Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued







Figure 8.3-37: Conducted spurious emissions of 5 MHz two low channels, LTE + NR operation



Figure 8.3-39: Conducted spurious emissions of 5 MHz two top channels, LTE + NR operation



Figure 8.3-36: Conducted spurious emissions of 20 MHz three top channels, three-carrier operation



Figure 8.3-38: Conducted spurious emissions of 5 MHz two mid channels, LTE + NR operation





Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



Figure 8.3-41: Conducted spurious emissions of 10 MHz two mid channels, LTE + NR operation



Figure 8.3-43: Conducted spurious emissions of 15 MHz two low channels, LTE + NR operation



Figure 8.3-45: Conducted spurious emissions of 15 MHz two top channels, LTE + NR operation



Figure 8.3-42: Conducted spurious emissions of 10 MHz two top channels, LTE + NR operation



Figure 8.3-44: Conducted spurious emissions of 15 MHz two mid channels, LTE + NR operation



Figure 8.3-46: Conducted spurious emissions of 20 MHz two low channels, LTE + NR operation

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued







Figure 8.3-48: Conducted spurious emissions of 20 MHz two top channels, LTE + NR operation Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



### Test data, continued



### On the plots below the measured "Total Channel Power" value must be lower than -25.04 dBm

**Figure 8.3-49:** Conducted band edge emission at 2110 MHz, 5 MHz channel single-carrier operation (RBW = 1% of EBW)

B66 LB Channe	E 1PC 20M Power			B66 UBE Channel F	1PC 5M ower		B66 UB Chann	BE 1MHZ El Power		B66 UBE 1PC 10M Channel Power		+
G G	INDUT: R Couplin Align: A	F grDC uto	Input 2 Correct Freq F	2:50 Ω :tions:Off Ref:Int(S) Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: F Gate: #IF Ga	ree Run Off in: Low	Center Fred Avg[Hold:>* Radio Std: I	g: 2.200025000 0 100/100 None	ЗНZ		
Graph	10.0 dB	•			1	Ref Lvi	Offset	41.78 dB		Mkr1	2.200000	000 GH
og	10.0 GB					ter var	10-41.7	, april				00 0.01
1.8			_									
1.8												
1.8			-				nere 1					
78												
22			$\vdash$									
8.2							\					
8.2												
0.2							è	1				
0.2		كمسمين										
10.2										and the second s		
enter 2.2 Res BW 1	00025 GHz 10.000 kHz				,	Video	BW 100	00 kHz*			Sweep 179 ms	oan 15 MH (1001 pt:
Metrics		•										
Total Ch	nannel Powe	r	-36.26	5 dBm / 50.	0 kHz							
Total Po	wer Spectra	l Density		-83.25 dE	im/Hz							
		2	Jan 3	26, 2021								

**Figure 8.3-51:** Conducted band edge emission at 2200 MHz, 5 MHz channel single-carrier operation (RBW = 1% of EBW)







Figure 8.3-52: Conducted band edge emission at 2201 MHz, 5 MHz channel single-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-53:** Conducted band edge emission at 2110 MHz, 10 MHz channel single-carrier operation (RBW = 1% of EBW)

B66 LE Chann	BE 1P0	C 20M ver	B66 UBE Channel F	1PC 5M Yower	B66 UE Channe	BE 1MHZ el Power	B66 UBE 1PC 10M Channel Power	• +
EYSIC	sht ⊋	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.200050 Avg Hold:>100/100 Radio Std: None	000 GHz	
Graph		۲		,	Ref Lvi Offset 4	41.78 dB	Mkr1	2.20000000 GH
cale/Div	10.0	dB		F	Ref Value 41.78	3 dBm		-41.339 dB
31.8								
21.8								
11.8			*****					
1.78								
8.22								
18.2					\			
28.2								
38.2		_				1		
48.2		and the				and a second		
enter 2.	20005	GHZ		,	Video BW 300.	00 kHz*		Span 25 Mi Swoop 22 1 ms (1001 p)
Metrics		•						
Total C	hanne	Power	-38.26 dBm / 10	0 kHz				
Total P	ower S	Spectral Density	-88.26 dE	8m/Hz				
			Jan 26, 2021	A .				
۰ ا	) (		1:35:27 PM					••• 💌 🛅 📈

