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FCC ID: OJFDHRU-DHPAM-85

Appendix B

Test Data and Result Details of GZCR2103000014AT



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1 ESMR (only for downlink: 862-869MHz)

1.1 AGC threshold level

Test Conf.	AGC Threshold level
DL_1S_M_AWGN_AWGN	0.43dBm
DL_1S_M_AWGN_GSM	0.27dBm



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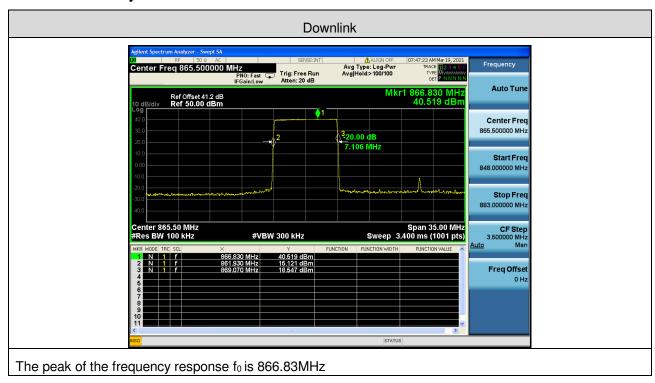


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1.2 Out-of-band rejection





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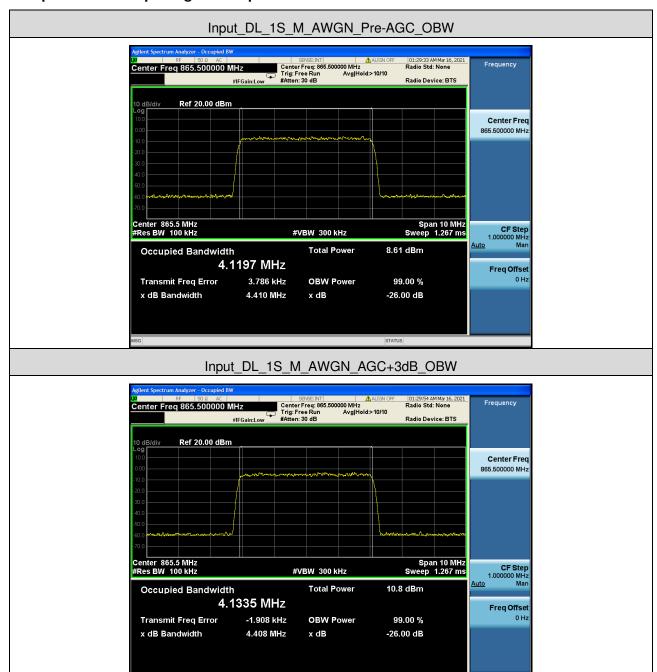


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1.3 Input-versus-output signal comparison





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Output DL 1S M AWGN Pre-AGC OBW SENSE:INTI ALIGN C Center Freq: 865.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 30 dB Center Freq 865.500000 MHz Radio Device: BTS Ref 60.00 dBm Center Freq 865.500000 MH Center 865.5 MHz #Res BW 100 kHz Span 10 MHz Sweep 1 ms CF Step 1.000000 MHz **#VBW** 300 kHz Total Power 49.3 dBm Occupied Bandwidth 4.1414 MHz 99.00 % Transmit Freq Error -1.372 kHz **OBW Power** x dB Bandwidth 4.429 MHz x dB -26.00 dB Output DL 1S M AWGN AGC+3dB OBW Center Freq: 865.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 30 dB Nadio Std: None Center Freg 865.500000 MHz Ref 60.00 dBm Center Fred 865.500000 MHz Span 10 MHz Sweep 1 ms Center 865.5 MHz #Res BW 100 kHz CF Step 1.000000 MHz Mar #VBW 300 kHz

Total Power

OBW Power

x dB

Occupied Bandwidth

Transmit Freq Error

x dB Bandwidth

4.1436 MHz

2.874 kHz

4.422 MHz

51.2 dBm

99.00 %

-26.00 dB



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Freq Offset



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Input DL 1S M GSM Pre-AGC OBW Center Freq: 865.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 30 dB Center Freq 865.500000 MHz Radio Device: BTS Ref 20.00 dBm Center Freq 865.500000 MH CF Step 100.000 kHz **#VBW 10 kHz** Ma Total Power 4.18 dBm Occupied Bandwidth 243.72 kHz 99.00 % Transmit Freq Error -1.260 kHz **OBW Power** x dB Bandwidth 310.1 kHz x dB -26.00 dB Input DL 1S M GSM AGC+3dB OBW Center Freq: 865.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 30 dB 03:40:24 AM Mar 16, 202 Radio Std: None enter Freg 865.500000 MHz Ref 20.00 dBm Center Fred 865.500000 MHz Center 865.5 MHz #Res BW 3 kHz Span 1 MHz Sweep 136.1 ms #VBW 10 kHz **Total Power** 7.03 dBm Occupied Bandwidth 245.47 kHz Freq Offset

OBW Power

x dB

99.00 %

-26.00 dB

264 Hz

310.7 kHz



Transmit Freq Error

x dB Bandwidth

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Output_DL_1S_M_GSM_Pre-AGC_OBW



Output_DL_1S_M_GSM_AGC+3dB_OBW



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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1.4 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	0.23	42.89	42.66	PASS
DL_1S_AWGN	866.83	AGC+3dB	3.23	42.78	/	PASS
		Pre-AGC	0.07	42.72	42.65	PASS
DL_1S_GSM	866.83	AGC+3dB	3.07	42.76	/	PASS

Remark:

According to the declaration from the applicant, the single antenna gain should not exceed 12.5dBi, the Directional gain = G_{ANT} + 10 log (N_{ANT}) dBi = 10dBi+10log (2) dBi= 13dBi.

