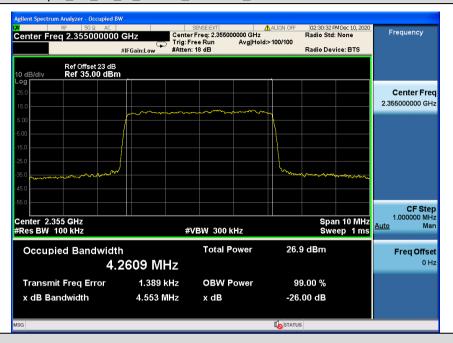


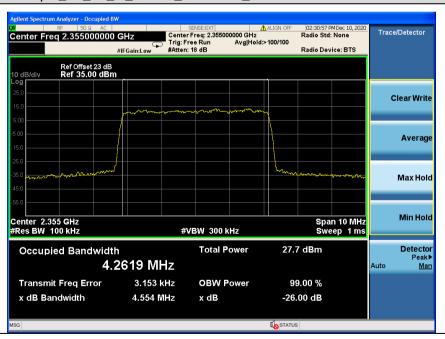
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Output DL 1S M AWGN Pre-AGC 26dB Bandwidth & 99% OBW



Output DL 1S M AWGN AGC+3dB 26dB Bandwidth & 99% OBW





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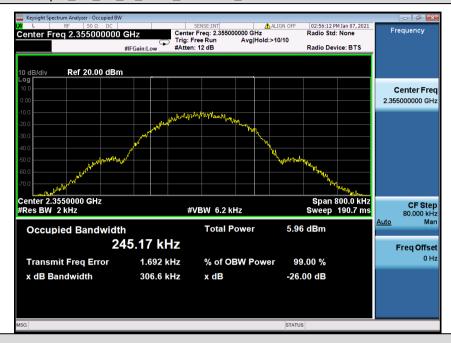
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Input DL 1S M GSM Pre-AGC 26dB Bandwidth & 99% OBW



Input_DL_1S_M_GSM_AGC+3dB_26dB Bandwidth & 99% OBW





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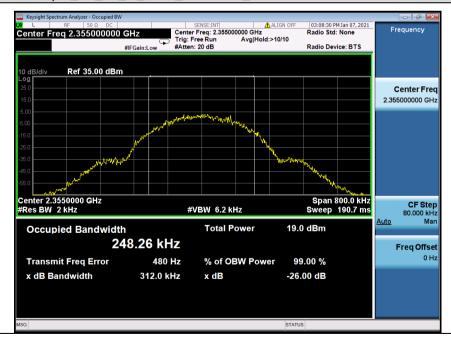
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Output DL 1S M GSM Pre-AGC 26dB Bandwidth & 99% OBW



Output_DL_1S_M_GSM_AGC+3dB_26dB Bandwidth & 99% OBW





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Remark:

Compare the spectral plot of the input signal to the output signal affirm that they are similar (in passband and roll off characteristic features and relative spectral locations). The test result complies with the



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4.4 Mean output power and amplifier/booster gain

Test Conf.	Test Freq. f ₀ (MHz)	Signal Level	Input Power (dBm)	Output Power (dBm)	Gain (dB)	Verdict
		Pre-AGC	-0.50	18.22	18.72	PASS
DL_1S_AWGN	2356.70	AGC+3dB	2.50	18.18	/	PASS
		Pre-AGC	-0.50	18.08	18.58	PASS
DL_1S_GSM	2356.70	AGC+3dB	2.50	18.12	/	PASS

Remark:

According to the declaration from the applicant, the antenna gain should not exceed 12.5dBi, the Directional gain = $G(ANT) + 10 \log (NANT) dBi = 12.5dBi + 10 \log (2) dBi = 15.5dBi$.

The total maximum EIRP for the EUT is (18.22dBm+18.22dBm) +15.5dBi=36.73dBm (4.710W) which don't exceed the required EIRP limit (400W/MHz)



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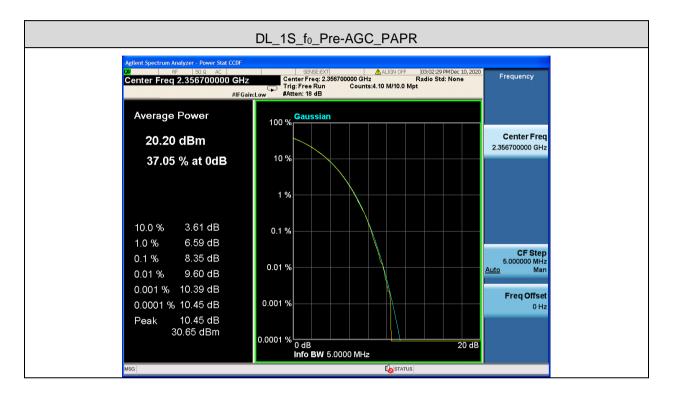
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Test Conf.	Test Freq. f ₀ (MHz)	Signal Level	PAPR (dB)	Limit (dB)	Verdict
DL_1S_AWGN	2356.7	Pre-AGC	8.35	13	PASS





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4.5 Out-of-band/out-of-block (including intermodulation) emissions and spurious emissions

Note:

1. The tested max conducted power for single antenna port is 18.22dBm, the power of any emission outside a licensee's frequency band(s) shall be attenuated below the transmitter power (P) in watts

(i)

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation.

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)- [43 + 10 log (0.0664W)] = -13dBm

By a factor of not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345

 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)- [75 + 10 log (0.0664W)] = -45dBm

(ii)

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz

Here.

