

LTE band 7 (15 Mb - QPSK)

Low Channel



Middle Channel



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http://www.sgsgroup.kr



High Channel

Report Number: F690501/RF-RTL013149



LTE band 7 (20 Mb - QPSK)

Low Channel



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http://www.sgsgroup.kr A4(210 mm × 297 mm)



LTE band 12 (1.4 Mb - QPSK)

Low Channel



Middle Channel



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LTE band 12 (3 Mb - QPSK)

Low Channel



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LTE band 12 (5 Mb - QPSK)

Low Channel



Middle Channel



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High Channel

Report Number: F690501/RF-RTL013149



LTE band 12 (10 Mz - QPSK)

Low Channel



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http://www.sgsgroup.kr A4(210 mm × 297 mm)



LTE band 17 (5 胍 - QPSK)

Low Channel



Middle Channel



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High Channel

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LTE band 17 (10 Mz - QPSK)

Low Channel



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6. Spurious Emissions at Antenna Terminal

6.1. Limit

FCC

<u>- </u> <u>\$22.917(a)</u>, 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 + 10log(P) dB.

<u>- \$24.238(a)</u>, 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.

- <u>§27.53(g)</u>, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

 $\frac{-\$27.53(h)(1)}{1}$, for operations in the 1 695-1 710 Mb, 1 710-1 755 Mb, 1 755-1 780 Mb, 1 915-1 920 Mb, 1 995-2 000 Mb, 2 000-2 020 Mb, 2 110-2 155 Mb, 2 155-2 180 Mb, and 2 180-2 200 bands, 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.

<u>- §27.53(m)(4)</u>, For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log₁₀ (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log₁₀ (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log₁₀ (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log₁₀ (P) dB on all frequencies between 2490.5 Mb and 2496 Mb and 55 + 10 log₁₀ (P) dB at or below 2490.5 Mb. Mobile Satellite Service licensees operating on frequencies below 2495 Mb may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

IC

- RSS-130 Issue 1

4.6.1, the power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dB W), by at least 43 + 10 log₁₀ p (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

- RSS-132 Issue 3

5.5, Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 Mb band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1 % of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 $\log_{10} p$ (watts).

(ii) After the first 1.0 Mb immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kb bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 log₁₀ p (watts). If the measurement is performed using 1 % of the occupied bandwidth, power integration over 100 kb is required.

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- RSS-133 Issue 6

6.5, Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 Mb bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 log₁₀ p(watts).

(ii) After the first 1.0 Mb, the emission power in any 1 Mb bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 $\log_{10} p$ (watts). If the measurement is performed using 1 % of the emission bandwidth, power integration over 1.0 Mb is required.

- RSS-139 Issue 3

6.6, (i) In the first 1.0 Mb bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least 43 + 10 log₁₀ p (watts) dB.

(ii) After the first 1.0 Mb outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 Mb bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least 43 + 10 $\log_{10} p$ (watts) dB.

- RSS-199 Issue 3

4.5, (b)

for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:

(i) 40 + 10 $\log_{10} p$ from the channel edges to 5 MHz away

(ii) 43 + 10 \log_{10} p between 5 Mz and X Mz from the channel edges, and

(iii) 55 + 10 \log_{10} p at X M and beyond from the channel edges

In addition, the attenuation shall not be less than 43 + 10 $\log_{10} p$ on all frequencies between 2490.5 Mb and 2496 Mb, and 55 + 10 $\log_{10} p$ at or below 2490.5 Mb.

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6.2. Test Procedure

The test follows section 6.1 of FCC KDB Publication 971168 D01 v03r01.

a. Start frequency was set to 30 Mz and stop frequency was set to at least 10* the fundamental frequency.

- b. Detector = Peak.
- c. Trace mode = Max hold.
- d. Sweep time = Auto couple.
- e. The trace was allowed to stabilize.
- f. Please see notes below for RBW and VBW settings.
- g. For plots showing conducted spurious emissions from 30 Mb to 26 Gb, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.



Note;

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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6.3. Test Results

Ambient temperature	:	(23	± 1) °C
Relative humidity	:	47	% R.H.

Please refer to the following plots.

LTE band 2 (1.4 Mb - QPSK)

Low Channel



				M1[1]		-18.98 dBn
					. 19.3	72660 GH
LO dBm						
/ dBm						
10 dBm	-13.000 dBm					
01	10.000 0.000					M1
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40 dBm 50 dBm 60 dBm 70 dBm	·					
-40 dBm	,					

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Middle Channel



Spectrum Spectrum	2 🕱		
RefLevel 20.00 dBm Att 30 dB SWT	 ● RBW 1 MHz 32 ms ● VBW 3 MHz Mc 	ode Sweep	
TDF			
DIPK Max		M1[1]	-20.02 dBm 19.966410 GHz
10 dBm			
0 dBm			
-10 dBm D1 -13.000 dBm			
-20 dBm		and the second	M
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Allowed and the second data and	And the second sec		
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm			
Start 10.0 GHz	32000	pts	Stop 20.0 GHz
		Measuring.	

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High Channel



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.0 dBm								
dBm								
10 dBm	D1 -13.000	dBm						
20 dBm						e, a matelia, el es	 	M1
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40 dBm								
50 dBm—								
60 dBm								
70 dBm								

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LTE band 2 (3 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum	Spectrum 2	×)			
Ref Level 20.00	dBm	RBW 1 MHz			
Att 3	0 dB SWT 32 ms	VBW 3 MHz r	Mode Sweep		
TDF					
) 1Pk Max					
			M1[1	1	-19.42 dBm
10 dBm					19.800410 GHz
0 dBm					
5 dbm					
-10 dBm					
D1 -13.	000 dBm				
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And the second second second second					
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-40 UBIII					
E0 d0m					
-50 UBIII					
60 d0					
70 40-					
-/u aBM					
Start 10.0 GHz	· ·	3200	0 pts	· · · · ·	Stop 20.0 GHz
				Measuring	

