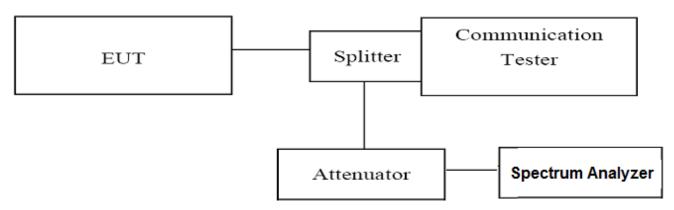


4.4 Band Edge Complicance

TEST APPLICABLE

During the process of testing, the EUT was controlled via Aglient Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was set up for the max output power with pseudo random data modulation;
- 2. The power was measured with Aglient Spectrum Analyzer N9020A;
- 3. Set RBW=5.1KHz,VBW=51KHz,Span=3MHz,SWT=300ms, Dector: RMS;
- 4. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (bottom, middle and top of operational frequency range).

TEST RESULTS

GSM 850								
Channel	Eroquopov	Measureme	ent Results	Limit				
Number	Frequency (MHz)	Frequency Values (MHz) (dBm)		(dBm)	Verdict			
128	824.20	823.998	-13.80	-13.00	PASS			
251	848.80	849.020	-16.81	-13.00	PASS			

GSM 1900								
Channel	Eroquopov	Measureme	ent Results	Limit				
Number	Frequency (MHz)	Frequency Values (MHz) (dBm)		(dBm)	Verdict			
512	1850.20	1849.981	-21.16	-13.00	PASS			
810	1909.80	1910.022	-20.62	-13.00	PASS			

GPRS 850								
Channel	Frequency	Measureme	ent Results	Limit				
Number	Frequency (MHz)	Frequency Values (MHz) (dBm)		(dBm)	Verdict			
128	824.20	823.990	-16.64	-13.00	PASS			
251	848.80	849.020	-17.16	-13.00	PASS			

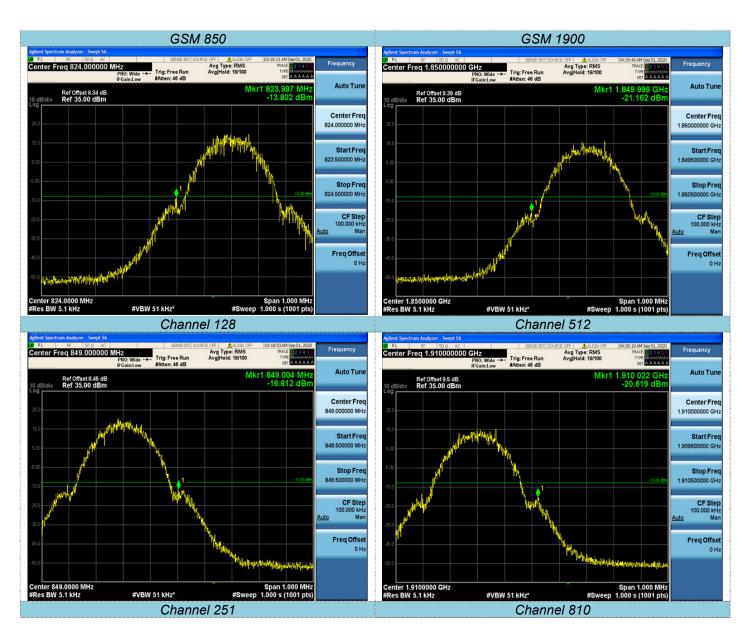
GPRS 1900								
Channel	Eroquopov	Measureme	ent Results	Limit				
Number	Frequency (MHz)	Frequency Values (MHz) (dBm)		(dBm)	Verdict			
512	1850.20	1849.978	-21.55	-13.00	PASS			
810	1909.80	1910.022	-20.87	-13.00	PASS			



