MOTOROLA SOLUTIONS

CERTIFICATE 2518.08

SAMM 825

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.A**

Date/s Tested	:	15-April-2024 - 28-June-2024
Report Issue Date	:	09-July-2024
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	:	CADOGAN SEAN
Product Type	:	Hand-held
Product Marketing Name (PMN)	:	APX N70
Hardware Version Identification Number (HVIN)	:	H35KET9PW8AN & H35KET9PW8AN-H
Frequency Band	:	Refer to section 1.4
Rated / Max RF Output Power	:	199.53mW / 252mW
Applicant Name	:	Motorola Solutions Inc
Applicant Address	:	Plot 2A, Medan Bayan Lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia
FCC Registrations	:	461337
ISED Registrations	:	MY0001
Firmware Version Identification Number(FVIN)	:	D03.75.21 (BP), D00.00.16 (AP)

The equipment was tested accordance to the requirement listed below:

(LTE Band 13)
FCC 47 CFR Part 2 / 27
ISED RSS GEN / 130

PASS

Prepared By:

Awatif Rahman
Technician

Approve Signatory:

Maheshvaran A/L Rajagopal
Responsible Engineer

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	9 July 2024	Awatif

1.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Results	Remarks	Serial Number Tested
2.1046 27.50(b)(12)	RSS-Gen 6.12 RSS-130 4.4	Conducted RF Output Power	Pass	Meet the requirement of limit	022TAD0679
-	RSS-130 4.4	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit	022TAD0679
2.1049	RSS-Gen 6.7	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit	022TAD0679
2.1055 27.54	RSS-130 4.3	Frequency Stability	Pass	Meet the requirement of limit	022TAD0679
2.1051 27.53(c)	RSS-Gen 6.13 RSS-130 4.7	Band Edge/Emission Mask Conducted Spurious Emission	Pass	Meet the requirement of limit	022TAD0679
2.1051 27.53(c)(2)	RSS-Gen 6.13 RSS-130 4.6	Conducted Spurious Emissions	Pass	Meet the requirement of limit	022TAD0679
2.1053 27.53(c)(2)	RSS-130 4.6	Radiated Spurious Emission	Pass	-42.9981 dBm (Margin: 29.9981 dBm, Noise Floor)	022TAF1521
2.1049 27.50(b)(10)	RSS-130 4.4	Effective Radiated Power (ERP)	Pass	Meet the requirement of limit	022TAD0679
27.53(f)	RSS – 130 4.7.2 (b)	GNSS (EIRP for 1599 – 1610MHz)	Pass	Meet the requirement of limit	022TAD0679

1.1. Measurement Uncertainty

Measurement	Frequency	Expended 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)				
Wideband Radio Communication Tester	CMW500	154550	8-Aug-23	8-Aug-24
Signal Analyzer	FSV40	101431	7-Aug-23	7-Aug-24
Chamber	SH-641	92003150	15-Sep-23	15-Sep-24
Power Supply	6652A	3640A02967	15-Oct-23	15-Oct-24
Test Software	R&S CMWrun			
Version	V.1.9.8			
RADIATED SPURIOUS EMISSION (EMC CHAMBER 1)				
Drg Horn Freq.	SAS-571	1143	08-Mar-23	08-Mar-25
Drg Horn Freq.	SAS-571	720	18-Apr-23	18-Apr-25
Power Supply	NR973A	MY54180189	30-Aug-23	30-Aug-24
Signal Generator	SMB 100A	182511	4-Jun-21	4-Jun-24
Emi Test Receiver	ESW44	101731	11-Aug-23	11-Aug-24
Bilog Antenna	CBL6112B	2950	14-Dec-23	14-Dec-24
Bilog Antenna	CBL6112B	2964	25-Sep-23	25-Sep-24
Data Logger Thermohygrometer	SDL500	A.016800	21-Jun-23	21-Jun-24
Broad-Band Horn Antenna	BBHA9170	BBHA9170143	28-Aug-23	28-Aug-24
Preamplifier	PAM-0118P	269	28-Jun-23	28-Jun-24
Loop Antenna	6502	00208416	26-Oct-23	26-Oct-24
5m Semi-Anechoic Chamber	S800-HX	J2308	Not required	Not required
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
Preamplifier 18-40Ghz	Miteq Hi Gain Sucoflex	002	Not required	Not required
Test Software	EMC_FCC_IC_BLUETOOTH_RE_TEST			
Version	EMC_FCC_RE_v1.6.5			

1.3. General Information

General Description of EUT

Product	APX N70			
Brand	Motorola Solutions			
Test Model	H35KET9PW8AN & H35KET9PW8AN-H			
Power Supply Rating	7.5 Vdc			
Mode of Operation	LTE Band 13			
Modulation Type	QPSK, 16QAM			
Operating Frequency	LTE Band 13	Channel Bandwidth 5MHz	779.5MHz~784.5MHz	
		Channel Bandwidth 10MHz	782MHz	
Max. Conducted RF Output Power	LTE Band 13 QPSK	Channel Bandwidth 5MHz	23.318dBm (0.215W)	
		Channel Bandwidth 10MHz	**23.825dBm (0.241W)**	
	LTE Band 13 16QAM	Channel Bandwidth 5MHz	22.446dBm (0.176W)	
		Channel Bandwidth 10MHz	**22.821dBm (0.191W)**	
Emission Designator	LTE Band 13		**QPSK**	**16QAM**
		Channel Bandwidth 5MHz	4M47G7D	4M48D7W
		Channel Bandwidth 10MHz	8M89G7D	8M87D7W
Antenna Type	LTE Band 13	Stamped Metal, Antenna LTE Low Band 777 – 787MHz (-1.5dBi)		
SW Version	D03.75.21 (BP), D00.00.16 (AP)			
HW Version	P1			

Note:

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

Item	Brand	Model or P/N	Specification
Li-ion Battery	MOTOROLA	PMNN4818A	UL 3650mAH (using RN 2170 Li-Ion cell)

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 OOBE 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 13	5 MHz	23205 ~ 23255	23205	23230	23255	779.5	782	784.5
	10 MHz	23230	-	23230	-	-	782	-

1.5. Test Mode Applicability and Tested Channel Detail

Pre-scan also have been conducted with the accessory devices listed in section table 1.3, only the worst case radiated emission results of the combination test configuration is reported in this report.
The following channel(s) was (were) selected for the final test as listed below:

LTE Band 13

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Uplink Modulation	Mode
Conducted RF Output Power	23025 ~ 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	As per table 1.6.3
	23025 ~ 23255	23230	10 MHz		
Peak to Average Power Ratio	23025 ~ 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	23025 ~ 23255	23230	10 MHz		50 RB / 0 RB Offset
Occupied Bandwidth	23025 ~ 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	23025 ~ 23255	23230	10 MHz		50 RB / 0 RB Offset
Frequency Stability	23025 ~ 23255	23205, 23255	5 MHz	QPSK	25 RB / 0 RB Offset
	23025 ~ 23255	23230	10 MHz		50 RB / 0 RB Offset
Band Edge / Emission Mask Conducted Spurious Emission	23025 ~ 23255	23205, 23255	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
	23025 ~ 23255	23230	10 MHz		1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
Conducted Spurious Emission	23025 ~ 23255	23205, 23230, 23255	5 MHz	QPSK	1 RB / 13 RB Offset
	23025 ~ 23255	23230	10 MHz		1 RB / 0 RB Offset
Radiated Spurious Emission	23025 ~ 23255	23205	5 MHz	QPSK	1 RB / 24 RB Offset
		23230	10 MHz		1 RB / 0 RB Offset
		23255	10 MHz		1 RB / 13 RB Offset
GNSS (EIRP for 1599 – 1610MHz)	23025 ~ 23255	23205	5 MHz	QPSK	1 RB / 24 RB Offset
		23255			1 RB / 13 RB Offset
Effective Radiated Power (ERP)	23025 ~ 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	As per table 1.6.4
	23025 ~ 23255	23230	10 MHz		

NOTE:

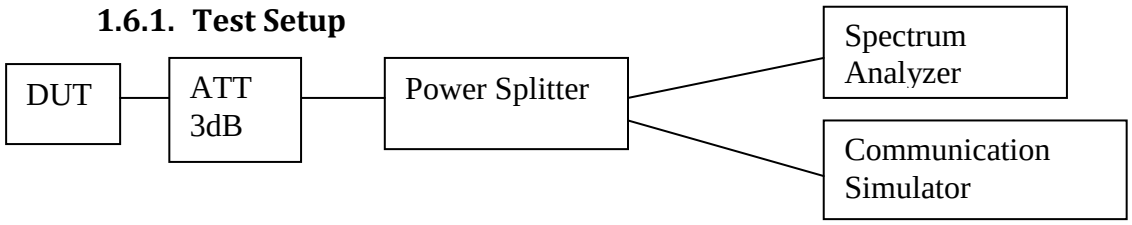
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK mode is higher than 16QAM mode. Therefore, only Conducted Spurious Emission, Radiated Emission and GNSS (EIRP for 1599 – 1610MHz) had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency band.
3. The Equivalent Radiated Power (ERP) 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	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Peak-to-Average Power Ratio	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Occupied Bandwidth	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Frequency Stability	-30ºC ~ 60ºC	7.5 Vdc	Awatif Rahman
Band Edge Conducted Spurious Emission	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Conducted Spurious Emission	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Radiated Spurious Emission	23.4ºC, 69.3% RH	7.5 Vdc	Nazrin & Rezza
Effective Radiated Power (ERP)	25ºC, 50% RH	7.5 Vdc	Awatif Rahman

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. Test Limits

FCC: Portable stations (hand-held devices) transmitting in the 776-788 MHz band is 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 13 (777-787MHz)

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
			23205	23230	23255	23205	23230	23255
			779.5MHz	782 MHz	784.5 MHz	779.5 MHz	782 MHz	784.5 MHz
Band 13 / 5MHz	**1**	**0**	23.191	23.155	23.248	22.358	22.268	22.236
	1	**13**	23.171	**23.318**	23.295	22.365	22.426	22.32
	1	**24**	23.216	23.311	23.077	22.381	**22.446**	22.18
	12	**0**	22.248	22.208	22.333	21.299	21.167	21.304
	12	**6**	22.129	22.27	22.309	21.236	21.257	21.274
	12	**13**	22.1	22.272	22.266	21.136	21.178	21.354
	25	**0**	22.276	22.269	22.331	21.31	21.331	21.276

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
				23230			23230	
				782 MHz			782 MHz	
Band 13 / 10MHz	**1**	**0**		**23.825**			**22.821**	
	1	**25**		23.339			22.42	
	1	**49**		23.65			22.487	
	25	**0**		22.387			21.541	
	25	**13**		22.303			21.431	
	25	**25**		22.347			21.394	
	50	**0**		22.347			21.418	

1.6.4. Effective Radiated Power – LTE Band 13 (777-787 MHz)

ERP (dBm)									
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation			
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH	
			23205	23230	23255	23205	23230	23255	
			779.5MHz	782 MHz	784.5 MHz	779.5 MHz	782 MHz	784.5 MHz	
Band 13 / 5MHz	1	0	19.541	19.505	19.598	18.708	18.618	18.586	
	1	13	19.521	**19.668**	19.645	18.715	18.776	18.67	
	1	24	19.566	19.661	19.427	18.731	**18.796**	18.53	
	12	0	18.598	18.558	18.683	17.649	17.517	17.654	
	12	6	18.479	18.62	18.659	17.586	17.607	17.624	
	12	13	18.45	18.622	18.616	17.486	17.528	17.704	
	25	0	18.626	18.619	18.681	17.66	17.681	17.626	

ERP (dBm)									
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation			
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH	
				23230			23230		
				782 MHz			782 MHz		
Band 13 / 10MHz	1	0		**20.175**			**19.171**		
	1	25		19.689			18.77		
	1	49		20			18.837		
	25	0		18.737			17.891		
	25	13		18.653			17.781		
	25	25		18.697			17.744		
	50	0		18.697			17.768		

The maximum ERP/EIRP from the measured RF output power is given in Equation as follows:

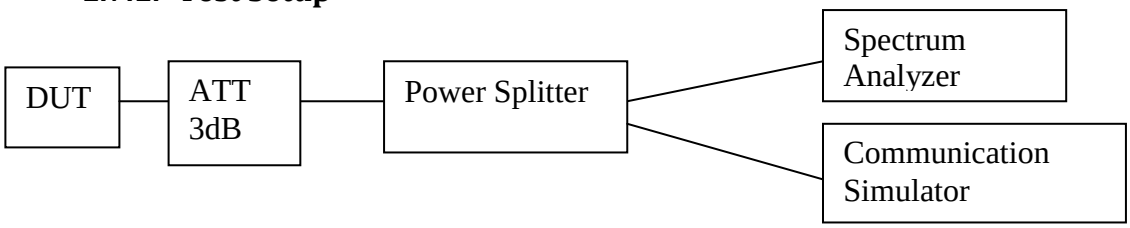
$$\mathbf{EIRP} = \mathbf{P_{Meas}} + \mathbf{G_T}$$
$$\mathbf{ERP} = \mathbf{EIRP} - \mathbf{2.15}$$

Where, ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (Expressed in the same units as PMeas, e.g., dBm)

$\mathbf{P_{Meas}}$ measured transmitter output power, in dBm
$\mathbf{G_T}$ gain of the transmitting antenna, in dBi (EIRP)

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.