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High Channel



Ref Level 2000 dbm RBW 1 MHz Att 30 dB SWT 32 ms VBW 3 MHz Mode Sweep TDF 19.8 Max 19.891090 G 19.891090 G 10 dbm 19.891090 G 19.891090 G 19.891090 G 0 dbm 0 dbm 10 dbm 19.891090 G 19.891090 G -10 dbm 01 -13.000 dbm 0 0 0 0 -20 dbm 0 0 0 0 0 0 -10 dbm 0 0 0 0 0 0 0 -20 dbm 0 0 0 0 0 0 0 -20 dbm 0 0 0 0 0 0 0 -20 dbm 0 0 0 0 0 0 0 0 0 -20 dbm 0 0 0 0 0 0 0 0 0 -40 dbm 0 0 0 0	Spectrun	n Sp	ectrum 2	(X)						
Att 30 dB SWT 32 ms VBW 3 MH2 Mode Sweep TDF Interview	Ref Leve	l 20.00 dBm	1	e RBV	/ 1 MHz					
10 Fb Max M1[1] -19.61 dB 10 dBm 19.891090 GI 19.891090 GI 10 dBm 10 dBm 10 dBm 10 dBm 10 dBm 01 -13.000 dBm 10 dBm 10 dBm 20 dBm 10 dBm 10 dBm 10 dBm 10 dBm 01 -13.000 dBm 10 dBm 10 dBm 20 dBm 10 dBm 10 dBm 10 dBm 40 dBm 10 dBm 10 dBm 10 dBm 60 dBm 10 dBm 10 dBm 10 dBm	Att	30 dB	SWT 3	2 ms 👄 VBV	V 3 MHz	Node Swee	р			
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10 dBm 0 0 0 0 0 20 dBm 0 0 0 0 0 40 dBm 0 0 0 0 0 50 dBm 0 0 0 0 0 60 dBm 0 0 0 0 0						IVI	1[1]		19.8	19.61 aBm
0 dBm Image: state s	10 dBm								-	51050 0112
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start 10.0 GHz 32000 pts Stop 20.0 GH	start 10.0	GHZ			3200	U pts	<u> </u>		Stop	20.0 GHz
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LTE band 2 (5 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum Spectr	um 2 🛞			
RefLevel 20.00 dBm Att 30 dB S	● RBW 1 MHz WT 32 ms ● VBW 3 MHz	Mode Sweep		
1Pk Max				
		M1[1]	-1 19.91	.9.51 dBm .8910 GHz
LO dBm				
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50 dBm				
-60 dBm				
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		2000 pts	зтор	20.0 0112

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High Channel



Spectrum	Spectrum 2	8				
Ref Level 20.00	dBm	🖷 RBW 1 MHz				
Att	30 dB SWT 32 ms	; 👄 VBW 3 MHz 🛛 M	lode Sweep			
DIPK Max			M11			-10.74 dBm
			in 1		1	9.933910 GHz
10 dBm						
) dBm						
10 dBm						
D1 -13	.000 dBm					M;
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-70 dBm						
Start 10.0 GHz		3200	0 pts		s	top 20.0 GHz
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LTE band 2 (10 胍 - QPSK)

Low Channel



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Middle Channel



Spectrum	Spectrum 2 🛛 🛞			
Ref Level 20.00 Att 30 TDF	dBm 🛛 🖷 🕅 DdB SWT 32 ms 🖷 V	BW 1 MHz BW 3 MHz Mode Swe	эер	
∋1Pk Max				
			M1[1]	-18.78 dBm
10 dBm			+ +	19.946410 GHz
0 dBm				
-10 dBm	000 dBm			
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High Channel



Spectrur	n Sp	ectrum 2	×						
Ref Leve	1 20.00 dBm	0.017 0	e RBW	1 MHz	Andre Course	_			
TDF	30 UB	5WI 32	2 ms 🖶 ¥DW	r o Minz i p	100e Swee	þ			
∋1Pk Max									
					М	1[1]		- 19.9	19.20 dBm 46720 GHz
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-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
Start 10.0	GHz			3200	0 pts			Stop	20.0 GHz
						Measur	ing 🚺		

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LTE band 2 (15 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum Spect	trum 2 🗵		
Ref Level 20.00 dBm Att 30 dB TDF	● RBW 11 SWT 32 ms ● VBW 31	MHz MHz Mode Sweep	
1Pk Max			
		M1[1]	-19.80 dBm 19.920780 GHz
10 dBm			
) dBm			
-10 dBm	m		
-20 dBm			M:
المعادية والمعادية والمعادية والمعادية	أللية فأنفس اللكاف وللرحين أستعساؤن ويوأتك	in the second	A State of the second sec
	The second s		
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm			
Start 10.0 GHz		32000 pts	Stop 20.0 GHz
1 C			

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High Channel



Spectrum Sp	ectrum 2 🛛 🗷 🖉					
Ref Level 20.00 dBr	n 👄 🖡	RBW 1 MHz				
Att 30 d	3 SWT 32 ms 🖷 V	BW 3 MHz Mod	le Sweep			
1DF						
IPK Max			M1[1]		-2	0.08 dBm
					19.87	1410 GHz
.0 dBm						
dBm						
10 dBm	dD as					
01 -13.000	l ubin					M1
20 dBm		. 41. 4	ىرى بىر بىر	da bahadan an ata	أنفيلا بالسار ليلب	ومتعطية والمقدوس أو
المسينا الدرينان فالمسلين الم	and a sector of the college of the		and similar for the second similar to	the francisco and allow	الأوادر وطاعته وسالي	and the second second
and the second second	and the second					
40 dBm				_		
50 dBm						
60 dBm						
70 dBm				_		
			•-		Oten C	0.0.011-
		32000 p	is	-	stop 2	O.O GHZ
Ц			Measu	uring 🔳		//

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LTE band 2 (20 胍 - QPSK)

Low Channel



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Middle Channel



Spectrum	Sp	ectrum 2	×							
Ref Level 2 Att	0.00 dBm 30 dB	SWT 3	e RBW 2 ms e VBV	/1 MHz ∕3 MHz I	Mode Swee	n				
TDF						F				
1Pk Max				1	1					
					M1[1]			-19.00 dBm 19.917660 GHz		
10 dBm								-	11000 0112	
) dBm										
-10 dBm	-13.000	dBm								
00 40									MJ	
-20 aBm	Ŀ.	undun das	المتحقي منار	فليتناب وماليا ويلتد	الاسانتياط أسرولي	tol) (taken be	Installant dit	أنطر وتناقص كالتعرير	HALLARD STREET	
Magalithe Calutta	الول واللي مشر م	A A A A A A A A A A A A A A A A A A A	and the second second	and the second	and the second	and the second second	Service Contraction	Parity of the second	and a second	
a file and the search of the	м), тик									
-40 dBm										
-50 dBm										
60 asm										
70 dBm										
/ 0 GDM										
Start 10.0 CH	17			2200	0 ptc	[Stor	20.0.047	
3turt 10.0 GH	[3200	o prs	Measur	ing ing	atur	20.0 GHZ J	
	L					Jineasur			- ///	

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High Channel



Spectrum Spectru	ım 2 🗵		
Ref Level 20.00 dBm Att 30 dB SN	● RBW 1 MHz WT 32 ms ● VBW 3 MHz	: Mode Sweep	
1Pk Max			
		M1[1]	-19.30 dBm 19.977030 GHz
10 dBm			
) dBm			
10 dBm D1 -13.000 dBm-			
20 dBm	يعالم بالاربين ال	الوالة الحالية ومعادمة المربسة وحراشي ورز المعالى	الار محمد المراجع ال
والمتحديق والمتحل والمتحد والمتحد والمعتدة	and the second		
40 dBm			
50 dBm			
60 dBm			
70 dBm			
3tart 10.0 GHz	3	2000 pts	Stop 20.0 GHz
		Measu	uring 🚺 🖬 🚧

