	EAVG 1.116 3.658 1.820	AMPT dBµ dBµ dBµ	90 k D V V	Hz PE/ -21.1 -29.0	WK LL11 98 dE 33 dE	3 -11 3 -22 3 -19	QPD L 3.508 2.222 9.711	dB dB dB	Dv -3 -3 -3	/ell EAVG 1.41 9.39 6.54	Tim 16 dB 10 dB 18 dB	e 96 0.' 0.'	Si .07 :0MP03 161 dl 152 dl 153 dl	top : us (# site Al B B B B	30 M 4 kH
rt 150 kH s BW 9 kH rcc 1 158 1 214 1 261 1 385	IZ FREQ .69 kHz .00 kHz .99 kHz .98 kHz	44.3 34.0 34.9 32.8	EAK AM 34 dE 16 dE 00 dE 05 dE	РТD 3µV 3µV 3µV 3µV	4	2.02 0.82 1.65 7.23	24 d 27 d 57 d 51 d	ΒμV ΒμV ΒμV ΒμV	34 23 24 19	EAVG 1.116 3.658 1.820 9.692	AMPT dBµ dBµ dBµ dBµ	90 k V V V V	Hz -21.1 -29.0 -26.4 -25.3	98 dE 33 dE 68 dE	3 -11 3 -21 3 -11 3 -21 3 -21	QPD L 3.508 2.222 9.711 0.919	dB dB dB dB	Dw -3 -3 -3 -3 -3	/ell EAVG 1.41 9.39 6.54 8.45	Tim 16 dB 10 dB 18 dB 57 dB	e 96 0.1 0.1 0.1	Si .07 :0MP0: 161 dl 152 dl 153 dl 153 dl 154 dl	top 3 JS (# BITE AI B B B B B	30 M 4 kH
rt 150 kH 5 BW 9 kH 1 158. 1 214. 1 261. 1 385. 1 497.	IZ FREQ .69 kHz .00 kHz .99 kHz .98 kHz .98 kHz	44.3 34.0 34.9 32.8 38.8	EAK AM 34 dE 16 dE 00 dE 05 dE 90 dE	РТD ЗµV ЗµV ЗµV ЗµV ЗµV	4 3 3 2 3	2.02 0.82 1.65 7.23 7.70	24 d 27 d 57 d 51 d 04 d	ΒμV ΒμV ΒμV ΒμV ΒμV	34 23 24 19 38	EAVG 1.116 3.658 1.820 9.692 5.405	AMPT dBµ dBµ dBµ dBµ dBµ	90 k ∨ ∨ ∨ ∨ V	Hz -21.1 -29.0 -26.4 -25.3	45 dE 445 dE	3 -11 3 -21 3 -19 3 -21 3 -21 3 -8	QPD L 3.508 2.222 9.711 0.919 330 (dB dB dB dB dB	Dw -7 -7 -7 -7 -7 -7 -7 -7 -7	7ell EAVG 1.41 9.39 6.54 8.45 0.62	Tim 16 dB 10 dB 18 dB 17 dB 28 dB	e 96 0.1 0.1 0.1 0.1	Si .07 :00000 161 dl 152 dl 153 dl 154 dl 155 dl	top : IS (# B B B B B B B B	30 M 4 kH
rt 150 kH 5 BW 9 kH 1 158. 1 214. 1 261. 1 385. 1 497.	IZ FREQ .69 kHz .00 kHz .99 kHz .98 kHz	44.3 34.0 34.9 32.8 38.8	EAK AM 34 dE 16 dE 00 dE 05 dE 90 dE	РТD ЗµV ЗµV ЗµV ЗµV ЗµV	4 3 3 2 3 3 3	2.02 0.82 1.65 7.23 7.70	24 d 27 d 57 d 51 d 04 d	ΒμV ΒμV ΒμV ΒμV	34 23 24 19 38	EAVG 1.116 3.658 1.820 9.692	AMPT dBµ dBµ dBµ dBµ dBµ	90 k ∨ ∨ ∨ ∨ V	Hz -21.1 -29.0 -26.4 -25.3	98 dE 33 dE 68 dE	3 -11 3 -21 3 -19 3 -21 3 -21 3 -8	QPD L 3.508 2.222 9.711 0.919	dB dB dB dB dB	Dw -7 -7 -7 -7 -7 -7 -7 -7 -7	7ell EAVG 1.41 9.39 6.54 8.45 0.62	Tim 16 dB 10 dB 18 dB 57 dB	e 96 0.1 0.1 0.1 0.1	Si .07 :0MP0: 161 dl 152 dl 153 dl 153 dl 154 dl	top : IS (# B B B B B B B B	30 M 4 kH

Plot 7-12. Line-Conducted Test Plot (L1)



Plot 7-13. Line-Conducted Test Plot (N)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Indoor Access Point FCC ID: A3LETWV525** is in compliance with Part 15 Subpart C (15.249) of the FCC Rules and RSS-210 of the Innovation, Science and Economic Development Canada Rules.

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