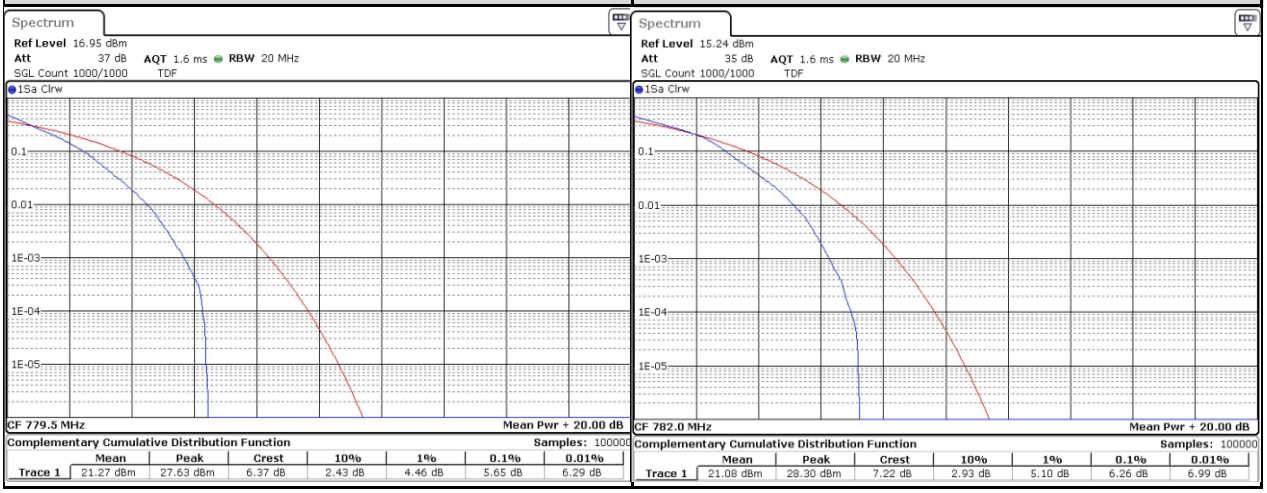
1.7.2. Test Limit

The peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

1.7.3. Peak-to-Average Power Ratio – LTE Band 13 (777-787MHz)

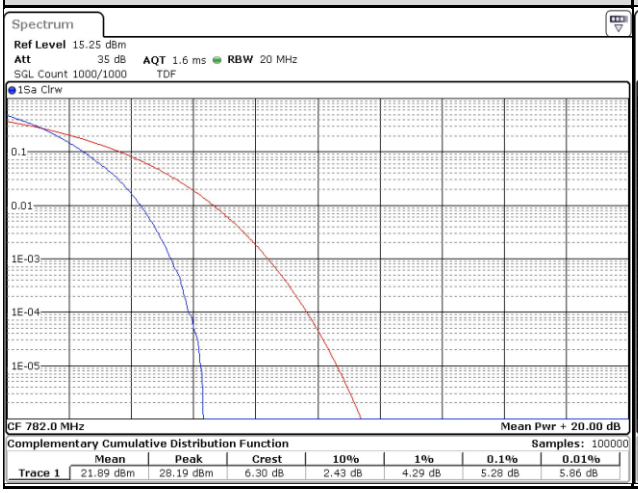
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 13/5MHz/25/0	Low CH 23205	779.5 MHz	5.449	6.203
	Mid CH 23230	782 MHz	**5.565**	**6.261**
	High CH 23255	784.5 MHz	5.043	5.913

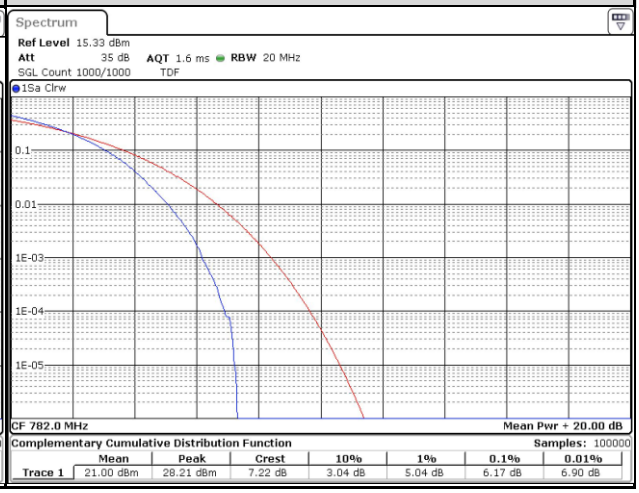
Spectrum Plot of Worst Value	
QPSK	16QAM



LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 13/10MHz/50/0	Low CH			
	Mid CH 23230	782 MHz	5.275	6.174
	High CH			

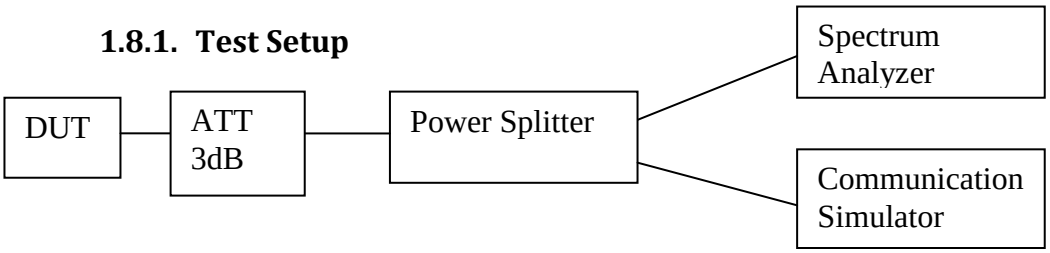
Spectrum Plot of Worst Value	
QPSK	16QAM





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.

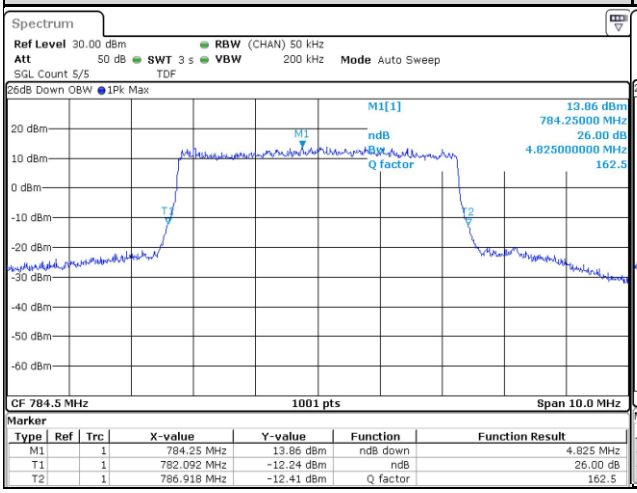
1.8.2. Test Limit

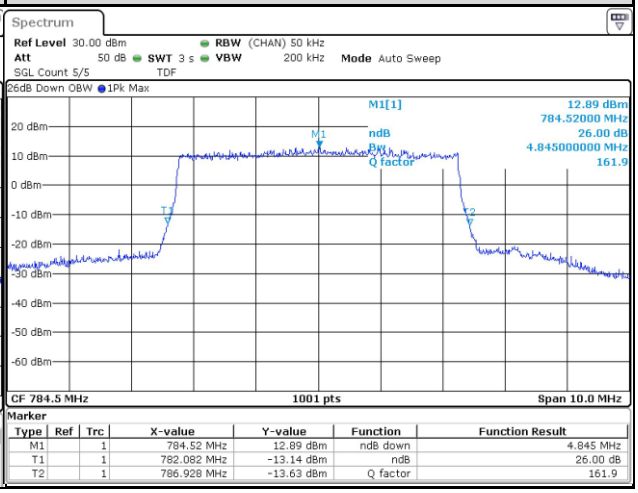
For measurement 99% of occupied bandwidth that is required by FCC 2.1049 and RSS Gen 6.7.

1.8.3. Occupied Bandwidth – LTE Band 13 (777-787MHz)

LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 13/5MHz/25/0	Low CH 23205	779.5 MHz	4.815	4.795
	Mid CH 23230	782 MHz	4.815	4.805
	High CH 23255	784.5 MHz	**4.825**	**4.845**

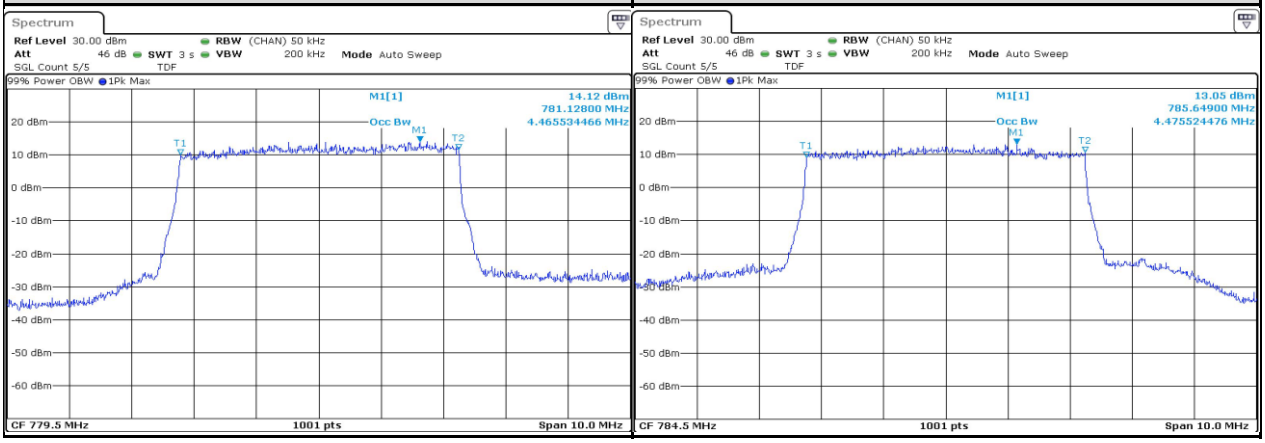
Spectrum Plot of Worst Value	
-26 dBC Bandwidth	
QPSK	16QAM





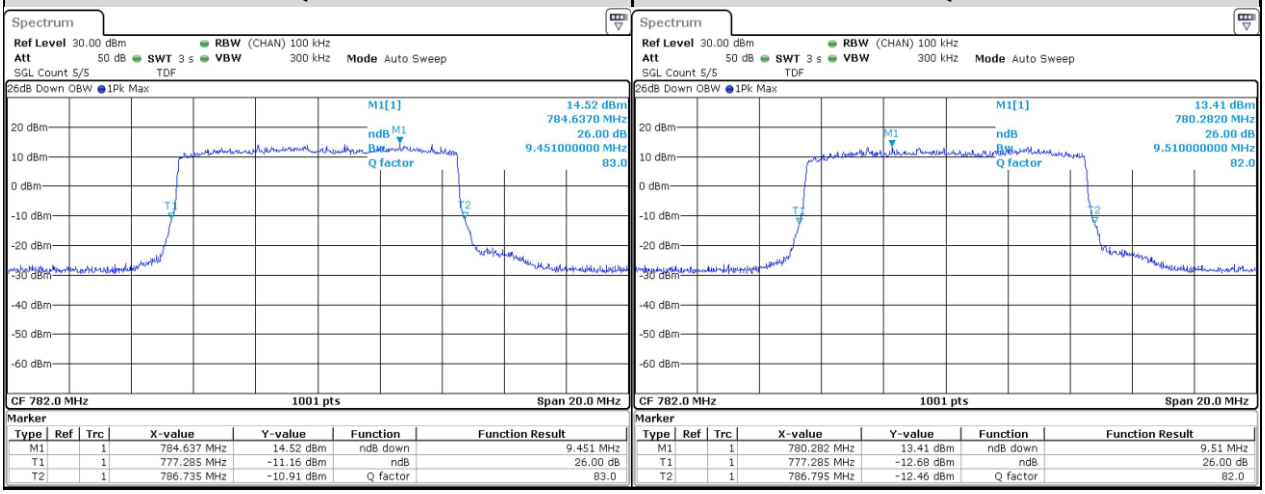
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 13/5MHz/25/0	Low CH 23205	779.5 MHz	**4.466**	4.456
	Mid CH 23230	782 MHz	4.466	4.466
	High CH 23255	784.5 MHz	4.456	**4.476**

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



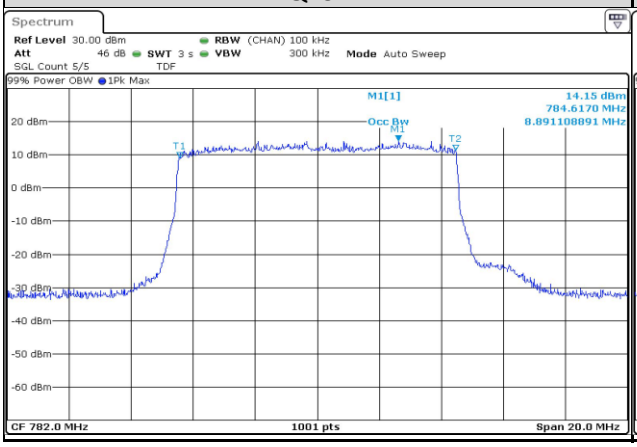
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 13/10MHz/50/0	Low CH			
	Mid CH 23230	782 MHz	9.451	9.51
	High CH			

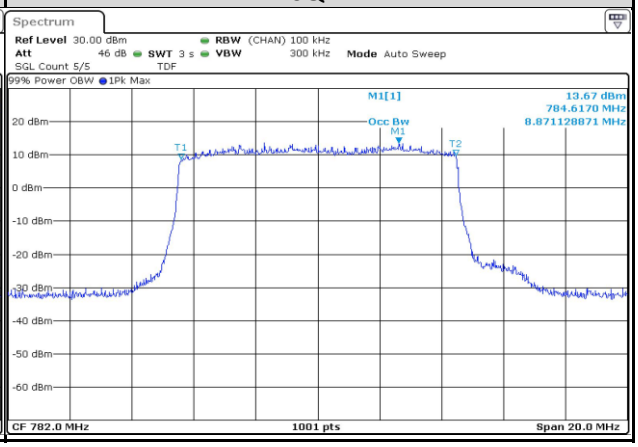
Spectrum Plot of Worst Value	
-26 dBC Bandwidth	
QPSK	16QAM



LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 13/10MHz/50/0	Low CH			
	Mid CH 23230	782 MHz	8.891	8.871
	High CH			

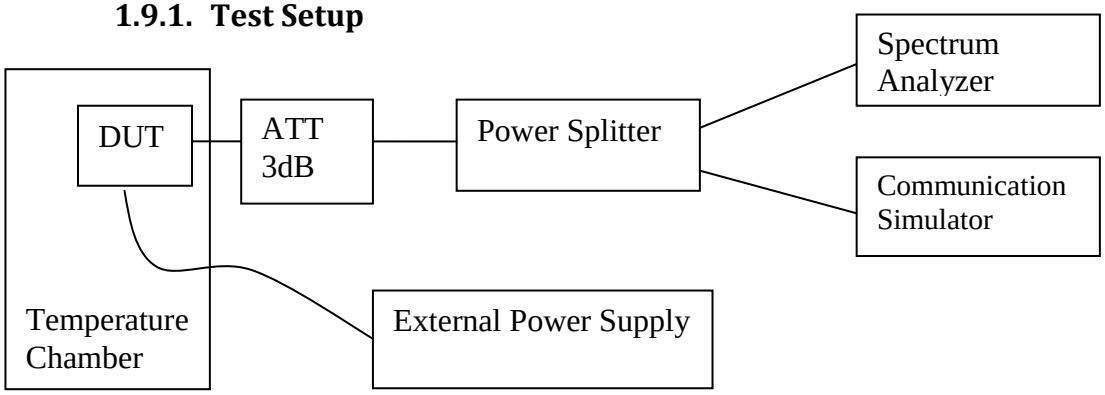
Spectrum Plot of Worst Value	
99% Occupied Bandwidth	
QPSK	16QAM





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 ~ 60 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 -30 to 60 deg C with spec of +/- 0.1ppm.

1.9.3. Frequency Stability – LTE Band 13 (777-787MHz)

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		779.5MHz		784.5MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 13	**60**	779.500052	0.00534	784.500034	0.010029
	50	779.500046	0.005983	784.500035	0.004431
	40	779.500054	-0.006148	784.500646	0.007586
	30	779.500463	-0.005652	784.500546	0.00837
	20	779.500546	-0.006019	784.500463	0.008114
	10	779.500351	0.006808	784.503324	0.010667
	0	779.500355	0.009378	784.500035	0.009956
	-10	779.500035	0.006772	784.500945	0.010594
	-20	779.500021	0.004771	784.500015	0.010394
	-30	779.500625	0.009047	784.500215	0.01426

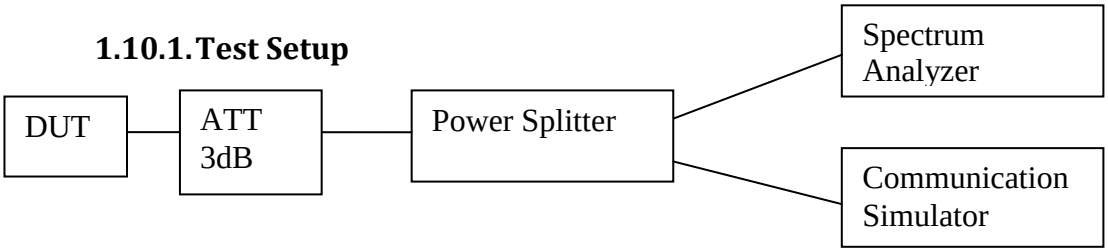
Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		779.5MHz		784.5MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 13	**9**	779.500049	0.007855	784.500041	0.012764
	7.5	779.500051	-0.005579	784.500001	0.007695
	6	779.500366	0.006662	784.500456	0.008206

Band	Temp (Deg C)	Frequency Error VS Temperature	
		Channel Bandwidth: 10 MHz	
		Mid Channel	
		782MHz	
		Frequency (MHz)	Frequency Error (ppm)
LTE Band 13	**60**	782.002563	0.005726
	50	782.000546	0.008671
	40	782.000645	0.006329
	30	782.000456	0.00547
	20	782.004536	0.007043
	10	782.006896	0.005982
	0	782.000654	0.006732
	-10	782.000684	0.006311
	-20	782.000521	0.007848
	-30	782.000056	0.008323

Band	Voltage (V)	Frequency Error VS Voltage	
		Channel Bandwidth: 10 MHz	
		Mid Channel	
		782MHz	
		Frequency (MHz)	Frequency Error (ppm)
LTE Band 13	**9**	782.000001	0.005506
	7.5	782.000058	0.006842
	6	782.000356	0.00664

1.10. Band Edge Conducted Spurious Emission

1.10.1. 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) The band edges of lowest and highest channels with the highest RF powers were measured.
5) On frequency outside the 776-788 MHz band, the instrumentation employed a resolution bandwidth of 100 kHz. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz is employed.
6) Record the maximum trace plot into the test report.

1.10.2. Test Limit

For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the 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, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

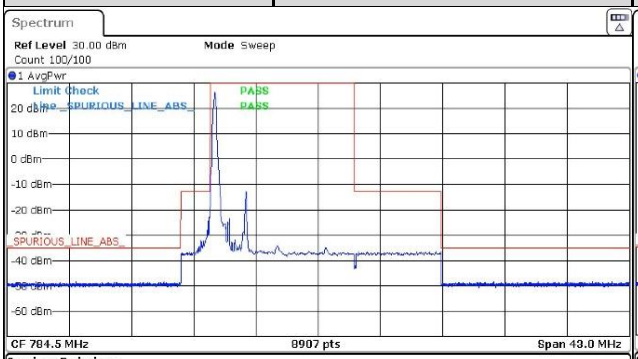
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (1) and (2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the 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 13 (777-787MHz)

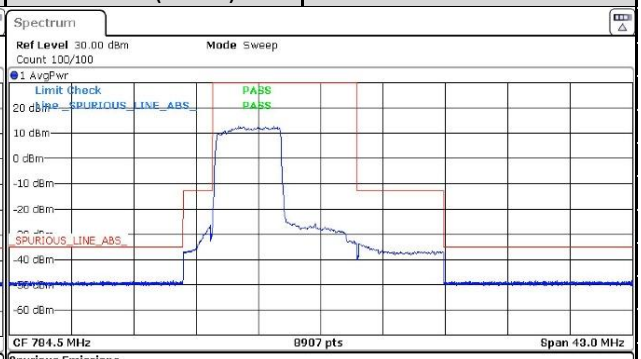
5MHZ

Band 13, 5MHz QPSK, Low CH 23205			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



Spurious Emissions

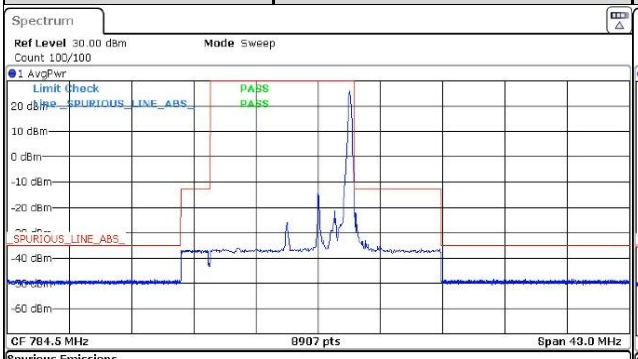
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	767.74331 MHz	-48.47 dBm	-13.47 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.89059 MHz	-24.43 dBm	-11.43 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.99158 MHz	-19.15 dBm	-6.15 dB
777.000 MHz	787.000 MHz	100.000 kHz	777.33865 MHz	25.32 dBm	-3.68 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.01436 MHz	-41.75 dBm	-28.75 dB
787.100 MHz	793.000 MHz	100.000 kHz	792.66788 MHz	-36.53 dBm	-23.53 dB
793.000 MHz	806.000 MHz	6.250 kHz	803.45168 MHz	-48.38 dBm	-13.38 dB



Spurious Emissions

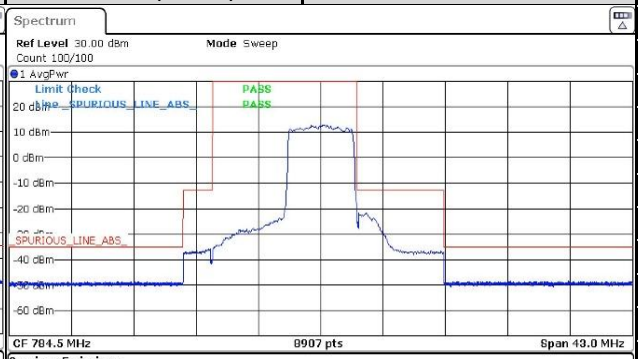
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	774.30267 MHz	-48.38 dBm	-13.38 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.89059 MHz	-26.35 dBm	-13.35 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.99455 MHz	-27.59 dBm	-14.59 dB
777.000 MHz	787.000 MHz	100.000 kHz	778.85259 MHz	12.62 dBm	-17.38 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.08762 MHz	-38.30 dBm	-25.30 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-33.74 dBm	-20.74 dB
793.000 MHz	806.000 MHz	6.250 kHz	799.29267 MHz	-48.40 dBm	-13.40 dB

Band 13, 5MHz QPSK, High CH 23255			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



Spurious Emissions

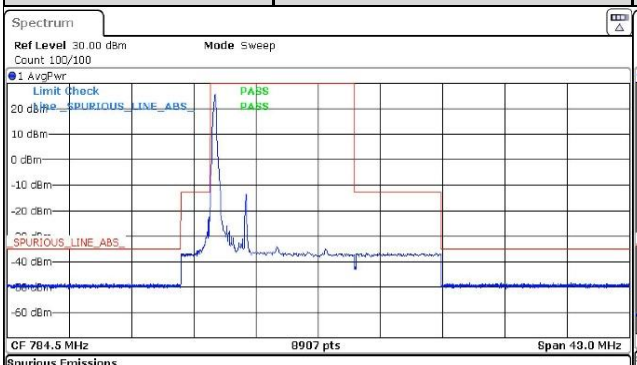
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	773.18095 MHz	-48.55 dBm	-13.55 dB
775.000 MHz	776.900 MHz	100.000 kHz	775.53614 MHz	-36.95 dBm	-23.95 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.90149 MHz	-41.87 dBm	-28.87 dB
777.000 MHz	787.000 MHz	100.000 kHz	786.66135 MHz	26.02 dBm	-3.98 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00050 MHz	-17.53 dBm	-4.53 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-22.54 dBm	-9.54 dB
793.000 MHz	806.000 MHz	6.250 kHz	802.03749 MHz	-48.25 dBm	-13.25 dB



Spurious Emissions

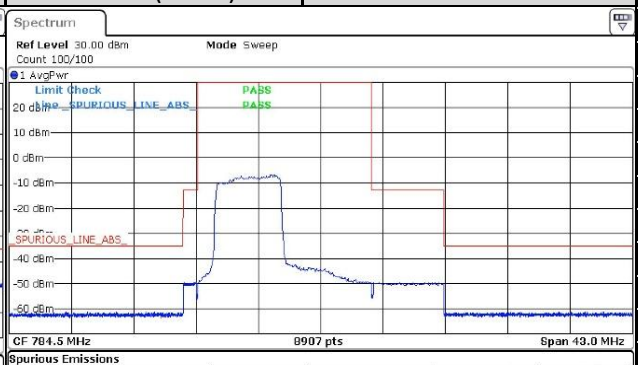
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	771.90027 MHz	-48.73 dBm	-13.73 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.87178 MHz	-35.84 dBm	-22.84 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.93713 MHz	-40.31 dBm	-27.31 dB
777.000 MHz	787.000 MHz	100.000 kHz	784.78884 MHz	12.86 dBm	-17.14 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00347 MHz	-24.24 dBm	-11.24 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.62748 MHz	-21.70 dBm	-8.70 dB
793.000 MHz	806.000 MHz	6.250 kHz	797.59379 MHz	-48.50 dBm	-13.50 dB

Band 13, 5MHz 16-QAM, Low CH 23205			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



Spurious Emissions

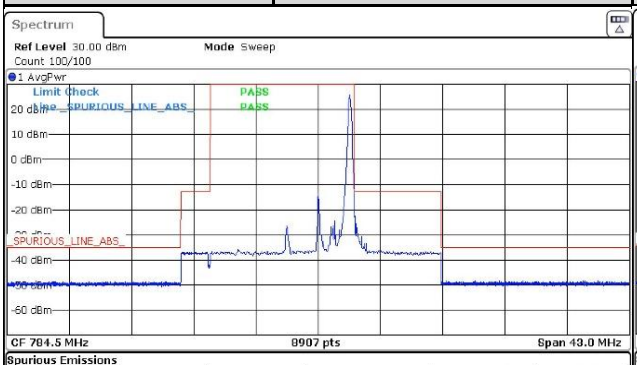
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	772.43414 MHz	-48.63 dBm	-13.63 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.89059 MHz	-23.61 dBm	-10.61 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.99851 MHz	-18.71 dBm	-5.71 dB
777.000 MHz	787.000 MHz	100.000 kHz	777.37849 MHz	25.52 dBm	-4.48 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.08960 MHz	-42.01 dBm	-29.01 dB
787.100 MHz	793.000 MHz	100.000 kHz	788.68245 MHz	-36.66 dBm	-23.66 dB
793.000 MHz	806.000 MHz	6.250 kHz	799.83421 MHz	-48.36 dBm	-13.36 dB