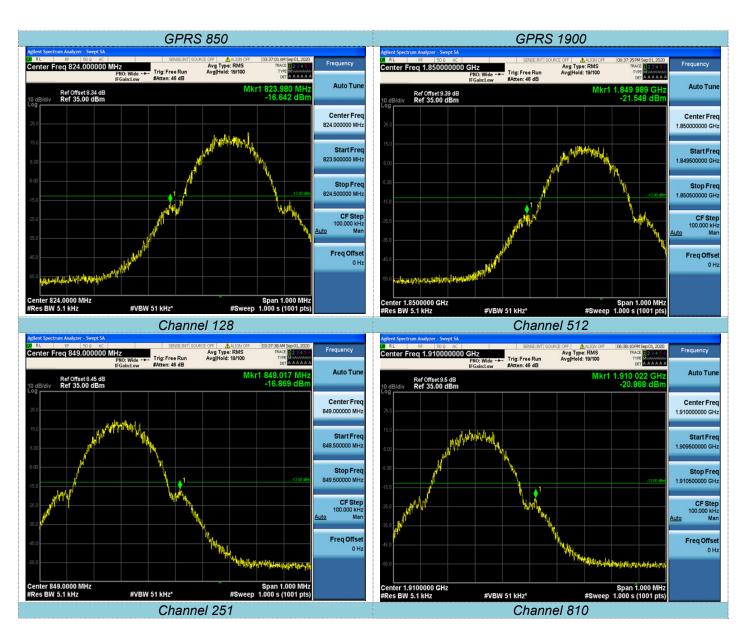
EGPRS 850									
Channel	Frequency	Measureme	ent Results	Limit					
Number	Frequency (MHz)	Frequency Values (MHz) (dBm)		(dBm)	Verdict				
128	824.20	823.980	-28.52	-13.00	PASS				
251	848.80	849.020	-27.97	-13.00	PASS				

EGPRS 1900								
Channel	Eroquopov	Measurem	ent Results	Limit				
Number	Frequency (MHz)	Frequency Values (MHz) (dBm)		(dBm)	Verdict			
512	1850.20	1849.984	-25.36	-13.00	PASS			
810	1909.80	1910.022	-28.16	-13.00	PASS			

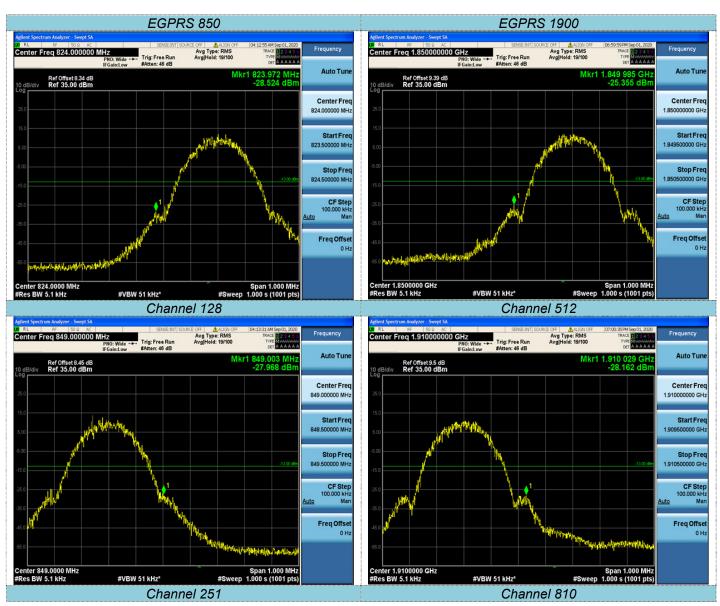














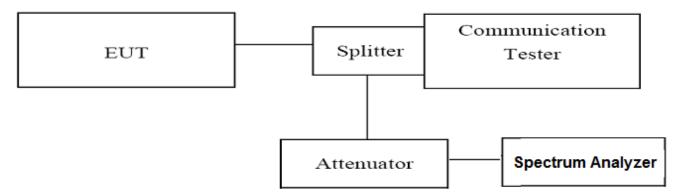
4.5 Spurious Emssion on Antenna Port

TEST APPLICABLE

The following steps outline the procedure used to measure the conducted emissions from the EUT.

- 1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 9 KHz to 19.1 GHz, data taken from 9 KHz to 25 GHz. For GSM850, data taken from 9 KHz to 9 GHz.
- 2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
- The procedure to get the conducted spurious emission is as follows: The trace mode is set to MaxHold to get the highest signal at each frequency; Wait 25 seconds; Get the result.
- 4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was set up for the max output power with pseudo random data modulation;
- 2. The power was measured with Agilent Spectrum Analyzer N9020A (peak);
- These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

TEST LIMIT

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P) dB$.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST RESULTS

Note:We tested GSM/GPRS/EGPRS mode and recorded the worst case at the GPRS mode.