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)- [43 + 10 log (0.0664W)] = -13dBm



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By a factor of not less than 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[70 + 10 log (0.0664W)] = -40dBm

By a factor of not less than 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)- [72 + 10 log (0.0664W)] =-42dBm

By a factor of not less than 75 + 10 log (P) dB below 2285 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[75 + 10 log (0.0664W)] = -45dBm

(iii)

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[43 + 10 log (0.0664W)] = -13dBm



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By a factor of not less than 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[55 + 10 log (0.0664W)] = -25dBm

By a factor of not less than 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[70 + 10 log (0.0664W)] = -40dBm

By a factor of not less than 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[72 + 10 log (0.0664W)] = -42dBm

By a factor of not less than 75 + 10 log (P) dB above 2370 MHz

Here.

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[75 + 10 log (0.0664W)] = -45dBm

The EUT supports 2x2 MIMO and the emissions were measured at one of output port, so the limit lines were set to -16.01dBm/-48.01dBm/43.01dBm/45.01dBm/28.01dBm Separately in following test plots in order to determine the test result conveniently.

2. Out-of-band/out-of-block (including intermodulation) emissions and spurious emissions have been tested using an AWGN test signal and a GSM-TDMA test signal, only the worst-case was recorded in this report.



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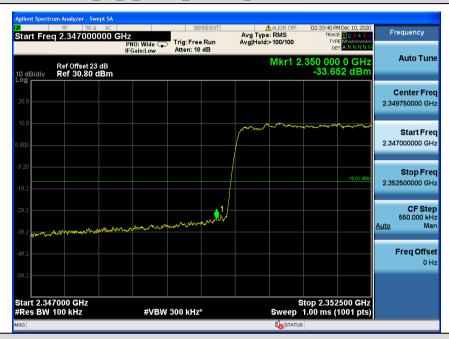
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DL 1S B AWGN Pre-AGC Out-of-band emission



DL 1S B AWGN AGC+3 Out-of-band emission





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DL 1S T AWGN Pre-AGC Out-of-band emission



DL 1S T AWGN AGC+3 Out-of-band emission





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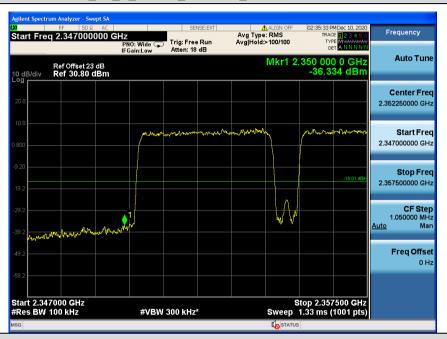
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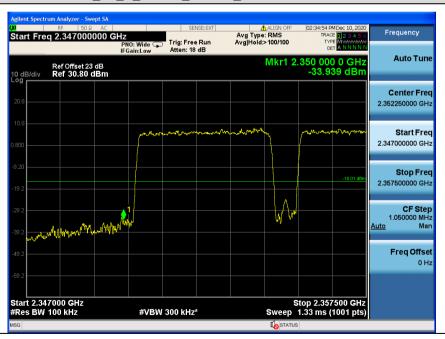
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DL 2S B AWGN Pre-AGC Out-of-band emission



DL 2S B AWGN AGC+3 Out-of-band emission





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DL 2S T AWGN Pre-AGC Out-of-band emission Avg Type: RMS Avg|Hold:>100/100 Frequency Start Freq 2.352500000 GHz Mkr1 2.360 000 0 GH: -34.740 dBn Auto Tune Ref Offset 23 dB Ref 30.80 dBm Center Fred 2.357750000 GHz Start Fred 2.352500000 GHz 2.363000000 GH CF Step 1.050000 MHz Mar Auto Freq Offset 0 Hz Start 2.352500 GHz #Res BW 100 kHz Stop 2.363000 GHz Sweep 1.33 ms (1001 pts) #VBW 300 kHz*

DL 2S T AWGN AGC+3 Out-of-band emission





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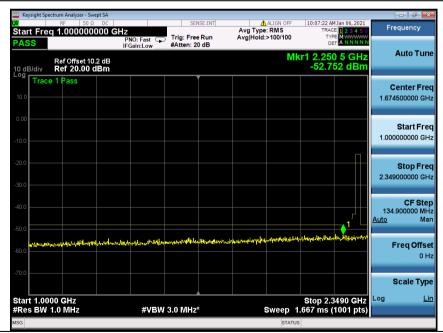
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DL_1S_B_AWGN_Pre-AGC_Spurious emission 1



DL_1S_B_AWGN_Pre-AGC_Spurious emission 2





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DL_1S_B_AWGN_Pre-AGC_Spurious emission 3



DL_1S_B_AWGN_Pre-AGC_Spurious emission 4





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DL 1S M AWGN Pre-AGC Spurious emission 1



DL_1S_M_AWGN_Pre-AGC_Spurious emission 2





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DL 1S M AWGN Pre-AGC Spurious emission 3