Spurious Emissions

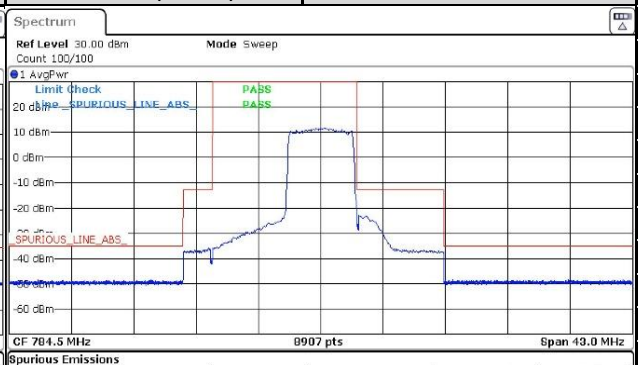
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	766.92152 MHz	-51.42 dBm	-26.42 dB
775.000 MHz	775.900 MHz	100.000 kHz	775.10248 MHz	-49.81 dBm	-36.81 dB
775.900 MHz	776.000 MHz	30.000 kHz	775.97178 MHz	-54.29 dBm	-41.29 dB
776.000 MHz	788.000 MHz	100.000 kHz	781.08306 MHz	-6.76 dBm	-36.76 dB
788.000 MHz	788.100 MHz	30.000 kHz	788.02220 MHz	-54.49 dBm	-41.49 dB
788.100 MHz	793.000 MHz	100.000 kHz	789.95782 MHz	-49.67 dBm	-36.67 dB
793.000 MHz	806.000 MHz	6.250 kHz	801.73114 MHz	-51.20 dBm	-26.20 dB

Band 13, 5MHz 16-QAM, High CH 23255			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	771.17146 MHz	-48.64 dBm	-13.64 dB
775.000 MHz	776.900 MHz	100.000 kHz	775.87475 MHz	-36.89 dBm	-23.89 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.95584 MHz	-41.89 dBm	-28.89 dB
777.000 MHz	787.000 MHz	100.000 kHz	786.65135 MHz	25.68 dBm	-4.32 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00347 MHz	-18.49 dBm	-5.49 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-25.36 dBm	-12.36 dB
793.000 MHz	806.000 MHz	6.250 kHz	793.34813 MHz	-48.26 dBm	-13.26 dB

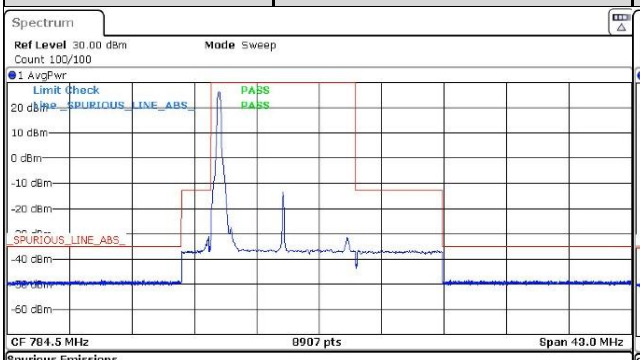


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	772.82104 MHz	-48.47 dBm	-13.47 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.79653 MHz	-35.92 dBm	-22.92 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.95297 MHz	-40.74 dBm	-27.74 dB
777.000 MHz	787.000 MHz	100.000 kHz	784.82869 MHz	11.80 dBm	-18.20 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00644 MHz	-25.72 dBm	-12.72 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-22.78 dBm	-9.78 dB
793.000 MHz	806.000 MHz	6.250 kHz	793.58950 MHz	-48.34 dBm	-13.34 dB

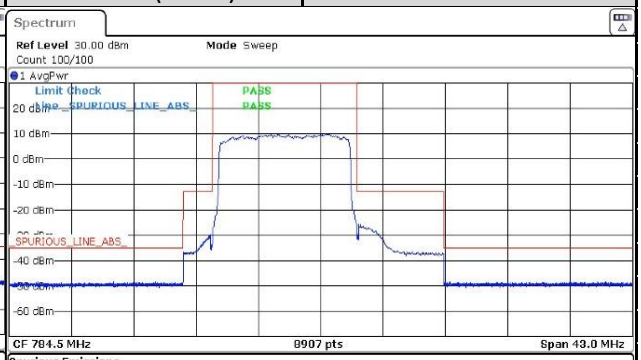
10MHz

Band 13, 10MHz QPSK, Low CH 23230			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



Spurious Emissions

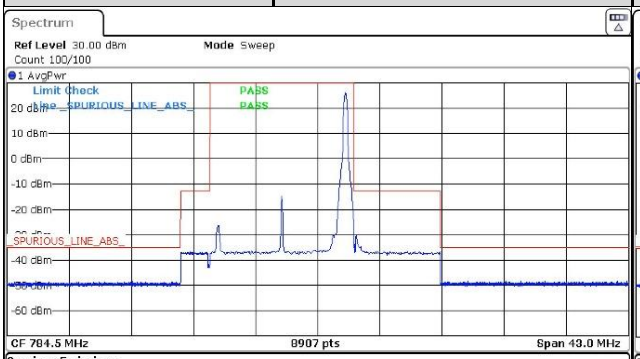
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	769.47088 MHz	-48.45 dBm	-13.45 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.87178 MHz	-31.13 dBm	-18.13 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.99950 MHz	-32.74 dBm	-19.74 dB
777.000 MHz	787.000 MHz	100.000 kHz	777.57769 MHz	26.51 dBm	-3.49 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.09950 MHz	-41.74 dBm	-28.74 dB
787.100 MHz	793.000 MHz	100.000 kHz	792.66788 MHz	-36.63 dBm	-23.63 dB
793.000 MHz	806.000 MHz	6.250 kHz	793.50905 MHz	-48.49 dBm	-13.49 dB



Spurious Emissions

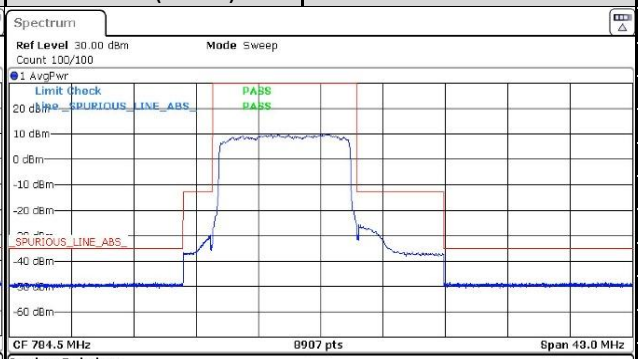
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	770.19370 MHz	-48.43 dBm	-13.43 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.89059 MHz	-29.95 dBm	-16.95 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.98465 MHz	-33.31 dBm	-20.31 dB
777.000 MHz	787.000 MHz	100.000 kHz	784.82869 MHz	10.04 dBm	-19.96 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.05297 MHz	-29.87 dBm	-16.87 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-25.79 dBm	-12.79 dB
793.000 MHz	806.000 MHz	6.250 kHz	803.62806 MHz	-48.30 dBm	-13.30 dB

Band 13, 10MHz QPSK, High CH 23230			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



Spurious Emissions

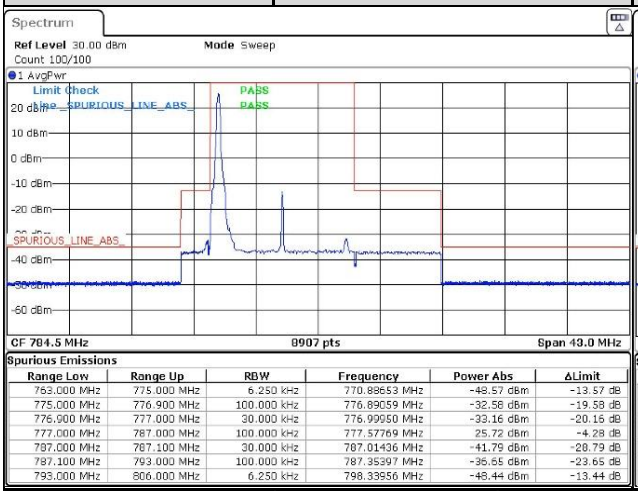
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	771.66633 MHz	-48.50 dBm	-13.50 dB
775.000 MHz	776.900 MHz	100.000 kHz	775.68663 MHz	-36.91 dBm	-23.91 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.95495 MHz	-41.92 dBm	-28.92 dB
777.000 MHz	787.000 MHz	100.000 kHz	786.42231 MHz	26.15 dBm	-3.85 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00347 MHz	-31.48 dBm	-18.48 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.15861 MHz	-30.52 dBm	-17.52 dB
793.000 MHz	806.000 MHz	6.250 kHz	798.52523 MHz	-48.47 dBm	-13.47 dB



Spurious Emissions

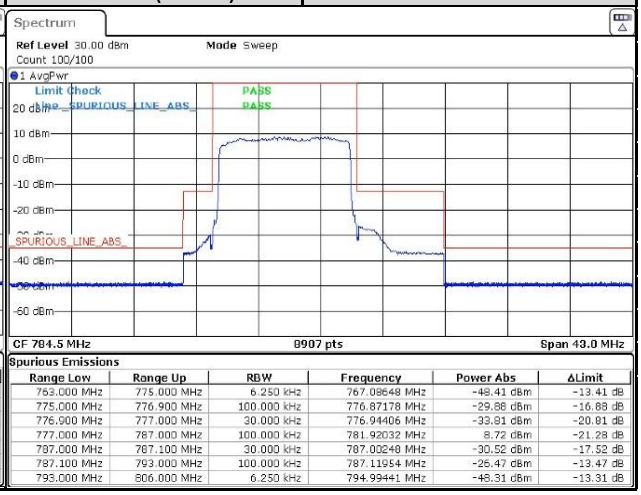
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	770.19370 MHz	-48.43 dBm	-13.43 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.89059 MHz	-29.95 dBm	-16.95 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.98465 MHz	-33.31 dBm	-20.31 dB
777.000 MHz	787.000 MHz	100.000 kHz	784.82869 MHz	10.04 dBm	-19.96 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.05297 MHz	-29.87 dBm	-16.87 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-25.79 dBm	-12.79 dB
793.000 MHz	806.000 MHz	6.250 kHz	803.62806 MHz	-48.30 dBm	-13.30 dB

Band 13, 10MHz 16-QAM, Low CH 23230			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



Spurious Emissions

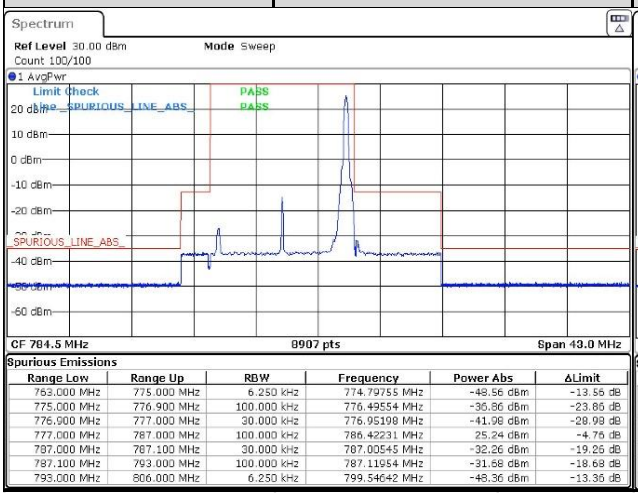
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	770.88653 MHz	-48.57 dBm	-13.57 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.89059 MHz	-32.58 dBm	-19.58 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.99950 MHz	-33.16 dBm	-20.16 dB
777.000 MHz	787.000 MHz	100.000 kHz	777.57769 MHz	25.72 dBm	-4.28 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.01436 MHz	-41.79 dBm	-20.79 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.35397 MHz	-36.65 dBm	-23.65 dB
793.000 MHz	806.000 MHz	6.250 kHz	798.33956 MHz	-48.44 dBm	-13.44 dB



Spurious Emissions

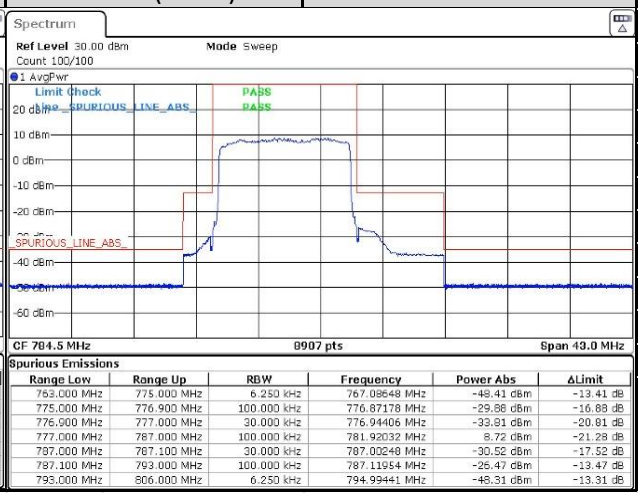
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	767.08648 MHz	-48.41 dBm	-13.41 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.87178 MHz	-29.88 dBm	-16.88 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.94406 MHz	-33.81 dBm	-20.81 dB
777.000 MHz	787.000 MHz	100.000 kHz	781.92032 MHz	8.72 dBm	-21.28 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00248 MHz	-30.52 dBm	-17.52 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-26.47 dBm	-13.47 dB
793.000 MHz	806.000 MHz	6.250 kHz	794.99441 MHz	-48.31 dBm	-13.31 dB

