

	    CERTIFICATE 2518.08 MS ISO/IEC 17025 TESTING SAMM NO. 0825						
MOTOROLA PENANG ADV. COMM. LABORATORY Motorola Solutions Malaysia Sdn Bhd, Plot 2A, Medan Bayan Lepas, Mukim 12 S.W.D, 11900 Bayan Lepas, Penang, Malaysia.	FCC / ISED TEST REPORT Report Revision : Rev.B						
Date/s Tested : 10-August-2020 - 27-August-2020 Manufacturer/Location : Motorola Solutions Malaysia Sdn Bhd Manufacturer Address : Plot 2A, Medan Bayan lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia Requestor : SIEW KHENG TAN Product Type : Portable Product Version (PMN) : P2B Model Number (HVIN) : AAH90ZDU9RH1AN Frequency Band : Refer to section 1.4 Applicant Name : Motorola Solutions Inc Applicant Address : 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322. FCC Registrations : 461337 ISED Registrations : MY0001 Firmware Version (FVIN) : I02.21.01.0029 (BP), D00.00.65 (AP) The equipment was tested accordance to the requirement listed below: (LTE Band 17) FCC 47 CFR Part 2 / 27 ISED RSS GEN / 130 PASS							
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REVISION HISTORY

Revision History	Description	Date	Originator
Rev A	Initial Report	8-September-2020	Lim Khay Kwang
Rev B	Update 1.3. General Information Table	11-November-2020	Lim Khay Kwang

1.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Results	Remarks	Serial Number Tested
2.1046	RSS-Gen 6.12 RSS-130 4.1	Conducted RF Output Power	Pass	Meet the requirement of limit	734TWP0386
-	RSS 130 4.4	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit	734TWP0386
2.1046	RSS-Gen 6.7	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit	734TWP0386
2.1055 27.54	RSS-130 4.3	Frequency Stability	Pass	Meet the requirement of limit	734TWP0386
2.1051 27.53(g)	RSS-Gen 6.13 RSS-130 4.6	Band Edge Conducted Spurious Emission	Pass	Meet the requirement of limit	734TWP0386
2.1051 27.53(g)	RSS-Gen 6.13 RSS-130 4.6	Conducted Spurious Emissions	Pass	Meet the requirement of limit	734TWP0386
2.1053 27.53 (g)	RSS-130 4.6	Radiated Spurious Emission	Pass	Meet the requirement of limit	734TWP0308
2.1049 27.50(c)(9)(10)	RSS-130 4.4	Effective Radiated Power (ERP)	Pass	Meet the requirement of limit	734TWP0386

1.1. Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=1.96) (±dB)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	5.01
	200MHz ~ 1000MHz	5.01
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.01
	18GHz ~ 25GHz	5.01

1.2. Equipment List

Description	Model	Serial Number	Calibration Date	Calibration Due Date
Broadband ATE 1 (RF Conducted Tests); Test Software Version: CMWRun v1.8.9				
SIGNAL ANALYZER	FSV40	101431	16-Jul-19	16-Jul-21
CHAMBER	SH-641	92003150	25-Sep-19	25-Sep-20
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	154550	23-Jul-19	23-Jul-21
POWER SUPPLY	6652A	3117A00162	16-Mar-20	16-Mar-21
Radiated Spurious Emission (EMC Chamber 1); Test Software Version: EMC_FCC_RE_v1.6.2				

DRG HORN FREQ.	SAS-571	720	21-Mar-19	21-Mar-21
DRG HORN FREQ.	SAS-571	1143	14-Feb-19	14-Feb-21
POWER SUPPLY	6032A	2615A01178	21-MAY-20	21-MAY-21
SIGNAL GENERATOR	SMB 100A	181117	8-Nov-18	8-Nov-21
EMI TEST RECEIVER	ESW44	101750	24-Jul-19	24-Sep-20
EMI TEST RECEIVER	ESIB26	100017	19-Jul-19	19-Sep-20
5m Semi-anechoic Chamber	S800-HX	J2308	Not Required	Not Required
BILOG ANTENNA	CBL6112B	2964	23-Apr-19	23-Apr-21
BILOG ANTENNA	CBL6112B	2950	8-Jul-19	8-Jul-21
DATA LOGGER	SDL500	A.016776	4-Jun-20	4-Jun-21
SYSTEM CONTROLLER	SC104V	050806-1	Not Required	Not Required
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	Not Required	Not Required
ANTENNA POSITIONING TOWER	TLT2	NA	Not Required	Not Required
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170255	27-Jan-20	27-Jan-21
18 - 40GHz PREAMPLIFIER	Miteq Hi Gain Sucoflex	001	Not Required	Not Required
PREAMPLIFIER	PAM-0118	269	24-May-19	24-May-22
LOOP ANTENNA	6502	00208416	5-Sep-19	5-Sep-20

1.3. General Information

General Description of EUT

Product	MACKENZIE UHF NAG MODEL			
Brand	Motorola Solutions			
Test Model	AAH90ZDU9RH1AN			
Power Supply Rating	7.5Vdc			
Mode of operation	LTE Band 17			
Modulation Type	QPSK, 16QAM			
Operating Frequency	LTE Band 17	Channel Bandwidth 5MHz	706.5MHz~713.5MHz	
		Channel Bandwidth 10MHz	709.0MHz~711.0MHz	
Max. ERP Power	LTE Band 17 QPSK	Channel Bandwidth 5MHz	22.313dBm (0.1703W)	
		Channel Bandwidth 10MHz	22.302dBm (0.1699W)	
	LTE Band 17 16QAM	Channel Bandwidth 5MHz	21.387dBm (0.1376W)	
		Channel Bandwidth 10MHz	21.569dBm (0.1435W)	
Emission Designator	LTE Band 17		QPSK	16QAM
		Channel Bandwidth 5MHz	4M48G7D	4M47D7W
		Channel Bandwidth 10MHz	8M93G7D	8M91D7W
Antenna Type	LTE Band 17	LTE LOW BAND MAIN ANTENNA (1.15dBi)		
SW Version	I02.21.01.0029 (BP), D00.00.65 (AP)			
HW Version	P2B			

Note:

1. The EUT contains following accessory devices and data cable.

Item	Brand	Model or P/N	Specification
Li-Ion	MOTOROLA	PMNN4804A	BATTERY PACK,BATTERY PACK,IMPRES GEN2, LIION,IP68, 2820T

Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

The following support units or accessories were used to form a representative test configuration during the tests.

NO.	Product	Brand	Model No.	Serial No.	FCC ID
1	Wideband Radio Communication Tester	R&S	CMW500	154550	NA

NO.	Signal Cable Description of The above Support Units
1	NA

Note:

1. All power cords of the above support units are non-shielded.
2. Item 1 acted as a communication partner to transfer data.

EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 971168 D02 Misc OOB License Digital Systems v02r01

ANSI C63.26

NOTE: All test items have been performed and recorded as per the above standards.

1.4. Channel number and frequency info

Band	Bandwidth supported	Available Channel Number	Test Channel Number			Test Channel Frequency (MHz)		
			Low Channel	Mid Channel	High Channel	Low Channel	Mid Channel	High Channel
LTE Band 17	5 MHz	23755 ~ 23825	23755	23790	23825	706.5	710	713.5
	10 MHz	23780 ~ 23800	23780	23790	23800	709	710	711

1.5. Test Mode Applicability and Tested Channel Detail

LTE Band 17

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Uplink Modulation	Mode
Conducted RF Output Power	23755 ~ 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM	As per table 1.6.2
	23780 ~ 23800	23780, 23790, 23800	10 MHz		
Peak to Average Power Ratio	23755 ~ 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	23780 ~ 23800	23780, 23790, 23800	10 MHz		50 RB / 0 RB Offset
Occupied Bandwidth	23755 ~ 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	23780 ~ 23800	23780, 23790, 23800	10 MHz		50 RB / 0 RB Offset
Frequency Stability	23755 ~ 23825	23755, 23825	5 MHz	QPSK	25 RB / 0 RB Offset
	23780 ~ 23800	23780, 23800	10 MHz		50 RB / 0 RB Offset
Band Edge Conducted Spurious Emission	23755 ~ 23825	23755, 23825	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
	23780 ~ 23800	23780, 23800	10 MHz		1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
Conducted Spurious Emission	23755 ~ 23825	23755, 23790, 23825	5 MHz	QPSK	1 RB / 0 RB Offset
	23780 ~ 23800	23780, 23790, 23800	10 MHz		1 RB / 0 RB Offset
Radiated Spurious Emission	23755 ~ 23825	23755, 23790, 23825	5 MHz	QPSK	1 RB / 0 RB Offset
	23780 ~ 23800	23780, 23790, 23800	10 MHz		1 RB / 0 RB Offset
Effective Radiated Power (ERP)	23755 ~ 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	23780 ~ 23800	23780, 23790, 23800	10 MHz		1 RB / 0 RB Offset

NOTE:

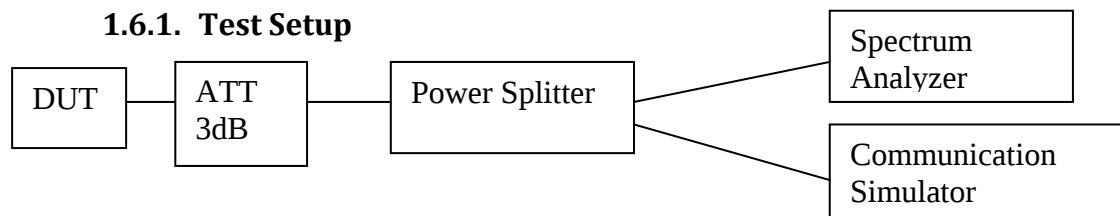
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK mode is higher than 16QAM mode. Therefore, only Conducted Spurious Emission and Radiated Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency band.
3. The Equivalent Isotropically Radiated Power (EIRP) was calculated from Conducted RF Output Power results in QPSK and 16QAM modulation.
4. Peak to Average and Occupied Bandwidth were performed with full Resource Block which is the worst case.
5. Frequency stability was performed with full Resource Block in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Conducted RF Output Power	25°C, 50% RH	7.5V DC	Khay Kwang
Peak-to-Average Power Ratio	25°C, 50% RH	7.5V DC	Khay Kwang
Occupied Bandwidth	25°C, 50% RH	7.5V DC	Khay Kwang
Frequency Stability	25°C, 50% RH	7.5V DC	Khay Kwang
Band Edge Conducted Spurious Emission	25°C, 50% RH	7.5V DC	Khay Kwang
Conducted Spurious Emission	25°C, 50% RH	7.5V DC	Khay Kwang
Radiated Spurious Emission	25°C, 63.7% RH	7.5V DC	Nazrin&Fendi
Equivalent Isotropically Radiated Power (EIRP)	25°C, 63.7% RH	7.5V DC	Khay Kwang

1.6. Conducted RF Output Power

1.6.1. Test Setup



1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. All the measurement was done at low, mid, high channel for each band and different modulation.
5. Record the average power into the test report.

1.6.2. Limits

FCC: Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

ISED: The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.

1.6.3. Conducted RF Output Power – LTE Band 17 (704-716MHz)

Conducted Output Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23755	23790	23825	23755	23790	23825
			706.5MHz	710.0MHz	713.5MHz	706.5MHz	710.0MHz	713.5MHz
Band 17 / 5 MHz	1	0	23.059	23.189	23.313	22.387	22.326	22.373
	1	13	23.075	23.211	23.266	22.361	22.339	22.341
	1	24	23.002	23.082	23.192	22.265	22.23	22.223
	12	0	22.045	22.2	22.338	21.11	21.218	21.417
	12	6	22.048	22.204	22.324	21.091	21.206	21.391
	12	13	21.994	22.163	22.256	21.05	21.165	21.317
	25	0	22.047	22.191	22.297	21.118	21.234	21.352

Conducted Output Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23780	23790	23800	23780	23790	23800
			709.0MHz	710.0MHz	711.0MHz	709.0MHz	710.0MHz	711.0MHz
Band 17 / 10MHz	1	0	23.157	23.302	23.271	22.569	22.305	22.403
	1	25	23.055	23.192	23.154	22.444	22.214	22.321
	1	49	22.944	23.065	23.068	22.355	22.093	22.197
	25	0	22.166	22.229	22.274	21.282	21.341	21.439
	25	13	22.142	22.201	22.254	21.271	21.34	21.369
	25	25	22.086	22.118	22.161	21.217	21.271	21.302
	50	0	22.143	22.19	22.245	21.231	21.301	21.294

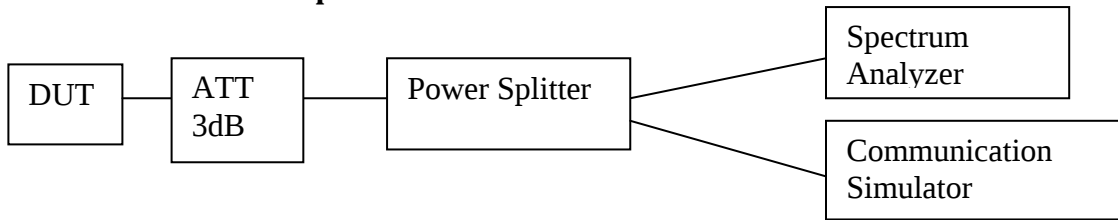
1.6.4 Effective Radiated Power (ERP) - LTE Band 17 (704-716MHz)

Effective Radiated Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23755	23790	23825	23755	23790	23825
			706.5MHz	710.0MHz	713.5MHz	706.5MHz	710.0MHz	713.5MHz
Band 17 / 5MHz	1	0	22.059	22.189	22.313	21.387	21.326	21.373
	1	13	22.075	22.211	22.266	21.361	21.339	21.341
	1	24	22.002	22.082	22.192	21.265	21.23	21.223
	12	0	21.045	21.2	21.338	20.11	20.218	20.417
	12	6	21.048	21.204	21.324	20.091	20.206	20.391
	12	13	20.994	21.163	21.256	20.05	20.165	20.317
	25	0	21.047	21.191	21.297	20.118	20.234	20.352

Effective Radiated Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23780	23790	23800	23780	23790	23800
			709.0MHz	710.0MHz	711.0MHz	709.0MHz	710.0MHz	711.0MHz
Band 17 / 10MHz	1	0	22.157	22.302	22.271	21.569	21.305	21.403
	1	25	22.055	22.192	22.154	21.444	21.214	21.321
	1	49	21.944	22.065	22.068	21.355	21.093	21.197
	25	0	21.166	21.229	21.274	20.282	20.341	20.439
	25	13	21.142	21.201	21.254	20.271	20.34	20.369
	25	25	21.086	21.118	21.161	20.217	20.271	20.302
	50	0	21.143	21.19	21.245	20.231	20.301	20.294

1.7. Peak-to-Average Power Ratio

1.7.1. Test Setup



1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. Set the CCDF (Complementary Cumulative Distribution Function) option in the spectrum analyzer.
5. Spectrum Analyzer setting, RBW = 20MHz.
6. Recorded the maximum PAR level associated with a probability of 0.1% as Peak to Average Ratio.
7. All the measurement was done at low, mid, high channel for each band and different modulation.