4.5.1 For GPRS 850Test Results

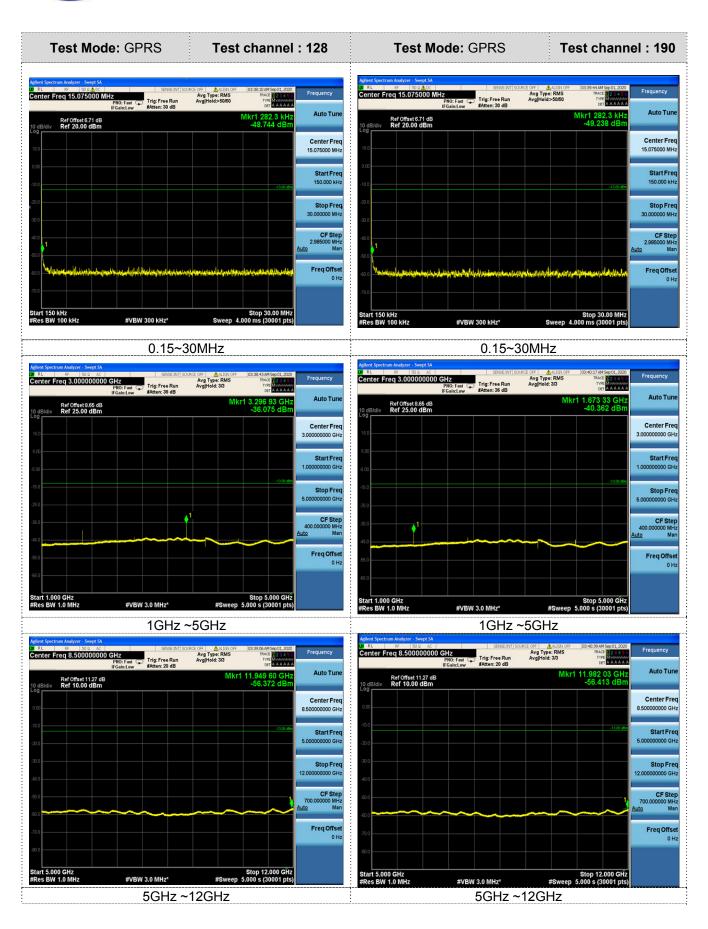
A. Test Verdict

Test Mode/ Channel	Frequency (MHz)	Frequency Range	Limit (dBm)	Verdict
GPRS 850		150KHz-30MHz	-13.00	PASS
/128	824.20	30MHz-5GHz	-13.00	PASS
/120		5GHz-18GHz	-13.00	PASS
		150KHz-30MHz	-13.00	PASS
GPRS 850 /190	836.60	30MHz-5GHz	-13.00	PASS
/190		5GHz-18GHz	-13.00	PASS
		150KHz-30MHz	-13.00	PASS
GPRS 850 /251	848.80	30MHz-5GHz	-13.00	PASS
7251		5GHz-18GHz	-13.00	PASS

Note:

1. In general, the worse case attenuation requirement shown above was applied. 2."---" means that the emission level is too low to be measured or at least 20 dB down than the limit.