Band 13, 10MHz 16-QAM, High CH 23230			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	774.79755 MHz	-48.56 dBm	-13.56 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.49554 MHz	-36.86 dBm	-23.86 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.95198 MHz	-41.98 dBm	-28.98 dB
777.000 MHz	787.000 MHz	100.000 kHz	786.42231 MHz	25.24 dBm	-4.76 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00545 MHz	-32.26 dBm	-19.26 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-31.68 dBm	-18.68 dB
793.000 MHz	806.000 MHz	6.250 kHz	799.54642 MHz	-48.36 dBm	-13.36 dB

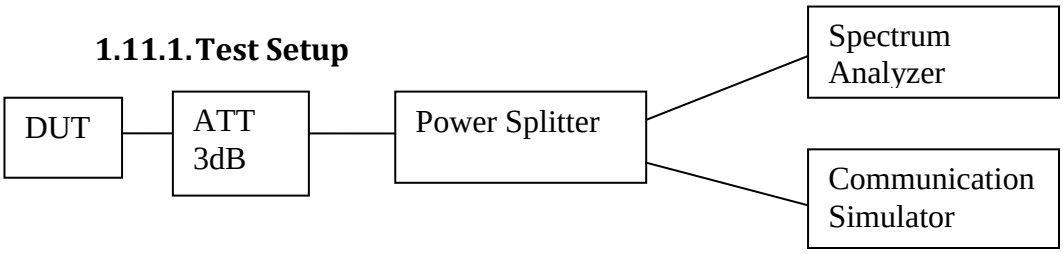


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	767.08648 MHz	-48.41 dBm	-13.41 dB
775.000 MHz	776.900 MHz	100.000 kHz	776.87178 MHz	-29.88 dBm	-16.88 dB
776.900 MHz	777.000 MHz	30.000 kHz	776.94406 MHz	-33.81 dBm	-20.81 dB
777.000 MHz	787.000 MHz	100.000 kHz	781.92032 MHz	8.72 dBm	-21.28 dB
787.000 MHz	787.100 MHz	30.000 kHz	787.00248 MHz	-30.52 dBm	-17.52 dB
787.100 MHz	793.000 MHz	100.000 kHz	787.11954 MHz	-26.47 dBm	-13.47 dB
793.000 MHz	806.000 MHz	6.250 kHz	794.99441 MHz	-48.31 dBm	-13.31 dB

1.11. Conducted Spurious Emission

1.11.1. 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) 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 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the 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, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

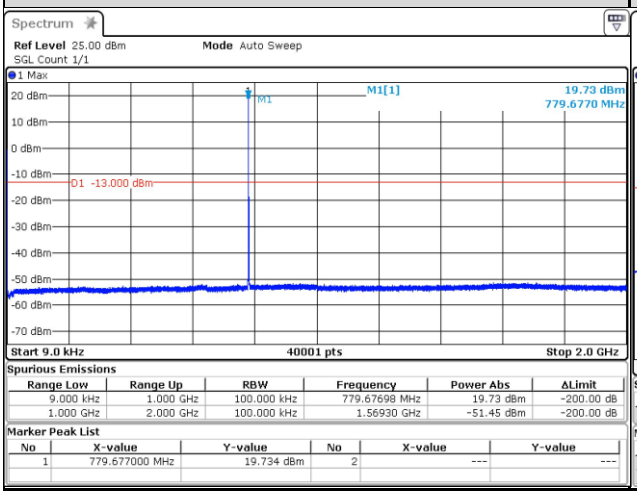
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

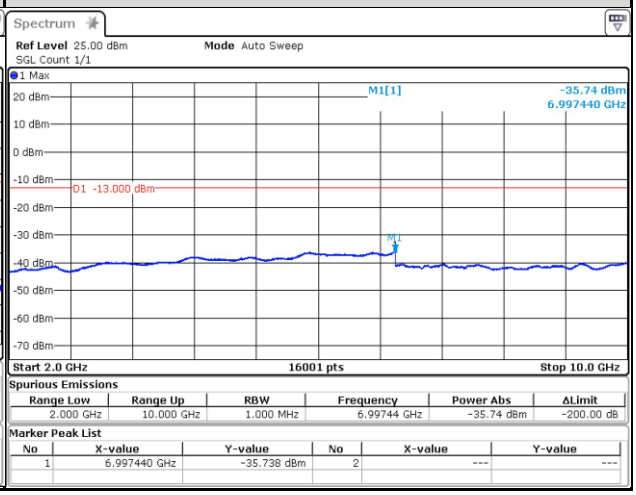
(5) Compliance with the provisions of paragraphs (1) and (2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

1.11.3. Conducted Spurious Emissions – LTE Band 13 (777-787MHz)

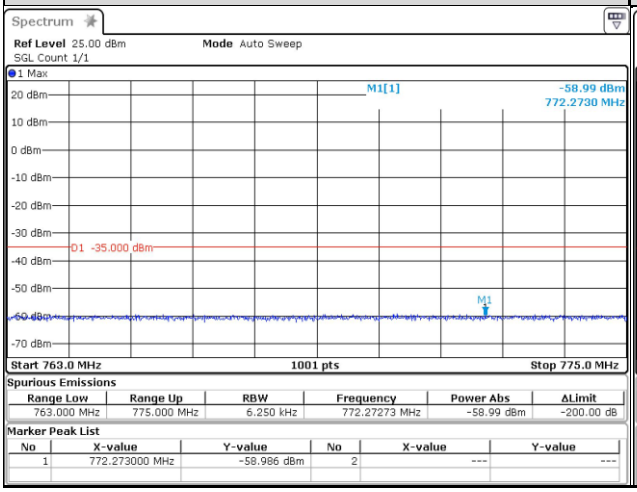
5MHz

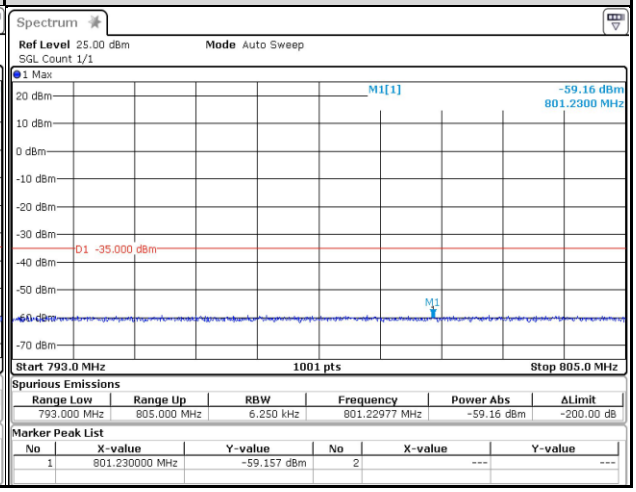
QPSK - Low Freq (779.5 MHz)	
RB Size =1, RB Offset = 13	
9kHz ~ 2GHz	2GHz ~ 10GHz



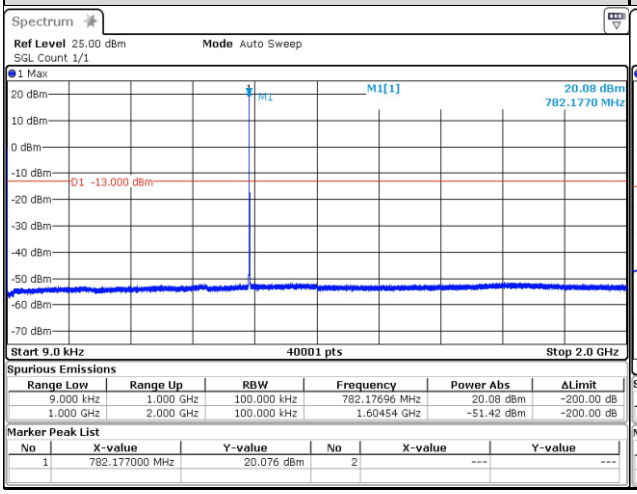


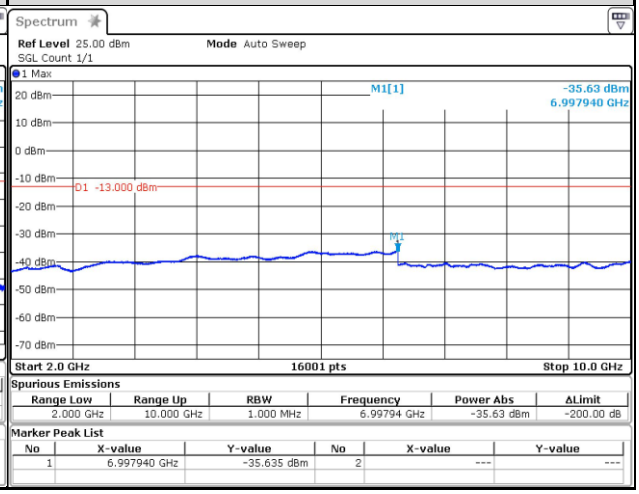
763MHz ~ 775MHz	793MHz ~ 805MHz



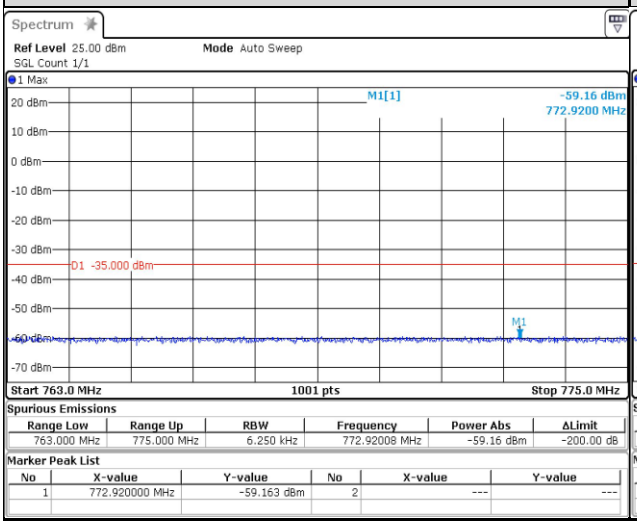


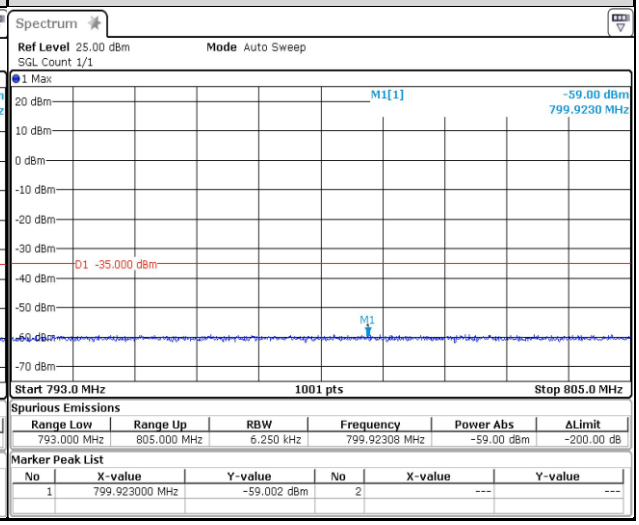
QPSK - Mid Freq (782 MHz)	
RB Size =1, RB Offset = 13	
9kHz ~ 2GHz	2GHz ~ 10GHz



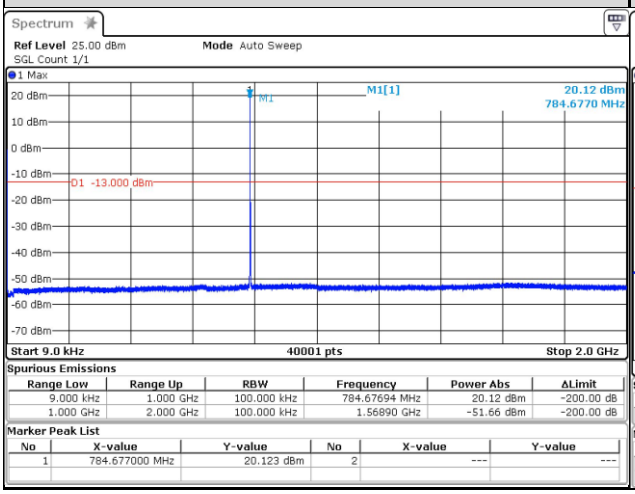


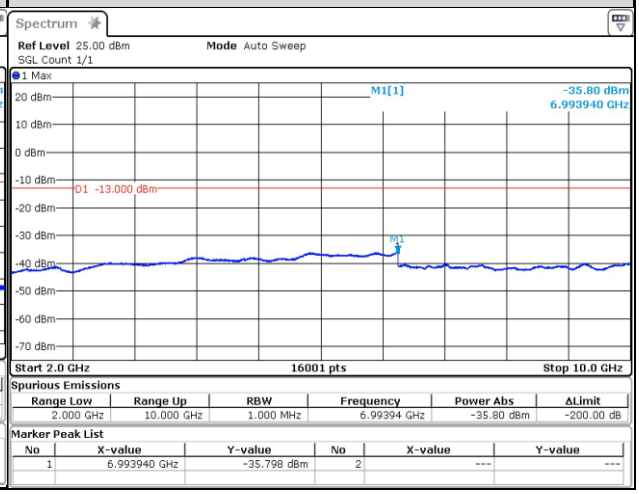
763MHz ~ 775MHz	793MHz ~ 805MHz



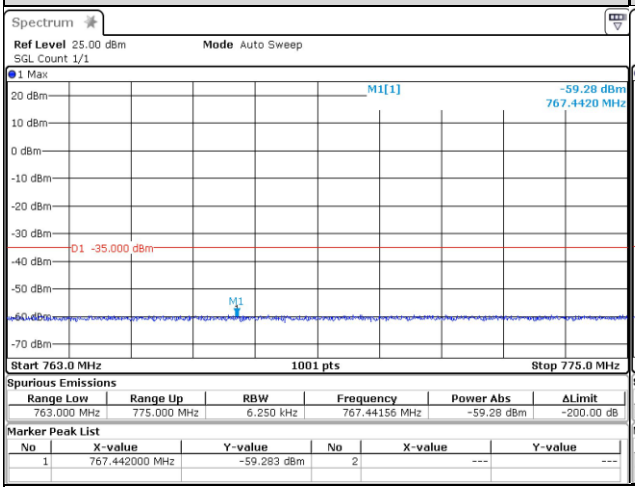


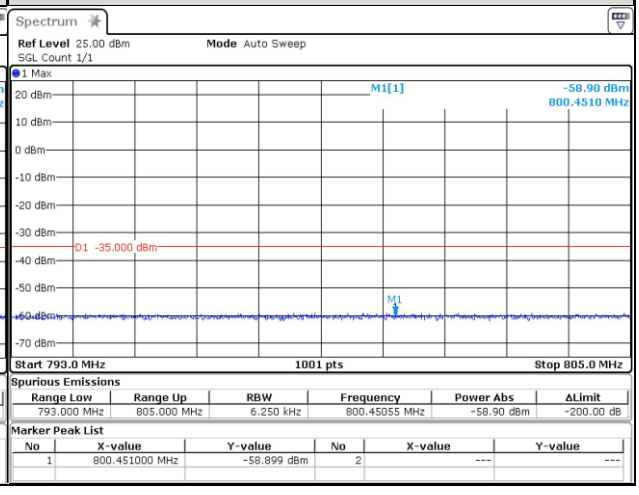
QPSK - High Freq (784.5 MHz)	
RB Size =1, RB Offset = 13	
9kHz ~ 2GHz	2GHz ~ 10GHz