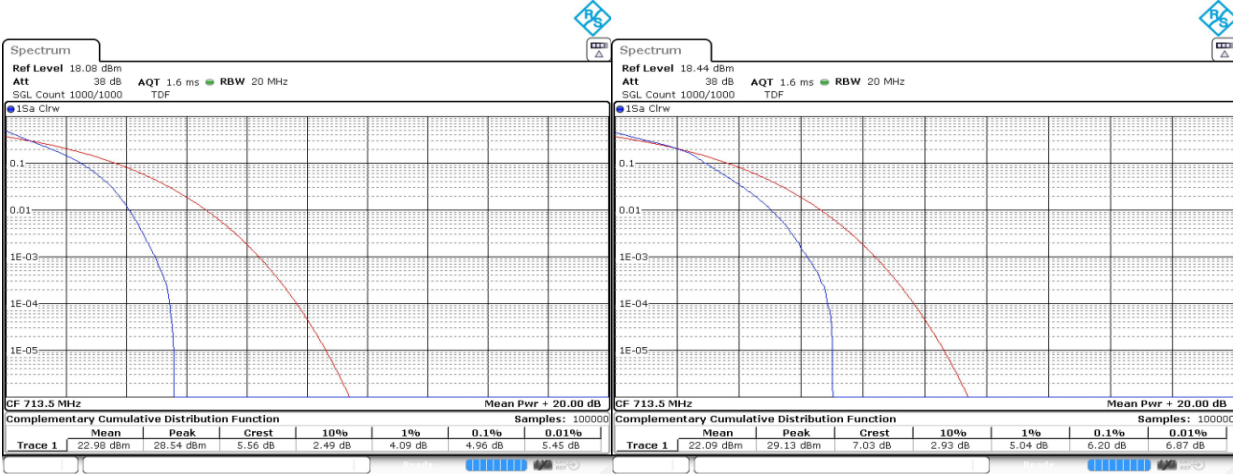
1.7.2. Test Limit

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

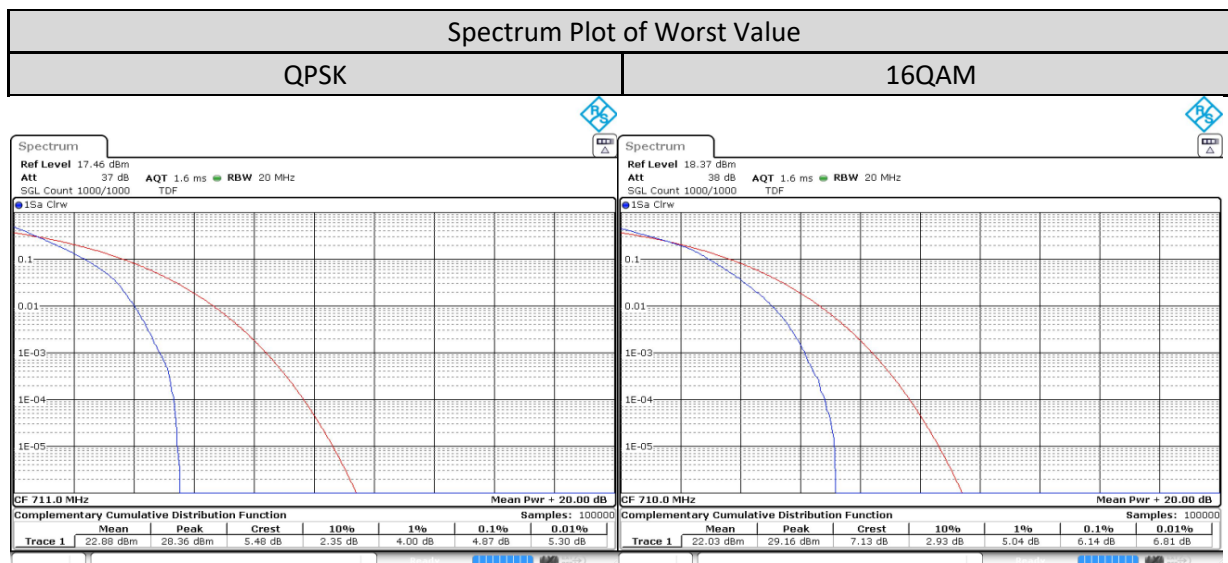
1.7.3. Peak-to-Average Power Ratio – LTE Band 17 (704-716MHz)

LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 17/5MHz/25/0	Low CH 23755	706.5 MHz	4.928	6
	Mid CH 23790	710 MHz	4.899	6.058
	High CH 23825	713.5 MHz	4.957	6.203

Spectrum Plot of Worst Value	
QPSK	16QAM

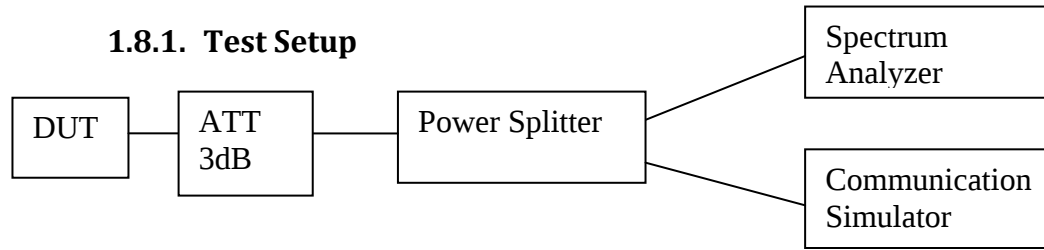


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 17/10MHz/50/0	Low CH 23780	709 MHz	4.812	5.971
	Mid CH 23790	710 MHz	4.812	6.145
	High CH 23800	711 MHz	4.87	6.116



1.8. Occupied Bandwidth

1.8.1. Test Setup



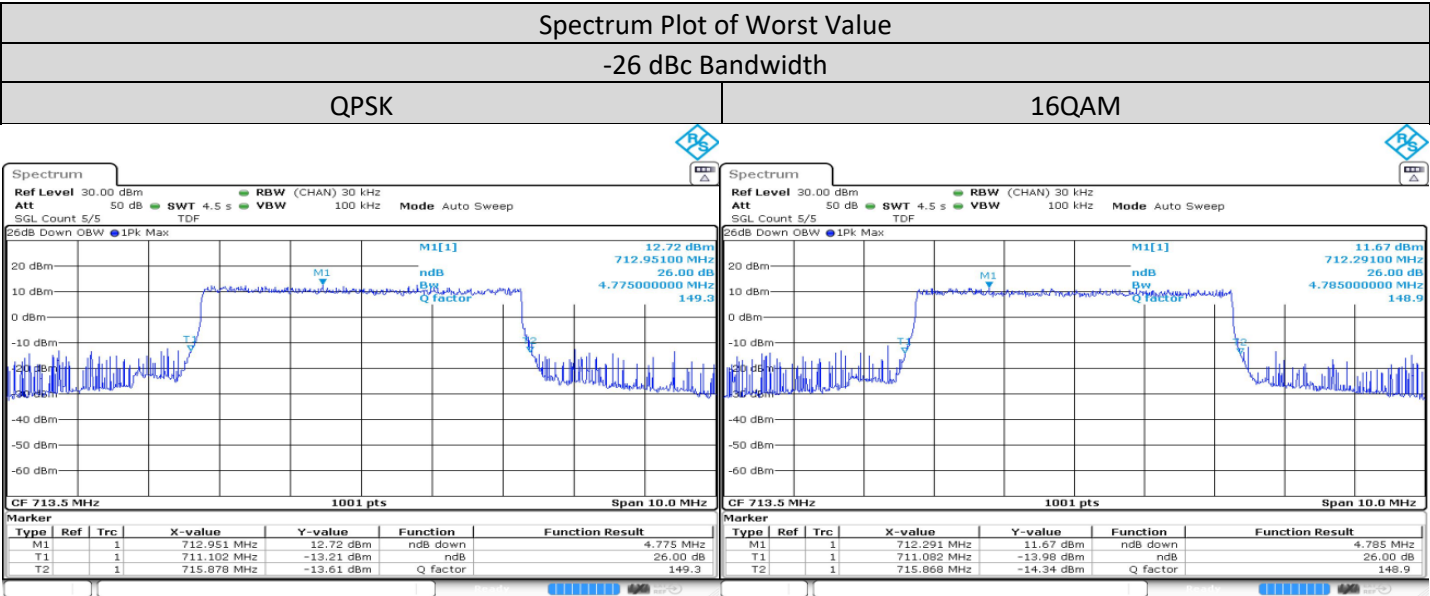
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) For LTE measurement, set DUT to transmit maximum power & full RB size through communication simulator.
- 4) For LTE measurement, set DUT to transmit maximum power through communication simulator.
- 5) Spectrum Analyzer setting, RBW is 1% of OBW and VBW is 3 times of RBW.
- 6) Measure & record -26dBc and 99% occupied bandwidth (BW).
- 7) All the measurement was done at low, mid, high channel for each band and different modulation.

1.8.2. Test Limit

For measurement 99% of occupied bandwidth that is required by FCC 2.1049 and RSS Gen 6.6.

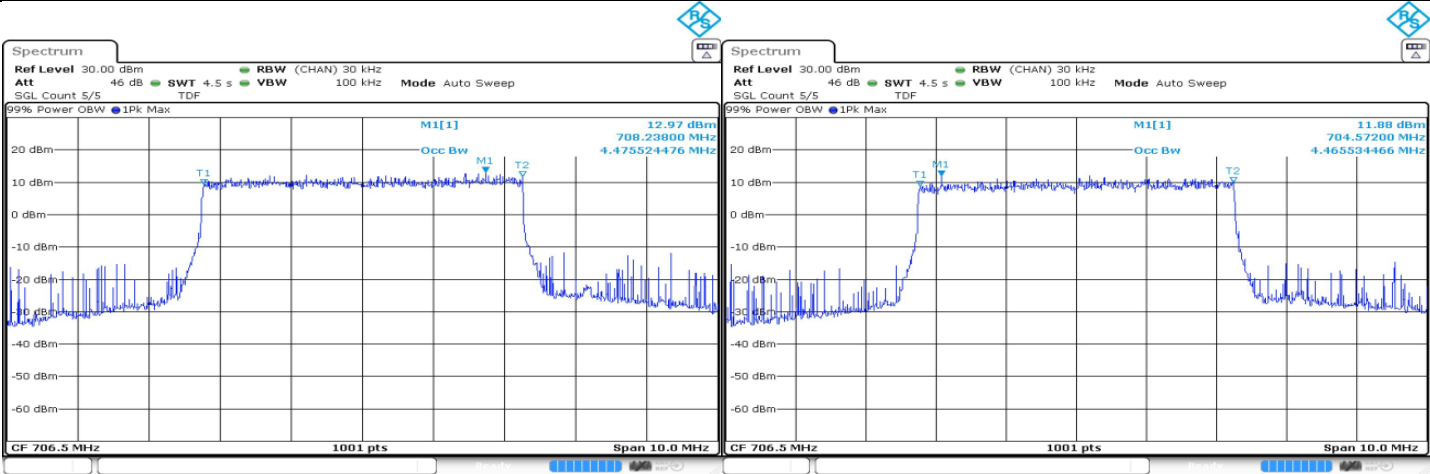
1.8.3. Occupied Bandwidth - LTE Band 17 (704-716MHz)

LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 17 / 5MHz/25/0	Low CH 23755	706.5 MHz	4.745	4.735
	Mid CH 23790	710 MHz	4.735	4.735
	High CH 23825	713.5 MHz	4.775	4.785