ERP= EIRP-2.15dB,

The total maximum ERP for the EUT is (42.89dBm+42.89dBm) +13dBi-2.15dB=56.75dBm (473.15W) which don't exceed the required ERP limit (1000W/MHz).



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

Note: 1. 90.691 a (1) Limit:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or 50 + 10 $Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

The tested max conducted power for single antenna port is 42.89dBm, the power of any emission must be reduced below the mean output power (P) by at least 50 + 10log (P) dB Here, P=42.89dBm= 19.45W.

So the limit = P(dBm)- [50 + 10 log (19.45)] = -20dBm

The EUT supports 2x2 MIMO and the emissions were measured at one of output port, so the limit line was set to -23.01dBm in following test plots in order to determine the test result conveniently.

2. 90.691 a (2) Limit:

(1) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log₁₀(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

The tested max conducted power for single antenna port is 42.89dBm, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB Here, P=42.89dBm= 19.45W.

So the limit = P(dBm)- [43 + 10 log (19.45W)] =-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.



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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 Frequency NO: Wide Trig: Free Run Start Freq 861.700000 MHz Avg Type: RMS AvalHold:>100/100 **Auto Tun** Ref Offset 41.2 dB Ref 40.00 dBm Center Fred Start Freq 861.700000 MHz Stop Freq 868.500000 MHz CF Step 680.000 kHz Mar Start 861.700 MHz #Res BW 100 kHz Stop 868.500 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz* DL 2S B AWGN AGC+3 Out-of-band emission Frequency Avg Type: RMS Avg|Hold:>100/100 Start Freq 861.700000 MHz PNO: Wide Trig: Free Run Atten: 10 dB Auto Tune Mkr1 862.000 0 Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 865.100000 MHz Start Fred 861.700000 MHz Stop Freq 868.500000 MHz CF Step 680.000 kHz Mar



Start 861.700 MHz #Res BW 100 kHz

#VBW 300 kHz*

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Stop 868.500 MHz Sweep 1.000 ms (1001 pts)

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DL 2S T AWGN Pre-AGC Out-of-band emission 10: Wide Trig: Free Run Frequency Start Freq 862.500000 MHz Avg Type: RMS AvalHold:>100/100 **Auto Tun** Ref Offset 41.2 dB Ref 40.00 dBm Center Fred Start Freq 862.500000 MHz Stop Freq 869.300000 MHz CF Step 680.000 kHz Mar Stop 869.300 MHz Sweep 1.000 ms (1001 pts) Start 862.500 MHz #Res BW 100 kHz #VBW 300 kHz* DL 2S T AWGN AGC+3 Out-of-band emission Frequency Start Freq 862.500000 MHz Avg Type: RMS Avg|Hold:>100/100 PNO: Wide Trig: Free Run Atten: 10 dB Auto Tune Mkr1 86 Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 865.900000 MHz Start Fred 862.500000 MHz Stop Freq 869.300000 MH CF Step 680.000 kHz Mar Freq Offset



Start 862.500 MHz #Res BW 100 kHz

#VBW 300 kHz*

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Stop 869.300 MHz Sweep 1.000 ms (1001 pts)

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FCC ID: OJFDHRU-DHPAM-85

DL_1S_B_GSM_Pre-AGC_Out-of-band emission



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





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FCC ID: OJFDHRU-DHPAM-85

DL 1S T GSM Pre-AGC Out-of-band emission Start Freq 868.800000 MHz Avg Type: RMS AvalHold:>100/100



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





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FCC ID: OJFDHRU-DHPAM-85

DL 2S B GSM Pre-AGC Out-of-band emission Frequency Start Freq 861.700000 MHz Avg Type: RMS AvalHold:>100/100 Trig: Free Run **Auto Tun** 2.000 0 M -26.370 dl Ref Offset 41.2 dB Ref 44.20 dBm Center Fred 862.150000 MH Start Freq 861.700000 MHz Stop Freq 862.600000 MHz Ma Start 861.7000 MHz #Res BW 100 kHz Stop 862.6000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz* DL 2S B GSM AGC+3 Out-of-band emission Frequency Avg Type: RMS Avg|Hold:>100/100 Start Freq 861.700000 MHz PNO: Wide Trig: Free Run IFGain:Low Atten: 20 dB Auto Tune Ref Offset 41.2 dB Ref 44.20 dBm -26.582 dBn Center Fred 862.150000 MHz Start Fred 861.700000 MHz Stop Fred 862.600000 MH



Start 861.7000 MHz #Res BW 100 kHz

#VBW 300 kHz*

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CF Step 90.000 kHz Mar

Freq Offset

Stop 862.6000 MHz 1.000 ms (1001 pts)



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FCC ID: OJFDHRU-DHPAM-85

DL 2S T GSM Pre-AGC Out-of-band emission Frequency Start Freq 868.400000 MHz Avg Type: RMS AvgiHold>100/100 Trig: Free Run **Auto Tun** 9.000 0 M -25.488 dl Ref Offset 41.2 dB Ref 44.20 dBm Center Fred 868.850000 MH Start Freq 868.400000 MH Stop Freq 869.300000 MHz Mar Start 868.4000 MHz #Res BW 100 kHz Stop 869.3000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz* DL 2S T GSM AGC+3 Out-of-band emission Frequency Avg Type: RMS Avg|Hold:>100/100 Start Freg 868.400000 MHz PNO: Wide Trig: Free Run IFGain:Low Atten: 20 dB Auto Tune Mkr1 869.000 0 MH: -25.445 dBm Ref Offset 41.2 dB Ref 44.20 dBm Center Fred 868.850000 MHz Start Fred 868.400000 MHz Stop Freq 869.300000 MH