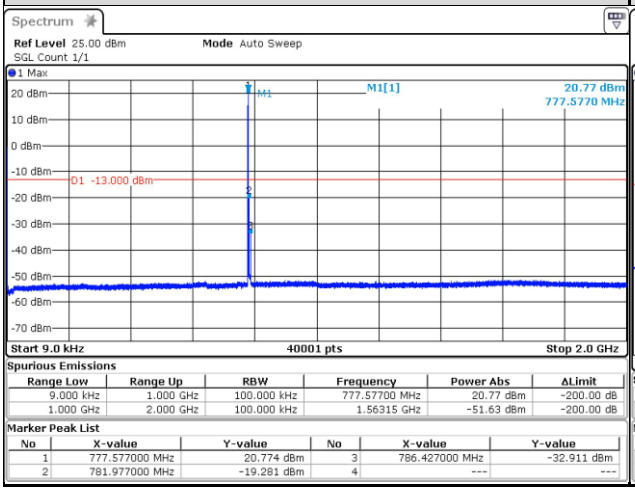
763MHz ~ 775MHz	793MHz ~ 805MHz





10MHz

QPSK - Mid Freq (782 MHz)	
RB Size =1, RB Offset = 0	
9kHz ~ 2GHz	2GHz ~ 10GHz

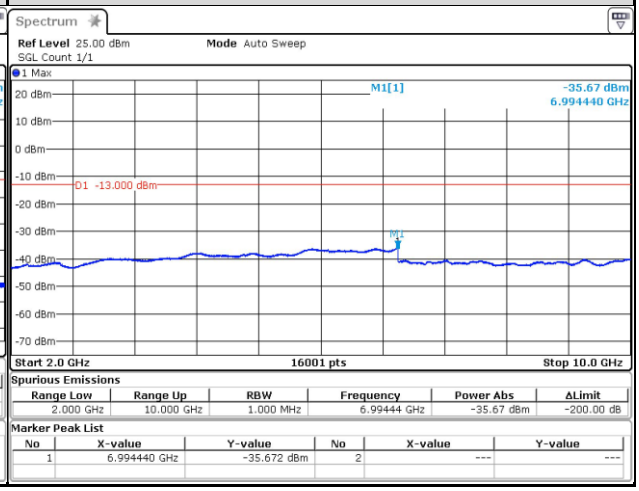


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	1.000 GHz	100.000 kHz	777.57700 MHz	20.77 dBm	-200.00 dB
1.000 GHz	2.000 GHz	100.000 kHz	1.56315 GHz	-51.63 dBm	-200.00 dB

Marker Peak List

No	X-value	Y-value	No	X-value	Y-value
1	777.577000 MHz	20.774 dBm	3	786.427000 MHz	-32.911 dBm
2	781.977000 MHz	-19.281 dBm	4	---	---



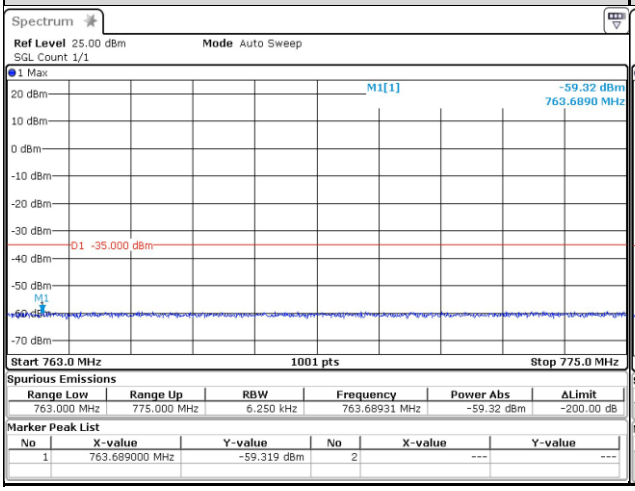
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.000 GHz	10.000 GHz	1.000 MHz	6.99444 GHz	-35.67 dBm	-200.00 dB

Marker Peak List

No	X-value	Y-value	No	X-value	Y-value
1	6.994440 GHz	-35.672 dBm	2	---	---

763MHz ~ 775MHz	793MHz ~ 805MHz

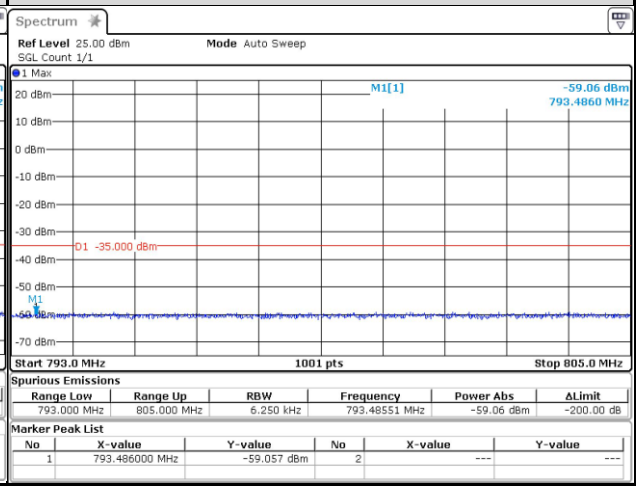


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	763.68931 MHz	-59.32 dBm	-200.00 dB

Marker Peak List

No	X-value	Y-value	No	X-value	Y-value
1	763.689000 MHz	-59.319 dBm	2	---	---



Spurious Emissions

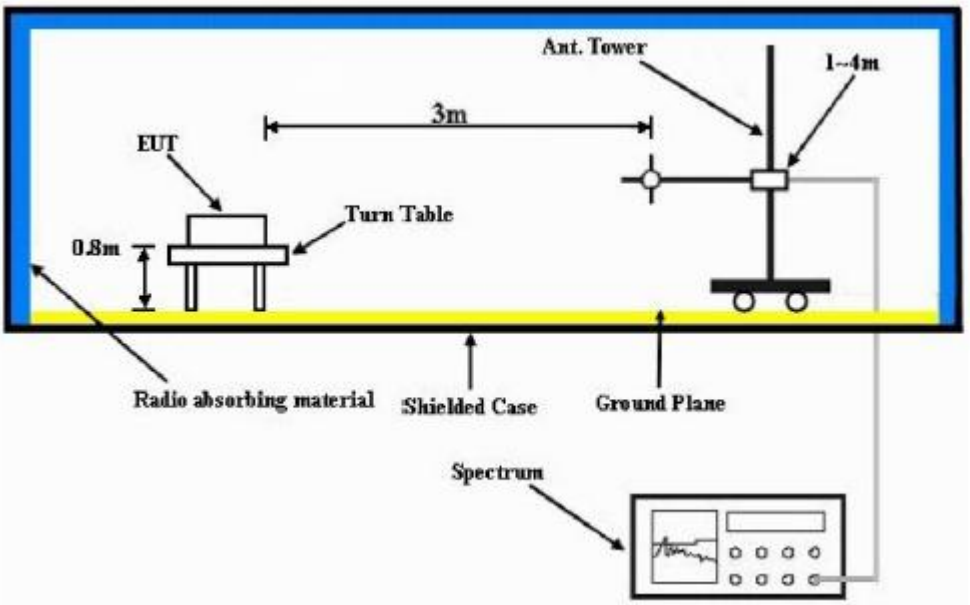
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
793.000 MHz	805.000 MHz	6.250 kHz	793.48551 MHz	-59.06 dBm	-200.00 dB

Marker Peak List

No	X-value	Y-value	No	X-value	Y-value
1	793.486000 MHz	-59.057 dBm	2	---	---

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 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the 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, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (1) and (2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

1.12.3. Radiated Spurious Emission – LTE Band 13 (777-787MHz)

SAC Transmitter Radiated Emission:

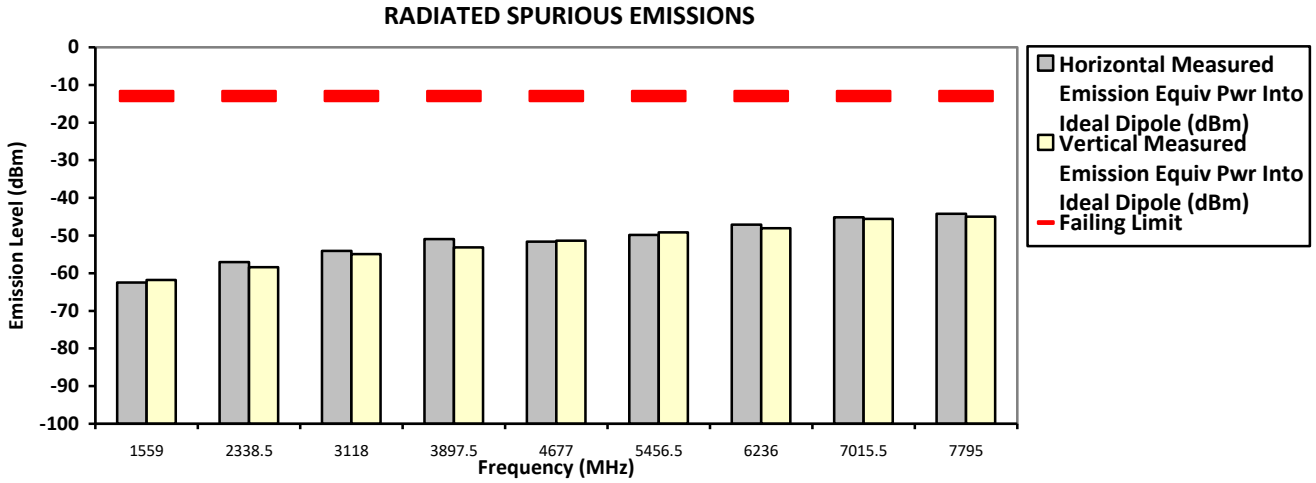
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) X-Plane

779.500000 MHz (Low) **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)
1559.0000	-13.0000	-62.5159 **	-61.7820 **
2338.5000	-13.0000	-57.0122 **	-58.4011 **
3118.0000	-13.0000	-54.0847 **	-54.8983 **
3897.5000	-13.0000	-50.9267 **	-53.1499 **
4677.0000	-13.0000	-51.6078 **	-51.3478 **
5456.5000	-13.0000	-49.8353 **	-49.1485 **
6236.0000	-13.0000	-47.1497 **	-48.0813 **
7015.5000	-13.0000	-45.1704 **	-45.5938 **
7795.0000	-13.0000	-44.2292 **	-45.0102 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	**Marginal Results**	**Failed Results**

SAC Transmitter Radiated Emission:

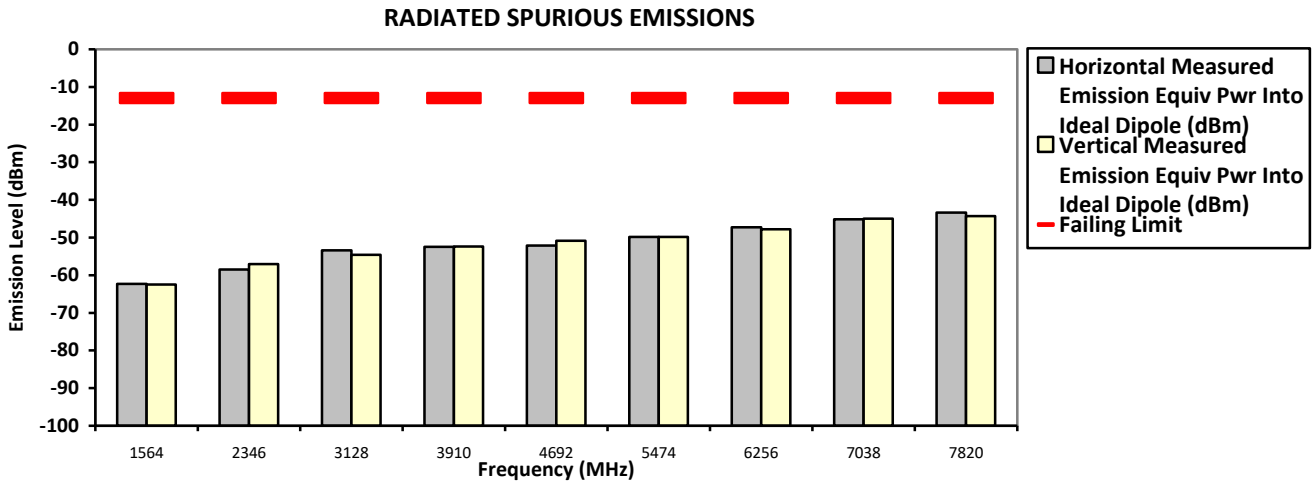
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) X-Plane