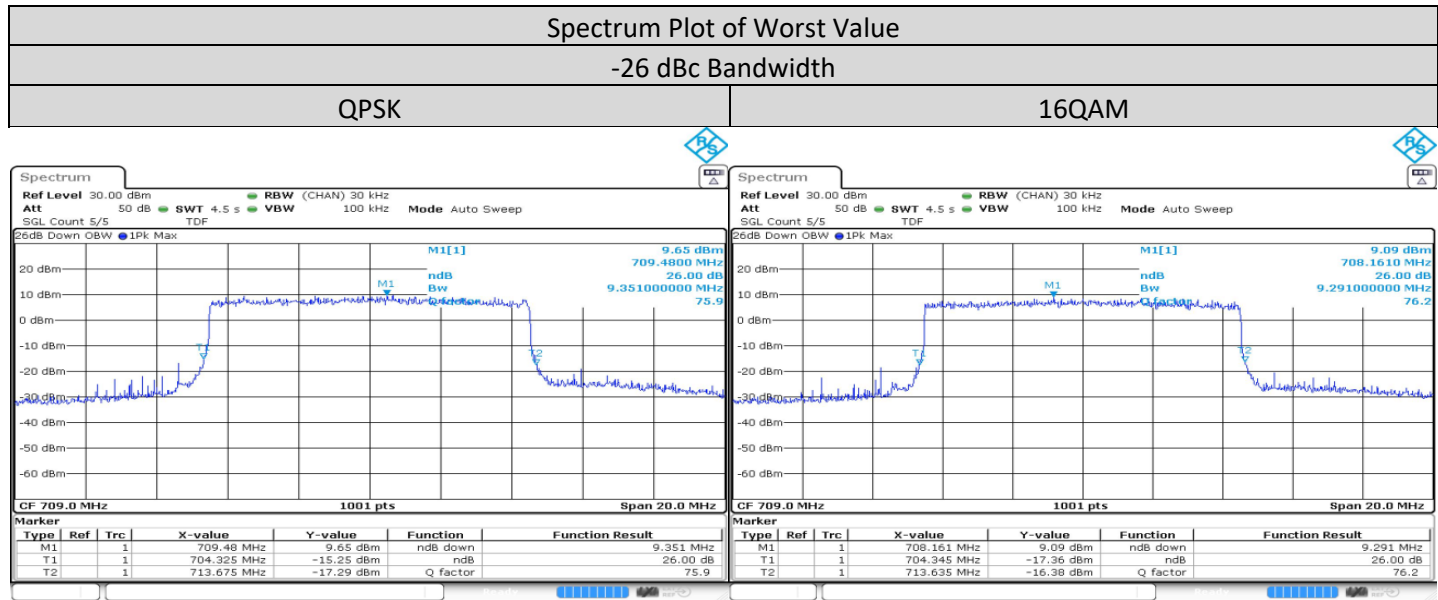


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 17 / 5MHz/25/0	Low CH 23755	706.5 MHz	4.476	4.466
	Mid CH 23790	710 MHz	4.456	4.456
	High CH 23825	713.5 MHz	4.476	4.466

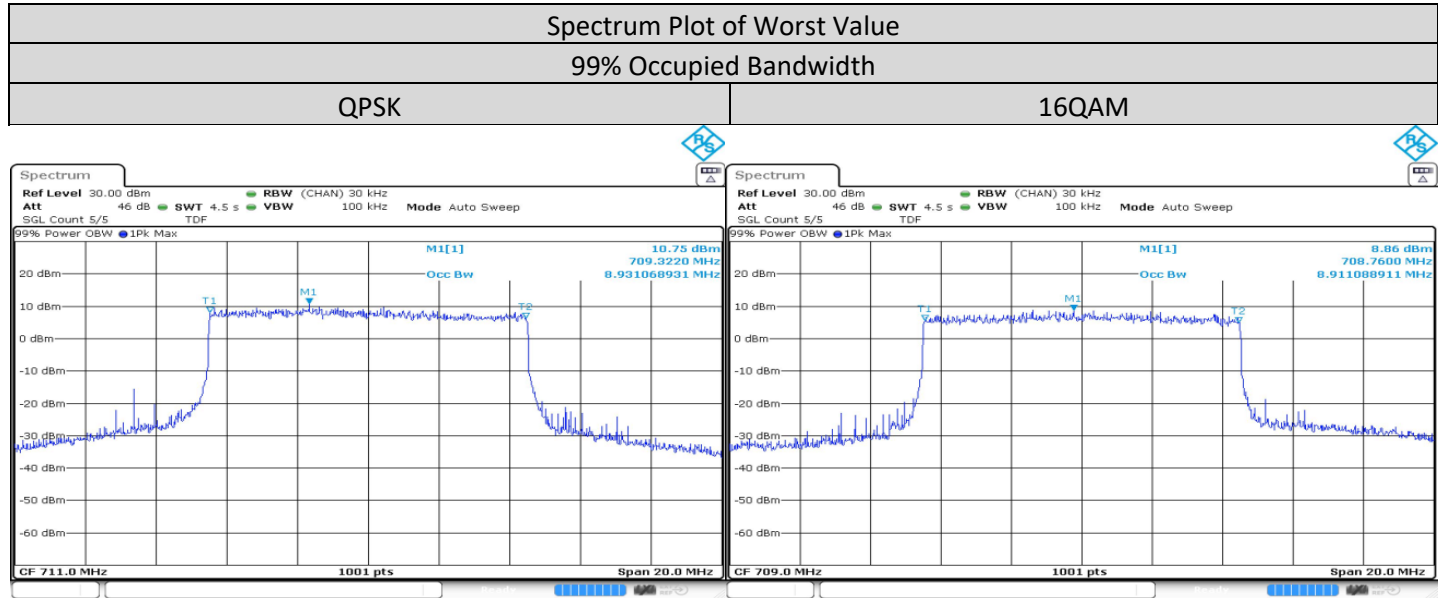
Spectrum Plot of Worst Value	
99% Occupied Bandwidth	
QPSK	16QAM



LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 17 / 10MHz/50/0	Low CH 23780	709 MHz	9.351	9.291
	Mid CH 23790	710 MHz	9.271	9.271
	High CH 23800	711 MHz	9.351	9.251

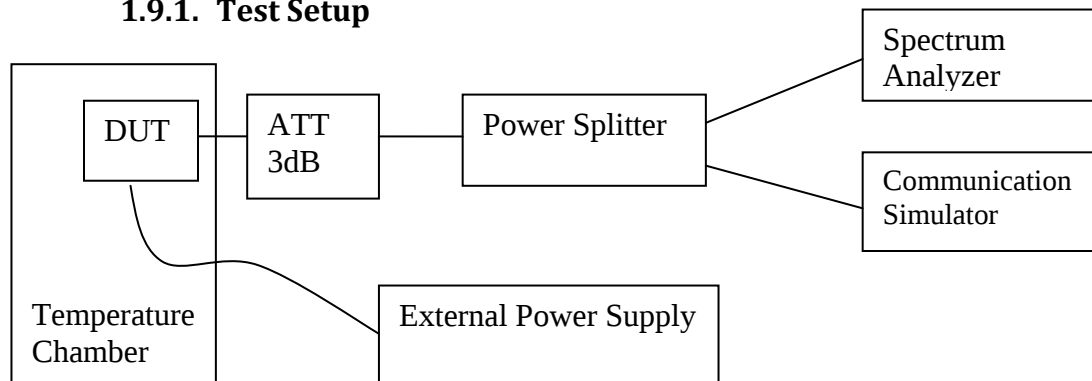


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 17 / 10MHz/50/0	Low CH 23780	709 MHz	8.891	8.911
	Mid CH 23790	710 MHz	8.891	8.911
	High CH 23800	711 MHz	8.931	8.911



1.9. Frequency Stability

1.9.1. Test Setup



- 1) The DUT is placed in the temperature chamber and DUT is power up by external power supply to control the DC input voltage.
- 2) The temperature chamber could control the temperature and humidity and external power supply could control the test voltage range from minimum to maximum operating voltage.
- 3) Measured frequency error from the communication simulator by vary below step :
 - i. Vary temperature of the temperature chamber from -30 ~ 50 deg C (10 deg C / Step) and set external supply voltage constant at nominal voltage.
 - ii. Vary external supply voltage from minimum to maximum operation voltage support by DUT and set temperature chamber constant at room temp.
- 4) All the measurement was done at mid channel for each band.

1.9.2. Test Limit

As per manufacturer declared product operating at -20 to 60 deg C with spec of +/- 0.1ppm.

1.9.3. Frequency Stability – LTE Band 17 (704-716MHz)

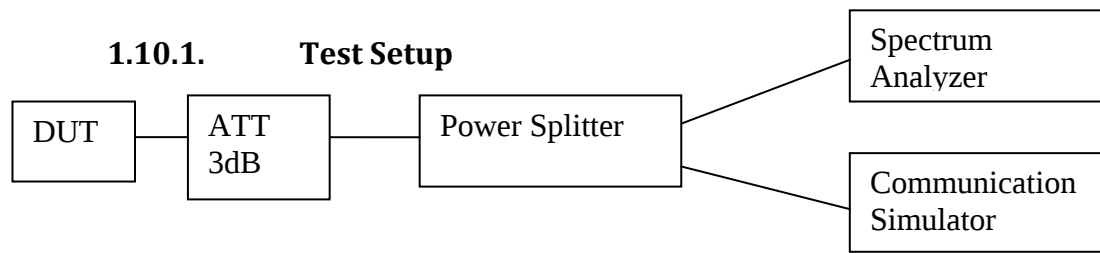
Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		706.5MHz		713.5MHz	
LTE Band 17		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	706.499993	-0.010347	713.499991	-0.011949
	50	706.499993	-0.010509	713.499991	-0.01219
	40	706.500008	0.011481	713.499988	-0.017062
	30	706.500008	0.010711	713.499991	-0.01207
	20	706.500008	0.011157	713.499993	-0.009403
	10	706.500007	0.009982	713.499991	-0.012531
	0	706.500006	0.007998	713.500009	0.012611
	-10	706.500007	0.010549	713.499991	-0.012491
	-20	706.500008	0.010995	713.499991	-0.01221

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		706.5MHz		713.5MHz	
LTE Band 17		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	706.500008	0.01146	713.49999	-0.013834
	7.5	706.500007	0.010002	713.499991	-0.011969
	6	706.499992	-0.011015	713.499991	-0.012571

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		709MHz		711MHz	
LTE Band 17		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	708.999993	-0.010189	710.999993	-0.009859
	50	708.999989	-0.016101	710.999993	-0.009195
	40	708.999991	-0.012711	711.000006	0.008913
	30	708.99999	-0.014184	711.000009	0.012716
	20	708.999991	-0.012973	711.000007	0.009778
	10	708.999991	-0.012025	711.000009	0.012193
	0	708.999993	-0.009322	710.999993	-0.009879
	-10	708.999991	-0.012267	710.999993	-0.010321
	-20	708.999992	-0.011601	711.000007	0.009617

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		709MHz		711MHz	
LTE Band 17		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9.0V	708.99999	-0.014487	711.000006	0.008028
	7.5V	708.99999	-0.014749	710.999993	-0.009557
	6V	708.999996	-0.005367	711.000005	0.007686

1.10. Band Edge Conducted Spurious Emission



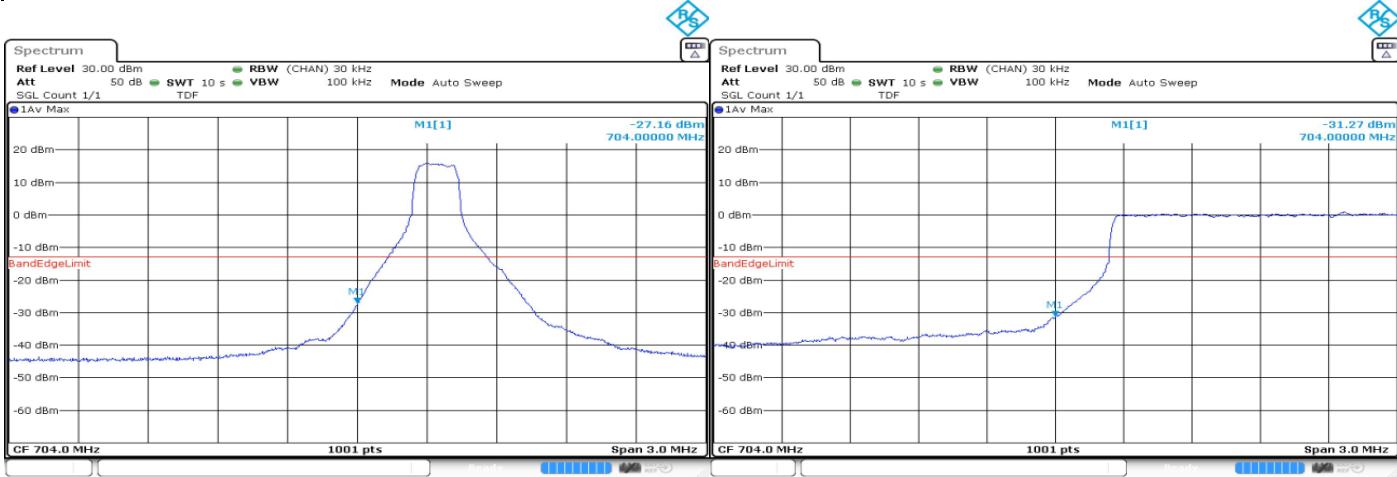
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) Set DUT to transmit maximum power through communication simulator.
- 4) The band edges of lowest and highest channels with the highest RF powers were measured.
- 5) The center frequency of spectrum is the band edge frequency, span is 3MHz, RBW is 1~3% of EBW and VBW is at least 3 times of RBW
- 6) Record the maximum trace plot into the test report.