**Figure 8.3-55:** Conducted band edge emission at 2200 MHz, 10 MHz channel single-carrier operation (RBW = 1% of EBW)



Figure 8.3-54: Conducted band edge emission at 2109 MHz, 10 MHz channel single-carrier operation (RBW = 1 MHz)



Figure 8.3-56: Conducted band edge emission at 2201 MHz, 10 MHz channel single-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-57:** Conducted band edge emission at 2110 MHz, 15 MHz channel single-carrier operation (RBW = 1% of EBW)

B66 U Chann	BE 1N Iel Pov	/HZ wer	B66 UBE Channel F	1PC 10M Yower	B66 UB8 Channel	E 1PC 15M Power	B66 UBE 1PC 20M Channel Power	+
CEYSIC (	GHT ⊋	Input: RF Coupling: DC Align: Auto	Input Z 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.2000750 Avg[Hold:>100/100 Radio Std: None	00 GHz	
Graph		•			Ref Lvi Offset 4	1.78 dB	Mkr1	2.20000000 GH
ale/Div	10.0	gr .		•	cer value 41.78	asm		-35.363 UDI
1.8								
1.8								
1.8		frank and the second second						
.78								
.22		1						
8.2		1						
8.2		<del>   </del>			<b> </b> _			
8.2					- <b>(</b>			
18.2	and the second					- And		
Inter 2.	20008	GHz 0 kHz			li Video BW 510.0	0 kHz*		Span 35 Mi Sweep 16.1 ms (1001 pt
Metrics		•						
Total C	hanne	el Power	-37.82 dBm / 15	0 kHz				
Total P	ower	Spectral Density	-89.58 dE	8m/Hz				
	2		Jan 26, 2021					

**Figure 8.3-59:** Conducted band edge emission at 2200 MHz, 15 MHz channel single-carrier operation (RBW = 1% of EBW)



Figure 8.3-58: Conducted band edge emission at 2109 MHz, 15 MHz channel single-carrier operation (RBW = 1 MHz)



Figure 8.3-60: Conducted band edge emission at 2201 MHz, 15 MHz channel single-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-61:** Conducted band edge emission at 2110 MHz, 20 MHz channel single-carrier operation (RBW = 1% of EBW)

B66 UBE 1M Channel Por	/HZ wer	B66 UBE Channel F	1PC 10M Power	B66 UBE Channel	E 1PC 15M Power	B66 UBE 1PC 20M Channel Power	• +
	Input: RF Coupling: DC Align: Auto	Input Z 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.2001000 Avg[Hold:>100/100 Radio Std: None	00 GHz	
Graph	•		,	Ref Lvi Offset 41	1.78 dB	Mkr1	2.200000000 GH
cale/Div 10.0	dB		F	Ref Value 36.68	dBm		-33.316 dBr
.og							
16.7							
5.68							
3.32							
13.3							
23.3				<b>1</b>			
33.3							
13.3							
53.3							
enter 2.20010 Res BW 100.0	) GHz 00 kHz		'	/ideo BW 1.000	0 MHz*	-	Span 45 MH Sweep 5.40 ms (1001 pt
Metrics	۲						
Total Channe	el Power	-35.11 dBm / 20	0 kHz				
Total Power	Spectral Density	-88.12 de	3m/Hz				
15		Jan 26, 2021					+• <b>NO OO N</b> /

**Figure 8.3-63:** Conducted band edge emission at 2200 MHz, 20 MHz channel single-carrier operation (RBW = 1% of EBW)



Figure 8.3-62: Conducted band edge emission at 2109 MHz, 20 MHz channel single-carrier operation (RBW = 1 MHz)



Figure 8.3-64: Conducted band edge emission at 2201 MHz, 20 MHz channel single-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-65:** Conducted band edge emission at 2110 MHz, 5 MHz channel two-carrier operation (RBW = 1% of EBW)