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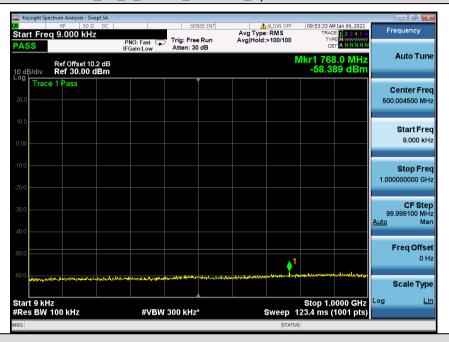
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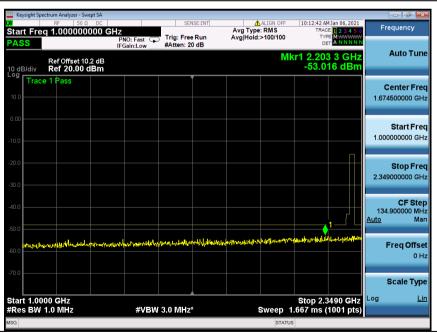
Application No.: GZEM2011016737CR

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DL_1S_T_AWGN_Pre-AGC_Spurious emission 1



DL_1S_T_AWGN_Pre-AGC_Spurious emission 2





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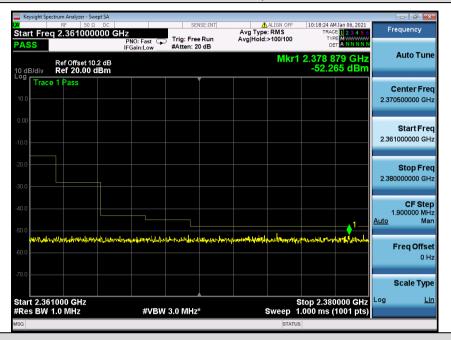
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DL_1S_T_AWGN_Pre-AGC_Spurious emission 3



DL_1S_T_AWGN_Pre-AGC_Spurious emission 4





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4.6 Frequency Stability

Note:

- 1. At 10 °C intervals of temperatures between −30 °C and +50 °C at the manufacturer's rated supply voltage, here the rated supply voltage is DC 48V.
- 2. At +20 °C temperature and $\pm15\%$ supply voltage variations. If a product is specified to operate over a range of input voltage, then the -15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.
- 3. The frequency stabilities can be maintained within the authorized bands of operation. Meet the requirement.
- 4. Frequency stability has been tested using an AWGN test signal and a GSM-TDMA test signal, only the worst-case was recorded in this report.



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Frequency stability vs temperature				
Temperature (°C)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict
50		2355.02242	-0.42	PASS
40		2355.02121	-0.94	PASS
30		2355.02434	0.39	PASS
20		2355.02342	Reference	PASS
10	DL_1S_M_AWGN	2355.02123	-0.92	PASS
0		2355.02442	0.42	PASS
-10		2355.02364	0.09	PASS
-20		2355.02345	0.01	PASS
-30		2355.02121	-0.94	PASS

Frequency stability vs voltage				
Voltage (V)	Test Conf.	Test data Tolerance (MHz) (ppm)		Verdict
DC 40.8		2355.02461	0.03	PASS
DC 48	DL_1S_M_AWGN	2355.02453	Reference	PASS
DC 55.2		2355.02333	-0.51	PASS



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4.7 Radiated spurious emissions

Note(1): The tested max conducted power for single antenna port is 18.22dBm, the 2x2 MIMO total power is 18.22dBm+18.22dBm= 0.1327W, the power of any emission outside a licensee's frequency band(s) shall be attenuated below the transmitter power (P) in watts (i)

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation.

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)- [43 + 10 log (0.0664W)] = -13dBm

By a factor of not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[75 + 10 log (0.0664W)] = -45dBm

(ii)

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz

Here.

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)- [43 + 10 log (0.0664W)] = -13dBm



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By a factor of not less than 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[70 + 10 log (0.0664W)] = -40dBm

By a factor of not less than 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[72 + 10 log (0.0664W)] = -42dBm

By a factor of not less than 75 + 10 log (P) dB below 2285 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[75 + 10 log (0.0664W)] = -45dBm

(iii)

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[43 + 10 log (0.0664W)] = -13dBm



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By a factor of not less than 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[55 + 10 log (0.0664W)] = -25dBm

By a factor of not less than 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[70 + 10 log (0.0664W)] = -40dBm

By a factor of not less than 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz

Here,

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[72 + 10 log (0.0664W)] = -42dBm

By a factor of not less than 75 + 10 log (P) dB above 2370 MHz

Here.

P=18.22dBm= 0.0664W.

So the limit =

P(dBm)-[75 + 10 log (0.0664W)] = -45dBm



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Note (2):

(1) : The radiated test performed at bottom / middle / top channel, only the worst-case middle channel test data was recorded in the report.

(2) : The disturbance 9kHz to 30MHz was very low and 20dB below the limit, therefore, the data was not recorded in the report.

(3): The strictest limit -45dbm was used for evaluate the emission from 9kHz~18GHz.