782.000000 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)
1564.0000	-13.0000	-62.3383 **	-62.5056 **
2346.0000	-13.0000	-58.4624 **	-57.0690 **
3128.0000	-13.0000	-53.4046 **	-54.6113 **
3910.0000	-13.0000	-52.4574 **	-52.3785 **
4692.0000	-13.0000	-52.1593 **	-50.8580 **
5474.0000	-13.0000	-49.8383 **	-49.8202 **
6256.0000	-13.0000	-47.3213 **	-47.7956 **
7038.0000	-13.0000	-45.1927 **	-44.9982 **
7820.0000	-13.0000	-43.3865 **	-44.3089 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results

SAC Transmitter Radiated Emission:

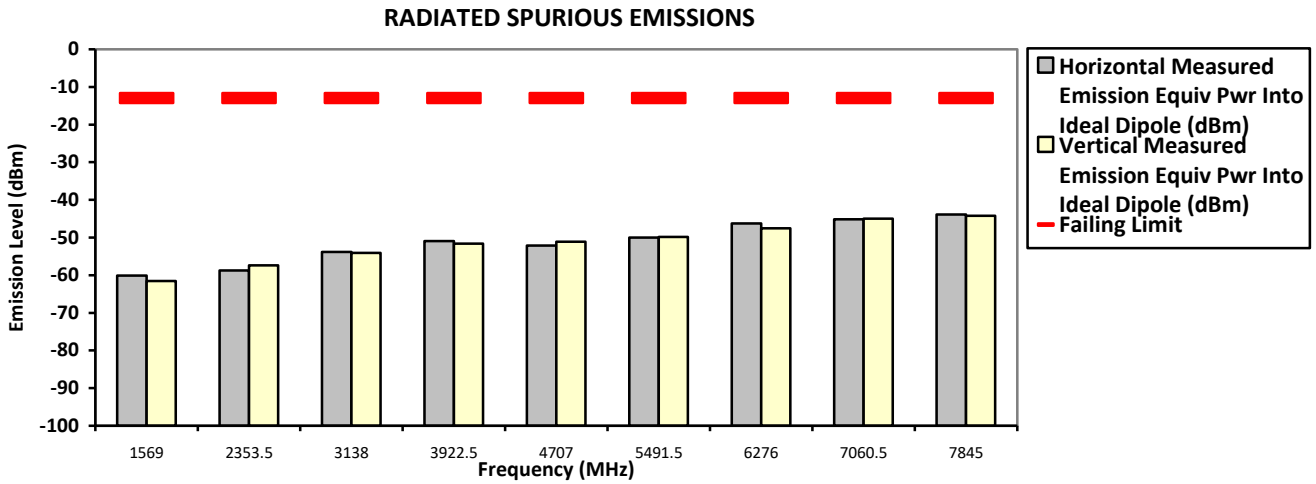
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) X-Plane

784.500000 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)
1569.0000	-13.0000	-60.0885 **	-61.5557 **
2353.5000	-13.0000	-58.7453 **	-57.3436 **
3138.0000	-13.0000	-53.8197 **	-54.0505 **
3922.5000	-13.0000	-50.9314 **	-51.5808 **
4707.0000	-13.0000	-52.1111 **	-51.0730 **
5491.5000	-13.0000	-50.0278 **	-49.8548 **
6276.0000	-13.0000	-46.3028 **	-47.5118 **
7060.5000	-13.0000	-45.1603 **	-44.9768 **
7845.0000	-13.0000	-43.8966 **	-44.2631 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	**Marginal Results**	**Failed Results**

SAC Transmitter Radiated Emission:

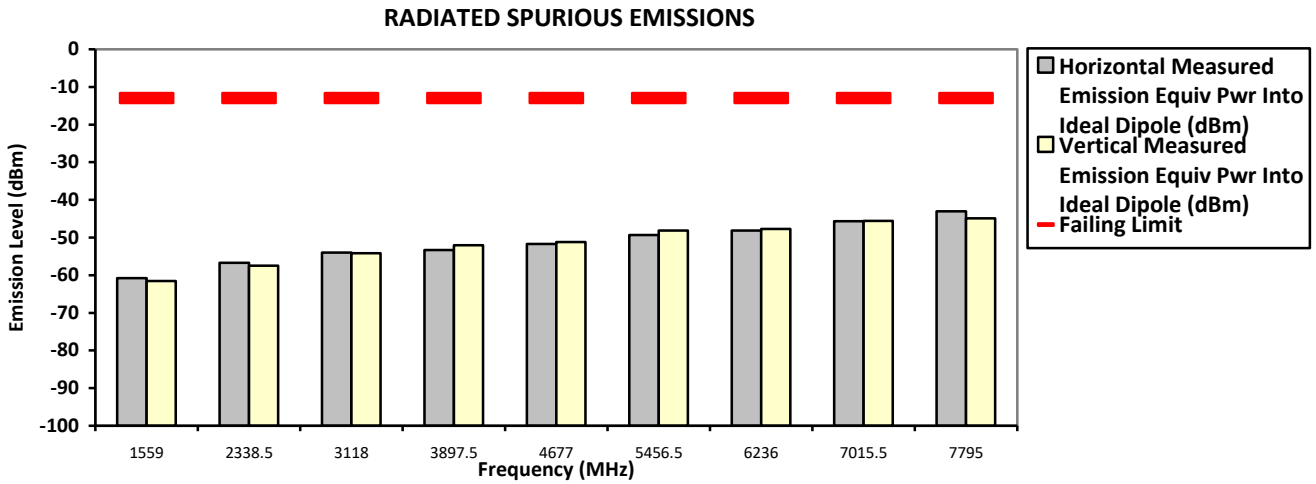
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) Y-Plane

779.500000 MHz (Low) **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)
1559.0000	-13.0000	-60.8198 **	-61.5287 **
2338.5000	-13.0000	-56.7402 **	-57.4447 **
3118.0000	-13.0000	-54.0268 **	-54.1295 **
3897.5000	-13.0000	-53.2697 **	-52.0750 **
4677.0000	-13.0000	-51.6566 **	-51.1548 **
5456.5000	-13.0000	-49.3219 **	-48.0968 **
6236.0000	-13.0000	-48.1634 **	-47.6895 **
7015.5000	-13.0000	-45.6545 **	-45.5728 **
7795.0000	-13.0000	-42.9981 **	-44.9096 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results

SAC Transmitter Radiated Emission:

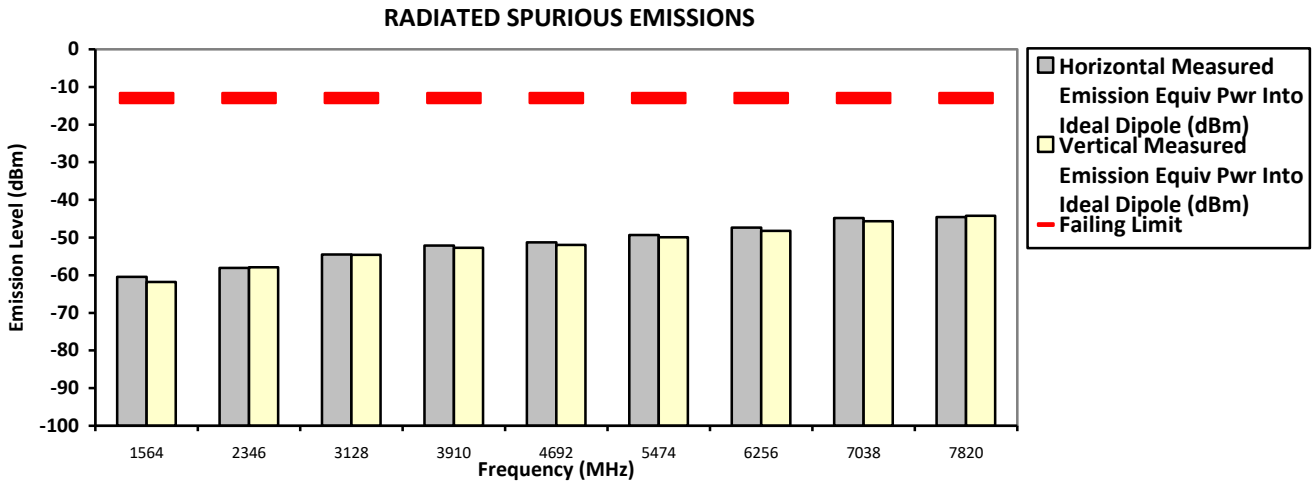
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) Y-Plane

782.000000 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)
1564.0000	-13.0000	-60.4119 **	-61.8009 **
2346.0000	-13.0000	-58.0788 **	-57.8808 **
3128.0000	-13.0000	-54.4807 **	-54.6245 **
3910.0000	-13.0000	-52.1596 **	-52.7019 **
4692.0000	-13.0000	-51.2341 **	-51.9655 **
5474.0000	-13.0000	-49.3264 **	-49.9218 **
6256.0000	-13.0000	-47.4063 **	-48.2218 **
7038.0000	-13.0000	-44.8336 **	-45.6787 **
7820.0000	-13.0000	-44.5663 **	-44.2261 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results

SAC Transmitter Radiated Emission:

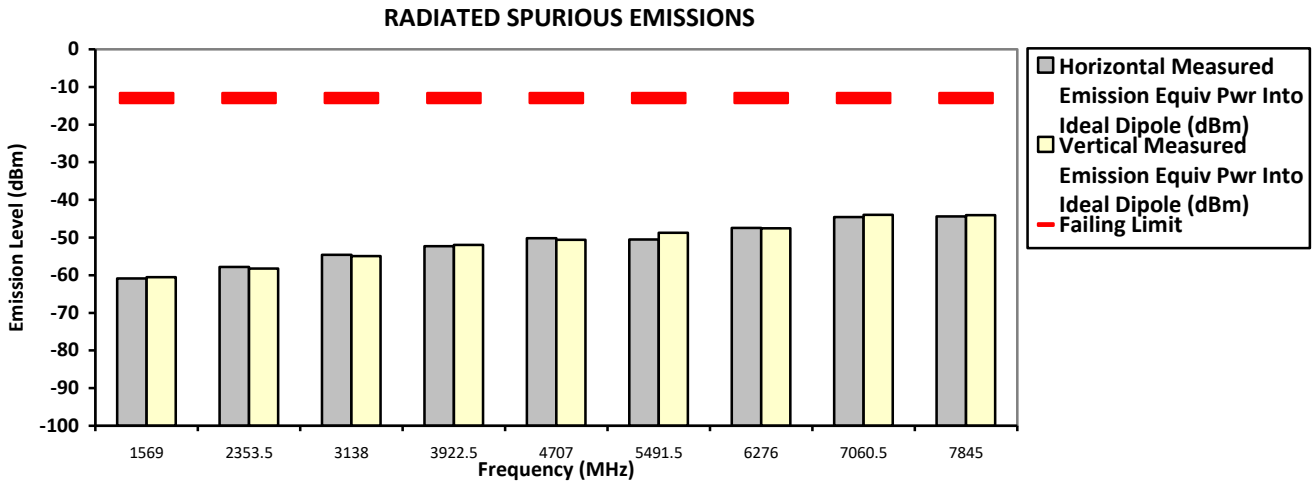
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) Y-Plane

784.500000 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)
1569.0000	-13.0000	-60.8886 **	-60.5608 **
2353.5000	-13.0000	-57.7716 **	-58.2511 **
3138.0000	-13.0000	-54.5561 **	-54.9056 **
3922.5000	-13.0000	-52.2791 **	-51.9601 **
4707.0000	-13.0000	-50.1975 **	-50.5612 **
5491.5000	-13.0000	-50.5081 **	-48.7666 **
6276.0000	-13.0000	-47.4357 **	-47.5223 **
7060.5000	-13.0000	-44.5379 **	-43.9974 **
7845.0000	-13.0000	-44.4357 **	-44.0183 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results

SAC Transmitter Radiated Emission:

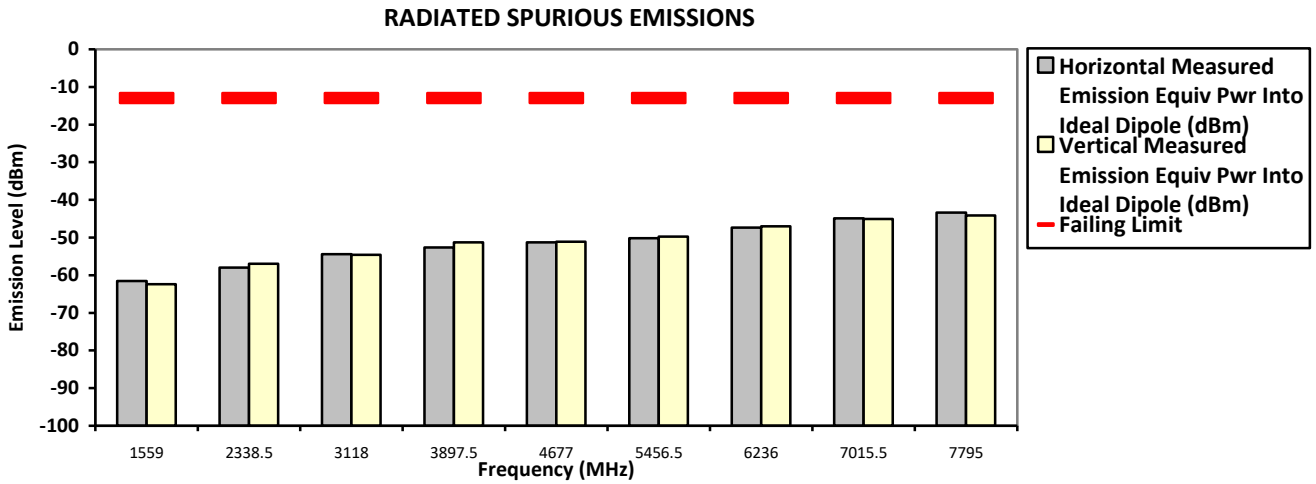
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) Z-Plane