1.10.2. Test Limit

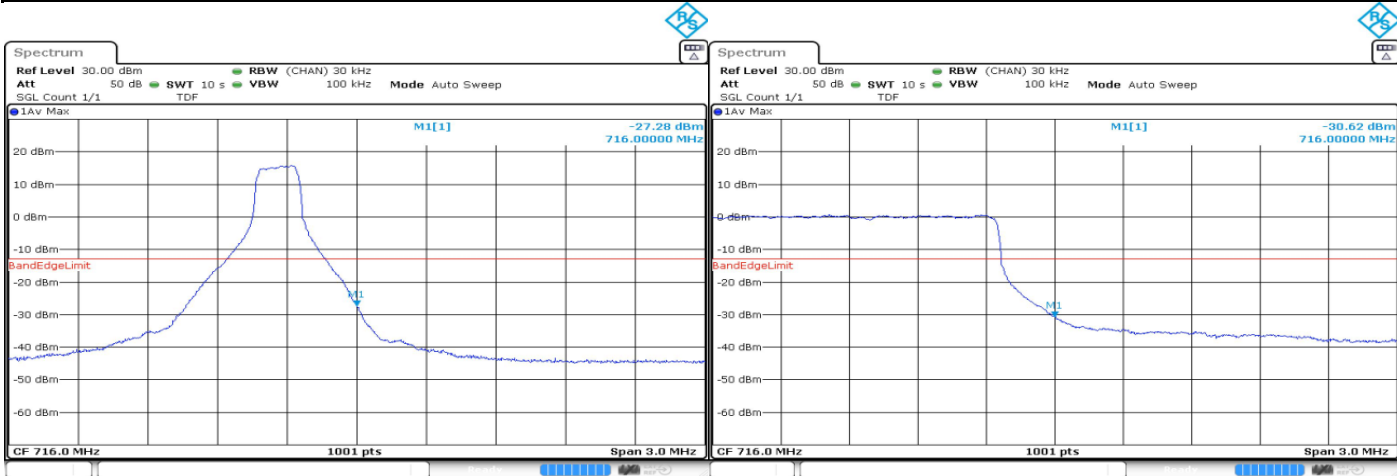
For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

1.10.3. Band Edge / Emission Mask Conducted Spurious Emission – LTE Band 17 (704-716MHz)

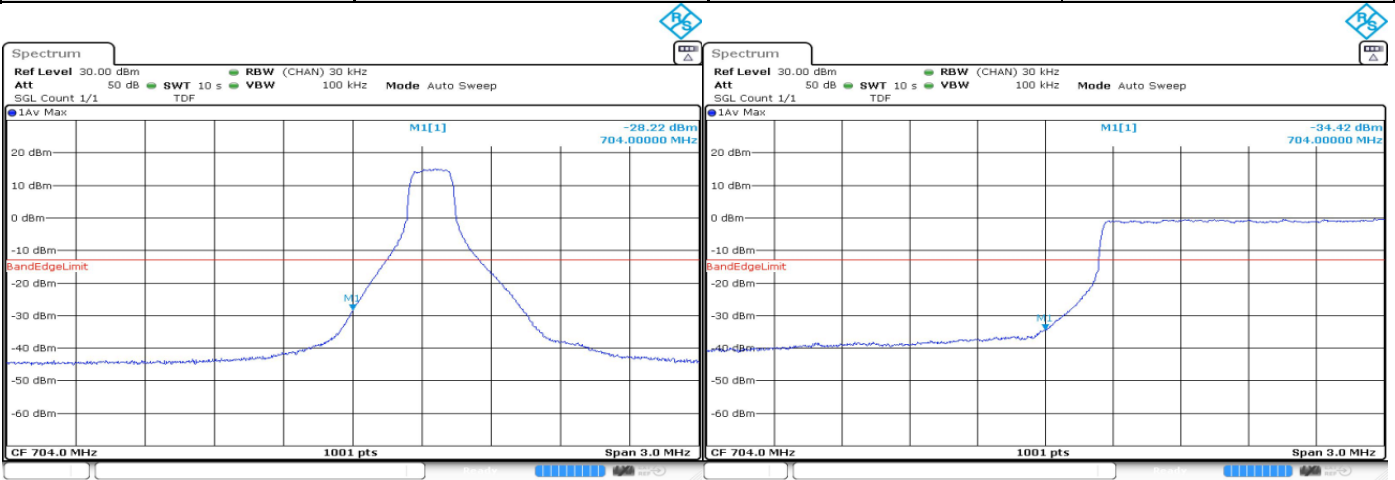
Band 17, 5MHz QPSK , Low CH 23755			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



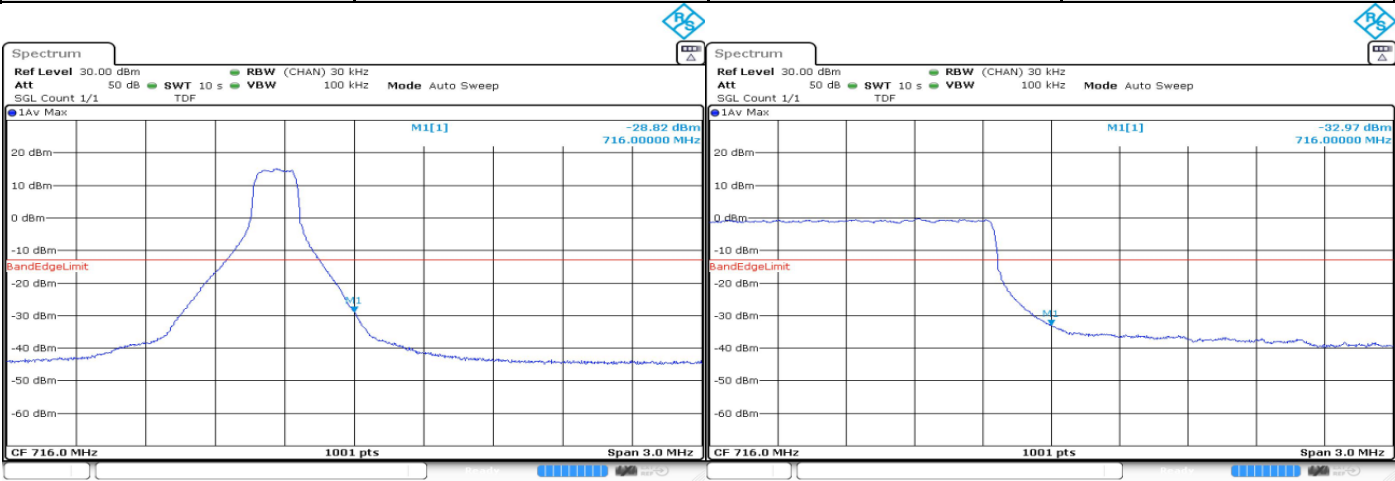
Band 17, 5MHz QPSK , High CH 23825			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



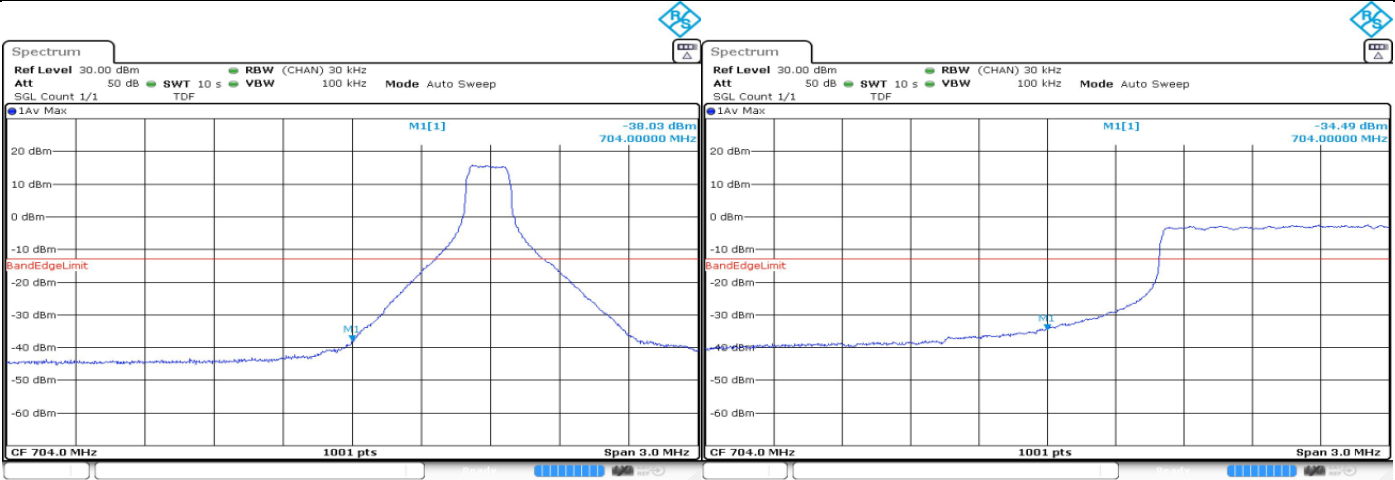
Band 17, 5MHz 16-QAM , Low CH 23755			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



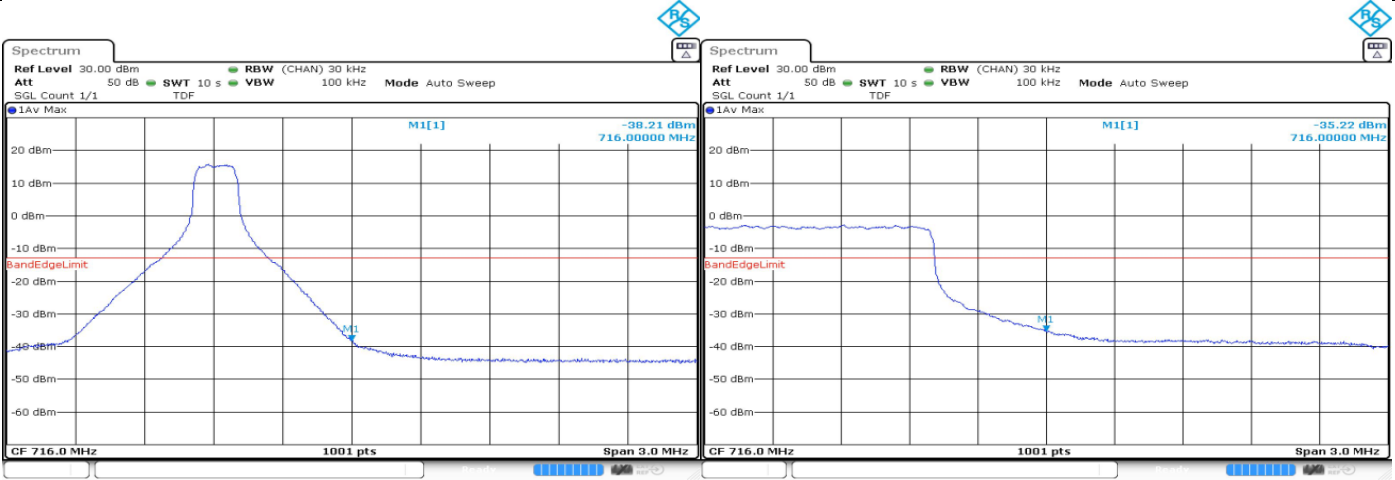
Band 17, 5MHz 16-QAM , High CH 23825			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



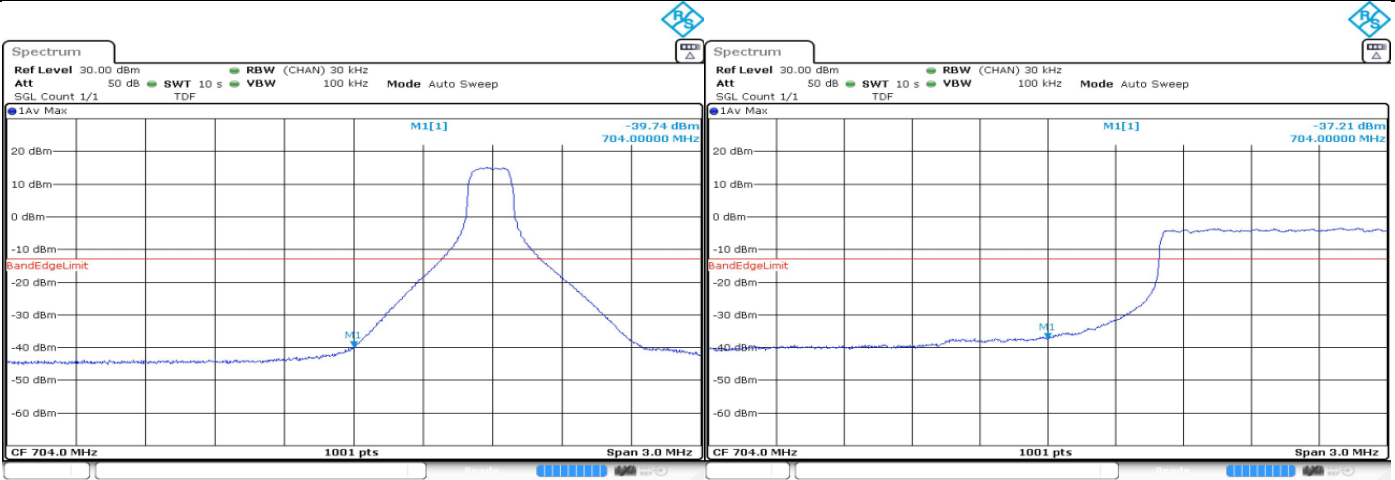
Band 17, 10MHz QPSK, Low CH 23780			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