Start 868.4000 MHz #Res BW 100 kHz

#VBW 300 kHz*

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CF Step 90.000 kHz Mar

Freq Offset

Stop 869.3000 MHz 1.000 ms (1001 pts)

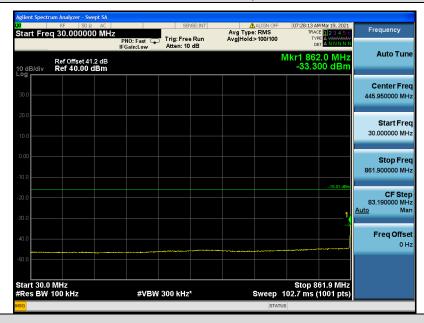


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DL 1S B AWGN Pre-AGC Spurious emission 1



DL_1S_B_AWGN_Pre-AGC_Spurious emission 2





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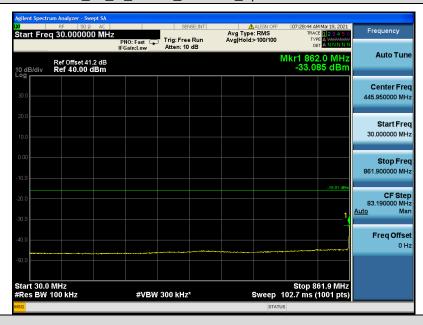


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FCC ID: OJFDHRU-DHPAM-85

DL 1S M AWGN Pre-AGC Spurious emission 1



DL_1S_M_AWGN_Pre-AGC_Spurious emission 2





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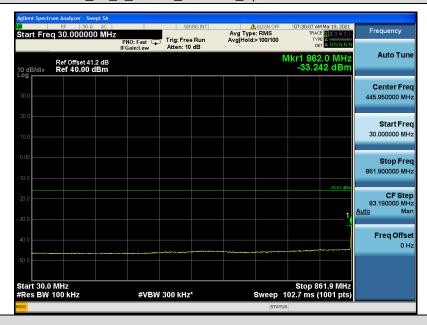


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FCC ID: OJFDHRU-DHPAM-85

DL 1S T AWGN Pre-AGC Spurious emission 1



DL_1S_T_AWGN_Pre-AGC_Spurious emission 2





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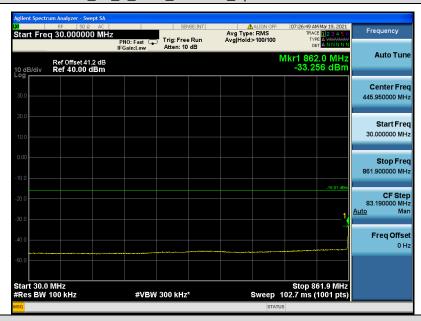


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FCC ID: OJFDHRU-DHPAM-85

DL 1S B GSM Pre-AGC Spurious emission 1



DL_1S_B_GSM_Pre-AGC_Spurious emission 2





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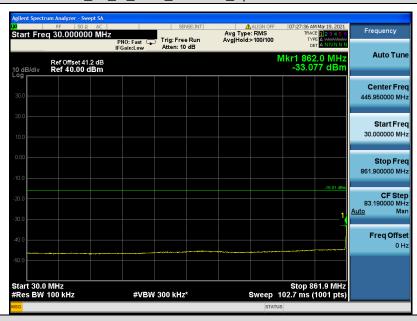


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FCC ID: OJFDHRU-DHPAM-85

DL 1S M GSM Pre-AGC Spurious emission 1



DL 1S M GSM Pre-AGC Spurious emission 2





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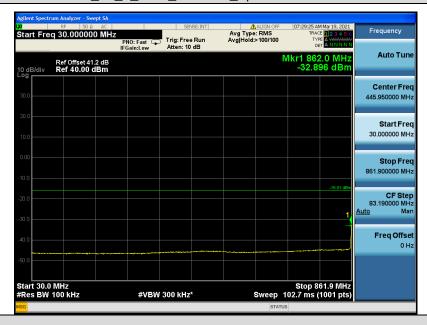


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FCC ID: OJFDHRU-DHPAM-85

DL 1S T GSM Pre-AGC Spurious emission 1



DL_1S_T_GSM_Pre-AGC_Spurious emission 2





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1.6 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 AC 110V.
- 2. At +20 °C temperature and $\pm 15\%$ 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 and less than 1.5ppm. 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 (℃)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict			
50		865.501345	-0.44	PASS			
40		865.501536	-0.22	PASS			
30		865.501132	-0.69	PASS			
20		865.501726		PASS			
10	DL_1S_M_AWGN	865.501893	0.19	PASS			
0		865.502038	0.36	PASS			
-10		865.501683	-0.05	PASS			
-20		865.502103	0.44	PASS			
-30		865.501898	0.20	PASS			

Frequency stability vs voltage								
Voltage (V)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict				
AC 93.5		865.501115	-0.71	PASS				
AC 110	DL_1S_M_AWGN	865.501726	Reference	PASS				
AC 126.5		865.502035	0.35	PASS				



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1.7 Radiated spurious emissions

Note:

1. The tested max conducted power for single antenna port is 42.89dBm, the 2x2 MIMO total power is 42.89dBm+42.89dBm=38.9W

a)For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

Here, P=38.90W,

the limit = P(dBm)- [50 + 10 log (38.90W)] = -20dBm

b) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

Here, P=38.90W,

the limit = P(dBm)- [43 + 10 log (38.90W)] = -13dBm

The limit line was set to -20dBm (the strictest limit) in following test plots in order to determine the test result conveniently.