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LTE band 4 (1.4 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum Spectrur	m 2 🛞					
Ref Level 20:00 dBm ● RBW 1 MHz Att 30 dB SWT 32 ms ● VBW 3 MHz Mode Sweep						
●1Pk Max						
		M1[1]		-20.04 dBm		
10 dBm			+ +	17.828380 GH2		
0 dBm						
10.10						
-10 dBmD1 -13.000 dBm						
-20 dBm				M1		
International Action of the Action	يعتلق باورالين ويتقفون بمعلمتهم	ومعاودين المعال والمار والتعالي والمعالية والمعالية	planter, beland the set of the state of the set of the s			
	and a second	A DESCRIPTION OF THE OWNER OWNER OF THE OWNER				
-40 dBm						
-50 dBm						
-60 dBm						
-70 dBm						
Start 10.0 GHz	32	2000 pts		Stop 18.0 GHz		
		Meas	uring 🚺			

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High Channel



Spectrum	Spectrum 2 🛛 🛞					
Ref Level 20.00	dBm 👄 RBN	W 1 MHz				
TDF 30	Jub SWI 32 ms 🖶 VB	W 3 MHZ MODE SWEE	ih			
●1Pk Max						
		M	11[1]	-20.46 dBm 16.350380 GHz		
10 dBm						
0 dBm						
-10 dBm						
-20 dBm			1			
	and a state of the second	A Design and the second se	A second se			
	No. of the local division of the local divis	al danale billion and the set				
-40 dBm						
-50 dBm						
-60 dBm						
-70 dBm						
Start 10.0 GHz		32000 pts		Stop 18.0 GHz		
			Measuring	••••••••••••••••••••••••••••••••••••••		

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LTE band 4 (3 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum Spectrur	n 2 🛞			
RefLevel 20.00 dBm Att 30 dB SW TDF	● RBW 1 MHz T 32 ms ● VBW 3 MHz	Mode Sweep		
1Pk Max				
		M1[1]	1	-20.21 dBm 5.423630 GHz
10 dBm				
0 dBm				
-10 dBm				
-20 dBm			M1	
والعروب والقلوم والاعتاد والمعادين	والمتعولة والمراجع والمتعلق ومالك التحدين	المعراقات والمثار التي وما المثل ويرو المثلون. المعرافين محمة وسرو محمة متعريق محمة المري	۵٬۵۰۹ مارونا ۲٬۵۰۹ مارو او ۱۹۹۵ می او در او ۱۹۹۵ می دود. محمولا محمد افغا او او می و در محمد مرد طرح مرد می و	Kanadal Inggan Lawara Tanagan Kanadara
and a state of the second s				
-40 dBm				
-50 dBm				
-60 dBm				
-70 dBm				
		1990 sta		10.0.01
start 10.0 GHZ	32	ouu pts	S	top 18.0 GHz

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High Channel



Spectrum	Spectrum 2 🛛 🛞				
Ref Level 20.00 d8 Att 30	3m e RB dB SWT 32 ms e VB	WIMHz WI3MHz Mode Sw	еер		
1Pk Max					
			M1[1]	16.	-20.10 dBm 443880 GHz
LO dBm					
) dBm					
10 dBm	00_dBm				
20 dBm			ىمەرىيە يىرىغان يەرىس	N11 Webse, Michaelster,	ر باطانيس ويسر الشاب
مللا ومنالعهم وار والملطما وساولتكون		and provide a state of the stat	and provide the states of the states	Manager and the second second	Particular and a filler
Second States and States					
40 dBm					
50 dBm					
60 dBm					
70 dBm					
Start 10.0 GHz		32000 pts		Sto	p 18.0 GHz
			Measuring	() 4	///

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LTE band 4 (5 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum Spectrum 2	$\overline{\otimes}$	
RefLevel 20.00 dBm Att 30 dB SWT 32 ms	 RBW 1 MHz VBW 3 MHz Mode Sweep 	
TDF		
1Pk Max	M1[1]	-21.22 dBm 16.357630 GHz
10 dBm		
0 dBm		
-10 dBm-D1 -13.000 dBm-		
-20 dBm		M.
ويتحققون والطنين ومعتقرين والخالات ويعتقر	الم المحمد المالي من المحمد المحم المحمد المحمد	the second sector and a second sector in the second sector is the second sector in the second sector is a second
	ng at disk dag _{to be} per per for any galaxies billing of a line of the set	
-40 dBm		
-50 dBm		
-60 dBm		
-70 dBm		
Start 10.0 GHz	32000 pts	Stop 18.0 GHz
1 M	Measu	ring

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High Channel



Spectrum Spectrum 2	×			
Ref Level 20.00 dBm	RBW 1 MHz			
Att 30 dB SWT 3	2 ms 👄 VBW 3 MHz	Mode Sweep		
1Pk Max				
		M1[1]	1	-20.58 dBm 6.524130 GHz
10 dBm				
) dBm				
10 dBmD1 -13.000_dBm				
-20 dBm		and the second	M1	والكريان والعسوار وللكو
أنطاله والأعليلية والمتحالين والمحدان والمعلى ويتدعون	أستنا فالمردين والمق ومعاطا بالمتنا	The second se	a saada dhaaraa ah faada da da da	See and he will be
and the second data and the se				
40 dBm				
50 dBm				
60 dBm				
70 dBm				
Start 10.0 GHz	3200	00 pts	s	top 18.0 GHz
		Measur	ing	4444

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LTE band 4 (10 胍 - QPSK)

Low Channel



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Middle Channel



Ref Level 20.00 dBm RBW 1 MHz Att 30 dB SWT 32 ms VBW 3 MHz Mode Sweep TDF Image: Sweet state	-19.97 dBm 16.522880 GHz
1Pk Max M1[1] 10 dBm M1[1] 0 dBm 0 -10 dBm 0 -20 dBm 0	-19.97 dBm 16.522880 GHz
10 dBm	-19.97 dBm 16.522880 GHz
10 dBm	
0 dBm D1 -13.000 dBm L100 dBm L100 dBm D1 -13.000 dBm L100 dBmL100 dBmL100 dBmL100 dBmL100 dBmL100 dBmL100 dBmL100 dBmL100 dBmL100 dBm100 dBm1000 dBm1000 dBm1000 dBm1000 dBm _	
-10 dBm 01 -13.000 dBm 01 -10 -10 -10 -10 -10 -10 -10 -10 -10	
-20 dBm	
40 dBm	entric territori
40 dBm	ي ها الله بين المربع المانية المانية المربعة المربعة المربعة المربعة المربعة المربعة المربعة المربعة المربعة ا مربعة المربعة من من المحادثة من من المحادثة المربعة المربعة المربعة المربعة المربعة المربعة المربعة المربعة الم
-40 dBm	
-50 dBm	
-60 dBm	
-70 dBm	
Start 10.0 GHz 32000 pts	