B66 LBE 1 Channel P	PC 10M ower	B66 LBE 1 Channel P	PC 15M ower	B66 LE Chann	BE 1PC 20M el Power	B66 UBE 1PC 5M Channel Power	· +
EYSIGH	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.20002 Avg[Hold:>100/100 Radio Std: None	5000 GHz	·
Graph	•		,	Ref Lvi Offset	41.78 dB	Mkr1	2.200000000 GH
ale/Div 10.	0 dB		F	Ref Value 41.7	8 dBm		-44.224 dBi
og							
1.0							
1.0							
70							
20							
8.2			$\mathcal{M}$	1			
0.2			17				
0.2			1		1		
82							
				1	and the second sec		
enter 2.200	03 GHz		,	video BW 100	.00 kHz*		Span 25 Mi
(es BW 10.)	JUU KHZ						Sweep 298 ms (1001 pt
Metrics							
Total Chan	nel Power	-38.44 dBm / 50.0	) kHz				
Total Powe	r Spectral Densit	y -85.43 dB	m/Hz				
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<b>I I I</b>	· 🔳 🗄	1:40:57 PM					••• 💽 🗆 🗡

**Figure 8.3-67:** Conducted band edge emission at 2200 MHz, 5 MHz channel two-carrier operation (RBW = 1% of EBW)



Figure 8.3-66: Conducted band edge emission at 2109 MHz, 5 MHz channel two-carrier operation (RBW = 1 MHz)





Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-69:** Conducted band edge emission at 2110 MHz, 10 MHz channel two-carrier operation (RBW = 1% of EBW)

B66 UBE 1 Channel Pe	MHZ	B66 UBE Channel F	1PC 10M Yower	B66 UE Channe	BE 1PC 15M el Power	B66 UBE 1PC 20M Channel Power	+
KEYSIGHT	Input: RF Coupling: DC Align: Auto	Input 2:50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.2000500 Awg Hold:>100/100 Radio Std: None	000 GHz	
Graph	•			Ref Lvi Offset	41.78 dB	Mkr1 2.2	20000000 GH
cale/Div 10.	0 dB		F	Ref Value 41.78	3 dBm		-43.363 GB
1.8							
1.8							
1.8							
.78							
22							
8.2	- [		¥ I				
8.2			4				
8.2			+		.1		
8.2	لمسينين						
enter 2.2000 Res BW 30.0	5 GHz 100 kHz			lideo BW 300.	00 kHz*	Swee	Span 50 Mi
Metrics	•						
Total Chan	nel Power	-39.87 dBm / 10	0 kHz				
Total Powe	r Spectral Density	/ -89.87 dE	8m/Hz				
		Jan 26, 2021					

Figure 8.3-71: Conducted band edge emission at 2200 MHz, 10 MHz channel two-carrier operation (RBW = 1% of EBW)



Figure 8.3-70: Conducted band edge emission at 2109 MHz, 10 MHz channel two-carrier operation (RBW = 1 MHz)



Figure 8.3-72: Conducted band edge emission at 2201 MHz, 10 MHz channel two-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-73:** Conducted band edge emission at 2110 MHz, 15 MHz channel two-carrier operation (RBW = 1% of EBW)

B66 UBE 1 Channel Po	MHZ	B66 UBE Channel F	1PC 10M Power	B66 UBE Channel	E 1PC 15M Power	B66 UBE 1PC 20M Channel Power	+
	Input: RF Coupling: DC Align: Auto	Input Z: 50 Q Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.200075 Avg[Hold:>100/100 Radio Std: None	000 GHz	
Graph	•			tef Lvi Offset 41	.78 dB	Mkr1	2.20000000 GH
cale/Div 10.0	GR		,	er value 41.78	asm		-41.000 UDI
1.8							
1.8							
1.8							
.78							
.22							
8.2							
8.2		¥					
8.2		1					
18.2					And the owner of the		
enter 2.2000 Res BW 51.0	8 GHz 00 kHz			/ideo BW 510.0	0 kHz*		Span 65 Mi Sweep 29.8 ms (1001 pt
Metrics	•						
Total Chann	el Power	-38.97 dBm / 15	i0 kHz				
Total Power	Spectral Density	-90.73 dE	3m/Hz				
		Jan 26, 2021					•

**Figure 8.3-75:** Conducted band edge emission at 2200 MHz, 15 MHz channel two-carrier operation (RBW = 1% of EBW)



Figure 8.3-74: Conducted band edge emission at 2109 MHz, 15 MHz channel two-carrier operation (RBW = 1 MHz)



**Figure 8.3-76:** Conducted band edge emission at 2201 MHz, 15 MHz channel two-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-77:** Conducted band edge emission at 2110 MHz, 20 MHz channel two-carrier operation (RBW = 1% of EBW)