- 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 from 9kHz to 30MHz was very low and 20dB below the limit, therefore, the data was not recorded in the report.



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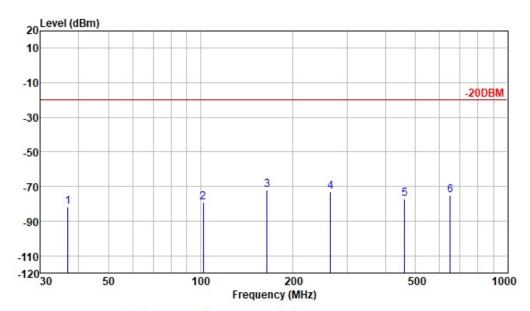


Application No.: GZCR2103000014AT

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FCC ID: OJFDHRU-DHPAM-85

DL 1S M AWGN Horizontal 30MHz~1GHz



		Read C	orrection	on	Limit	Over	
	Freq	Level	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	36.90	-84.12	2.53	-81.59	-19.99	-61.60	HORIZONTAL
2	101.64	-69.59	-9.56	-79.15	-19.99	-59.16	HORIZONTAL
3	164.33	-65.62	-6.32	-71.94	-19.99	-51.95	HORIZONTAL
4	264.75	-69.43	-3.53	-72.96	-19.99	-52.97	HORIZONTAL
5	462.35	-77.38	0.30	-77.08	-19.99	-57.09	HORIZONTAL
6	649.66	-79.01	3.79	-75.22	-19.99	-55.23	HORIZONTAL



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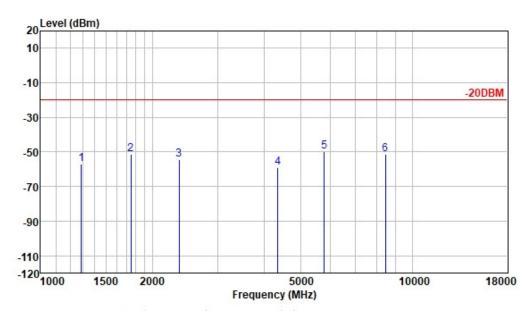


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FCC ID: OJFDHRU-DHPAM-85

DL 1S M AWGN Horizontal above 1GHz



		Read Correction		Limit	Over		
	Freq	Level	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	6.
1	1285.90	-61.25	4.06	-57.19	-19.99	-37.20	HORIZONTAL
2	1751.96	-57.07	6.03	-51.04	-19.99	-31.05	HORIZONTAL
3	2359.48	-63.78	9.54	-54.24	-19.99	-34.25	HORIZONTAL
4	4341.89	-63.21	4.38	-58.83	-19.99	-38.84	HORIZONTAL
5	5797.03	-65.26	15.33	-49.93	-19.99	-29.94	HORIZONTAL
6	8465.38	-64.85	13.43	-51.42	-19.99	-31.43	HORIZONTAL



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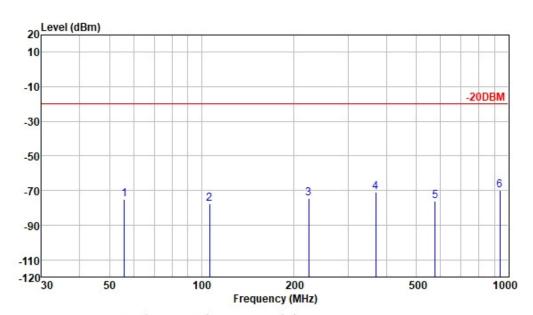


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FCC ID: OJFDHRU-DHPAM-85

DL 1S M AWGN Vertical 30MHz~1GHz



		Read C	Read Correction			Over	
	Freq	Level	Factor	Level	Line	Limit	Pol/Phase
100	MHz	dBm	dB	dBm	dBm	dB	
1	55.80	-71.09	-3.71	-74.80	-19.99	-54.81	VERTICAL
2	106.01	-72.79	-4.84	-77.63	-19.99	-57.64	VERTICAL
3	222.95	-68.39	-6.03	-74.42	-19.99	-54.43	VERTICAL
4	369.40	-69.30	-1.50	-70.80	-19.99	-50.81	VERTICAL
5	576.64	-79.11	3.02	-76.09	-19.99	-56.10	VERTICAL
6	935.55	-78.72	8.94	-69.78	-19.99	-49.79	VERTICAL



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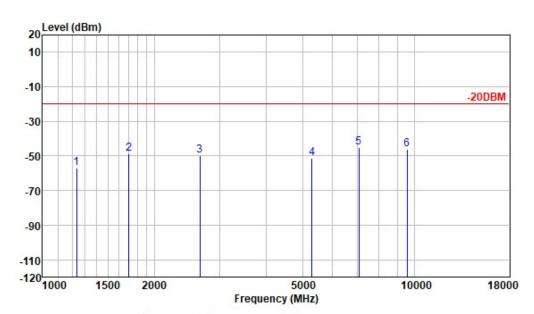