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High Channel



Spectrun	n Sp	ectrum 2	×						
Ref Leve Att	l 20.00 dBm 30 dB	n Sowta:	e RBW 2 ms e VBW	/1MHz /3MHz M	Inde Swee	n			
TDF						F			
∎1Pk Max			-						10.00 40
					191	1[1]		15.9	12630 GHz
10 dBm									
) dBm									
-10 dBm									
	D1 -13.000	dBm					M1		
-20 dBm					date ou	na hita	and a state of the state of the	a subart on the stiller of	the state of the second state
الماطلان ويتطلق	ملحوي ومطلبه والم		فالرجعا الأروادية	Husel a Back and the	Constraints of the	And and a second second second	and determined and	hand the state of the second	
and the second second									
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
Start 10.0	GHz			3200	0 pts			Ston	18.0 GHz
						Measur	ing 🔳		
)			///

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LTE band 4 (15 Mb - QPSK)

Low Channel



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Middle Channel





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High Channel



Spectrum Spectr	um 2 🗵			
RefLevel 20.00 dBm Att 30 dB S	● RBW 1 MH WT 32 ms ● VBW 3 MH	iz iz Mode Sweep		
1Pk Max				
		M1[1]		-20.89 dBm 16.379380 GHz
10 dBm				
0 dBm				
-10 dBm				
-20 dBm			M1	databate or not con-
المسل والمعلقون ومستحشريها والمحمول والمعقدان	فترسيها فرجيه فالسحاء أحاري ويت	المساقة الطامون والمحالطة المريمة الطاعرة ويسالة المساقة المحار والمحالطة المحاري ومحالطة ومريمة	al manger and a single sector of the sector	and the second sec
and the second state of th	and the second se			
-40 dBm				
-50 dBm				
-60 dBm				
-70 dBm				
Start 10.0 GHz		32000 nts		Ston 18-0 GHz
		02000 pts		

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LTE band 4 (20 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum	Sp	ectrum 2	×						
Ref Level	20.00 dBm	I.	● RBW	/ 1 MHz					
Att	30 dB	SWT 32	2 ms 👄 VBV	/ 3 MHz	Mode Swee	р			
1DF 1Pk Max									
					M	1[1]		- 15.7	21.02 dBm 75880 GHz
10 dBm									
) dBm									
-10 dBm	1 -13.000	dBm							
-20 dBm						1	M1	ال المرقلة ماميراند. ي.	
ana bilita	a section of the	A STATE OF STATE	have be alterated and	(hile alteriate		المي الأردياني _{مع} ادين الارداني معادر	and the second second	a the part of the factory	an a
مر والمكتمر برا ومقدون	- Character and the	No. of Street, or other	All a state of the	an a	Contrast of the				
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
Start 10.0 G	Hz			320	00 pts			Stop	18.0 GHz
						Measur	ing		(

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High Channel



Ref Level 20.00 dBm RBW 1 MHz Att 30 dB SWT 32 ms VBW 3 MHz Mode Sweep TDF Max M1[1] M1[1] 10 dBm	-19.85 dBm
TDF Image: Second	-19.85 dBm
1Pk Max 10 dBm	-19.85 dBm
10 dBm	-19.85 dBm
10 dBm	10.077000 GHz
0 dBm	
-10 dBm	
-20 dBm	M1
	tana da anti statulati ya matanti da ana kati ya pana ana panti da a Nanga ana matanta ana ang
and the second	
-40 dBm	
-50 dBm-	
-60 dBm	
70.40	
-/u asm	
Start 10.0 GHz 32000 pts	Stop 18.0 GHz
Mea	suring 🚺 🗰 🥼

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LTE band 5 (1.4 Mb - QPSK)

Low Channel



Middle Channel



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High Channel



LTE band 5 (3 Mb - QPSK)

Low Channel



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Middle Channel



High Channel

Spectrum Sp	ectrum 2 🛛 🗴					
Ref Level 20.00 dBr	n 🖷 RB	W 1 MHz				
Att 30 di	B SWT 30 ms 👄 VB'	WI3 MHZ Mode Swee	p			
1DF May						
M		N	12[1]			25.31 dBm
1412					6.9	71140 GHz
10 dBm		N	11[1]			27.53 dBm
			1 1		84 I	8.810 MHz
) dBm						
-10 dBm	l dBm					
-20 dBm				M2		
		1	البحاب التحدي	atternation atternet	المرابع	اللي بالدر ان
-30 dBm		plusted form from the start of the	and the second states of the	phenological and a second second	Charles and and	Arran I and a state
and the location of the location of the second s	A DEPARTMENT OF STREET	and the second se				
40 uBm						
E0 dDee						
-50 UBIII						
60 d8m						
70 dBm						
o dom						
Start 30.0 MHz		30000 pts			Sto	p 9.0 GHz
			Measuri	ng 💵		

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LTE band 5 (5 Mb - QPSK)

Low Channel



Middle Channel



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High Channel



LTE band 5 (10 Mb - QPSK)

Low Channel



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SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 RTT5041-19(2017.07.10)(0) Tel. +82 31 428 5700 / Fax. +82 31 427 2370 A4(210 mm × 297 mm)

http://www.sgsgroup.kr



Middle Channel



High Channel

Spectrum Spe	ectrum 2 🛛 🗴			
Ref Level 20.00 dBm	e RBW	1 MHz		,
Att 30 dB	SWT 30 ms 👄 VBW	3 MHz Mode Swee	p	
1Pk Max				
MI		M	2[1]	-25.15 dBm
				6.914620 GHz
10 dBm		M	1[1]	27.50 dBm
J dBm				
10 d9m				
D1 -13.000 c	dBm			
20 dBm				
			M.	2
30 dBm		a second s	الماليك المسالة المترادم والمراد والمسال	The second designed and second s
while a dimension of the	المتعطية بعاريناه فأعلان بماريلاتهم	and the state of the second	and the subdate of the sub-	The second s
40 diam-	and the second			
-50 dBm				
-60 dBm				
-70 dBm				
Start 30.0 MHz	1	30000 pts	1	Stop 9.0 GHz

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LTE band 7 (5 Mb - QPSK)

Low Channel



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Middle Channel



1Pk Max					
			M1[1]		-35.90 dBm 21.954750 GHz
10 dBm					
20 dBm					
D1 -25.	000 dBm				
				M1	a
40 dBm	A CONTRACTOR OF THE OWNER	AND REAL PROPERTY OF A DESCRIPTION OF A	The second s	particular and the second second	
Su dum		A REAL PROPERTY AND	han an a		b and but the second
60 d0m					
oo ubiii					
70 dBm					
80 dBm					
90 dBm					

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High Channel



Ref Leve	1 5.00 dBm	OULT 40		1 MHz	ada owana				
TDF	15 UB	SWI 48	ms 🖷 ¥DW	3 MITZ (V)	ioae Sweep				
1Pk Max									
) dBm					M	1[1]	I	- 21.5	36.23 dBm 63250 GHz
-10 dBm—									
20 dBm—									
30 dBm—	-01 -25.000	dBm					M1		
40 dBm—	ور بالارانية الم	al, and a share of the	ار مادار است. امری _{لی} بار. ار مادر امریکی	line in the second s	and the second se	ى ئەربىلى يۈلۈمىيا ئەتتارىپى مەربېرىدىدىدى ^{ئەرس} ىرىي	ha Valifipation	الدانية من المراجع محمد المراجع المراجع المراجع	a la capitel a dal basis Angli a dal basis
5e dsm	and the second	reader allow first		- INCOMPACT					
60 dBm—									
70 dBm—									
80 dBm—									
90 dBm—									
N	CH ₂			3200	10 pts			Stop	26.0 GHz