B66 UBE 1 Channel Po	WHZ wer	B66 UBE Channel P	IPC 10M ower	B66 Cha	UBE 1PC 15M nnel Power		B66 UBE 1PC 20M Channel Power	· +
EYSIGHT	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free R Gate: Off #IF Gain: Lo	un Center Fre Avg[Hold:> w Radio Std:	q: 2.200100000 100/100 None	GHz	
Graph	T.		1	Ref Lvi Offs	et 41.78 dB		Mkr1	2.20000000 GH
	ub			value ov	1 I	1		-01.110 0.0
5.7								
3.7								
.68								
32								
1.3		V			1			
3.3		V						
3.3		\			<b>4</b> 1		_	
3.3								
3.3					-			
nter 2.2001	) GHz		· · · · ·	/ideo BW 1	1 0000 MHz*			Span 85 Mi
Metrics	•							
Total Chann	el Power	-37.53 dBm / 20	) kHz					
Total Power	Spectral Density	/ -90.54 dB	m/Hz					
		Jan 26, 2021						

Figure 8.3-79: Conducted band edge emission at 2200 MHz, 20 MHz channel two-carrier operation (RBW = 1% of EBW)









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# Test data, continued

















Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-85:** Conducted band edge emission at 2110 MHz, 10 MHz channel tree-carrier operation (RBW = 1% of EBW)

B66 UBB Channel	E 1MHZ Power	B66 UBE Channel F	1PC 10M Power	•	B66 UBE Channel	1PC 15M Power	B66 UBE 1PC 20M Channel Power	+
EYSIGI	T Input: RF Coupling: DC Align: Auto	Input Z 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Fre Gate: O #IF Gain	ee Run ff n: Low	Center Freq: 2.200050 Avg[Hold:>100/100 Radio Std: None	000 GHz	
Graph	, ,		:	Ref Lvi (	Offset 41	.78 dB	Mkr1 2.2	00000000 GI
ale/Div 1	0.0 dB		,	cer valu	1 1 1 1 1 1 1	asm		-42.414 UD
1.8								
1.8					_			
1.8								
78								
22								
3.2								
8.2					_			
8.2					1			
82								
inter 2.20	005 GHz			Video B	 W 300.0	0 kHz*	Swoo	Span 65 M
Metrics	•							<u>,</u>
Total Cha	annel Power	-40.47 dBm / 10	0 kHz					
Total Pov	ver Spectral Densit	/ -90.47 dE	3m/Hz					
		Jan 26, 2021						

**Figure 8.3-87:** Conducted band edge emission at 2200 MHz, 10 MHz channel tree-carrier operation (RBW = 1% of EBW)



Figure 8.3-86: Conducted band edge emission at 2109 MHz, 10 MHz channel tree-carrier operation (RBW = 1 MHz)



Figure 8.3-88: Conducted band edge emission at 2201 MHz, 10 MHz channel tree-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-89:** Conducted band edge emission at 2110 MHz, 15 MHz channel tree-carrier operation (RBW = 1% of EBW)

B66 UBE Channel F	1MHZ lower	B66 UBE Channel F	1PC 10M Yower	B66 U Chan	IBE 1PC 15M nel Power	B66 UBE 1PC 20M Channel Power	+
EYSIGH ,	T Input: RF Coupling: DC Align: Auto	Input Z 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.200075 Avg[Hold:>100/100 Radio Std: None	000 GHz	
Graph	۲ ال		:	Ref Lvi Offset	41.78 dB	Mkr1 2	2.20000000 GI
	U UB			ter value 41.1	t upini		-55.517 00
1.8							
1.8							
18							
78							
12							
22							
0.2			ł		1		
nter 2.200	08 GHz		,	video BW 510	0.00 kHz*	5.	Span 95 N
Motrics	T					34	eep 45.5 ms (1001 p
Total Char	nel Power	-39.28 dBm / 15	0 kHz				
Total Powe	er Spectral Density	/ -91.04 dE	8m/Hz				
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**Figure 8.3-91:** Conducted band edge emission at 2200 MHz, 15 MHz channel tree-carrier operation (RBW = 1% of EBW)



Figure 8.3-90: Conducted band edge emission at 2109 MHz, 15 MHz channel tree-carrier operation (RBW = 1 MHz)