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FCC ID: OJFDHRU-DHPAM-85

DL 1S M AWGN Vertical above 1GHz



		Read C	orrection	on	Limit	0ver	
	Freq	Level	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1234.91	-60.53	3.71	-56.82	-19.99	-36.83	VERTICAL
2	1706.97	-54.45	5.65	-48.80	-19.99	-28.81	VERTICAL
3	2648.66	-55.20	5.42	-49.78	-19.99	-29.79	VERTICAL
4	5300.20	-64.57	13.20	-51.37	-19.99	-31.38	VERTICAL
5	7076.52	-65.03	19.82	-45.21	-19.99	-25.22	VERTICAL
6	9558.02	-63.87	17.80	-46.07	-19.99	-26.08	VERTICAL



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FCC ID: OJFDHRU-DHPAM-85

2 Cellular (only for downlink: 869-894MHz)

2.1 AGC threshold level

Test Conf.	AGC Threshold level
DL_1S_M_AWGN_AWGN	0.17dBm
DL_1S_M_AWGN_GSM	0.05dBm



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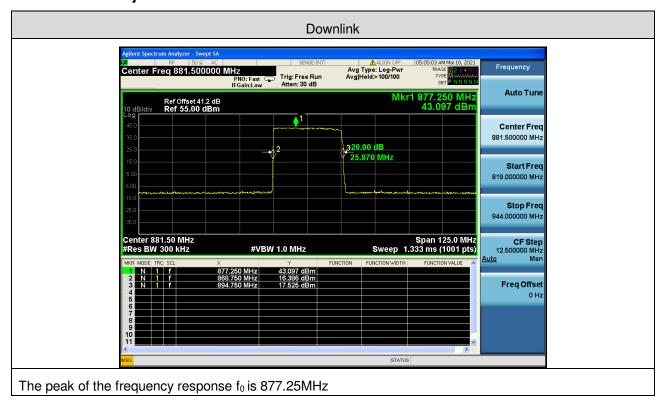


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2.2 Out-of-band rejection





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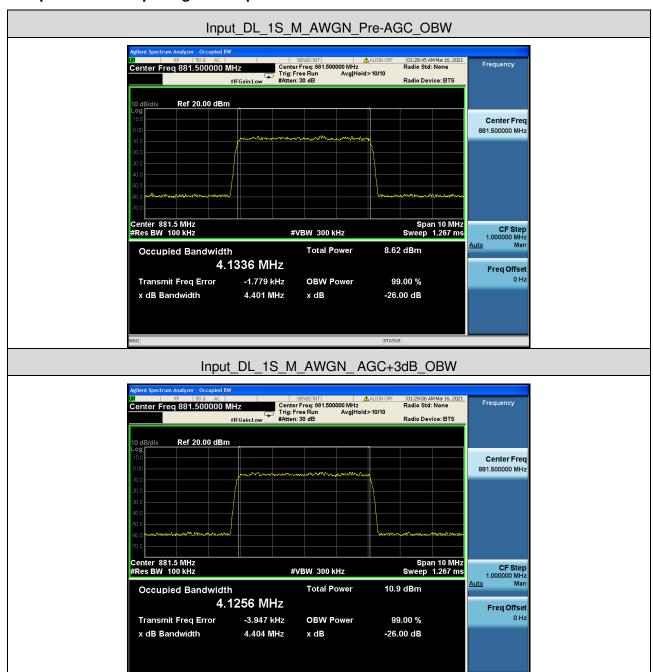


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2.3 Input-versus-output signal comparison





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FCC ID: OJFDHRU-DHPAM-85

Output DL 1S M AWGN Pre-AGC OBW Center Freq: 881.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 20 dB Center Freq 881.500000 MHz Radio Device: BTS Ref 60.00 dBm Center Freq 881.500000 MHz Center 881.5 MHz #Res BW 100 kHz Span 10 MHz Sweep 1 ms CF Step 1.000000 MHz **#VBW** 300 kHz Total Power 48.0 dBm Occupied Bandwidth 4.1397 MHz 99.00 % Transmit Freq Error 3.698 kHz **OBW Power** x dB Bandwidth 4.423 MHz x dB -26.00 dB Output DL 1S M AWGN AGC+3dB OBW Nadio Std: None Center Freq: 881.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 20 dB Center Freg 881.500000 MHz Ref 60.00 dBm Center Fred 881.500000 MHz Span 10 MHz Sweep 1 ms Center 881.5 MHz #Res BW 100 kHz CF Step 1.000000 MHz Mar **#VBW 300 kHz Total Power** 48.4 dBm Occupied Bandwidth 4.1368 MHz Freq Offset **OBW Power** Transmit Freq Error 994 Hz 99.00 % x dB Bandwidth 4.418 MHz x dB -26.00 dB



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FCC ID: OJFDHRU-DHPAM-85

Input DL 1S M GSM Pre-AGC OBW Center Freq: 881.500000 MHz Trig: Free Run Avg|Hold: 7/10 #Atten: 30 dB Center Freq 881.500000 MHz Radio Device: BTS Ref 20.00 dBm Center Freq 881.500000 MHz CF Step 100.000 kHz **#VBW 10 kHz** Ma Total Power 3.38 dBm Occupied Bandwidth 245.10 kHz 99.00 % Transmit Freq Error -186 Hz **OBW Power** x dB Bandwidth 307.6 kHz x dB -26.00 dB Input_DL_1S_M_GSM_ AGC+3dB OBW Radio Std: None Center Freq: 881.500000 MHz Trig: Free Run Avg|Hold: 9/10 #Atten: 30 dB enter Freg 881.500000 MHz Ref 20.00 dBm Center Fred 881.500000 MHz Center 881.5 MHz #Res BW 3 kHz Span 1 MHz Sweep 136.1 ms #VBW 10 kHz