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LTE band 7 (10 胍 - QPSK)

Low Channel



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Middle Channel



Spectrum Spe	ectrum 2 🛛 🔊		
Ref Level 0.00 dBm	● RBW 1	MHz MHz	
TDF IS UB	5WI 48 ms - 46W 3	Minz Mode Sweep	
1Pk Max			
		M1[1]	-36.44 dBm 25.860250 GHz
-10 dBm			
-20 dBm			
-30 dBm	dBm		
-40 dBm	No of the other states of the states of the	a in the property of the second se	Carry Company of the Party of t
รับสืบที่ - 11 ค.ศ.	teaching and an interest of the second se		
-60 dBm			
-70 dBm			
-80 dBm			
-80 dBm			
-80 dBm		32000 pts	Stop 26.0 GHz

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High Channel



Spectrun	n Sp	ectrum 2	×)						
Ref Leve	0.00 dBm		e RBW	1 MHz					
Att TDF	15 dB	SWT 48	ms 👄 VBW	3 MHz M	ode Sweep				
1Pk Max									
					м	1[1]		- 25.9	36.63 dBm 28250 GHz
-10 dBm									
-20 dBm									
-30 dBm	D1 -25.000	dBm							
-40 dBm					to the state of the	والعريد الطاري	official Contractor	Parking halds back	NA STREET
الل والي وألي والع الرواني وألي والع			a sign and well with a state of a	Martin and a second	and in a particular state of the			and the second secon	are the second secon
-50 dam									
-60 dBm									
-70 dBm									
-80 dBm									
-90 dBm									
Start 10.0	GHz		1	3200	0 pts	1	1	Stop	26.0 GHz
						Measuri	ing 💷		a ////

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LTE band 7 (15 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum	pectrum 2 🛞			
Ref Level 5.00 dBm Att 15 dB	SWT 48 ms ● VBW	1 MHz 3 MHz Mode Swee	۶p	X
1Pk Max				
) dBm			M1[1]	-36.39 dBm 25.721250 GHz
10 dBm				
20 dBm-01 05 00	0 d8m			
30 dBm				M1
40 dBm				the De Digener programme and the second second
50 dBm				
50 dBm				
70 dBm				
80 dBm				
90 dBm				
tart 10 0 CHz		32000 pts		Stop 26.0 GHz

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation.



High Channel



Ref Leve	5.00 dBm		RBW	1 MHz					
	15 GB	SWI 48	ms 🖶 VBW	3 MHZ N	oae sweep				
1Pk Max									
) dBm					M	1[1]	1	- 19.9	36.74 dBm 64750 GHz
-10 dBm									
20 dBm	01 05 000								
30 dBm	DI -25.000					M1			
-40 dBm	and a state of the second second	al a shi a bi a di	And the second second				يريا في العربية الله وريا في والعربية العربي	^{la fo} llo a del produte Renduci del como del	ر المراجع المر مع من المراجع ال
Su dum	and a start from	and the second second		a ann an Annailtean Annailtean An	and the second sec				
60 dBm									
70 dBm									
-80 dBm									
90 dBm									
start 10.0	GHz			3200	0 pts			Stop	26.0 GHz

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LTE band 7 (20 Mb - QPSK)

Low Channel



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Middle Channel



Spectrum	n Sp	ectrum 2	×						
Ref Leve Att	5.00 dBm 15 dB	SWT 48	ms e VBW	1 MHz 3 MHz M	nde Sween				
TDF									
∎1Pk Max				I					
0 dBm					M	1[1]	1	21.6	36.33 dBm 01250 GHz
-10 dBm									
-20 dBm									
-30 dBm	D1 -25.000	dBm							
40 dBm			a shitteless	At lalas as dela	and the local difference of the	الماليون وتروي ومرافعاتهم والمرور	M1	aline and the second	and the second
			and the second second	The Addition of Longing	and the second second	- Laboratoria (n. 1997) - Aliante Aliante (n. 1997)	and the second	and the product of the second s	and the second
JU UBIII									
60 dBm									
70 dBm									
•80 dBm									
·90 dBm									
Start 10.0	GHz			3200	0 pts			Stop	26.0 GHz
						Measuri	ing 🚺		• <i>////</i>

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High Channel



Spectru	m Sp	ectrum 2	2 🛛						
Ref Leve Att TDF	el 5.00 dBm 15 dB	SWT 48	● RBW ms ● VBW	1 MHz 3 MHz M	ode Sweep				
1Pk Max									
) dBm					M	1[1]	1	- 25.7	36.45 dBm 76250 GHz
10 dBm—									
20 dBm—	-01 -25 000	dBm							
30 dBm—	01 -23,000	uom							M1
40 dBm—	در رامان در رامان درمان رومانی م	un de la ^{br} ad ^{ita} n	Partie and a second		and a larger light	ليو الإلغانية التي والتي مادورية بالإستاني	and Lindy (Day) and Lindy (Day)	Bertender anderen Frankrigenser	a papar da tara la face Papar da tara d
sə dəm—	and the second								
50 dBm—									
70 dBm—									
30 dBm—									
90 dBm—									
start 10.0) GHz			3200	0 pts			Stop	26.0 GHz
Start 10.1	GHZ			3200	U pts) Measur	ing 💵	Stop	26.U GHZ

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LTE band 12 (1.4 Mb - QPSK)

Low Channel



Middle Channel



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High Channel



LTE band 12 (3 Mb - QPSK)

Low Channel



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Middle Channel



High Channel

pectrum Spectrum 2 🛛 🔊			
RefLevel 20.00 dBm 🛛 👄 RBW 1 MHz			
Att 30 dB SWT 30 ms 👄 VBW 3 MHz	Mode Sweep		
Pk Max			
MI	M2[1]	-	24.91 dBm
		6.9	86610 GHz
asm	M1[1]	71	26.87 dBm 16.080 MHz
40			
28m			
0 d9m			
D1 -13.000 dBm			
0 dBm			
		M2	
	الالمارية والالمريان والمراجع المراجع	a lay and the medican belleville (being a second	all have all and a
to the second		haden to be a second and the second se	Constant of the Property sector
CCC			
0 dBm			
0 dBm			
0 dBm			
art 30.0 MHz 31	0000 pts	Sto	0 8.0 GHz

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LTE band 12 (5 Mb - QPSK)

Low Channel



Middle Channel



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High Channel



LTE band 12 (10 Mb - QPSK)