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DL 1S M AWGN Horizontal 30MHz~1GHz Level (dBm) 30 10 -10 -30 45DBM -50 6 -70 -90 -110 -120₃₀ 100 200 500 1000 50 Freq. Limit Over Limit Level Polarization Verdict (dB) (MHz) (dBm) (dBm) 37.812 Horizontal **PASS** -68.55 -45 -23.55 -71.85 -26.85 Horizontal 51.301 -45 **PASS** 71.863 -74.22 -45 -29.22 Horizontal **PASS** 93.113 -65.19 -45 -20.19 Horizontal **PASS** -26.62 Horizontal **PASS** 115.321 -71.62-45 -69.01 -24.01 **PASS** 189.074 -45 Horizontal



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DL 1S M AWGN Horizontal above 1GHz 40 Level (dBm) 30 10 -10 -30 45DBM 4 5 2 -50 -70 -90 1000 1500 2000 5000 18000 10000 Freq. Level Limit Over Limit Polarization Verdict (MHz) (dBm) (dBm) (dB) 1129.072 Horizontal **PASS** -57.84 -45 -12.84 1648.778 -52.85 -45 -7.85 Horizontal **PASS PASS** 2292.257 -50.70 -45 -5.7 Horizontal 6142.019 -51.77 -45 -6.77Horizontal **PASS** 6659.763 -51.10 -45 Horizontal **PASS** -6.1 10514.327 -48.62 -45 -3.62 Horizontal **PASS**



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DL 1S M AWGN Vertical 30MHz~1GHz Level (dBm) 30 10 -10 -30 45DBM -50 2 3 -70 -90 -110 -120¹30 50 200 500 100 1000 Freq. Level Limit Over Limit Polarization Verdict (MHz) (dBm) (dBm) (dB) 37.812 -68.01 -45 -23.01 Vertical **PASS** 64.887 -69.48 -45 -24.48Vertical **PASS** 71.832 -69.78 -24.78 Vertical **PASS** -45 94.098 -59.02 -14.02 Vertical **PASS** -45 121.462 -67.79 -45 -22.79 Vertical **PASS** 286.982 -71.94 -26.94 Vertical **PASS** -45



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DL 1S M AWGN Vertical above 1GHz 40 Level (dBm) 30 10 -10 -30 45DBM - 5 -50 -70 -90 -120 1000 1500 5000 18000 2000 10000 Freq. Level Limit Over Limit Polarization Verdict (MHz) (dBm) (dBm) (dB) 1648.778 Vertical **PASS** -54.66 -45 -9.66 1955.344 -56.17 -45 -11.17 Vertical **PASS** Vertical **PASS** 2325.634 -55.09 -45 -10.09 6106.616 -50.67 -45 -5.67 Vertical **PASS** 6659.763 -52.03 -45 -7.03 Vertical **PASS PASS** 10432.800 -48.31 -45 -3.31 Vertical



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5 BRS/EBS (2496-2690MHz unpaired)

5.1 AGC threshold level

Test Conf.	AGC Threshold level		
DL_1S_M_AWGN	0.08dBm		
DL_1S_M_GSM	0.00dBm		



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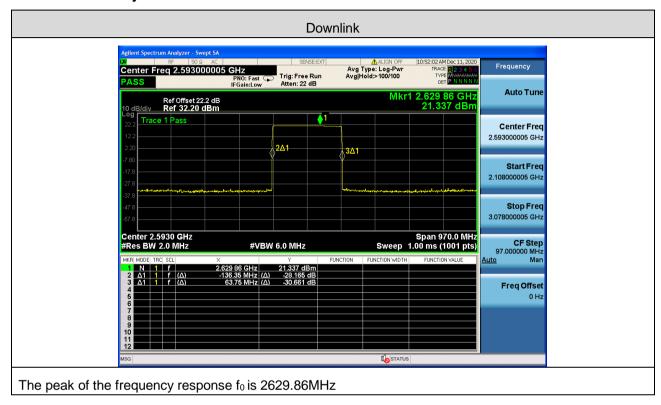
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5.2 Out-of-band rejection





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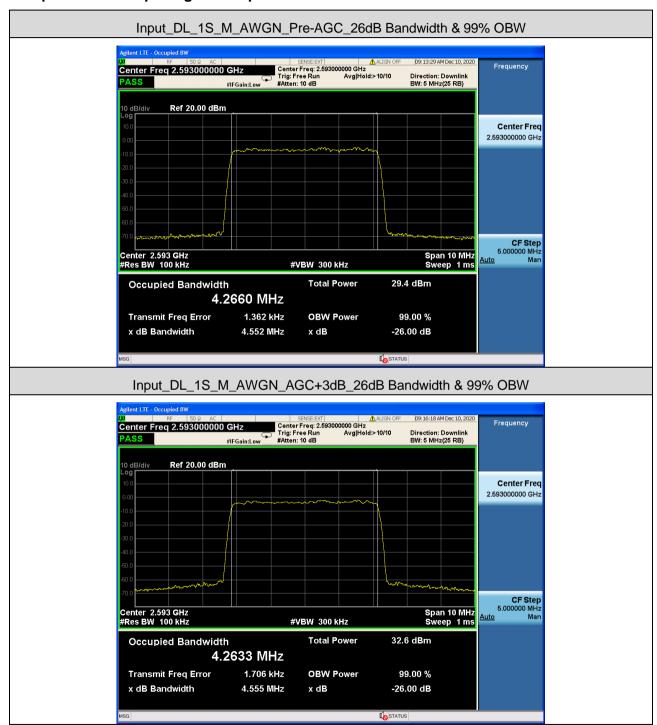
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5.3 Input-versus-output signal comparison