Total Power

OBW Power

x dB

Occupied Bandwidth

Transmit Freq Error

x dB Bandwidth

246.89 kHz

1.721 kHz

310.3 kHz

5.76 dBm

99.00 %

-26.00 dB



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Freq Offset



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FCC ID: OJFDHRU-DHPAM-85

Output DL 1S M GSM Pre-AGC OBW Center Freq: 881.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 20 dB Center Freq 881.500000 MHz Radio Device: BTS Ref 60.00 dBm Center Freq 881.500000 MHz CF Step 100.000 kHz **#VBW 10 kHz** Ma Total Power 48.2 dBm Occupied Bandwidth 245.62 kHz 99.00 % Transmit Freq Error 45 Hz **OBW Power** x dB Bandwidth 309.5 kHz x dB -26.00 dB Output DL 1S M GSM AGC+3dB OBW ub:26:03 AM Mar 18, 202 Radio Std: None SENSE:INT AALIGN (Center Freq: 881.500000 MHz Trig: Free Run Avg|Hold:>10/10 #Atten: 20 dB enter Freg 881.500000 MHz Ref 60.00 dBm Center Fred 881.500000 MHz Center 881.5 MHz #Res BW 3 kHz Span 1 MHz Sweep 105.5 ms #VBW 10 kHz **Total Power** 48.2 dBm Occupied Bandwidth 246.20 kHz Freq Offset **OBW Power** Transmit Freq Error 185 Hz 99.00 % x dB Bandwidth 310.5 kHz x dB -26.00 dB



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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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FCC ID: OJFDHRU-DHPAM-85

2.4 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	877.25	Pre-AGC	0.00	42.94	42.94	PASS
		AGC+3dB	3.00	42.76	/	PASS
DL_1S_GSM	877.25	Pre-AGC	-0.10	42.76	42.86	PASS
		AGC+3dB	2.90	42.87	/	PASS

Remark:

According to the declaration from the applicant, the single antenna gain should not exceed 12.5dBi, the Directional gain = G_{ANT} + 10 log (N_{ANT}) dBi = 10dBi+10log (2) dBi= 13dBi.

ERP= EIRP-2.15dB,

The total maximum ERP for the EUT is (42.94dBm+42.94dBm) +13dBi-2.15dB=56.8dBm (478.63W) which don't exceed the required ERP limit (500W).



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

Note:

The tested max conducted power for single antenna port is 42.94dBm, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB Here,

P=42.94dBm= 19.7W.

So the limit =

P(dBm)-[43 + 10 log (19.7W)] = -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.



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DL 1S B AWGN Pre-AGC Out-of-band emission Frequency Start Freq 868.700000 MHz NO: Wide Trig: Free Run Gain:Low #Atten: 20 dB Avg Type: RMS AvalHold:>99/99 **Auto Tun** Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 870.100000 MH Start Freq 868.700000 MH Stop Freq 871.500000 MHz **CF Step** 280.000 kHz Mar Stop 871.500 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz* DL 1S B AWGN AGC+3 Out-of-band emission Frequency Avg Type: RMS Avg|Hold:>99/99 Start Freg 868.700000 MHz PNO: Wide Trig: Free Run Auto Tune Mkr1 8 Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 870.100000 MHz Start Fred 868.700000 MHz



Start 868.700 MHz #Res BW 100 kHz

#VBW 300 kHz*

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Stop 871.500 MHz Sweep 1.000 ms (1001 pts)

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Stop Freq 871.500000 MHz

Freq Offset



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FCC ID: OJFDHRU-DHPAM-85

DL 1S T AWGN Pre-AGC Out-of-band emission Frequency Start Freq 891.500000 MHz 10: Wide Trig: Free Run Bain:Low #Atten: 20 dB Avg Type: RMS AvalHold:>100/100 **Auto Tun** Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 891.500000 MH Stop Freq 894.300000 MHz **CF Step** 280.000 kHz Mar Start 891.500 MHz #Res BW 100 kHz Stop 894.300 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz* DL 1S T AWGN AGC+3 Out-of-band emission Frequency Avg Type: RMS Avg|Hold:>100/100 Start Freq 891.500000 MHz PNO: Wide Trig: Free Run Auto Tune Mkr1 894.000 0 Ref Offset 41.2 dB Ref 40.00 dBm -30.275 dBn Center Fred 892.900000 MHz Start Fred 891.500000 MHz Stop Freq 894.300000 MHz



Start 891.500 MHz #Res BW 100 kHz

#VBW 300 kHz*

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Stop 894.300 MHz Sweep 1.000 ms (1001 pts)

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CF Step 280.000 kHz Mar

Freq Offset



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FCC ID: OJFDHRU-DHPAM-85

DL 2S B AWGN Pre-AGC Out-of-band emission Frequency Start Freq 868.700000 MHz NO: Wide Trig: Free Run Gain:Low #Atten: 20 dB Avg Type: RMS AvalHold:>99/99 **Auto Tun** Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 872.600000 MH Start Freq 868.700000 MH Stop Freq 876.500000 MHz CF Step 780.000 kHz Mar Stop 876.500 MHz Sweep 1.000 ms (1001 pts) Start 868.700 MHz #Res BW 100 kHz #VBW 300 kHz* DL 2S B AWGN AGC+3 Out-of-band emission Avg Type: RMS Avg|Hold:>99/99 Frequency Start Freq 868.700000 MHz PNO: Wide Trig: Free Run Auto Tune Mkr1 869.000 0 Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 872.600000 MHz Start Fred 868.700000 MHz Stop Freq 876.500000 MHz CF Step 780.000 kHz Mar Freq Offset Start 868.700 MHz #Res BW 100 kHz Stop 876.500 MHz Sweep 1.000 ms (1001 pts)