**Figure 8.3-92:** Conducted band edge emission at 2201 MHz, 15 MHz channel tree-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



**Figure 8.3-93:** Conducted band edge emission at 2110 MHz, 20 MHz channel tree-carrier operation (RBW = 1% of EBW)

B66 UB Channe	B66 UBE 1MHZ B66 Channel Power Cha		JBE 1PC 10M nel Power	1PC 10M 'ower		1PC 15M Power		B66 UBE 1PC 20M Channel Power	· +
CEYSIG	HT Input: RF Coupling: DC Align: Auto	Input Z: 50 C Corrections: Freq Ref: Inf NFE: Off	<ul> <li>Atten: 12 dB</li> <li>Off Preamp: Off</li> <li>(S) µW Path: Standa</li> <li>#PNO: Fast</li> </ul>	Trig: Gate and #IF	Free Run Off Bain: Low	Center Free Avg[Hold:>' Radio Std: I	r: 2.200100000 100/100 None	) GHz	
Graph	,			Ref L	vi Offset 41	.78 dB		Mkr1	2.20000000 GI
cale/Div	10.0 dB			Ref V	alue 36.68 (	lBm			-37.791 08
6.7									
6.7									
1.68									
3.32									
3.3				-					
3.3				-		-			
3.3				-					
13.3				-					
53.3				-					
enter 2.2 Res BW 1	0010 GHz			Video	BW 1.000	) MHz*			Span 125 M Sweep 14.9 ms (1001 p
Metrics	•								
Total Ch	annel Power	-38.95 dBn	1 / 200 kHz						
Total Po	wer Spectral Dens	ty -91.	96 dBm/Hz						
		Jan 26, 20	21 👝 🛆						

Figure 8.3-95: Conducted band edge emission at 2200 MHz, 20 MHz channel tree-carrier operation (RBW = 1% of EBW)



Figure 8.3-94: Conducted band edge emission at 2109 MHz, 20 MHz channel tree-carrier operation (RBW = 1 MHz)



Figure 8.3-96: Conducted band edge emission at 2201 MHz, 20 MHz channel tree-carrier operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



### Test data, continued



**Figure 8.3-97:** Conducted band edge emission at 2110 MHz, 5 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)

B66 LE Chann	BE 1PC el Pow	C 10M ver	B66 LBE 1 Channel P	PC 15M ower		B66 LBE Channel	1PC 20M Power	B66 Cha	3 UBE 1PC 5M annel Power		· +
CEYSIC C	iht ₽	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Fre Gate: O #IF Gair	e Run ff 1: Low	Center Freq: 2.20 Avg Hold:>100/10 Radio Std: None	0025000 GHz 00			
Graph		•		F	Ref Lvi C	Offset 41	.78 dB		Mkr	1 2.2000	00000 GI
cale/Div	10.0 c	B		F	Ref Valu	e 41.78 e	dBm			-4	4.302 dB
31.8											
21.8											
11.8											
1 78				(							
8.22		1									
18.2		_		V							
28.2				¥		-					
38.2				-		1					
48.2		-				- <u> </u>					
enter 2 2	20003	GH7			Video B	L W 100 0	0 kHz*				Span 25 M
Res BW	10.000	0 kHz			FIGEO B	100.0				Sweep 29	3 ms (1001 p
! Metrics		,									
Total C	hanne	I Power	-38.01 dBm / 50.0	) kHz							
Total P	ower S	Spectral Density	/ -85.00 dB	m/Hz							
		3 -	) Jan 26, 2021 🖌							•• 15	
Total P	ower S	Spectral Density	/ -85.00 dB Jan 26, 2021 1:46:06 PM	m/Hz						.:: 🖎	] [

**Figure 8.3-99:** Conducted band edge emission at 2200 MHz, 5 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)



**Figure 8.3-98:** Conducted band edge emission at 2109 MHz, 5 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)



**Figure 8.3-100:** Conducted band edge emission at 2201 MHz, 5 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



*Figure 8.3-101:* Conducted band edge emission at 2110 MHz, 10 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)