Low Channel



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Middle Channel



High Channel

pectrum Spectrum 2 🛞				
Ref Level 20.00 dBm	Mada Owen			
DF	Mode Sweep			
.Pk Max				
MI	M2[1]	-24.13 dBm		
1 dBm	A41541	6.401880 GHz		
UBIII	WILI	27.43 dBm 706 700 MHz		
JBm				
D1 -13.000 dBm				
0 dBm		M2		
		and the second		
	In the second	and the second		
	A DY DATA DO DO TAL			
ordBut the state of the state o				
0 dBm				
U dBm				
0 dBm				
art 30.0 MHz 30	1000 pts	Stop 8.0 GHz		
	· · · · · · · · · · · · · · · · · · ·			

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LTE band 17 (5 Mb - QPSK)

Low Channel



Middle Channel



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High Channel



LTE band 17 (10 Mb - QPSK)

Low Channel



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Middle Channel



High Channel

Spectrum Spe	ctrum 2 🛛 🗴						
Ref Level 20.00 dBm	e RBV	V 1 MHz					
Att 30 dB	SWT 30 ms 👄 VBV	V 3 MHz Mode Swee	эр				
1Pk Max							
MI		N	12[1]	-	24.88 dBm		
			6.9		98040 GHz		
		la l	11[1]	70	27.64 dBm 706 790 MHz		
dem							
J UBIN							
10 dBm							
D1 -13.000 c	IBm-						
-20 dBm							
-30 dBm		and the second and the latter section in	and the second states of the		deal through the later of		
and the second	and the strength of the second strength of the	I with the second s	for a second		and the second second second		
40 dBm	a provide a literative of the state based in the state of the state						
-50 dBm							
-60 dBm							
-70 dBm							
Start 30.0 MHz		30000 pts	•	Sto	p 8.0 GHz		

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7. Band Edge

7.1. Limit

FCC

- <u>§22.917(a)</u>, 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 + 10log(P) dB.

<u>- \$24.238(a)</u>, 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.

<u>- $\S27.53(g)$ </u>, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

 $\frac{-\$27.53(h)(1)}{1}$, for operations in the 1 695-1 710 Mb, 1 710-1 755 Mb, 1 755-1 780 Mb, 1 915-1 920 Mb, 1 995-2 000 Mb, 2 000-2 020 Mb, 2 110-2 155 Mb, 2 155-2 180 Mb, and 2 180-2 200 bands, 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.

<u>- §27.53(m)(4)</u>, For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log₁₀ (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log₁₀ (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log₁₀ (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log₁₀ (P) dB on all frequencies between 2490.5 Mb and 2496 Mb and 55 + 10 log₁₀ (P) dB at or below 2490.5 Mb. Mobile Satellite Service licensees operating on frequencies below 2495 Mb may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

IC

- RSS-130 Issue 1

4.6.1, the power of any unwanted emissions in any 100 kt bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dB W), by at least 43 + 10 log₁₀ p (watts), dB. However, in the 100 kt band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kt may be employed.

- RSS-132 Issue 3

5.5, Mobile and base station equipment shall comply with the limits in (i) and (ii) below. (i) In the first 1.0 Mb band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1 % of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 $\log_{10} p$ (watts).

(ii) After the first 1.0 Mb immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kb bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 log₁₀ p (watts). If the measurement is performed using 1 % of the occupied bandwidth, power integration over 100 kb is required.

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- RSS-133 Issue 6

6.5, Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 Mb bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 log₁₀ p(watts).

(ii) After the first 1.0 Mb, the emission power in any 1 Mb bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least 43 + 10 $\log_{10} p$ (watts). If the measurement is performed using 1 % of the emission bandwidth, power integration over 1.0 Mb is required.

- RSS-139 Issue 3

6.6, (i) In the first 1.0 Mb bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least 43 + 10 log₁₀ p (watts) dB.

(ii) After the first 1.0 Mb outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 Mb bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least 43 + 10 $\log_{10} p$ (watts) dB.

- RSS-199 Issue 3

4.5, (b)

for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:

(i) 40 + 10 $\log_{10} p$ from the channel edges to 5 MHz away

(ii) 43 + 10 \log_{10} p between 5 Mz and X Mz from the channel edges, and

(iii) 55 + 10 \log_{10} p at X M and beyond from the channel edges

In addition, the attenuation shall not be less than 43 + 10 $\log_{10} p$ on all frequencies between 2490.5 Mb and 2496 Mb, and 55 + 10 $\log_{10} p$ at or below 2490.5 Mb.

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7.2. Test Procedure

The test follows section 6.0 of FCC KDB Publication 971168 D01 v03r01.

- a. Span was set large enough so as to capture all out of band emissions near the band edge.
- b. RBW ≥ 1 % of OBW
- c. VBW \ge 3 x RBW.
- d. Detector = RMS.
- e. Trace mode = Average.
- f. Sweep time = Auto.
- g. The trace was allowed to stabilize.
- h. All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF function.



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7.3. Test Results

Ambient temperature	:	(23	± 1) °C
Relative humidity	:	47	% R.H.

Please refer to the following plots.

LTE band 2 (1.4 Mb - QPSK_RB 6)

Low Channel



LTE band 2 (1.4 Mb - QPSK_RB 1)

Low Channel



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LTE band 2 (1.4 Mb - QPSK_RB 6)

High Channel



LTE band 2 (1.4 Mb - QPSK_RB 1)

High Channel



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LTE band 2 (3 Mb - QPSK_RB 15)

Low Channel



LTE band 2 (3 Mb - QPSK_RB 1)

Low Channel



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LTE band 2 (3 Mb - QPSK_RB 15)

High Channel



LTE band 2 (3 Mb - QPSK_RB 1)

High Channel



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LTE band 2 (5 Mb - QPSK_RB 25)

Low Channel



LTE band 2 (5 Mb - QPSK_RB 1)

Low Channel



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A4(210 mm × 297 mm)



LTE band 2 (5 Mb - QPSK_RB 25)

High Channel



LTE band 2 (5 Mb - QPSK_RB 1)

High Channel



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LTE band 2 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 2 (10 胍 - QPSK_RB 1)

Low Channel



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LTE band 2 (10 Mb - QPSK_RB 50)

High Channel



LTE band 2 (10 胍 - QPSK_RB 1)

High Channel



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LTE band 2 (15 Mb - QPSK_RB 75)

Low Channel



LTE band 2 (15 胍 - QPSK_RB 1)

Low Channel



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LTE band 2 (15 Mb - QPSK_RB 75)

High Channel



LTE band 2 (15 胍 - QPSK_RB 1)

High Channel



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LTE band 2 (20 Mb - QPSK_RB 100)

Low Channel



LTE band 2 (20 Mt - QPSK_RB 1)

Low Channel



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LTE band 2 (20 Mb - QPSK_RB 100)

High Channel



LTE band 2 (20 Mt - QPSK_RB 1)

High Channel



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LTE band 4 (1.4 Mb - QPSK_RB 6)

Low Channel



LTE band 4 (1.4 Mb - QPSK_RB 1)

Low Channel



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LTE band 4 (1.4 Mb - QPSK_RB 6)

High Channel



LTE band 4 (1.4 Mb - QPSK_RB 1)