#VBW 300 kHz*



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DL 2S T AWGN Pre-AGC Out-of-band emission Frequency Start Freq 886.500000 MHz 10: Wide Trig: Free Run Bain:Low #Atten: 20 dB Avg Type: RMS AvalHold:>100/100 **Auto Tun** Ref Offset 41.2 dB Ref 40.00 dBm Center Fred Start Freq 886.500000 MHz Stop Freq 894.300000 MHz CF Step 780.000 kHz Mar Stop 894.300 MHz Sweep 1.000 ms (1001 pts) Start 886.500 MHz #Res BW 100 kHz #VBW 300 kHz* DL 2S T AWGN AGC+3 Out-of-band emission Frequency Avg Type: RMS Avg|Hold:>100/100 Start Freg 886.500000 MHz PNO: Wide Trig: Free Run Auto Tune Mkr1 89 Ref Offset 41.2 dB Ref 40.00 dBm Center Fred 890.400000 MHz Start Fred 886.500000 MHz Stop Freq 894.300000 MHz



Start 886.500 MHz #Res BW 100 kHz

#VBW 300 kHz*

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Stop 894.300 MHz Sweep 1.000 ms (1001 pts)

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CF Step 780.000 kHz Mar

Freq Offset



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FCC ID: OJFDHRU-DHPAM-85

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



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





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



DL_1S_T_GSM_AGC+3_Out-of-band emission





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FCC ID: OJFDHRU-DHPAM-85

DL_2S_B_GSM_Pre-AGC_Out-of-band emission Aglient Spectrum Analyzer - Swept SA PRE 50 9 AC Start Freq 868.700000 MHz PASS PRO: Wide Frequency Fr



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





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



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





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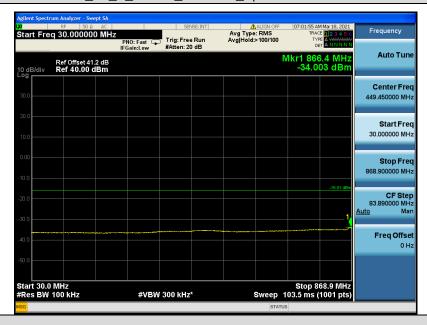


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DL 1S B AWGN Pre-AGC Spurious emission 1



DL_1S_B_AWGN_Pre-AGC_Spurious emission 2





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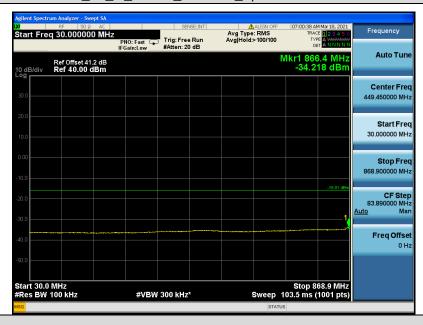


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FCC ID: OJFDHRU-DHPAM-85

DL 1S M AWGN Pre-AGC Spurious emission 1



DL_1S_M_AWGN_Pre-AGC_Spurious emission 2





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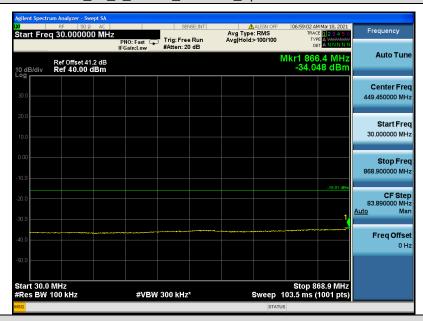


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FCC ID: OJFDHRU-DHPAM-85

DL 1S T AWGN Pre-AGC Spurious emission 1



DL_1S_T_AWGN_Pre-AGC_Spurious emission 2





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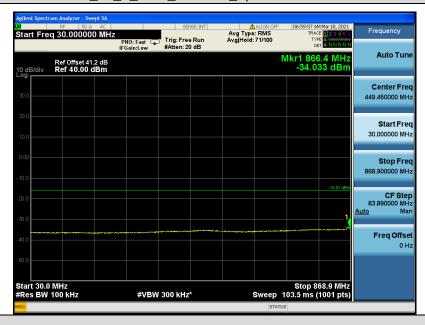


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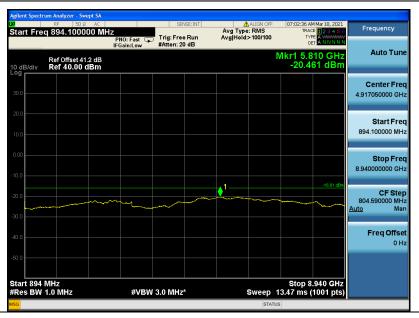
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DL 1S B GSM Pre-AGC Spurious emission 1



DL_1S_B_GSM_Pre-AGC_Spurious emission 2





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DL 1S M GSM Pre-AGC Spurious emission 1



DL 1S M GSM Pre-AGC Spurious emission 2





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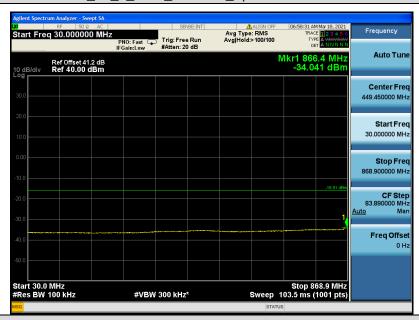