B66 UBE 1 Channel Po	MHZ wer	B66 UBE Channel P	1PC 10M lower	•	B66 UBE Channel	1PC 15M Power	B66 UBE 1PC 20M Channel Power	+
KEYSIGHT ↓	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Fi Gate: 0 #IF Ga	ree Run Off in: Low	Center Freq: 2.2000500 Avg Hold:>100/100 Radio Std: None	000 GHz	
Graph	•		,	Ref Lvi	Offset 41	.78 dB	Mkr1	2.20000000 GI
cale/Div 10.0	dB		F	Ref Valu	Je 41.78	dBm		-45.433 08
31.8								
21.8								
11.8								
1.78								
8.22								
18.2			V I		- <u>\</u>			
28.2			1		-			
38.2			-		- 61			
48.2								
enter 2.2000 Res BW 30.0	5 GHz 00 kHz			Video E	sw 300.0	0 kHz*		Span 50 M Sweep 66.2 ms (1001 p
Metrics	۲							
Total Chann	el Power	-40.60 dBm / 10	0 kHz					
Total Power	Spectral Density	/ -90.60 dB	im/Hz					
46		Jan 26, 2021						+• <b>N</b> N
45	< ∎ ?	Jan 26, 2021 1:47:41 PM						

**Figure 8.3-103:** Conducted band edge emission at 2200 MHz, 10 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)



**Figure 8.3-102:** Conducted band edge emission at 2109 MHz, 10 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)



**Figure 8.3-104:** Conducted band edge emission at 2201 MHz, 10 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



### Test data, continued



**Figure 8.3-105:** Conducted band edge emission at 2110 MHz, 15 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)

B66 UBE Channel	E 1MHZ Power	B66 UBE 1PC 10M Channel Power	B66 UBE Channel	E 1PC 15M Power	B66 UBE 1PC 20M Channel Power	+
	T Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Atten: 12 dB Corrections: Off Preamp: Off Freq Ref: Int (S) µW Path: Standard NFE: Off #PNO. Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 2.2000750 Avg[Hold:>100/100 Radio Std: None	00 GHz	
Graph	,		Ref Lvi Offset 41	.78 dB	Mkr1	2.20000000 GH
Cale/DIV 1	0.0 dB		Ref Value 41.78 (	asm		-43.024 UDI
31.8						
21.8						
11.8						
1.78						
8.22						
18.2			\			
28.2						
38.2		- i	1			
48.2				and the second sec		
enter 2.20	008 GHz		L Video BW 510.0	0 kHz*		Span 65 Mi
Metrics	1.000 KHZ T					Sweep 29.6 ms (1001 pt
Total Cha	annel Power	-39 70 dBm / 150 kHz				
Total Pov	wer Spectral Density	-91.46 dBm/Hz				
-		Inn 26 2021				
- ກ	C" = ?	1:48:08 PM				

**Figure 8.3-107:** Conducted band edge emission at 2200 MHz, 15 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)



**Figure 8.3-106:** Conducted band edge emission at 2109 MHz, 15 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)



**Figure 8.3-108:** Conducted band edge emission at 2201 MHz, 15 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)

Testing data Spurious emissions at RF antenna connector (Band 66) FCC Part 27, RSS-139, Issue 3, RSS-170 Issue 3



# Test data, continued



*Figure 8.3-109:* Conducted band edge emission at 2110 MHz, 20 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)

B66 UBE 1MHZ B66 UBE 1PC 10M Channel Power Channel Power		1PC 10M Yower	B66 UBE 1PC 15M Channel Power		B66 UBE 1PC 20M Channel Power	• +		
CEYSIC (	<u>3HT</u> ⊋	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) NFE: Off	Atten: 12 dB Preamp: Off µW Path: Standard #PNO: Fast	Trig: Free R Gate: Off #IF Gain: Lo	un Center Freq: 2.200 Avg[Hold:>100/100 w Radio Std: None	00000 GHz	
Graph		•			Ref Lvi Offs	et 41.78 dB	Mkr1	2.20000000 GH
cale/Div	/ 10.0	dB		F	Ref Value 30	3.68 dBm		-43.315 GB
26.7								
16.7								
5.68	f							
3.32								
13.3								
23.3	-							
33.3	ļ		¥			1		
43.3								
53.3								
enter 2.	20010	GHz		1	/ideo BW 1	.0000 MHz*		Span 85 Mi
Metrics	100.0	•						oncep to this (toorp
Total C	hanne	el Power	-40.18 dBm / 20	0 kHz				
Total P	ower	Spectral Density	-93.19 dE	8m/Hz				
			Jan 26, 2021	A .				
4	) (		1:49:22 PM					••• 💌 🔂 📈