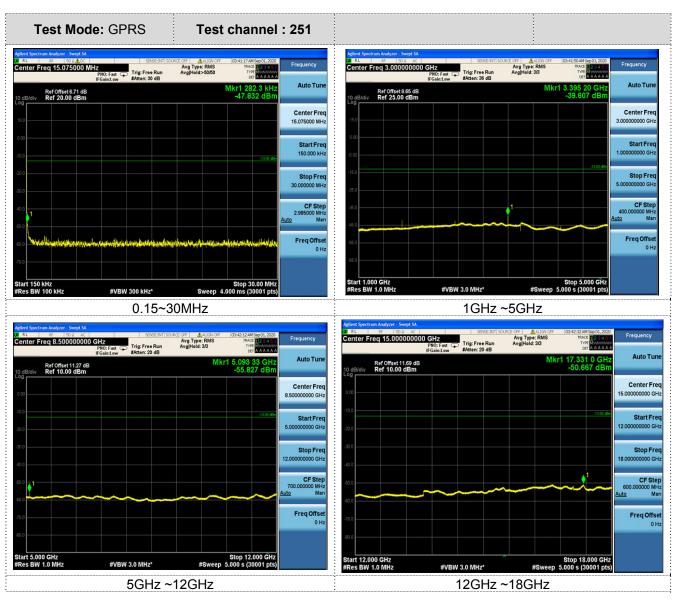
B. Test Plots





Agilent Spectrum Analyzer - Swept SA RL RF SOR AC Center Freq 15.0000000		RCE OFF ALIGN OFF 03:3 Avg Type: RMS Avg Hold: 3/3	89:26 AM Sep 01, 2020 TRACE 2:345 C TYPE MANAGE A A A A A	Frequency	RL	Analyzer - Swept SA № 50 Ω AC q 15.00000000	IO GHZ PNO: Fast G	SENSE:INT SOU Trig: Free Run #Atten: 20 dB	RCE OFF ALIGN OFF Avg Type: RMS Avg Hold: 3/3	03:40:59 AM Sep 01, 2020 TRACE 2 3 4 5 6 TYPE MUMMUMU DET A A A A A A	Frequency
Ref Offset 11.69 dE	a connection	Mkr1 16	.609 0 GHz 50.520 dBm	Auto Tune	10 dB/div	Ref Offset 11.69 dB Ref 10.00 dBm			Mkr	1 17.327 4 GHz -50.561 dBm	Auto Tune
0.00				Center Freq 5.00000000 GHz	0.00						Center Freq 15.000000000 GHz
20.0			-13.00 dBm	Start Freq 2.000000000 GHz	-10.0					-13.00 dBm	Start Fre 12.000000000 GH
40.0			1	Stop Freq 8.00000000 GHz	-30.0						Stop Fre 18.000000000 GH
.50.0				CF Step 600.000000 MHz uto Man	-50.0		<u></u>			~!	CF Ste 600.000000 MH <u>Auto</u> Ma
-70.0				Freq Offset 0 Hz	-70.0						Freq Offse 0 H
Start 12.000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz*	Sto #Sweep 5.000	p 18.000 GHz		-80.0 Start 12.000					Stop 18.000 GHz	
	12GHz ·				#Res BW 1.	U MHZ		3.0 MHz* 12GHz ~	^{#sweep} : ∽18GHz	.000 s (30001 pts)	







4.5.2 For GPRS 1900 Test Results

A. Test Verdict

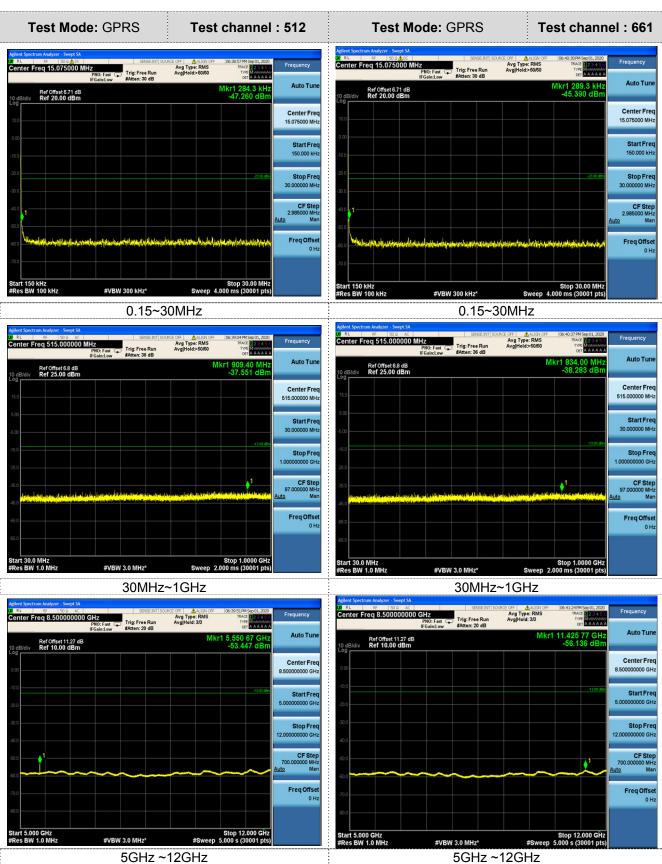
Test Mode/ Channel	Frequency (MHz)	Frequency Range	Limit (dBm)	Verdict
		9KHz-150KHz	-13.00	PASS
GPRS 1900	1850.20	150KHz-30MHz	-13.00	PASS
/512	1650.20	30MHz -8GHz	-13.00	PASS
		8GHz-26.5GHz	-13.00	PASS
		9KHz-150KHz	-13.00	PASS
GPRS 1900	1880.00	150KHz-30MHz	-13.00	PASS
/661	1000.00	30MHz -8GHz	-13.00	PASS
		8GHz-26.5GHz	-13.00	PASS
		9KHz-150KHz	-13.00	PASS
GPRS 1900	1000.90	150KHz-30MHz	-13.00	PASS
/810	1909.80	30MHz -8GHz	-13.00	PASS
		8GHz-26.5GHz	-13.00	PASS