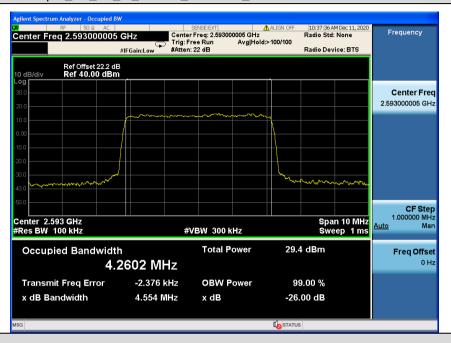
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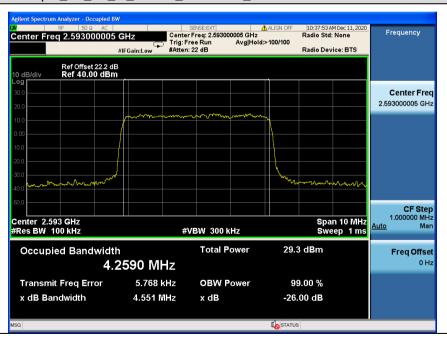
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Output DL 1S M AWGN Pre-AGC 26dB Bandwidth & 99% OBW



Output DL 1S M AWGN AGC+3dB 26dB Bandwidth & 99% OBW





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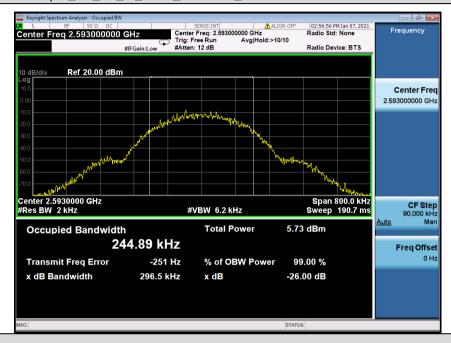
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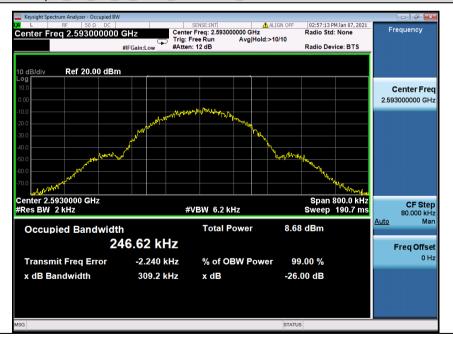
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Input DL 1S M GSM Pre-AGC 26dB Bandwidth & 99% OBW



Input_DL_1S_M_GSM_AGC+3dB_26dB Bandwidth & 99% OBW





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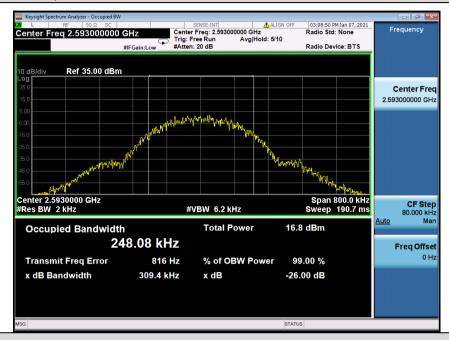
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Output_DL_1S_M_GSM_Pre-AGC_26dB Bandwidth & 99% OBW



Output_DL_1S_M_GSM_AGC+3dB_26dB Bandwidth & 99% OBW





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Remark:

Compare the spectral plot of the input signal to the output signal affirm that they are similar (in passband and roll off characteristic features and relative spectral locations). The test result complies with the requirement.



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5.4 Mean output power and amplifier/booster gain

Test Conf.	Test Freq. f ₀ (MHz)	Signal Level	Input Power (dBm)	Output Power (dBm)	Gain (dB)	Verdict
DL_1S_AWGN	2629.86	Pre-AGC	-0.10	20.24	20.34	PASS
		AGC+3dB	2.90	20.20	/	PASS
DL_1S_GSM	2629.86	Pre-AGC	-0.10	20.21	20.31	PASS
		AGC+3dB	2.90	20.15	/	PASS

Remark:

According to the declaration from the applicant, the antenna gain should not exceed 12.5dBi, the Directional gain = $G(ANT) + 10 \log (NANT) dBi = 12.5dBi + 10 \log (2) dBi = 15.5dBi$.

The total maximum EIRP for the EUT is (20.24dBm+20.24dBm) +15.5dBi=38.75dBm (7.500W) which don't exceed the required EIRP limit (1993W)



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5.5 Out-of-band/out-of-block (including intermodulation) emissions and spurious emissions

Note:

1. The tested max conducted power for single antenna port is 20.24dBm, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB

Here,

P=20.35dBm= 0.1057W.

So the limit =

P(dBm)- [43 + 10 log (0.1057W)] = -13dBm

The EUT supports 2x2 MIMO and the emissions were measured at one of output port, so the limit line was set to -16.01dBm in following test plots in order to determine the test result conveniently.

2. Out-of-band/out-of-block (including intermodulation) emissions and spurious emissions have been tested using an AWGN test signal and a GSM-TDMA test signal, only the worst-case was recorded in this report.



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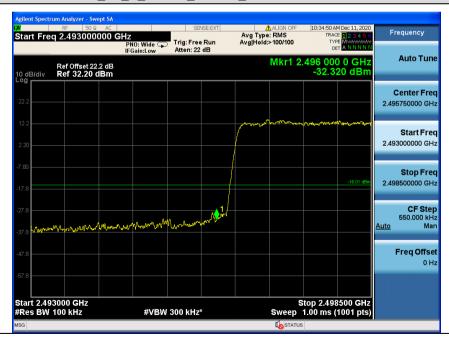
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DL 1S B AWGN Pre-AGC Out-of-band emission



DL 1S B AWGN AGC+3 Out-of-band emission





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DL 1S T AWGN Pre-AGC Out-of-band emission



DL 1S T AWGN AGC+3 Out-of-band emission





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DL 2S B AWGN Pre-AGC Out-of-band emission