**Figure 8.3-111:** Conducted band edge emission at 2200 MHz, 20 MHz channel two-carrier LTE + NR operation (RBW = 1% of EBW)



**Figure 8.3-110:** Conducted band edge emission at 2109 MHz, 20 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)



**Figure 8.3-112:** Conducted band edge emission at 2201 MHz, 20 MHz channel two-carrier LTE + NR operation (RBW = 1 MHz)



# 8.4 Radiated spurious emissions (Band 66 & 2/25a)

### 8.4.1 Definitions and limits

### FCC §27.53:

#### (h) AWS emission limits

(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 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  $\log_{10}$  (P) dB.

### (3) Measurement procedure.

(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1-megahertz bands immediately outside and adjacent to the licensee's 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 points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

#### FCC §24.238(a):

Out of band emissions. 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.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

#### RSS-139, Section 6.6:

i. In the first 1.0 MHz 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 dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

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

#### RSS-170, Section 5.4:

The transmitter unwanted emissions shall be measured for all channel bandwidths with the carrier frequency set at both the highest and lowest channels in which the equipment is designed to operate.

The e.i.r.p. density of unwanted and carrier-off state emissions outlined in this section (Section 5.4) shall be averaged over any 2-ms active transmission using an RMS detector with a resolution bandwidth of 1 MHz for broadband emissions and a resolution bandwidth of 1 kHz for discrete emissions, unless stated otherwise.

For ATC equipment operating in the bands 2000-2020 MHz and 2180-2200 MHz, the unwanted emission limits shall be determined using a measurement bandwidth of 1 MHz or greater. However, in the 1 MHz band immediately outside and adjacent to the equipment's operating frequency block, a resolution bandwidth of at least 1% of the occupied bandwidth may be employed.

#### 5.4.1.2 ATC Base Station Equipment operating in bands 2000-2020 MHz and 2180-2200 MHz

he unwanted emissions of ATC base station equipment transmitting in the bands 2000–2020 MHz and 2180–2200 MHz shall comply with the following:

(1) The power of any unwanted emissions at frequencies outside the equipment's operating frequency block shall be attenuated below the transmitter power P (dBW), by 43 + 10 log p (watts), dB.

(2) \*For equipment operating in the band 2180–2200 MHz, in addition to (1), the power of any emissions on all frequencies between 2200 MHz and 2290 MHz shall not exceed an e.i.r.p. of –100.6 dBW/4 kHz (–70.6 dBm/4 kHz).

#### \* This requirement is for implementation and is enforced at the time of licensing. Therefore, results are not included in this report.

Report reference ID: 391738-5TRFWL-R1



### Definitions and limits, continued

### RSS-133, Section 6.5.1:

i. In the first 1.0 MHz 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 below the transmitter output power P (in dBW) by at least 43 + 10 log<sub>10</sub> p (watts) dB. ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10

log<sub>10</sub> p (watts) dB. If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

#### 8.4.2 Test summary

Test date	January 27, 2021
Test engineer	Andrey Adelberg

# 8.4.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic per ANSI C63.26 Paragraph 5.5.3.2 method.
- RBW within 30–1000 MHz was 100 kHz and 1 MHz above 1 GHz. VBW was wider than RBW.
- Testing was performed with RF ports terminated with 50 Ohm load.

Testing was performed with dual band (Band 2/25a and Band 66a) simultaneous transmission.

# 8.4.4 Test data



Figure 8.4-1: Radiated spurious emissions within 30-200 MHz dual band, NR only

Testing data Radiated spurious emissions (Band 66 & 2/25a) FCC Part 24 and 27, RSS-133, Issue 6 and RSS-170 Issue 3



# Test data, continued



Radiated emissions – PK+\_MAXH – Limit line -13 dBM in 82.23 dBuV/m





PK+\_MAXH Limit line of -13 dBm

Figure 8.4-3: Radiated spurious emissions within 1–3 GHz dual band, NR only

Testing data Radiated spurious emissions (Band 66 & 2/25a) FCC Part 24 and 27, RSS-133, Issue 6 and RSS-170 Issue 3