High Channel



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LTE band 4 (3 Mb - QPSK_RB 15)

Low Channel



LTE band 4 (3 Mb - QPSK_RB 1)

Low Channel



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LTE band 4 (3 Mb - QPSK_RB 15)

High Channel



LTE band 4 (3 Mb - QPSK_RB 1)

High Channel



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LTE band 4 (5 Mb - QPSK_RB 25)

Low Channel



LTE band 4 (5 Mb - QPSK_RB 1)

Low Channel



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A4(210 mm × 297 mm)



LTE band 4 (5 Mb - QPSK_RB 25)

High Channel



LTE band 4 (5 Mb - QPSK_RB 1)

High Channel



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LTE band 4 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 4 (10 胍 - QPSK_RB 1)

Low Channel



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LTE band 4 (10 Mb - QPSK_RB 50)

High Channel



LTE band 4 (10 胍 - QPSK_RB 1)

High Channel



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LTE band 4 (15 Mb - QPSK_RB 75)

Low Channel



LTE band 4 (15 胍 - QPSK_RB 1)

Low Channel



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LTE band 4 (15 Mb - QPSK_RB 75)

High Channel



LTE band 4 (15 胍 - QPSK_RB 1)

High Channel



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LTE band 4 (20 Mb - QPSK_RB 100)

Low Channel



LTE band 4 (20 胍 - QPSK_RB 1)

Low Channel



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LTE band 4 (20 Mb - QPSK_RB 100)

High Channel



LTE band 4 (20 胍 - QPSK_RB 1)

High Channel



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LTE band 5 (1.4 Mb - QPSK_RB 6)

Low Channel



LTE band 5 (1.4 Mb - QPSK_RB 1)

Low Channel



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LTE band 5 (1.4 Mb - QPSK_RB 6)

High Channel



LTE band 5 (1.4 Mb - QPSK_RB 1)

High Channel



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LTE band 5 (3 Mb - QPSK_RB 15)

Low Channel



LTE band 5 (3 Mb - QPSK_RB 1)

Low Channel



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LTE band 5 (3 Mb - QPSK_RB 15)

High Channel



LTE band 5 (3 Mb - QPSK_RB 1)

High Channel



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LTE band 5 (5 Mb - QPSK_RB 25)

Low Channel



LTE band 5 (5 Mb - QPSK_RB 1)

Low Channel



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LTE band 5 (5 Mb - QPSK_RB 25)

High Channel



LTE band 5 (5 Mb - QPSK_RB 1)

High Channel



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A4(210 mm × 297 mm)



LTE band 5 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 5 (10 胍 - QPSK_RB 1)

Low Channel



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LTE band 5 (10 Mb - QPSK_RB 50)

High Channel



LTE band 5 (10 胍 - QPSK_RB 1)

High Channel



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LTE band 7 (5 Mb - QPSK_RB 25)

Low Channel



LTE band 7 (5 Mb - QPSK_RB 1)

Low Channel



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LTE band 7 (5 Mb - QPSK_RB 25)

High Channel



LTE band 7 (5 Mb - QPSK_RB 1)

High Channel



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LTE band 7 (10 胍 - QPSK_RB 50)

Low Channel



LTE band 7 (10 Mb - QPSK_RB 1)

Low Channel



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LTE band 7 (10 Mb - QPSK_RB 50)

High Channel



LTE band 7 (10 Mt - QPSK_RB 1)

High Channel



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LTE band 7 (15 胍 - QPSK_RB 75)

Low Channel



LTE band 7 (15 Mb - QPSK_RB 1)

Low Channel



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LTE band 7 (15 Mb - QPSK_RB 75)

High Channel



LTE band 7 (15 Mb - QPSK_RB 1)

High Channel



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LTE band 7 (20 Mb - QPSK_RB 100)

Low Channel



LTE band 7 (20 Mb - QPSK_RB 1)

Low Channel



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LTE band 7 (20 Mb - QPSK_RB 100)

High Channel



LTE band 7 (20 Mb - QPSK_RB 1)

High Channel



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LTE band 12 (1.4 Mb - QPSK_RB 6)

Low Channel



LTE band 12 (1.4 Mb - QPSK_RB 1)

Low Channel



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LTE band 12 (1.4 Mb - QPSK_RB 6)

High Channel



LTE band 12 (1.4 Mb - QPSK_RB 1)

High Channel



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LTE band 12 (3 Mb - QPSK_RB 15)

Low Channel



LTE band 12 (3 胍 - QPSK_RB 1)

Low Channel



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LTE band 12 (3 Mb - QPSK_RB 15)

High Channel



LTE band 12 (3 Mt - QPSK_RB 1)

High Channel



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LTE band 12 (5 Mb - QPSK_RB 25)

Low Channel



LTE band 12 (5 M - QPSK_RB 1)

Low Channel



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LTE band 12 (5 Mb - QPSK_RB 25)

High Channel



LTE band 12 (5 Mt - QPSK_RB 1)

High Channel



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LTE band 12 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 12 (10 Mb - QPSK_RB 1)

Low Channel



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LTE band 12 (10 Mb - QPSK_RB 50)

High Channel



LTE band 12 (10 Mb - QPSK_RB 1)

High Channel



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LTE band 17 (5 Mb - QPSK_RB 25)

Low Channel



LTE band 17 (5 M - QPSK_RB 1)

Low Channel



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LTE band 17 (5 Mb - QPSK_RB 25)

High Channel



LTE band 17 (5 Mt - QPSK_RB 1)

High Channel



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LTE band 17 (10 Mb - QPSK_RB 50)

Low Channel



LTE band 17 (10 Mb - QPSK_RB 1)

Low Channel



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LTE band 17 (10 Mb - QPSK_RB 50)

High Channel



LTE band 17 (10 Mb - QPSK_RB 1)

High Channel



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8. Frequency Stability

8.1. Limit

FCC

- <u>§2.1055 (a)</u>, The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a)(2) and (3) of this section.

(2) From −20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 Mb at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

(3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

- §2.1055 (d), The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

- <u>§22.355</u>, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.

For Mobile devices operating in the 824 to 849 M_{2} band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

- <u>§24.235</u>, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

- <u>§27.54</u>, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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IC

- RSS-130 Issue 1

4.3, the transmitter frequency stability limit shall be determined as follows:

(a) The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded;

(b) Using a resolution bandwidth of 1 % of the occupied bandwidth, a reference point at the unwanted emission level which complies with the attenuation of 43 + 10 log10 p (watts) on the emission mask of the lowest and highest channel shall be selected, and the frequency at these points shall be recorded as f₁ and f_H respectively.

The applicant shall ensure frequency stability by showing that $f_{\rm L}$ minus the frequency offset and $f_{\rm H}$ plus the frequency offset shall be within the frequency range in which the equipment is designed to operate.

- RSS-132 Issue 3

5.3, The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.5 ppm for base stations.

- RSS-133 Issue 6

6.3, the carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.