DL 2S B AWGN AGC+3 Out-of-band emission





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DL 2S T AWGN Pre-AGC Out-of-band emission



DL 2S AWGN T AGC+3 Out-of-band emission





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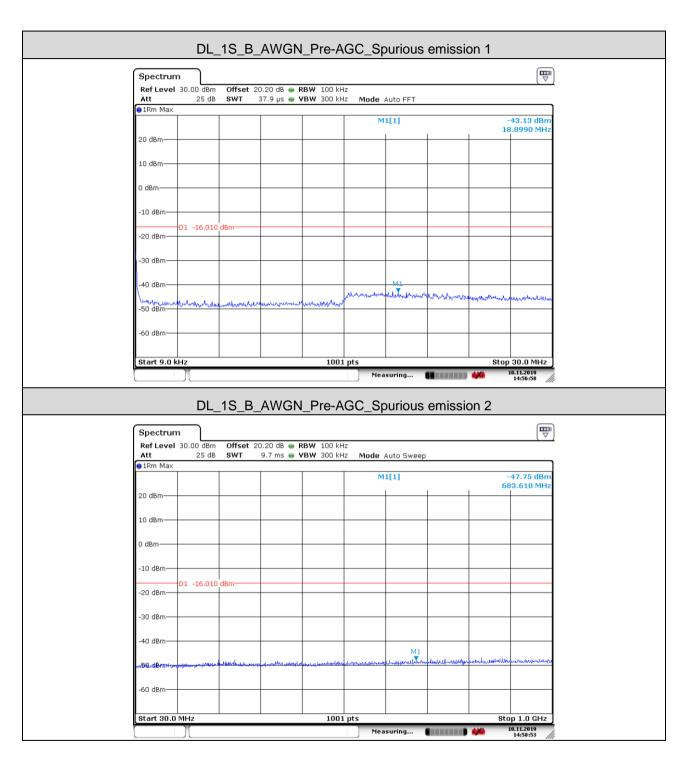
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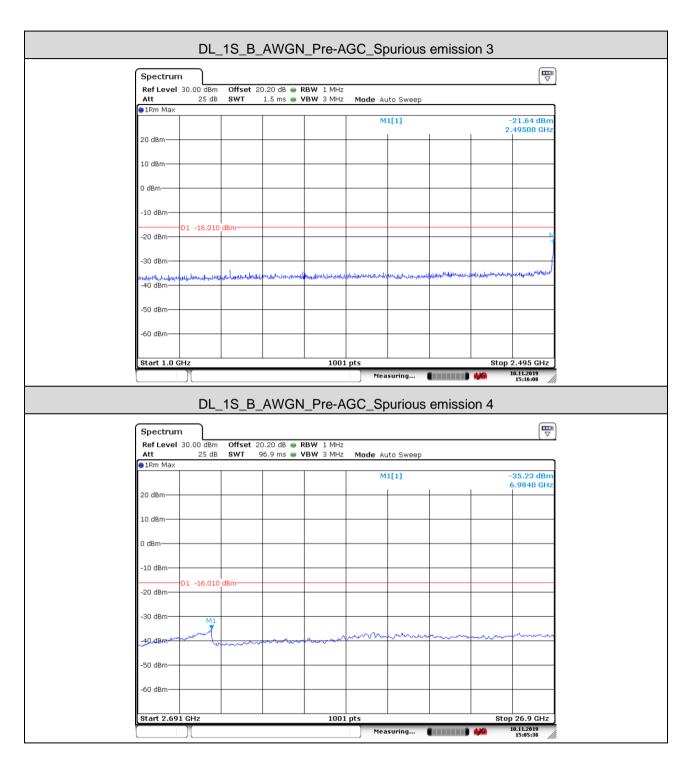