Note:

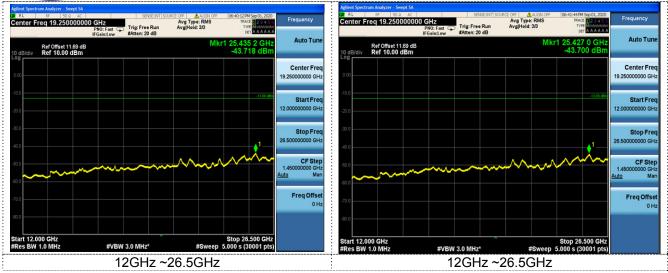
1. In general, the worse case attenuation requirement shown above was applied. 2."---" means that the emission level is too low to be measured or at least 20 dB down than the limit.

B. Test Plots

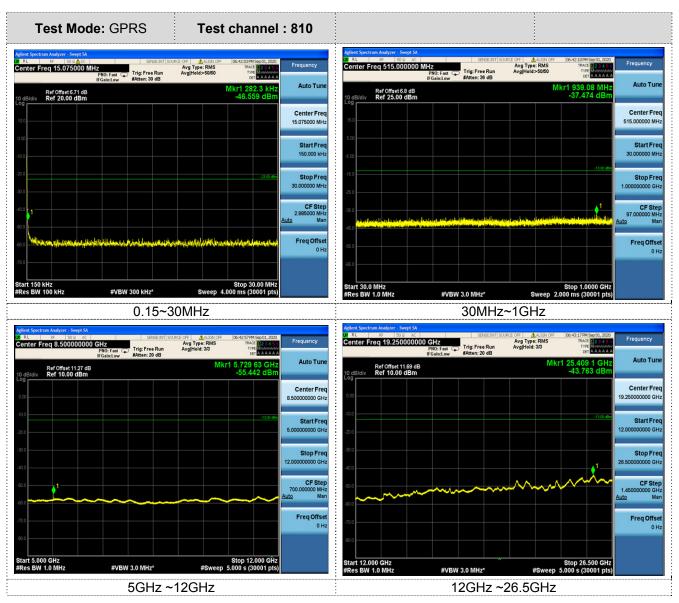














4.6 Frequency Stability Test

TEST APPLICABLE

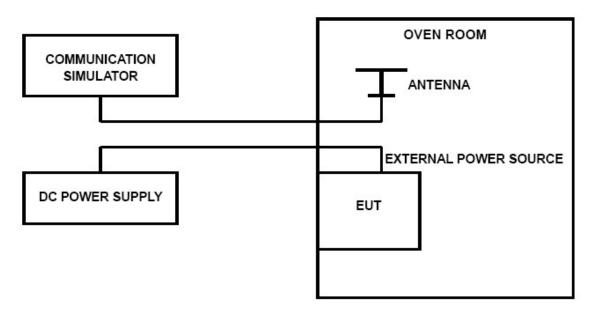
- 1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade.
- 2. According to FCC Part 2 Section 2.1055 (E) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
- 3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment and the end voltage point was 10.8V.

TEST PROCEDURE

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

- 1. Measure the carrier frequency at room temperature;
- 2. Subject the EUT to overnight soak at -30°C;
- 3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on middle channel of PCS 1900 and GSM850, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
- 4. Repeat the above measurements at 10 °C increments from -30 °C to +50 °C. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
- Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
- 6. Subject the EUT to overnight soak at $+50^{\circ}$ C;
- 7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
- 8. Repeat the above measurements at 10℃ increments from +50℃ to -30℃. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
- 9. At all temperature levels hold the temperature to +/- 0.5° C during the measurement procedure;

TEST CONFIGURATION





TEST LIMITS

For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.40VDC and 4.20VDC, with a nominal voltage of 3.80 DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