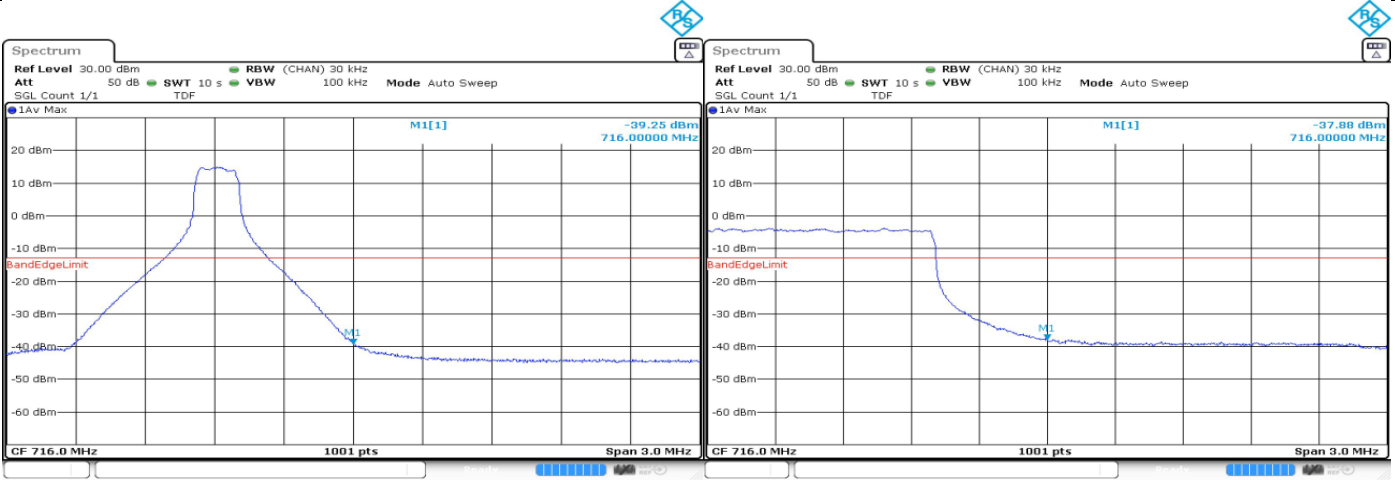
Band 17, 10MHz QPSK, High CH 23800			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



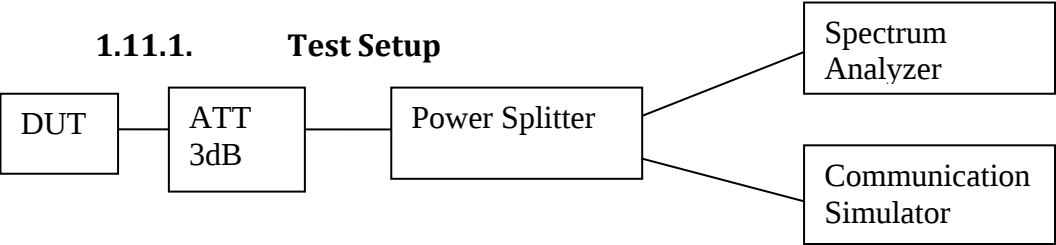
Band 17, 10MHz 16-QAM, Low CH 23780			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



Band 17, 10MHz 16-QAM, High CH 23800			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



1.11. Conducted Spurious Emission



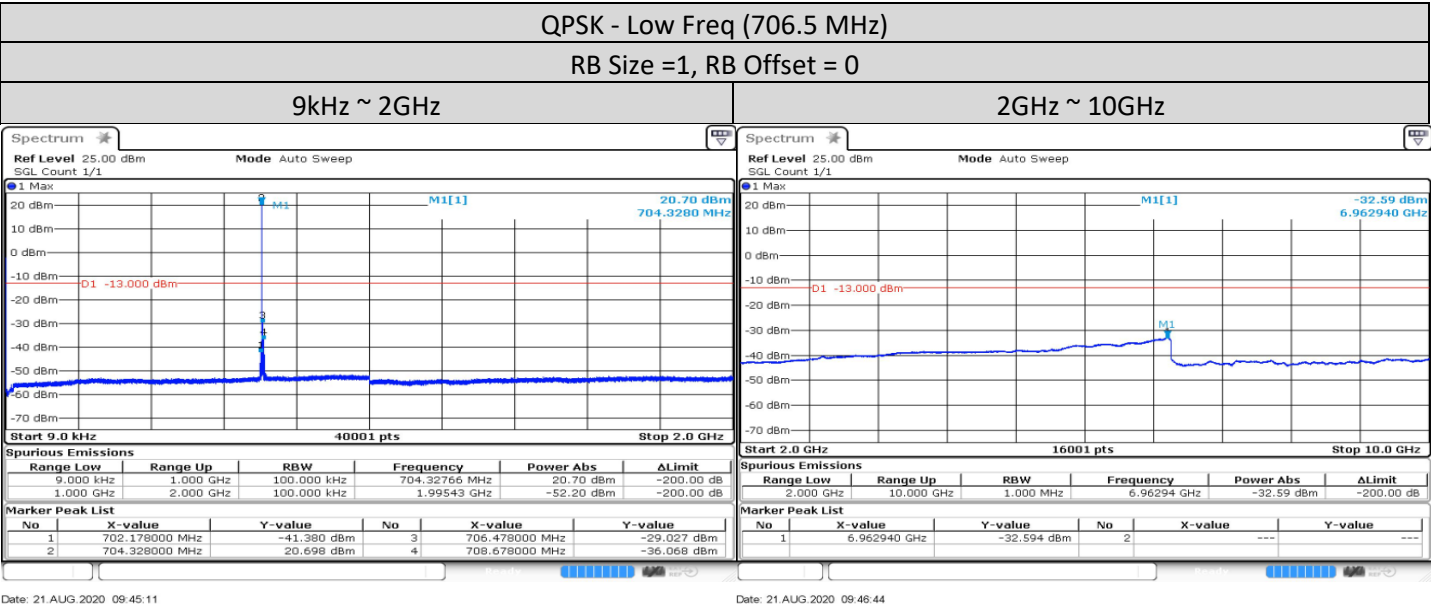
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) Set DUT to transmit maximum power through communication simulator.
- 4) Spectrum Analyzer setting, RBW = 1 MHz, VBW = 3 MHz.
- 5) The spurious emission of lowest, middle and highest channels with the highest RF powers were measured.
- 6) Record the maximum trace plot into the test report.

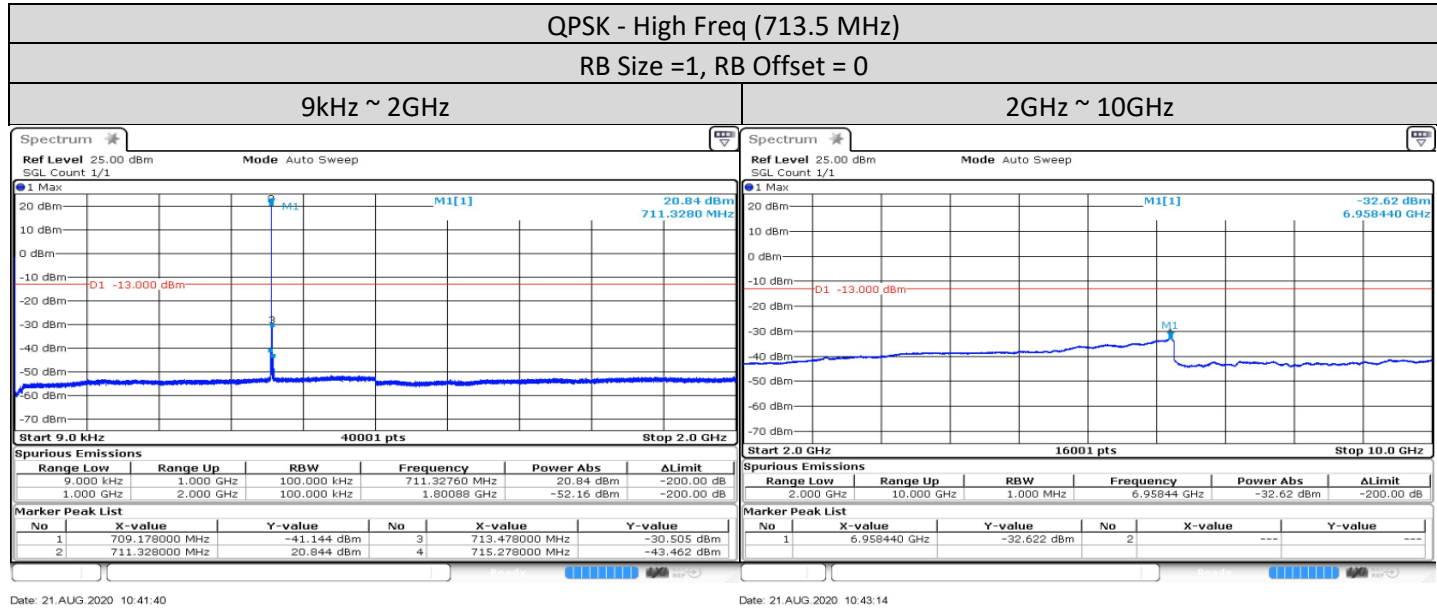
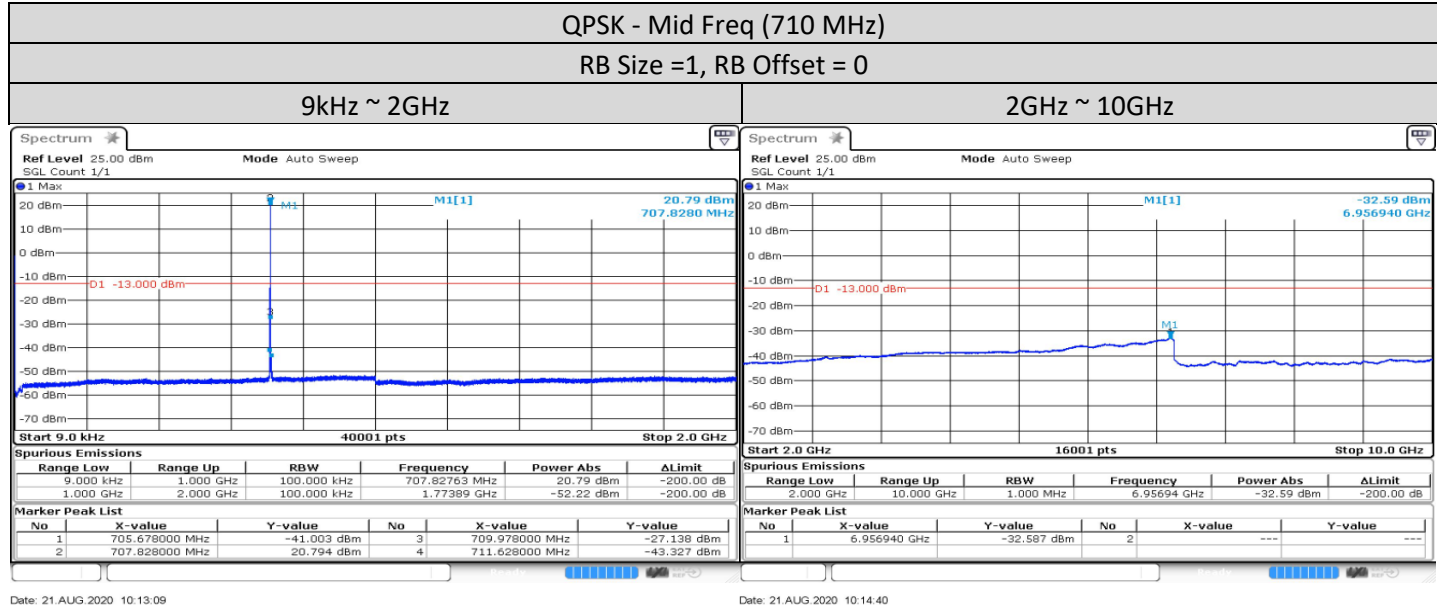
1.11.2. Test Limit