- RSS-139 Issue 3

6.4, the frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

- RSS-199 Issue 3

4.3, the transmitter frequency stability limit shall be determined as follows:

(a) the frequency offset shall be measured according to the procedure described in RSS-Gen and recorded.

(b) using a resolution bandwidth equal to that permitted within the 1 Mb band immediately outside the channel edge, as found in section 4.5, reference points will be selected at the unwanted emission limits, which comply with the attenuation specified in section 4.5 for the type of device under test, on the emission mask of the lowest and highest channels. The frequency at these points shall be recorded as $f_{\rm H}$ and $f_{\rm H}$ respectively.

The applicant shall ensure compliance with frequency stability requirements by showing that f₁ minus the frequency offset and f_H plus the frequency offset is within the frequency range in which the equipment is designed to operate.

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8.2. Test Procedure

- 1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Mobile Test Unit via feed-through attenuators.
- 2. The EUT was placed inside the temperature chamber.
- 3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from Mobile Test Unit.



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8.3. Test Results

Ambient temperature	:	(23	± 1) °C
Relative humidity	:	47	% R.H.

LTE band 2 at middle channel

Reference Frequency: 1 880.0 Mb				
	Frequency Stability versus Temperature			
Environment	Environment Power Temperature (°C) Supplied (V _{dc})	Frequency Measure with Time Elapse		
Temperature (℃)		Frequency Error (Hz)	ppm	
50		2	0.001 1	
40		2	0.001 1	
30		1	0.000 5	
23		1	0.000 5	
10	4	1	0.000 5	
0		1	0.000 5	
-10		-1	-0.000 5	
-20		-1	-0.000 5	
-30		-2	-0.001 1	
Frequency Stability versus Power Supply				
Environment Power Temperature (°C) Supplied (V _{dc})	Frequency Measure with Time Elapse			
	Supplied (V _{dc})	Frequency Error (Hz)	with Time Elapse ppm 0.001 1 0.001 1 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.000 5 0.001 1	
22	3.6	1	0.000 5	
23	4.4	2	0.001 1	

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LTE band 4 at middle channel

Reference Frequency: 1 732.5 Mb				
Frequency Stability versus Temperature				
Environment	nent Power ire (℃) Supplied (V _{dc})	Frequency Measure with Time Elapse		
Temperature (°C)		Frequency Error (Hz)	ppm	
50		4	0.002 3	
40		3	0.001 7	
30		2	0.001 2	
23	4	2	0.001 2	
10		1	0.000 6	
0		-1	-0.000 6	
-10		1	0.000 6	
-20		1	0.000 6	
-30		-1	-0.000 6	
	Frequency Stability versus Power Supply			
Environment Temperature (℃)	Power	Frequency Measure with Time Elapse		
	Supplied (V _{dc})	Frequency Error (Hz)	ppm	
23	3.6	1	0.000 6	
	4.4	-1	-0.000 6	

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LTE band 5 at middle channel

Reference Frequency: 836.5 Mz				
Frequency Stability versus Temperature				
Environment	Environment Power mperature (°C) Supplied (V _{dc})	Frequency Measure with Time Elapse		
Temperature (℃)		Frequency Error (Hz)	ppm	
50	_	-1	-0.001 2	
40		1	0.001 2	
30		1	0.001 2	
23		2	0.002 4	
10	4	1	0.001 2	
0		1	0.001 2	
-10		-1	-0.001 2	
-20		-1	-0.001 2	
-30		-2	-0.002 4	
Frequency Stability versus Power Supply				
Environment Temperature (℃)	Power	Frequency Measure with Time Elapse		
	Supplied (V _{dc})	Frequency Error (Hz)	ppm	
23	3.6	-1	-0.001 2	
	4.4	1	0.001 2	

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LTE band 7 at middle channel

Reference Frequency: 2 535.0 ₩				
	Frequency Stability versus Temperature			
Environment	t Power °C) Supplied (V _{dc}) Frequency Measure with Time Frequency Error (Hz)	with Time Elapse		
Temperature (℃)		Frequency Error (Hz)	ppm	
50	4	1	0.000 4	
40		1	0.000 4	
30		2	0.000 8	
23		2	0.000 8	
10		2	0.000 8	
0		1	0.000 4	
-10		-1	-0.000 4	
-20		-2	-0.000 8	
-30		-3	-0.001 2	
	Frequency Stability versus Power Supply			
Environment Temperature (℃)	Power	Frequency Measure with Time Elapse		
	Supplied (V _{dc})	Frequency Error (Hz)	with Time Elapse ppm 0.000 4 0.000 4 0.000 8 0.000 8 0.000 4 0.000 8 0.000 4 0.000 8 0.000 4 -0.000 4 -0.000 4 -0.000 8 -0.001 2 with Time Elapse ppm 0.000 8 0.000 8 0.000 4	
23	3.6	2	0.000 8	
	4.4	1	0.000 4	

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LTE band 12 at middle channel

Reference Frequency: 707.5 Mz				
Frequency Stability versus Temperature				
Environment Power Temperature (°C) Supplied (V _{dc})	Frequency	Frequency Measure	cy Measure with Time Elapse	
	Supplied (V _{dc})	Frequency Error (Hz)	ppm	
50		2	0.002 8	
40		2	0.002 8	
30		3	0.004 2	
23	4	3	0.004 2	
10		1	0.001 4	
0		-1	-0.001 4	
-10		1	0.001 4	
-20		1	0.001 4	
-30		-2	-0.002 8	
Frequency Stability versus Power Supply				
Environment Temperature (℃)	Power	Frequency Measure with Time Elapse		
	Supplied (V _{dc})	Frequency Error (Hz)	with Time Elapse ppm 0.002 8 0.002 8 0.004 2 0.004 2 0.001 4 -0.001 4 0.001 4 -0.001 4 -0.002 8 with Time Elapse ppm -0.002 8 -0.002 8 -0.002 8 -0.002 8 -0.002 8	
23	3.6	-2	-0.002 8	
	4.4	-3	-0.004 2	

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LTE band 17 at middle channel				
Reference Frequency: 710.0 Mb				
	Frequency Stability ve	ersus Temperature		
Environment Temperature (℃)	Power	Frequency Measure with Time Elapse		
	Supplied (V _{dc})	Frequency Error (Hz)	ror ppm	
50		3	0.004 2	
40		3	0.004 2	
30		1	0.001 4	
23		1	0.001 4	
10	4	-1	-0.001 4	
0		-1	-0.001 4	
-10		-3	-0.004 2	
-20		-3	-0.004 2	
-30		-4	-0.005 6	
Frequency Stability versus Power Supply				
Environment Temperature (℃)	Power	Frequency Measure with Time Elapse		
	Supplied (V _{dc})	Frequency Error (Hz)	with Time Elapse ppm 0.004 2 0.004 2 0.001 4 0.001 4 0.001 4 -0.001 4 -0.004 2 -0.004 2 -0.004 2 -0.005 6 with Time Elapse ppm 0.001 4 -0.001 4	
23	3.6	1	0.001 4	
23	4.4	-1	-0.001 4	

- End of the Test Report -

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