TEST RESULTS

	GPRS 850 Middle channel=190 channel=836.6MHz									
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict					
3.42	25	-11.11	-0.013280	2.50	PASS					
3.8	25	-10.72	-0.012814	2.50	PASS					
4.18	25	-10.14	-0.012120	2.50	PASS					
3.8	-30	-7.81	-0.009335	2.50	PASS					
3.8	-20	-10.27	-0.012276	2.50	PASS					
3.8	-10	-12.14	-0.014511	2.50	PASS					
3.8	0	-7.68	-0.009180	2.50	PASS					
3.8	10	-8.65	-0.010339	2.50	PASS					
3.8	20	-9.10	-0.010877	2.50	PASS					
3.8	30	-8.33	-0.009814	2.50	PASS					
3.8	40	-10.07	-0.011864	2.50	PASS					
3.8	50	-6.26	-0.007375	2.50	PASS					

	GPRS 1900 Middle channel=661 channel=1880MHz								
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict				
3.42	25	-5.62	-0.002989	2.50	PASS				
3.8	25	-7.94	-0.004223	2.50	PASS				
4.18	25	-13.69	-0.007282	2.50	PASS				
3.8	-30	-6.78	-0.003606	2.50	PASS				
3.8	-20	-7.04	-0.003745	2.50	PASS				
3.8	-10	-12.27	-0.006527	2.50	PASS				
3.8	0	-9.17	-0.004878	2.50	PASS				
3.8	10	-6.91	-0.003676	2.50	PASS				
3.8	20	-3.68	-0.001957	2.50	PASS				
3.8	30	-6.46	-0.003383	2.50	PASS				
3.8	40	-10.33	-0.005409	2.50	PASS				
3.8	50	-12.27	-0.006425	2.50	PASS				



	GSM 850 Middle channel=190 channel=836.6MHz								
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict				
3.42	25	-14.40	-0.017213	2.50	PASS				
3.8	25	-15.37	-0.018372	2.50	PASS				
4.18	25	-13.95	-0.016675	2.50	PASS				
3.8	-30	-14.85	-0.017750	2.50	PASS				
3.8	-20	-12.40	-0.014822	2.50	PASS				
3.8	-10	-13.75	-0.016436	2.50	PASS				
3.8	0	-15.69	-0.018754	2.50	PASS				
3.8	10	-15.63	-0.018683	2.50	PASS				
3.8	20	-12.79	-0.015288	2.50	PASS				
3.8	30	-7.94	-0.009354	2.50	PASS				
3.8	40	-7.17	-0.008447	2.50	PASS				
3.8	50	-7.10	-0.008365	2.50	PASS				

	GSM 1900 Middle channel=661 channel=1880MHz				
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.42	25	-16.21	-0.008761	2.50	PASS
3.8	25	-11.30	-0.006107	2.50	PASS
4.18	25	-9.30	-0.005026	2.50	PASS
3.8	-30	-8.98	-0.004854	2.50	PASS
3.8	-20	-6.13	-0.003313	2.50	PASS
3.8	-10	-6.78	-0.003606	2.50	PASS
3.8	0	-3.87	-0.002059	2.50	PASS
3.8	10	-4.71	-0.002505	2.50	PASS
3.8	20	-1.42	-0.000755	2.50	PASS
3.8	30	-0.39	-0.000207	2.50	PASS
3.8	40	1.23	0.000654	2.50	PASS
3.8	50	3.36	0.001787	2.50	PASS



EGPRS 850 Middle channel=190 channel=836.6MHz					
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.42	25	-6.39	-0.007638	2.50	PASS
3.8	25	-10.33	-0.012348	2.50	PASS
4.18	25	-11.49	-0.013734	2.50	PASS
3.8	-30	-8.43	-0.010077	2.50	PASS
3.8	-20	-9.33	-0.011152	2.50	PASS
3.8	-10	-6.81	-0.008140	2.50	PASS
3.8	0	-6.52	-0.007793	2.50	PASS
3.8	10	-9.85	-0.011774	2.50	PASS
3.8	20	-7.26	-0.008553	2.50	PASS
3.8	30	-5.91	-0.006963	2.50	PASS
3.8	40	-6.01	-0.007081	2.50	PASS
3.8	50	-7.20	-0.008483	2.50	PASS

