

## Frequency Band = Band 5, Direction = Downlink, Signal Type = LTE, Band Edge = lower (S01\_AA01)



Date: 27.JAN.2020 20:13:24



Spectrun	n						Ē
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset SWT	10.40 dB 👄 18.7 μs 👄	RBW 100 kHz VBW 300 kHz	Mode Auto FF	г	х — х —
●1Rm AvgP	wr		-				
20 dBm					M1[1]		-55.76 dBm 868.999850 MHz
10 dBm			+	+			
0 dBm				+		_	
-10 dBm				+			
-20 dBm-	D1 -19.000	dBm		+			
-30 dBm							
-40 dBm							
-50 dBm							N
-6U dBm			+			_	
-70 dBm							
Start 868.	7 MHz			1001 p	ts		Stop 869.0 MHz
Marker Type Re	f Trc	X-val		Y-value	Function	Fun	ction Result
		606.99	903 MP2	-33.70 UBII	Ready		27.01.2020

Date: 27.JAN.2020 20:16:42



## Frequency Band = Band 12, Direction = Downlink, Signal Type = GSM, Band Edge = upper (S01\_AA01)



Date: 27.JAN.2020 20:05:42

Frequency Band = Band 12, Direction = Downlink, Signal Type = LTE, Band Edge = upper (S01\_AA01)

Spectrum							
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset SWT	10.40 dB e 18.7 μs e	RBW 100 kH	z z Mode Auto FF	т	· · · · · ·
●1Rm AvgP	wr						
20 dBm					M1[1]	1	-43.53 dBm 746.000150 MHz
10 dBm						_	
0 dBm							
-10 dBm							
-20 dBm-	D1 -19.000	dBm====					
-30 dBm							
1.40 dBm							
-50 dBm							
-60 dBm-							
-70 dBm							
Start 746.0	) MHz			1001	pts		Stop 746.3 MHz
Marker Type Ref M1	f Trc	X-val 746.00	Je 015 MHz	Y-value -43.53 dB	Function	Fur	iction Result
	][				Ready	amm	27.01.2020

Date: 27.JAN.2020 20:08:59



## Frequency Band = Band 12, Direction = Downlink, Signal Type = CDMA, Band Edge = upper (S01\_AA01)



Date: 27.JAN.2020 20:07:31

Frequency Band = Band 12, Direction = Downlink, Signal Type = GSM, Band Edge = lower (S01\_AA01)

Spectrum									
Ref Level	25.00 dBm	Offset	10.40 dB 👄	RBW 100 kH	z				
Att	30 dB	SWT	18.7 µs 👄	VBW 300 kH	z Mode A	uto FFT			
SGL Count :	2000/2000								
1Rm AvgPw	/r								
20 dBm			_		MI	[1]		727.9	-31.95 dBm 99850 MHz
10 dBm									
0 dBm									
-10 dBm									
-20 dBm	01 -19.000	dBm							
-30 dBm									M
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
Start 727.7	MHz			1001	l pts			Stop	728.0 MHz
Marker									
Type Ref	Trc	X-valu 727.00	985 MH2	-31.95 dP	Funct	ion	Fund	tion Result	t
	Υ Αι	121.39	200 11112	51,55 06					27.01.2020

Date: 27.JAN.2020 20:03:56



## Frequency Band = Band 12, Direction = Downlink, Signal Type = LTE, Band Edge = lower (S01\_AA01)



Date: 27.JAN.2020 20:00:00

Frequency Band = Band 12, Direction = Downlink, Signal Type = CDMA, Band Edge = lower (S01\_AA01)

Spectrum	<u> </u>									₩
Ref Level	25.00 dBm	Offset	10.40 dB 👄	RBW 1	.00 kHz					
Att	30 dB	SWT	18.7 µs 🖷	VBW 3	00 kHz	Mode	Auto FFT			
SGL Count	2000/2000									
1Rm AvgP	vr									
20 dBm				+		M	1[1]		727.9	-56.76 dBm )99850 MHz
10 dBm										
0 dBm				_						
-10 dBm										
-20 dBm-	D1 -19.000	dBm								
-30 dBm				_						
-40 dBm				_	_					
-50 dBm			+							M
-6U dBm				-				-		
-70 dBm										
Start 727.7	/ MHz				1001 pt	s			Stop	728.0 MHz
Marker										
Type Ref	1 Trc	X-valu 727.99	1e	<u>Y-va</u> -56.	lue 76 dBm	Func	tion	Fu	nction Resul	t
	)[						teady			27.01.2020

Date: 27.JAN.2020 20:02:18



## Frequency Band = Band 13, Direction = Downlink, Signal Type = GSM, Band Edge = upper (S01\_AA01)



Date: 27.JAN.2020 19:48:41

Frequency Band = Band 13, Direction = Downlink, Signal Type = LTE, Band Edge = upper (S01\_AA01)