779.500000 MHz (Low) **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)
1559.0000	-13.0000	-61.5686 **	-62.3828 **
2338.5000	-13.0000	-57.9588 **	-56.9752 **
3118.0000	-13.0000	-54.4438 **	-54.6262 **
3897.5000	-13.0000	-52.6648 **	-51.2807 **
4677.0000	-13.0000	-51.2850 **	-51.1062 **
5456.5000	-13.0000	-50.1800 **	-49.7310 **
6236.0000	-13.0000	-47.3701 **	-47.0195 **
7015.5000	-13.0000	-44.8749 **	-45.0671 **
7795.0000	-13.0000	-43.4204 **	-44.1788 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results

SAC Transmitter Radiated Emission:

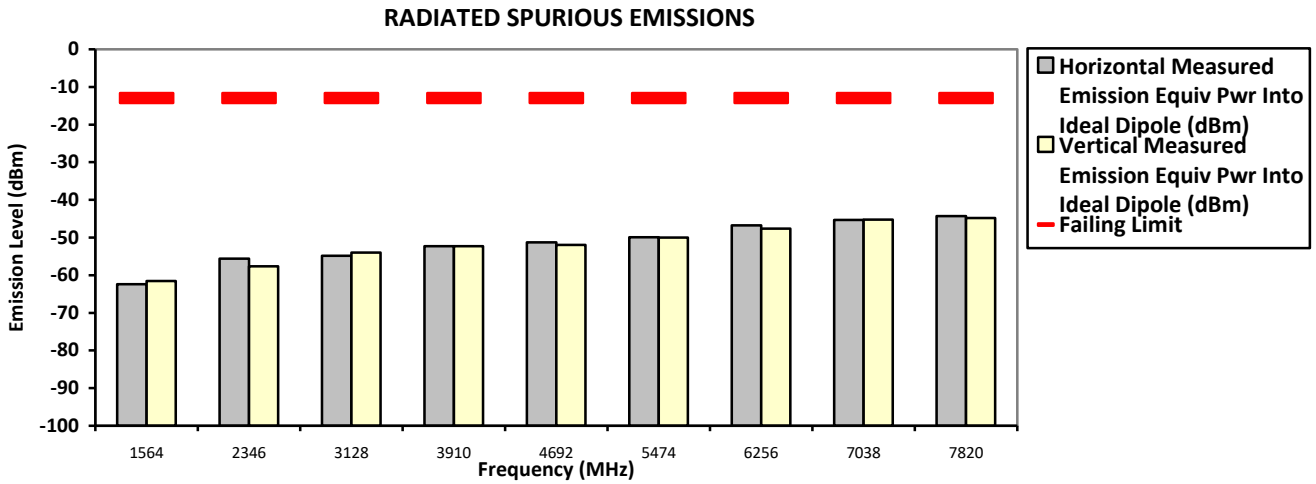
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) Z-Plane

782.000000 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)
1564.0000	-13.0000	-62.3880 **	-61.5859 **
2346.0000	-13.0000	-55.5683 **	-57.6495 **
3128.0000	-13.0000	-54.8364 **	-53.9540 **
3910.0000	-13.0000	-52.2601 **	-52.2670 **
4692.0000	-13.0000	-51.2449 **	-51.9257 **
5474.0000	-13.0000	-49.9154 **	-49.9658 **
6256.0000	-13.0000	-46.7826 **	-47.6082 **
7038.0000	-13.0000	-45.3411 **	-45.2828 **
7820.0000	-13.0000	-44.3421 **	-44.7866 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

System MU: 4.03 dB

Remarks:

Passed Results	Marginal Results	Failed Results

SAC Transmitter Radiated Emission:

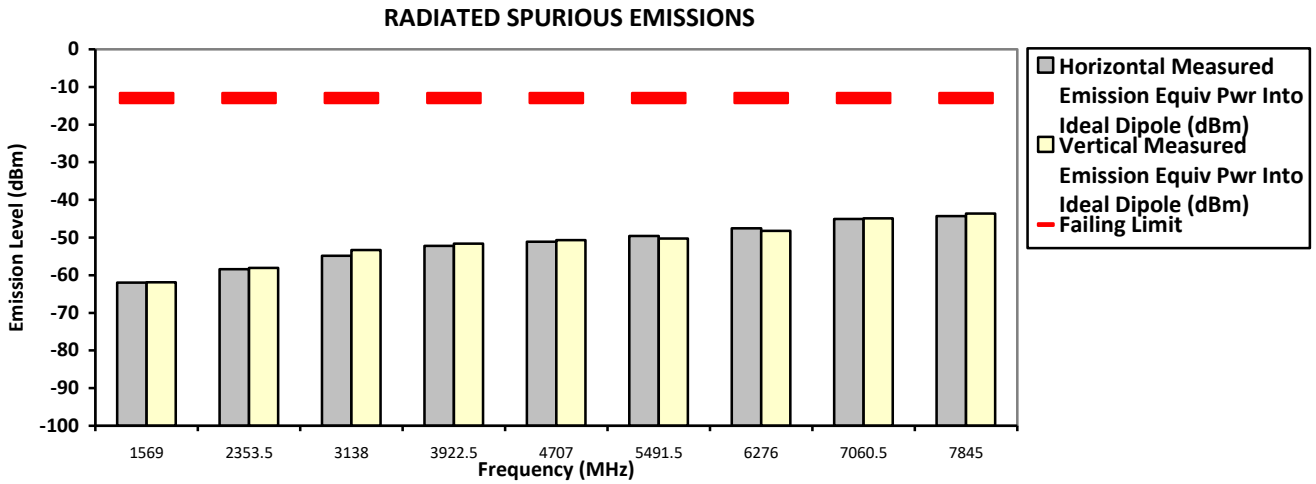
Model Number: H35KET9PW8AN-H **S/N: 022TAF1521** **SR:30468-EMC-00051**

Battery Part No: PMNN4818A **Accy Part No: AN000414A01**

Test Mode: TX LTE (Band 13) Z-Plane

784.500000 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)
1569.0000	-13.0000	-61.9951 **	-61.8607 **
2353.5000	-13.0000	-58.4025 **	-58.0922 **
3138.0000	-13.0000	-54.8358 **	-53.2973 **
3922.5000	-13.0000	-52.2271 **	-51.5817 **
4707.0000	-13.0000	-51.1057 **	-50.6926 **
5491.5000	-13.0000	-49.5606 **	-50.2775 **
6276.0000	-13.0000	-47.5078 **	-48.2294 **
7060.5000	-13.0000	-45.0834 **	-44.8783 **
7845.0000	-13.0000	-44.3409 **	-43.6742 **



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: Nazrin & Rezza **Sun, 26 May, 2024**

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): 23.7 Hum(%RH): 68.2

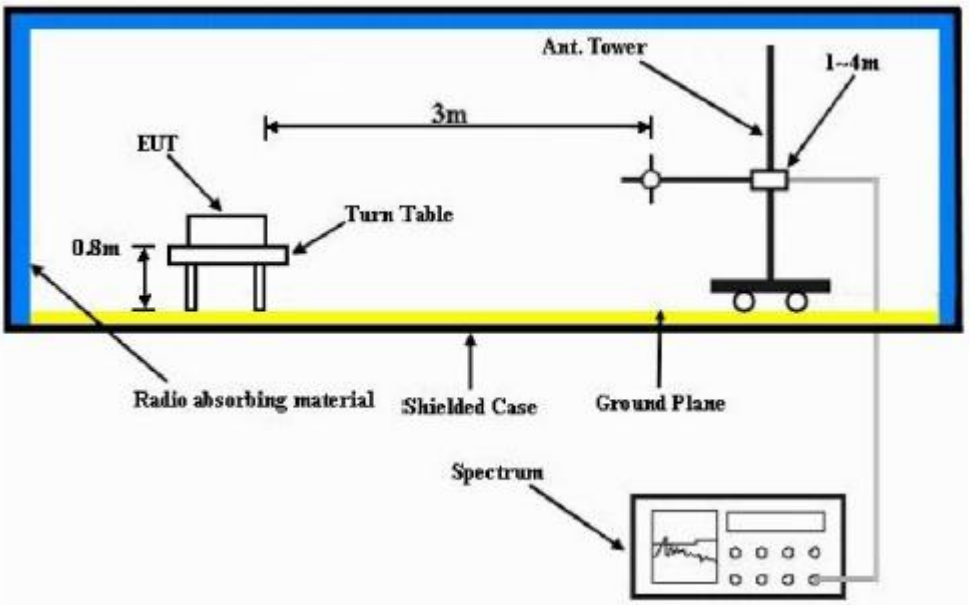
System MU: 4.03 dB

Remarks:

Passed Results	**Marginal Results**	**Failed Results**

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 = “Read Value” + Measured substitution value.

1.13.2. Test Limit

FCC: Portable stations (hand-held devices) transmitting in the 776-788 MHz band is limited to 3 watts ERP.

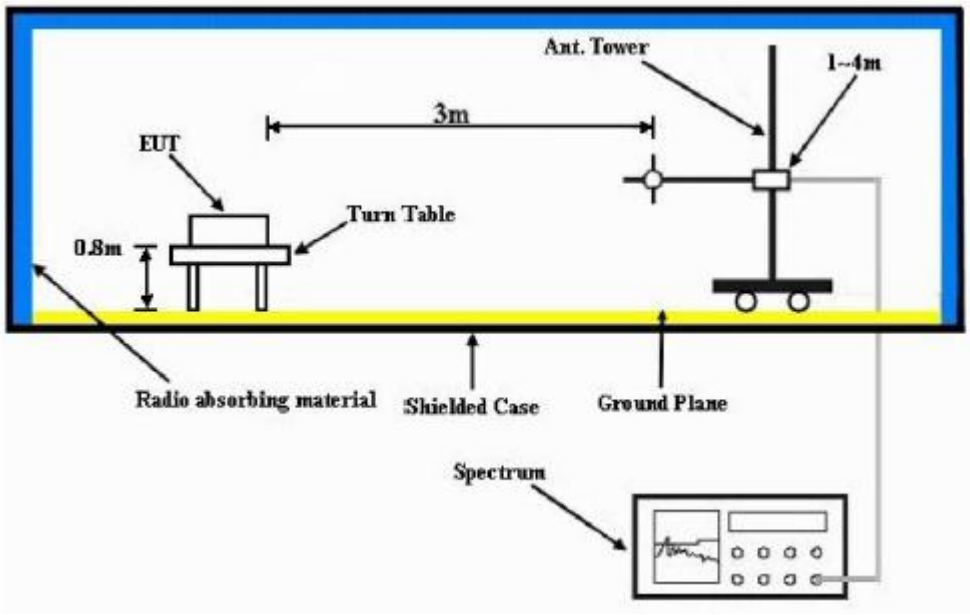
ISED: The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.

1.13.3. Effective Radiated Power (ERP) - LTE Band 13 (777-787MHz)

Refer to 1.6.4 / Not Performed.

1.14. GNSS (EIRP for 1559 – 1610MHz)

1.14.1. Test Setup



1) The Resolution Bandwidth for Equivalent Isotropically Radiated Power (EIRP) below 1 GHz is 100 kHz with Video Bandwidth = 300 kHz and Resolution Bandwidth for EIRP above 1 GHz is 1 MHz with Video Bandwidth = 3 MHz. Detector Mode is RMS.
2) In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval 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 for each degree interval. The “Read Value” is the spectrum reading of maximum power value.
3) The substitution antenna is substituted for DUT 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 = “Read Value” + Measured substitution value + 2.15.

1.14.2. Test Limit

FCC: For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

ISED: The e.i.r.p. in the band 1559-1610 MHz shall not exceed −70 dBW/MHz for wideband signal and −80 dBW for discrete emission with bandwidth less than 700 Hz.

1.14.3. GNSS (EIRP for 1599 – 1610MHz) - LTE Band 13 (777-787MHz)

EiRP in RNSS band (1.581GHz)

S/N: 022TAF1521 **Tx Power: 0.252 Watts**

Channel BW: 5 MHz **Modulation: QPSK**

Accessory: AN000414A01

Battery: PMNN4818A

Frequency Channel: 779.5000 MHz (LTE Band 13)

Antenna Polarization	2Fc (MHz)	EIRP (dBm)	Limit (dBm)
Horizontal	1581.0000	-68.17	-40
Vertical	1581.0000	-67.29	-40

EiRP in RNSS band (1.581GHz)

S/N: 022TAF1521

Tx Power: 0.252 Watts

Channel BW: 5 MHz

Modulation: QPSK

Accessory: AN000414A01

Battery: PMNN4818A

Frequency Channel: 784.5000 MHz (LTE Band 13)

Antenna Polarization	2Fc (MHz)	EIRP (dBm)	Limit (dBm)
Horizontal	1591.0000	-67.98	-40
Vertical	1591.0000	-67.53	-40

--End of Test Report--