EGPRS 1900 Middle channel=661 channel=1880MHz					
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
3.42	25	-2.68	-0.001426	2.50	PASS
3.8	25	-18.34	-0.009755	2.50	PASS
4.18	25	-12.59	-0.006697	2.50	PASS
3.8	-30	-4.07	-0.002165	2.50	PASS
3.8	-20	-9.75	-0.005186	2.50	PASS
3.8	-10	-8.10	-0.004309	2.50	PASS
3.8	0	-7.30	-0.003883	2.50	PASS
3.8	10	-9.56	-0.005085	2.50	PASS
3.8	20	-8.46	-0.004500	2.50	PASS
3.8	30	-5.81	-0.003042	2.50	PASS
3.8	40	-7.14	-0.003739	2.50	PASS
3.8	50	-5.07	-0.002655	2.50	PASS

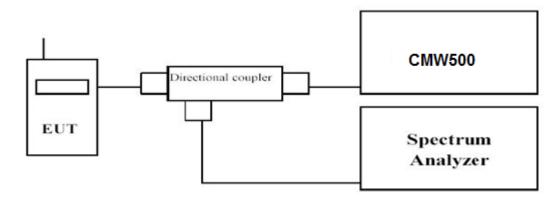


4.7 Peak-to-Average Ratio (PAR)

<u>LIMIT</u>

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

TEST CONFIGURATION



TEST PROCEDURE

Use spectrum to measure the total peak power and record as P_{Pk} . Use spectrum to measure the total average power and record as P_{Avg} . Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm).

Determine the PAPR from:

PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).

TEST RESULTS

Note:We tested EGPRS/GPRS/GSM mode and recorded the worst case at the GPRS mode.

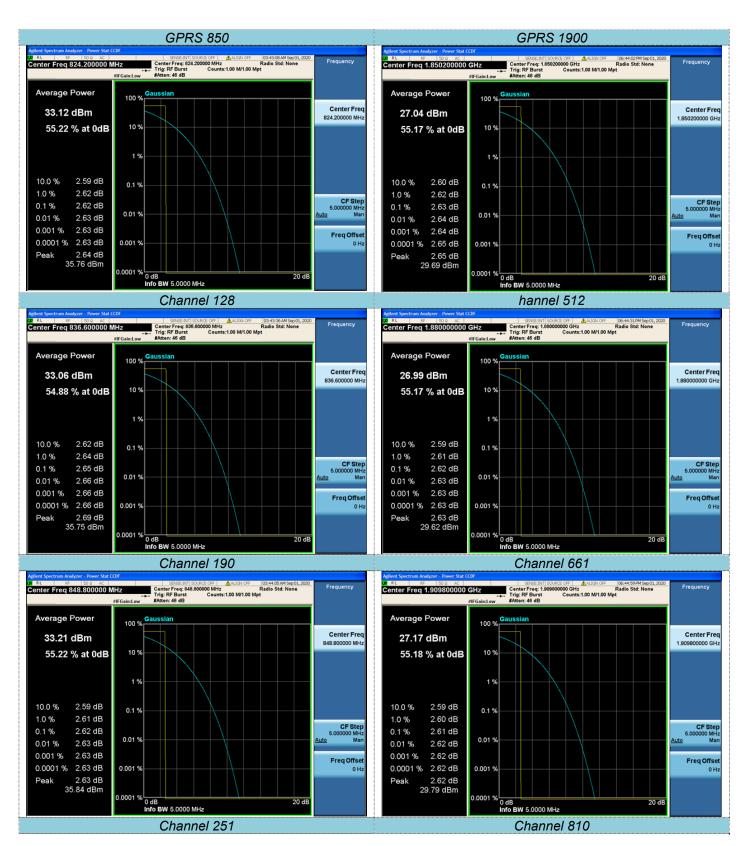
	GPRS 850				
Frequency (MHz)	Peak power	AV power	Measured (dB)		
824.20	35.76	33.12	2.62		
836.60	35.75	33.06	2.65		
848.80	35.84	33.21	2.62		

	GPRS 1900			
Frequency (MHz)	Peak power	AV power	Measured (dB)	
1850.20	29.69	27.04	2.63	
1880.00	29.62	26.99	2.62	
1909.80	29.79	27.17	2.61	

	EGPRS 850				
Frequency (MHz)	Peak power	AV power	Measured (dB)		
824.20	30.59	25.03	5.32		
836.60	30.84	25.47	5.17		
848.80	30.56	25.23	5.19		

	EGPRS 1900				
Frequency (MHz)	Peak power	AV power	Measured (dB)		
1850.20	30.42	24.86	5.41		
1880.00	30.43	24.89	5.34		
1909.80	29.51	23.85	5.51		











5 Test Setup Photos of the EUT

See the attached test photos

.....End of Report.....