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DL 1S T GSM Pre-AGC Spurious emission 1



DL_1S_T_GSM_Pre-AGC_Spurious emission 2





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2.6 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 AC 110V.
- 2. At +20 °C temperature and $\pm 15\%$ 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		881.500935	-1.31	PASS		
40		881.501526	-0.64	PASS		
30		881.502518	-0.48	PASS		
20		881.502093 Ref		PASS		
10	DL_1S_M_AWGN	881.501283	-0.92	PASS		
0		881.502612	0.59	PASS		
-10		881.502003	-0.10	PASS		
-20		881.501678	-0.47	PASS		
-30		881.502341	0.28	PASS		

Frequency stability vs voltage						
Voltage (V)	Test Conf.	Test data (MHz)	Tolerance (ppm)	Verdict		
AC 93.5		881.501872	-0.25	PASS		
AC 110	DL_1S_M_AWGN	DL_1S_M_AWGN		PASS		
AC 126.5		881.501986	-0.12	PASS		



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2.7 Radiated spurious emissions

Note:

1. The tested max conducted power for single antenna port is 42.94dBm, the 2x2 MIMO total power is 42.94dBm+42.94dBm=39.4W, the power of any emission must be reduced below the mean output power (P) by at least 43 + 10log (P) dB

Here,

P= 39.4W.

So the limit =

P(dBm)-[43 + 10 log (39.4W)] = -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 from 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 20 Level (dBm) 13DBM -10 -30 -50 4 -70 -90 -110 -120<mark>30</mark> 50 100 200 500 1000 Frequency (MHz) Limit Read Correction Over Line Freq Level Factor Level Limit Pol/Phase dBm dBm dB MHz -85.47 3.13 -82.34 -12.99 -69.35 HORIZONTAL 32.75 1 2 59.23 -76.43 -2.46 -78.89 -12.99 -65.90 HORIZONTAL 3 165.49 -64.07 -6.29 -70.36 -12.99 -57.37 HORIZONTAL 281.01 -64.03 -2.44 -66.47 -12.99 -53.48 HORIZONTAL 5 370.70 -73.79 -1.25 -75.04 -12.99 -62.05 HORIZONTAL 6 603.54 -78.42 3.11 -75.31 -12.99 -62.32 HORIZONTAL



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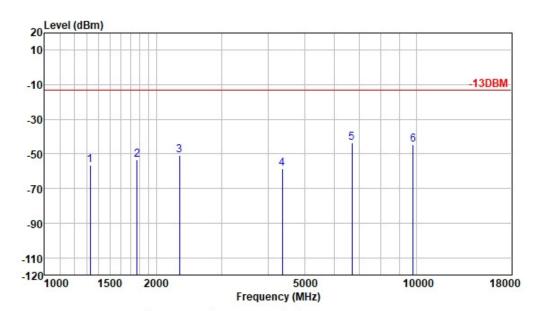


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DL 1S M AWGN Horizontal above 1GHz



		Read Correction			Limit	Over	
	Freq	Level	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1327.45	-60.31	4.06	-56.25	-12.99	-43.26	HORIZONTAL
2	1772.33	-59.36	5.83	-53.53	-12.99	-40.54	HORIZONTAL
3	2305.55	-60.33	9.59	-50.74	-12.99	-37.75	HORIZONTAL
4	4354.45	-63.13	4.40	-58.73	-12.99	-45.74	HORIZONTAL
5	6698.37	-63.99	20.28	-43.71	-12.99	-30.72	HORIZONTAL
6	9781.60	-63.30	18.61	-44.69	-12.99	-31.70	HORIZONTAL



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DL 1S M AWGN Vertical 30MHz~1GHz 20 Level (dBm) 13DBM -10 -30 -50 6 -70 3 -90 -110 -120₃₀ 200 100 500 1000 Frequency (MHz) Limit Read Correction Over Line Freq Level Factor Level Limit Pol/Phase dBm dBm dB MHz -69.76 -2.63 -72.39 -12.99 -59.40 VERTICAL 58.20 1 2 104.54 -69.88 -4.93 -74.81 -12.99 -61.82 VERTICAL 3 168.41 -73.46 -3.94 -77.40 -12.99 -64.41 VERTICAL 272.28 -67.71 -3.20 -70.91 -12.99 -57.92 VERTICAL 5 465.60 -76.57 1.75 -74.82 -12.99 -61.83 VERTICAL 6 932.27 -79.55 8.90 -70.65 -12.99 -57.66 VERTICAL



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DL 1S M AWGN Vertical above 1GHz 20 Level (dBm) 13DBM -10 -30 2 3 -50 -70 -90 -110 -120 1000 1500 2000 5000 10000 18000 Frequency (MHz) Limit Read Correction Over Line Freq Level Factor Level Limit Pol/Phase dBm dBm dB MHz 1249.27 -60.97 3.92 -57.05 -12.99 -44.06 VERTICAL 1 2 1736.83 -44.25 5.68 -38.57 -12.99 -25.58 VERTICAL -47.69 5.57 -42.12 -12.99 -29.13 3 2625.80 VERTICAL -62.94 11.95 -50.99 -12.99 -38.00 5284.90 VERTICAL 5 -62.78 16.06 -46.72 -12.99 -33.73 8036.21 VERTICAL 10126.82 -58.88 21.01 -37.87 -12.99 -24.88 VERTICAL

-- End of Appendix B--



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