# Test data, continued



PK+\_MAXH Limit line of -13 dBm





Figure 8.4-5: Radiated spurious emissions within 18–22 GHz dual band, NR only

Testing data Radiated spurious emissions (Band 66 & 2/25a) FCC Part 24 and 27, RSS-133, Issue 6 and RSS-170 Issue 3



# Test data, continued



Radiated emissions

PK+\_MAXH FCC Part 15 and ICES-003 Limit - Class B (QP and Avg), 3 m RF Licensed limit line (-13 dBm)





PK+\_MAXH FCC Part 15 and ICES-003 Limit - Class B (QP and Avg), 3 m RF Licensed limit line (-13 dBm)



Testing data Radiated spurious emissions (Band 66 & 2/25a) FCC Part 24 and 27, RSS-133, Issue 6 and RSS-170 Issue 3



### Test data, continued



Radiated emissions PK+\_MAXH Limit line of -13 dBm







Testing data Radiated spurious emissions (Band 66 & 2/25a) FCC Part 24 and 27, RSS-133, Issue 6 and RSS-170 Issue 3



# Test data, continued



Radiated emissions Spurious emissions limite line (-13 dBm) PK+\_MAXH

Figure 8.4-10: Radiated spurious emissions within 18–22 GHz dual band, multi-RAT (NR + LTE)



# 8.5 Spurious out-of-band emissions (Band 2/25a)

### 8.5.1 Definitions and limits

### FCC §24.238(a):

Out of band emissions. 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  $43 + 10 \log(P) dB$ .

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### RSS-133, Section 6.5.1:

i. In the first 1.0 MHz 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 below the transmitter output power P (in dBW) by at least 43 + 10 log<sub>10</sub> p (watts) dB.
ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log<sub>10</sub> p (watts) dB.
10 log<sub>10</sub> p (watts) dB. If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

### 8.5.2 Test summary

Test date	January 25, 2021
Test engineer	Andrey Adelberg

# 8.5.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic.

- All measurements were performed using an average (RMS) detector per ANSI C63.26 Paragraph 5.7.2 method.
- Limit line (43 + 10 log<sub>10</sub> (P) or -13 dBm) was adjusted for MIMO operation by 12.04 dB\*: -13 dBm 12.04 dB = -25.04 dBm \*MIMO correction factor for 16 antenna ports: 10 × Log<sub>10</sub>(16) = 12.04 dB
- RBW 1 MHz, VBW was wider than RBW.



### 8.5.4 Test data



Figure 8.5-1: Conducted spurious emissions of 5 MHz low channel, single carrier operation



Figure 8.5-3: Conducted spurious emissions of 5 MHz top channel, single carrier operation



Figure 8.5-5: Conducted spurious emissions of 10 MHz mid channel, single carrier operation



Figure 8.5-2: Conducted spurious emissions of 5 MHz mid channel, single carrier operation



Figure 8.5-4: Conducted spurious emissions of 10 MHz low channel, single carrier operation





Section 8Testing ofTest nameSpuriousSpecificationFCC Part

Testing data Spurious out-of-band emissions (Band 2/25a) FCC Part 24 and RSS-133, Issue 6



### Test data, continued



Figure 8.5-7: Conducted spurious emissions of 15 MHz low channel, single carrier operation



Figure 8.5-9: Conducted spurious emissions of 15 MHz top channel, single carrier operation



Figure 8.5-11: Conducted spurious emissions of 20 MHz mid channel, single carrier operation



Figure 8.5-8: Conducted spurious emissions of 15 MHz mid channel, single carrier operation



Figure 8.5-10: Conducted spurious emissions of 20 MHz low channel, single carrier operation



Figure 8.5-12: Conducted spurious emissions of 20 MHz top channel, single carrier operation

Testing data Spurious out-of-band emissions (Band 2/25a) FCC Part 24 and RSS-133, Issue 6



### Test data, continued







Figure 8.5-15: Conducted spurious emissions of 5 MHz two top channels, two-carrier operation



Figure 8.5-17: Conducted spurious emissions of 10 MHz two mid channels, two-carrier operation



Figure 8.5-14: Conducted spurious emissions of 5 MHz two mid channels, two-carrier operation



Figure 8.5-16: Conducted spurious emissions of 10 MHz two low channels, two-carrier operation