For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

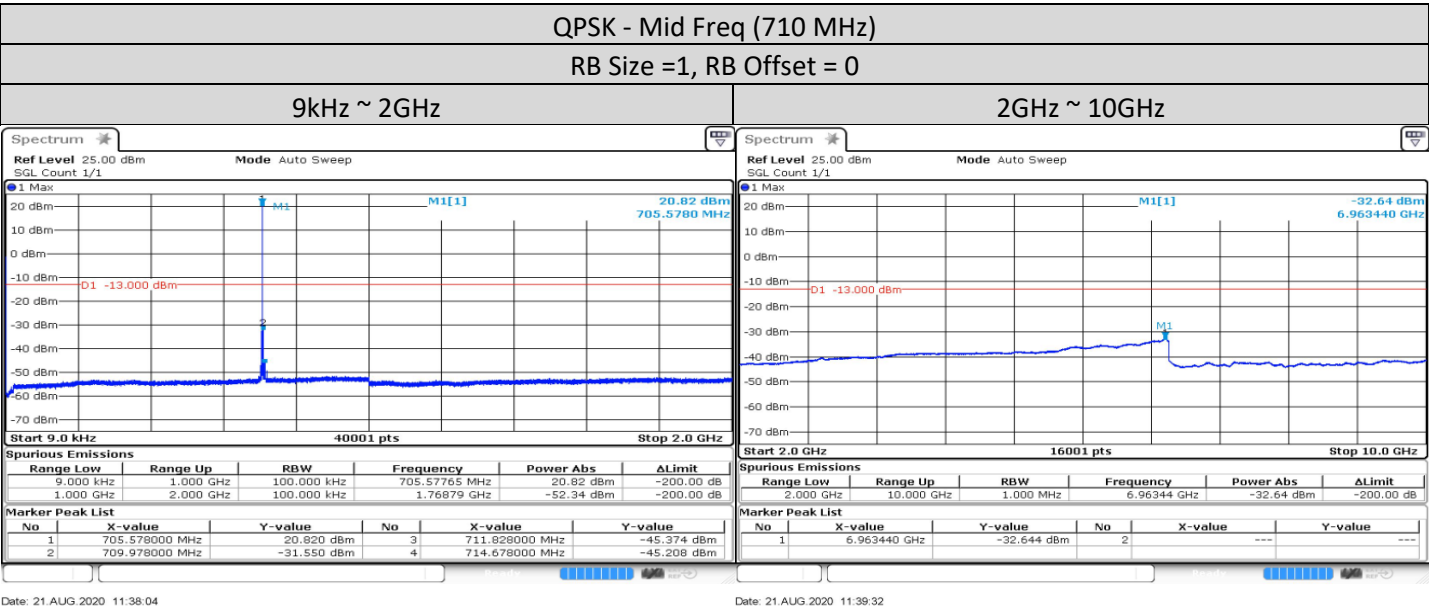
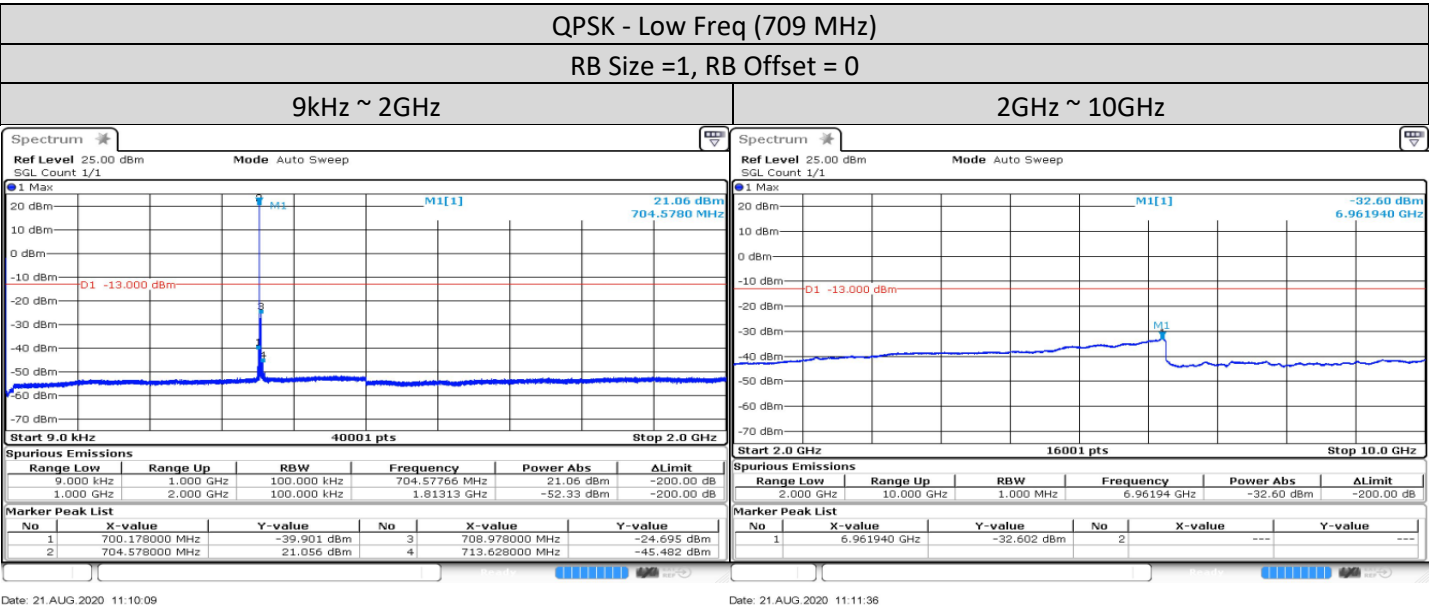
1.11.3. Conducted Spurious Emissions – LTE Band 17 (704-716MHz)

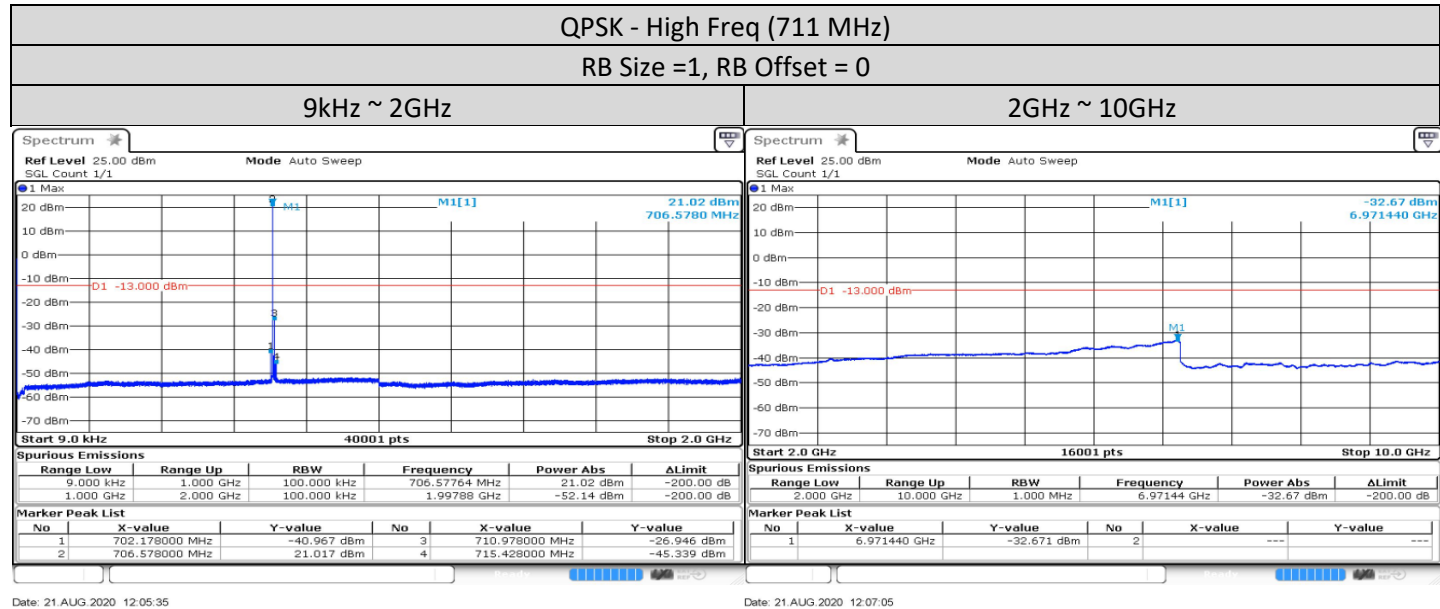
5MHz





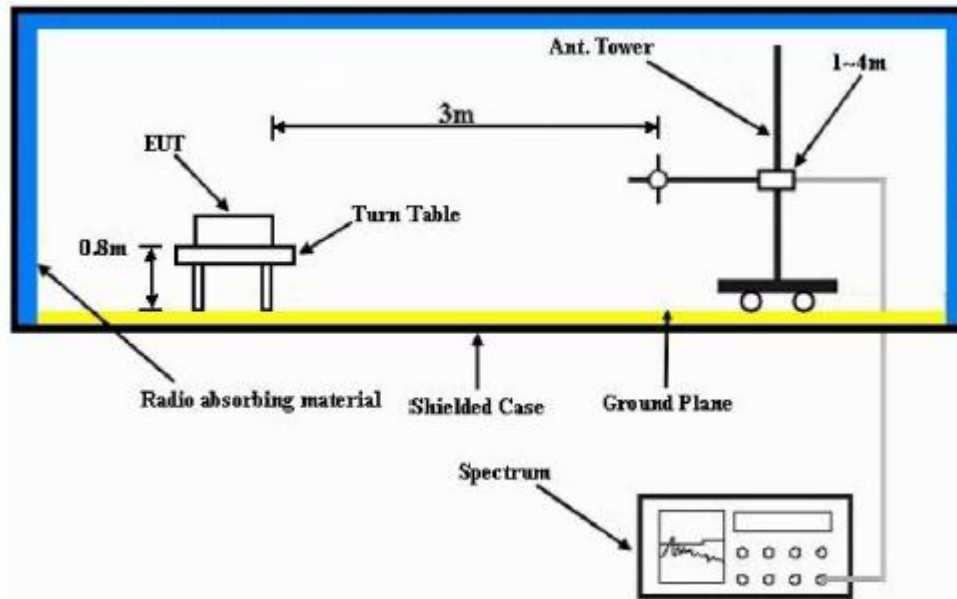
10MHz





1.12. Radiated Spurious Emission

1.12.1. Test Setup



- 1) The spectrum setting for scanning Radiated Emission below 1 GHz is RBW = 100 kHz, VBW = 300 kHz and above 1 GHz is RBW = 1MHz, VBW = 3MHz. Detector mode is positive peak.
- 2) In the semi-anechoic chamber, setup as illustrated above the EUT placed on the Turn Table at 0.8m height for below 1Ghz measurement and at 1.5m height for above 1GHz measurement, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- 3) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
- 4) Final Radiated Spurious Emission = “Read Value” + Measured substitution value.

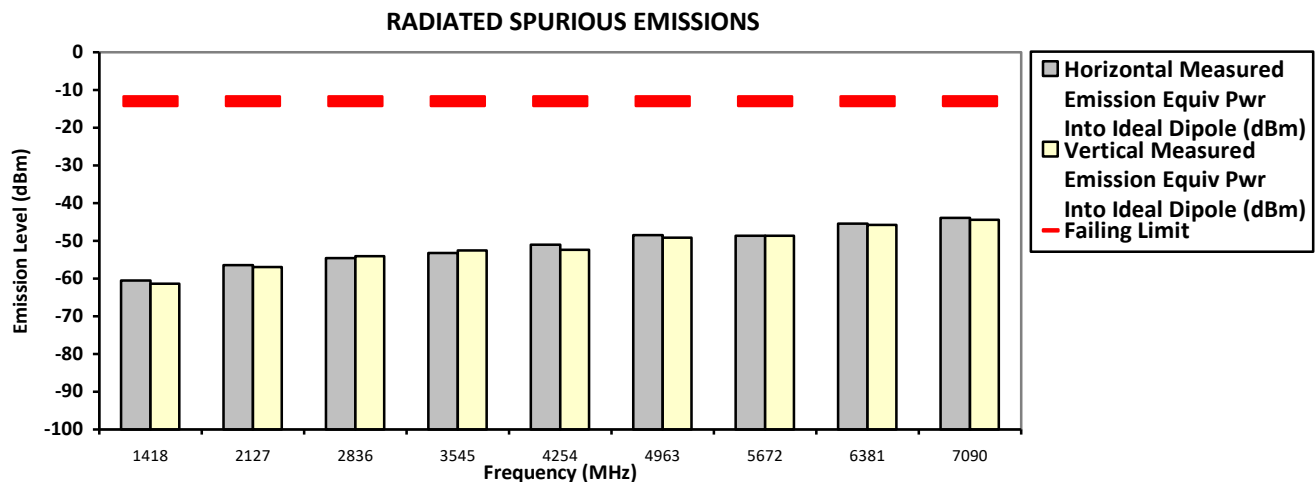
1.12.2. Test Limit

For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

1.12.3. Radiated Spurious Emission – LTE Band 17 (704-716MHz)

SAC Transmitter Radiated Emission:
Model Number: AAH90ZDU9RH1AN **S/N:** 734TWP0308 **SR:**18058-EMC-00055
Battery Part No: PMNN4804A **Accy Part No:** AN000348A01
Test Mode: TX LTE (Band 17) X-Plane
709.000000 MHz (Low) **Bandwidth 10MHz** **0.252 Watt(s) /Max Power**

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1418.0000	-13.0000	-60.5479 **	-61.3775 **
2127.0000	-13.0000	-56.4781 **	-56.9585 **
2836.0000	-13.0000	-54.5351 **	-54.1458 **
3545.0000	-13.0000	-53.2027 **	-52.4697 **
4254.0000	-13.0000	-50.9777 **	-52.2890 **
4963.0000	-13.0000	-48.4656 **	-49.2072 **
5672.0000	-13.0000	-48.6743 **	-48.6252 **
6381.0000	-13.0000	-45.4680 **	-45.8361 **
7090.0000	-13.0000	-43.8282 **	-44.3591 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