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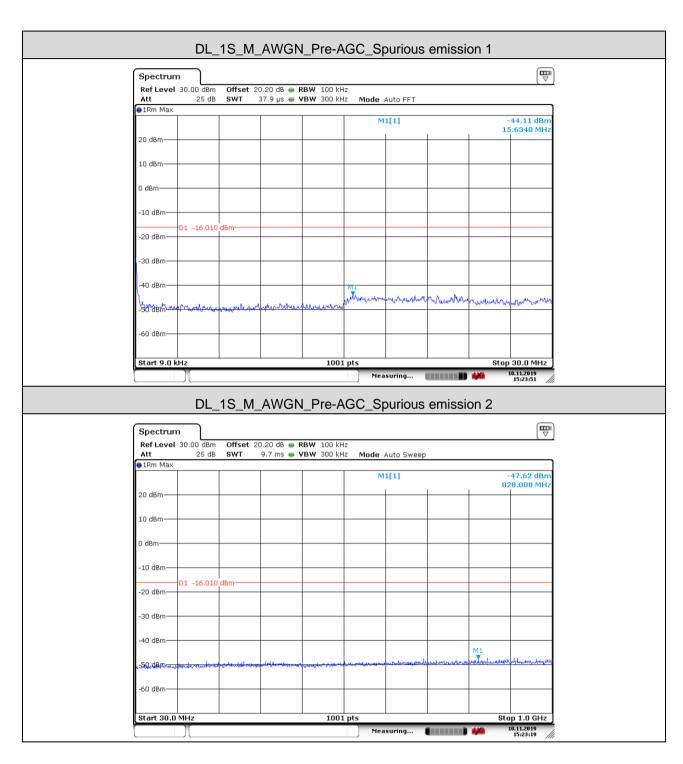
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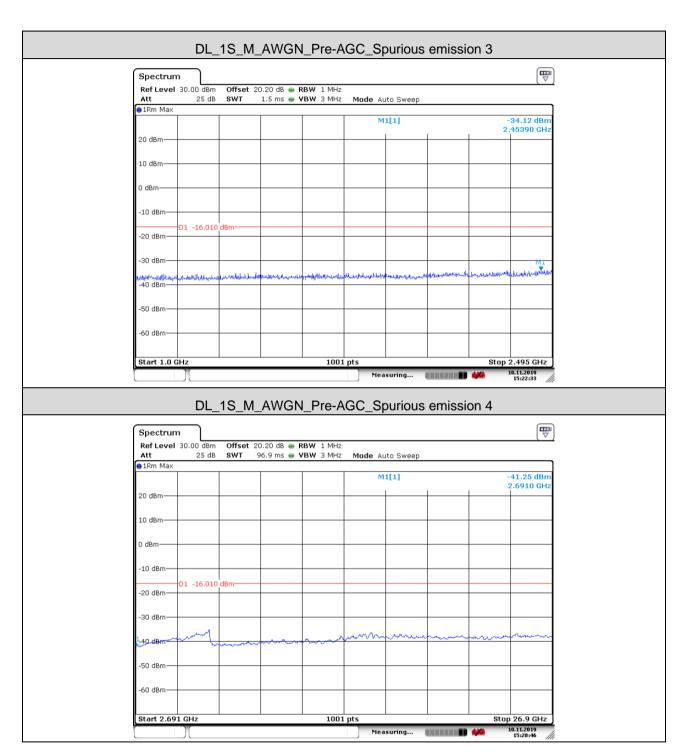
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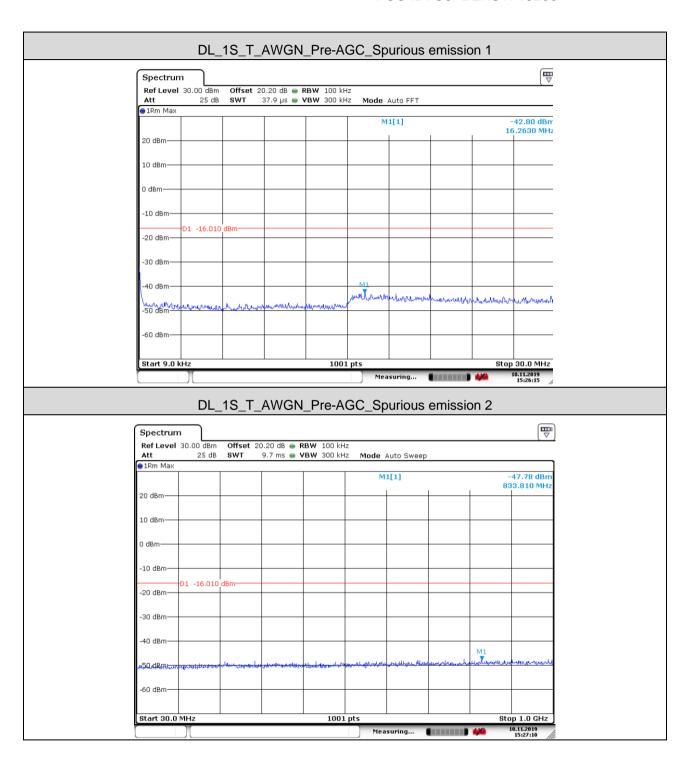
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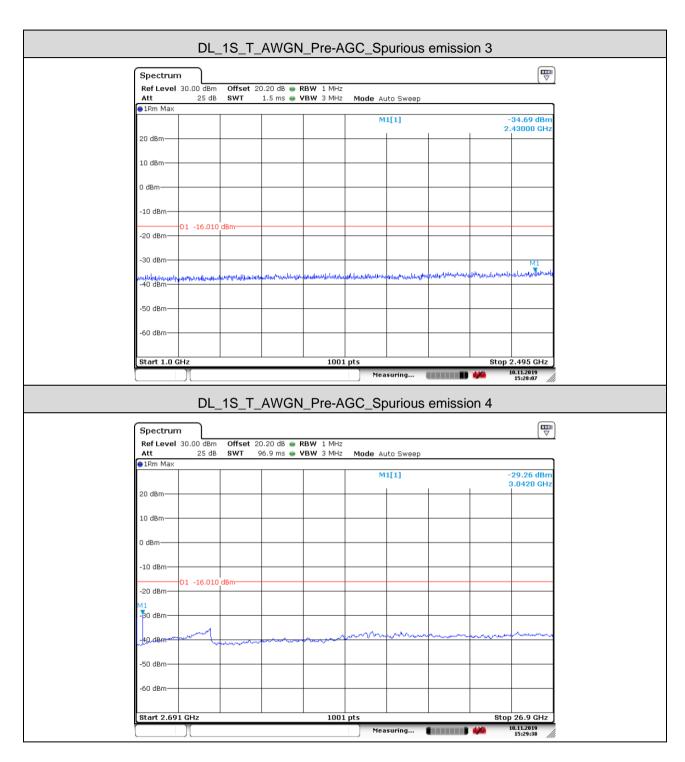
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5.6 Frequency Stability