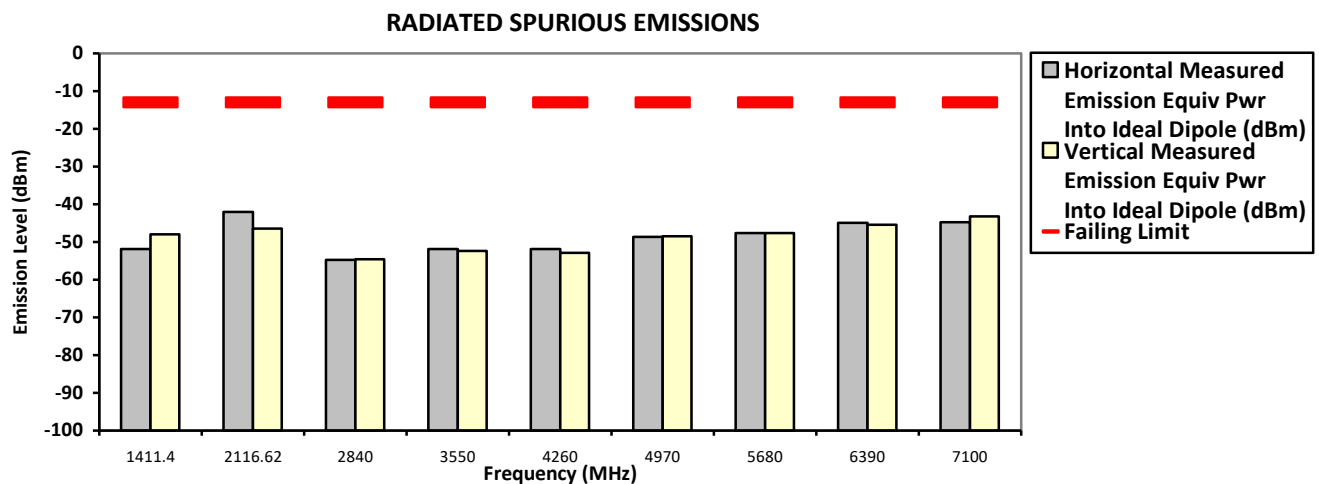
System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results
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SAC Transmitter Radiated Emission:
Model Number: AAH90ZDU9RH1AN **S/N: 734TWP0308** **SR:18058-EMC-00055**
Battery Part No: PMNN4804A **Accy Part No: AN000348A01**
Test Mode: TX LTE (Band 17) X-Plane
710.000000 MHz (Mid) **Bandwidth 10MHz** **0.252 Watt(s) /Max Power**

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1411.4000	-13.0000	-51.7800 *	-48.0100 *
2116.6200	-13.0000	-42.0900 *	-46.5100 *
2840.0000	-13.0000	-54.8064 **	-54.6169 **
3550.0000	-13.0000	-51.9452 **	-52.4530 **
4260.0000	-13.0000	-51.7892 **	-52.8426 **
4970.0000	-13.0000	-48.6470 **	-48.4698 **
5680.0000	-13.0000	-47.6585 **	-47.6673 **
6390.0000	-13.0000	-44.8470 **	-45.4098 **
7100.0000	-13.0000	-44.6791 **	-43.1664 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
 *Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

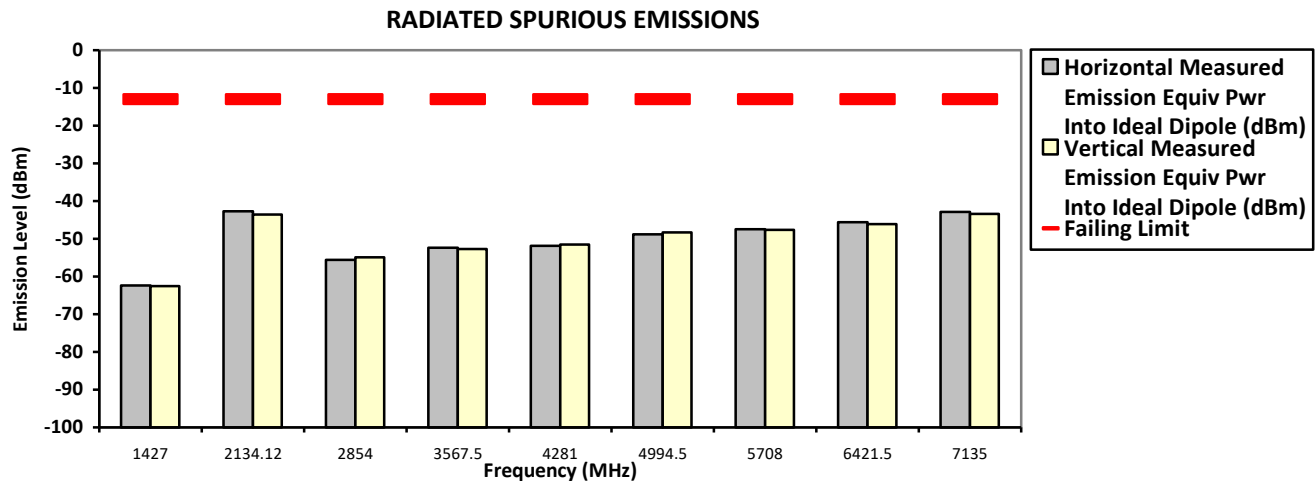
System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results
----------------	------------------	----------------

Model Number: AAH90ZDU9RH1AN **SAC Transmitter Radiated Emission:** **S/N: 734TWP0308** **SR:18058-EMC-00055**
Battery Part No: PMNN4804A **Accy Part No: AN000348A01**
Test Mode: TX LTE (Band 17) X-Plane
713.500000 MHz (High) **Bandwidth 5MHz** **0.252 Watt(s) /Max Power**

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1427.0000	-13.0000	-62.3494 **	-62.5474 **
2134.1200	-13.0000	-42.7100 *	-43.5400 *
2854.0000	-13.0000	-55.6013 **	-54.9201 **
3567.5000	-13.0000	-52.4243 **	-52.7409 **
4281.0000	-13.0000	-51.7901 **	-51.4761 **
4994.5000	-13.0000	-48.8738 **	-48.2838 **
5708.0000	-13.0000	-47.4415 **	-47.6579 **
6421.5000	-13.0000	-45.5152 **	-46.1516 **
7135.0000	-13.0000	-42.8846 **	-43.3522 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

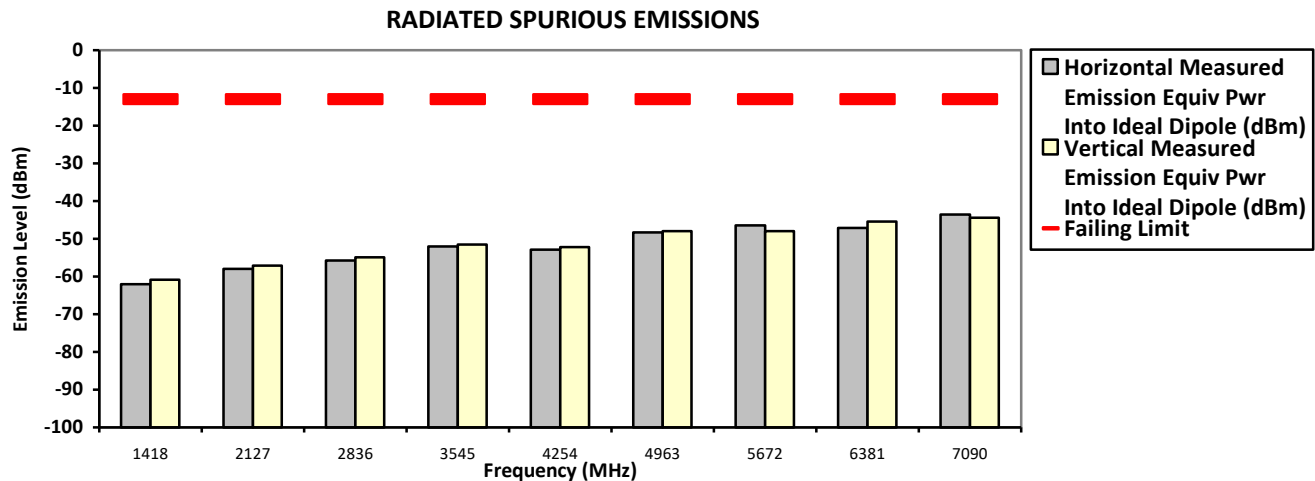
System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results
----------------	------------------	----------------

Model Number: AAH90ZDU9RH1AN **SAC Transmitter Radiated Emission:** **S/N: 734TWP0308** **SR:18058-EMC-00055**
Battery Part No: PMNN4804A **Accy Part No: AN000348A01**
Test Mode: TX LTE (Band 17) Y-Plane
709.000000 MHz (Low) **Bandwidth 10MHz** **0.252 Watt(s) /Max Power**

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1418.0000	-13.0000	-62.0344 **	-60.9165 **
2127.0000	-13.0000	-58.0351 **	-57.0719 **
2836.0000	-13.0000	-55.6967 **	-54.9249 **
3545.0000	-13.0000	-52.0740 **	-51.4587 **
4254.0000	-13.0000	-52.9344 **	-52.1871 **
4963.0000	-13.0000	-48.3530 **	-47.9865 **
5672.0000	-13.0000	-46.5016 **	-48.0249 **
6381.0000	-13.0000	-47.1704 **	-45.4215 **
7090.0000	-13.0000	-43.5134 **	-44.4178 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

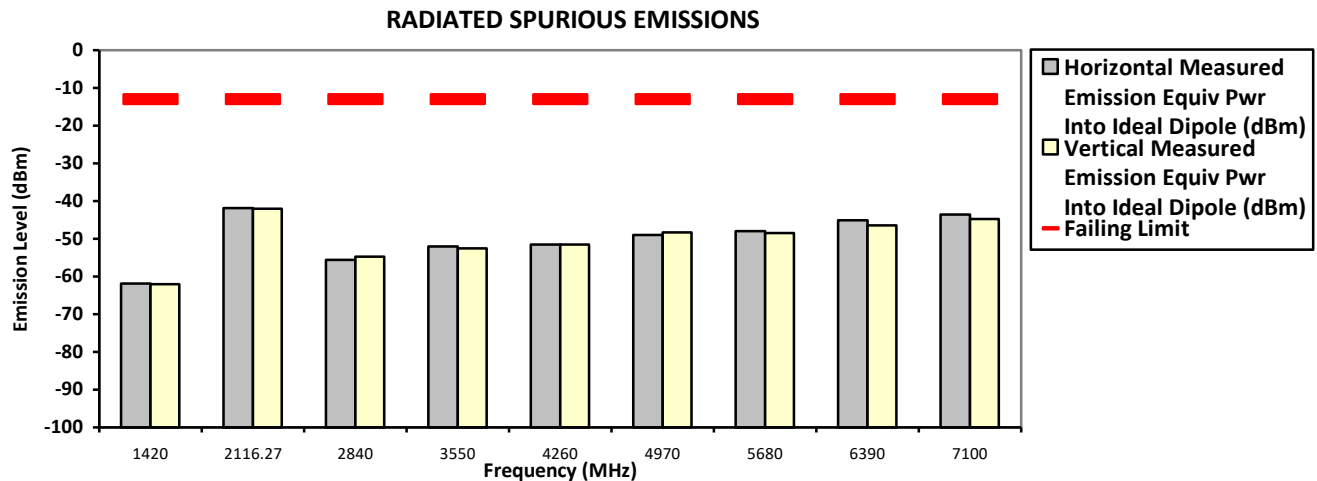
System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results
----------------	------------------	----------------

Model Number: AAH90ZDU9RH1AN **SAC Transmitter Radiated Emission:** **S/N: 734TWP0308** **SR:18058-EMC-00055**
Battery Part No: PMNN4804A **Accy Part No: AN000348A01**
Test Mode: TX LTE (Band 17) Y-Plane
710.000000 MHz (Mid) **Bandwidth 10MHz** **0.252 Watt(s) /Max Power**

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1420.0000	-13.0000	-61.8416 **	-62.0886 **
2116.2700	-13.0000	-41.7800 *	-41.9900 *
2840.0000	-13.0000	-55.6271 **	-54.7169 **
3550.0000	-13.0000	-52.0548 **	-52.5661 **
4260.0000	-13.0000	-51.4428 **	-51.5471 **
4970.0000	-13.0000	-49.0656 **	-48.3370 **
5680.0000	-13.0000	-48.0408 **	-48.5357 **
6390.0000	-13.0000	-45.0856 **	-46.4286 **
7100.0000	-13.0000	-43.6043 **	-44.7709 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results
----------------	------------------	----------------

Model Number: AAH90ZDU9RH1AN
 Battery Part No: PMNN4804A

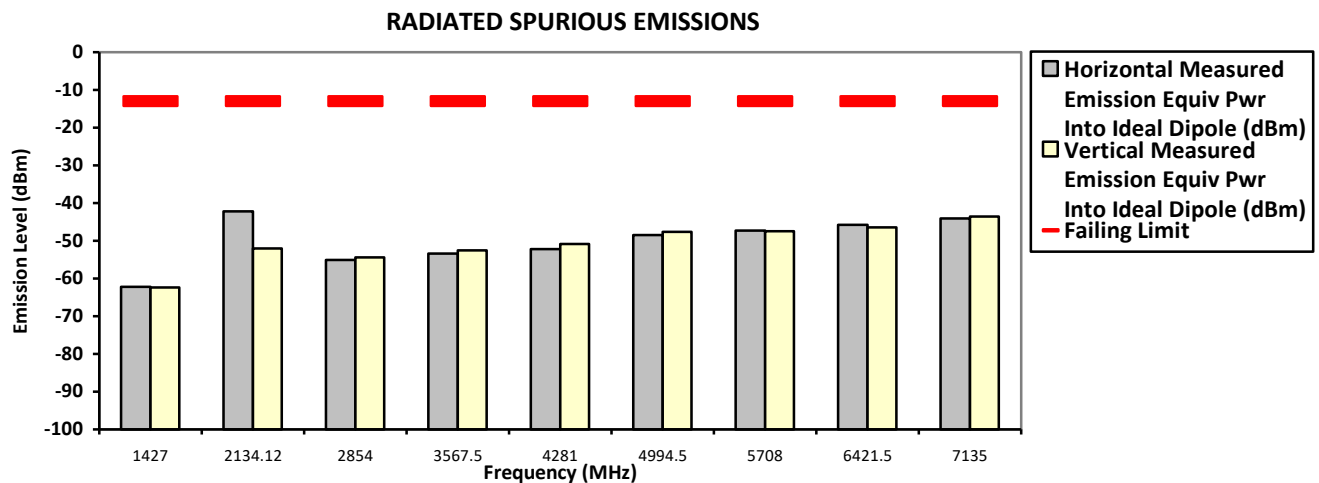
SAC Transmitter Radiated Emission:
 S/N: 734TWP0308
 Accy Part No: AN000348A01
 Test Mode: TX LTE (Band 17) Y-Plane
 Bandwidth 5MHz