Note:

- 1. At 10 °C intervals of temperatures between −30 °C and +50 °C at the manufacturer's rated supply voltage, here the rated supply voltage is DC 48V.
- 2. At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage, then the −15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.
- 3. The frequency stabilities can be maintained within the authorized bands of operation. Meet the requirement.
- 4. Frequency stability has been tested using an AWGN test signal and a GSM-TDMA test signal, only the worst-case was recorded in this report.



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Frequency stability vs temperature							
Temperature (°C)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict			
50		2593.001302	-0.02	PASS			
40		2593.001412	0.02	PASS			
30		2593.001311	-0.02	PASS			
20		2593.001352	Reference	PASS			
10	DL_1S_M_AWGN	2593.001398	0.02	PASS			
0		2593.001418	0.03	PASS			
-10		2593.001431	0.03	PASS			
-20		2593.001399	0.01	PASS			
-30		2593.001428	0.03	PASS			

Frequency stability vs voltage								
Voltage (V)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict				
DC 40.8		2593.001248	-0.04	PASS				
DC 48	DL_1S_M_AWGN	2593.001364	Reference	PASS				
DC 55.2		2593.001417	0.02	PASS				



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5.7 Radiated spurious emissions

Note:

1. The tested max conducted power for single antenna port is 20.24dBm. the 2x2 MIMO total power is 20.24dBm+20.24dBm= 0.2114W.

the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB

Here,

P=0.2114W,

So the limit =

P(dBm)- [43 + 10 log (0.2114W)] = -13dBm

- 2. The radiated test performed at bottom / middle / top channel, the data with more than 20db margin, therefore, only the worst-case middle channel test data was recorded in the report.
- 3. The disturbance 9kHz to 30MHz was very low and 20dB below the limit, therefore, the data was not recorded in the report.



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DL 1S M AWGN Horizontal 30MHz~1GHz 40 Level (dBm) 30 10 **13DBM** -10 -30 -50 6 -70 3 -90 -120₃₀ 100 200 500 1000 50 Freq. Level Limit Over Limit Polarization Verdict (dB) (MHz) (dBm) (dBm) 37.812 -54.21 Horizontal **PASS** -67.21 -13 51.301 -73.41 -13 -60.41 Horizontal **PASS** -62.85 **PASS** 64.887 -75.85 -13 Horizontal 94.098 -65.79 -13 -52.79Horizontal **PASS** 115.321 -71.92 -13 -58.92 Horizontal **PASS** 189.074 -67.88 -13 -54.88 Horizontal **PASS**



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DL 1S M AWGN Horizontal above 1GHz 40 Level (dBm) 10 **13DBM** -10 -30 6 -50 -70 -90 1000 1500 2000 5000 10000 18000 Freq. Level Limit Over Limit Polarization Verdict (MHz) (dBm) (dBm) (dB) 1648.778 Horizontal **PASS** -50.96 -13 -37.96 2089.751 Horizontal **PASS** -51.20 -13 -38.22428.671 -49.35 -13 -36.35 Horizontal **PASS** 5730.396 -41.72 -13 -28.72 Horizontal **PASS** -28.75 Horizontal **PASS** 6659.763 -41.75 -13 10885.670 **PASS** -39.22-13 -26.22Horizontal



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DL 1S M AWGN Vertical 30MHz~1GHz 40 Level (dBm) 30 10 13DBM -10 -30 -50 5 2 3 -70 -90 -110 -120₃₀ 50 100 200 500 1000 Freq. Level Limit Over Limit Polarization Verdict (MHz) (dBm) (dBm) (dB) 37.815 Vertical **PASS** -67.00 -13 -54 64.887 -69.27 Vertical **PASS** -13 -56.27 78.413 -70.23 -13 -57.23 Vertical **PASS** 93.113 -59.36 -13 -46.36 Vertical **PASS** 121.213 -67.34 Vertical **PASS** -13 -54.34285.978 -70.71 Vertical **PASS** -13 -57.71



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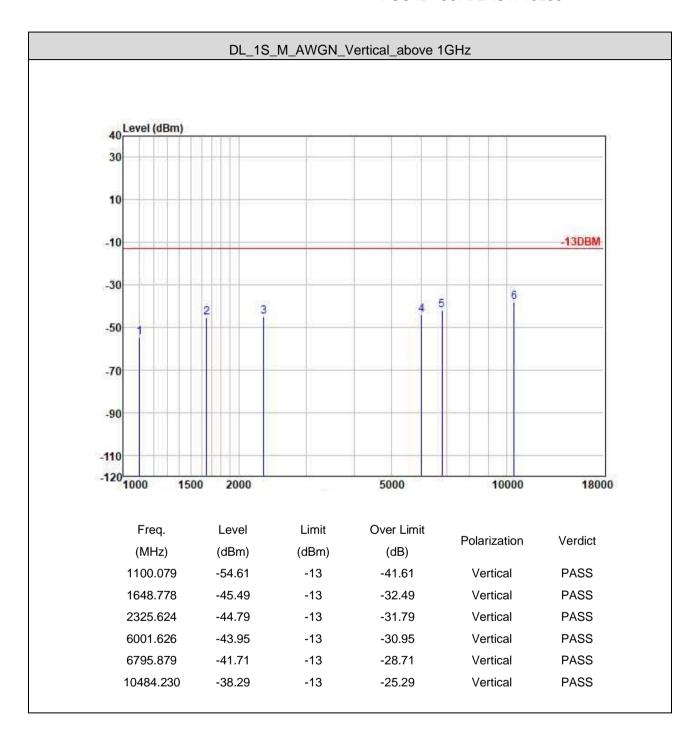
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-- End of Appendix B--



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