SR:18058-EMC-00055

713.500000 MHz (High)

0.252 Watt(s) /Max Power

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1427.0000	-13.0000	-62.1601 **	-62.3237 **
2134.1200	-13.0000	-42.2300 *	-52.0300 *
2854.0000	-13.0000	-55.0984 **	-54.3367 **
3567.5000	-13.0000	-53.4436 **	-52.5185 **
4281.0000	-13.0000	-52.1757 **	-50.7814 **
4994.5000	-13.0000	-48.4314 **	-47.5474 **
5708.0000	-13.0000	-47.3345 **	-47.3810 **
6421.5000	-13.0000	-45.7811 **	-46.3943 **
7135.0000	-13.0000	-44.0813 **	-43.5921 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

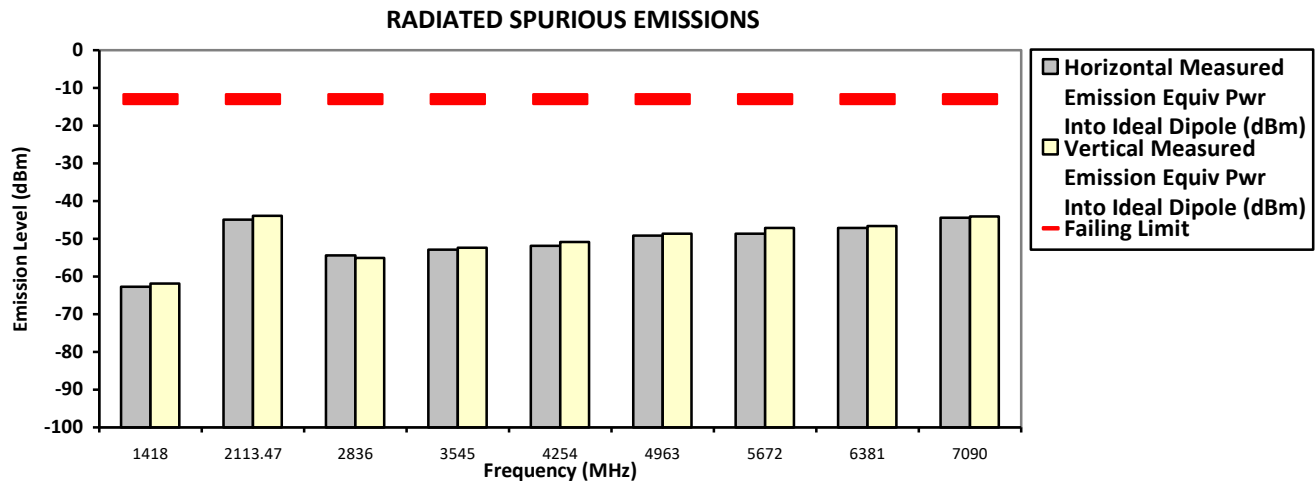
System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results
----------------	------------------	----------------

Model Number: AAH90ZDU9RH1AN SAC Transmitter Radiated Emission: S/N: 734TWP0308 SR:18058-EMC-00055
 Battery Part No: PMNN4804A Accy Part No: AN000348A01
 Test Mode: TX LTE (Band 17) Z-Plane
 709.000000 MHz (Low) Bandwidth 10MHz 0.252 Watt(s) /Max Power

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1418.0000	-13.0000	-62.6306 **	-61.9277 **
2113.4700	-13.0000	-44.8700 *	-43.9600 *
2836.0000	-13.0000	-54.3818 **	-55.1274 **
3545.0000	-13.0000	-52.8595 **	-52.3311 **
4254.0000	-13.0000	-51.8561 **	-50.9187 **
4963.0000	-13.0000	-49.0706 **	-48.6206 **
5672.0000	-13.0000	-48.5834 **	-47.0716 **
6381.0000	-13.0000	-47.1910 **	-46.5565 **
7090.0000	-13.0000	-44.4105 **	-44.0699 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

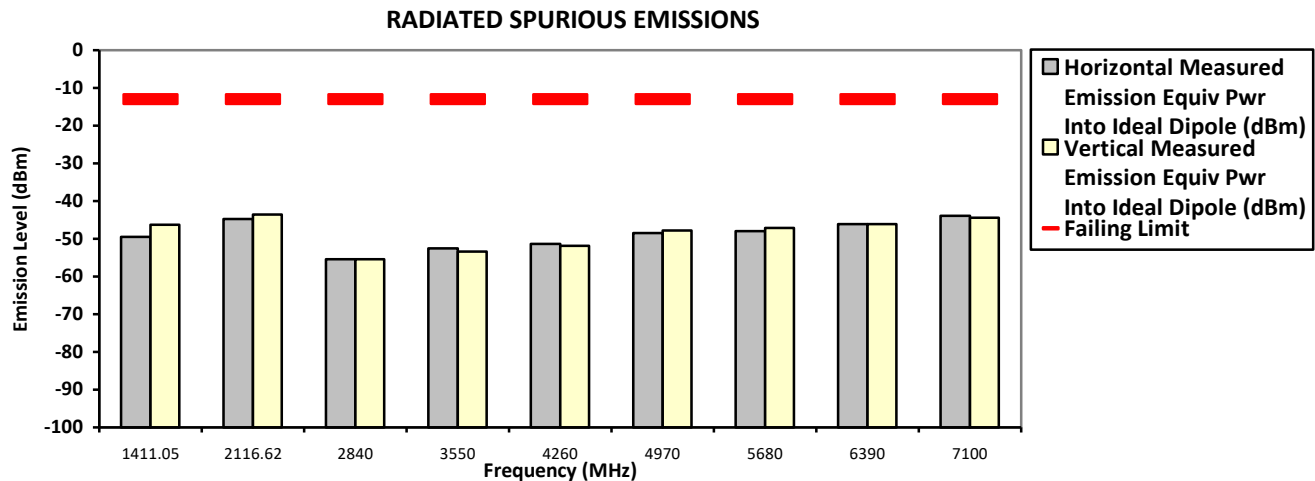
*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

System MU: 4.03 dB

Remarks: Passed Results Marginal Results Failed Results

Model Number: AAH90ZDU9RH1AN SAC Transmitter Radiated Emission: S/N: 734TWP0308 SR:18058-EMC-00055
 Battery Part No: PMNN4804A Accy Part No: AN000348A01
 Test Mode: TX LTE (Band 17) Z-Plane
 710.000000 MHz (Mid) Bandwidth 10MHz 0.252 Watt(s) /Max Power

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1411.0500	-13.0000	-49.4100 *	-46.1900 *
2116.6200	-13.0000	-44.7600 *	-43.5600 *
2840.0000	-13.0000	-55.4832 **	-55.4530 **
3550.0000	-13.0000	-52.5529 **	-53.3235 **
4260.0000	-13.0000	-51.3097 **	-51.9096 **
4970.0000	-13.0000	-48.4124 **	-47.8274 **
5680.0000	-13.0000	-48.0154 **	-47.2029 **
6390.0000	-13.0000	-46.1025 **	-46.0305 **
7100.0000	-13.0000	-43.9236 **	-44.3594 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
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Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

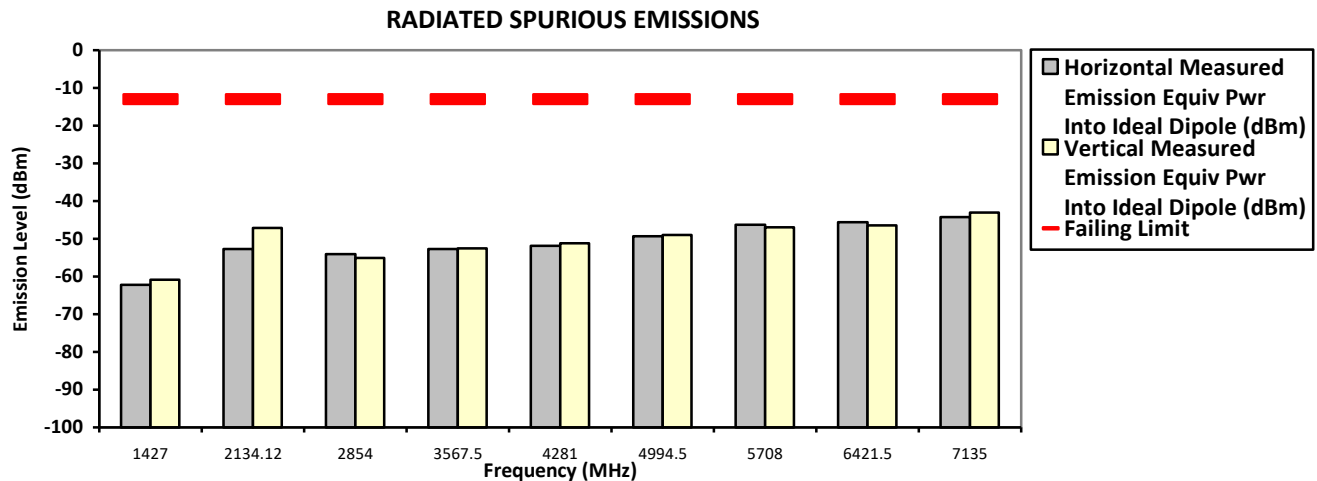
*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

System MU: 4.03 dB

Remarks: Passed Results Marginal Results Failed Results

Model Number: AAH90ZDU9RH1AN **SAC Transmitter Radiated Emission:** **S/N: 734TWP0308** **SR:18058-EMC-00055**
Battery Part No: PMNN4804A **Accy Part No: AN000348A01**
Test Mode: TX LTE (Band 17) Z-Plane
713.500000 MHz (High) **Bandwidth 5MHz** **0.252 Watt(s) /Max Power**

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
1427.0000	-13.0000	-62.2869 **	-60.9223 **
2134.1200	-13.0000	-52.6900 *	-47.1200 *
2854.0000	-13.0000	-54.0068 **	-55.0423 **
3567.5000	-13.0000	-52.6533 **	-52.5143 **
4281.0000	-13.0000	-51.8715 **	-51.1521 **
4994.5000	-13.0000	-49.2438 **	-48.9125 **
5708.0000	-13.0000	-46.2602 **	-46.9175 **
6421.5000	-13.0000	-45.6263 **	-46.3607 **
7135.0000	-13.0000	-44.3006 **	-43.0116 **



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Thu, 10 Sep, 2020

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 23.9 Hum(%RH): 68.7

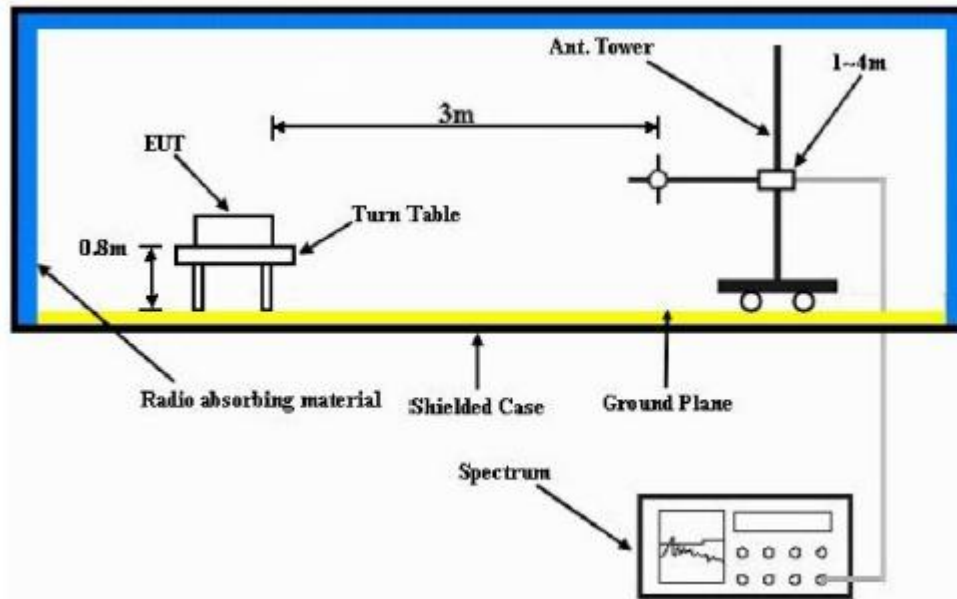
System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results
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1.13. Effective Radiated Power (ERP)

1.13.1. Test Setup



- 1) The spectrum setting for scanning Radiated Emission below 1 GHz is RBW = 100 kHz, VBW = 300 kHz and above 1 GHz is RBW = 1MHz, VBW = 3MHz. Detector mode is RMS.
- 2) In the semi-anechoic chamber, setup as illustrated above the EUT placed on the Turn Table at 0.8m height for below 1Ghz measurement and at 1.5m height for above 1GHz measurement, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- 3) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
- 4) $EIRP = \text{“Read Value”} + \text{Measured substitution value.}$

1.13.2. Test Limit

The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw). Power is given in terms of effective radiated power (ERP).

1.13.3. Effective Radiated Power (ERP) - LTE Band 17 (704-716MHz)

Not Performed.

--End of Test Report--