Spectrum	1 D						
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 1 SWT	.0.40 dB 👄 18.7 μs 👄	RBW 100 kH: VBW 300 kH:	z Mode Auto FF	т	
●1Rm AvgP	wr						
20 dBm					M1[1]	1	-43.95 dBm 756.000150 MHz
10 dBm							
0 dBm							
-10 dBm							
-20 dBm	D1 -19.000	dBm					
-30 dBm							
140 dBm-							
-50 dBm							
-70 dBm							
Start 756.	D MHz	1	1	1001	pts	1	Stop 756.3 MHz
Marker							
Type Re M1	f Trc 1	X-valu 756.000	e 115 MHz	Y-value -43.95 dBr	m Function	Fur	nction Result
	)[				Ready		27.01.2020

Date: 27.JAN.2020 19:42:37



## Frequency Band = Band 13, Direction = Downlink, Signal Type = CDMA, Band Edge = upper (S01\_AA01)



Date: 27.JAN.2020 19:46:19

Frequency Band = Band 13, Direction = Downlink, Signal Type = GSM, Band Edge = lower (S01\_AA01)

Spectrum	₩								
Ref Level 2	25.00 dBm	Offset	10.40 dB 👄	RBW 100 k	Hz				
Att	30 dB	SWT	18.7 µs 🖷	VBW 300 ki	Hz Mode	Auto FFT			
SGL Count 2	2000/2000								
1Rm AvgPw	r								
20 dBm					M	1[1]		745.9	32.26 dBm 99850 MHz
10 dBm				_					
0 dBm				_					
-10 dBm									
-20 dBm 0	1 -19.000	dBm		_					
-30 dBm									M
-40 dBm				_					
-50 dBm									
-60 dBm -									
-70 dBm				_					
Start 745.7	MHz			100	1 pts			Stop	746.0 MHz
Marker									
Type Ref	Trc	X-valu 745.00	1e	-32.26 d	Func	tion	Fund	tion Result	
	<u>, 1</u>	140.99	505 MHZ	J2,20 u		teady			27.01.2020
								REP	

Date: 27.JAN.2020 19:51:03



## Frequency Band = Band 13, Direction = Downlink, Signal Type = LTE, Band Edge = lower (S01\_AA01)



Date: 27.JAN.2020 19:56:16

Frequency Band = Band 13, Direction = Downlink, Signal Type = CDMA, Band Edge = lower (S01\_AA01)

Spectrum	$\neg$						
Ref Level 2 Att SGL Count 2	25.00 dBm 30 dB 2000/2000	Offset SWT	10.40 dB 👄 18.7 μs 👄	RBW 100 kHz VBW 300 kHz	Mode Auto FF1	r	
●1Rm AvgPw	r						
20 dBm					M1[1]		-55.99 dBm 745.999850 MHz
10 dBm							
0 dBm							
-10 dBm				+ +			
-20 dBm 0	01 -19.000	dBm					
-30 dBm							
-40 dBm							
-50 dBm							M
-60 dBm							
Start 745.7	MHz			1001	ots		Stop 746.0 MHz
Marker							
Type Ref	Trc 1	X-val 745.99	JIE 985 MHz	Y-value -55.99 dBm	Function	Fun	ction Result
	)[]				Ready		27.01.2020

Date: 27.JAN.2020 19:53:57



## Frequency Band = Band 2, Direction = Uplink, Signal Type = GSM, Band Edge = upper (S01\_AA01)



Date: 24.JAN.2020 11:50:57

## Frequency Band = Band 2, Direction = Uplink, Signal Type = LTE, Band Edge = upper (S01\_AA01)

Spectrur	n								
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10 SWT 1	.70 dB 👄 8.9 μs 👄	RBW 100 kHz VBW 300 kHz	2 2 Mode A	uto FFT			
●1Rm AvgF	wr								
20 dBm					M1	[1]		1.910	·23.40 dBm )00150 GHz
10 dBm				+ +	M:	2[1]		1.911	29.61 dBm 00000 GHz
0 dBm				+ +					
-10 dBm—							-		
1-20 dBm	D1 -19.000	) dBm							
-30 dBm			M2						
-40 dBm									
-50 dBm—									
-60 dBm									
-70 dBm—									
Start 1.91	GHz			1001	pts			Stop	1.913 GHz
Marker									
Type Re	f Trc	X-value		Y-value	Funct	ion	Fun	ction Result	:
M1 M2	1	1.910001	1 GHz	-23.40 dBr -29.61 dBr	n				
					R	e ad y			24.01.2020

Date: 24.JAN.2020 12:06:16



## Frequency Band = Band 2, Direction = Uplink, Signal Type = CDMA, Band Edge = upper (S01\_AA01)



Date: 24.JAN.2020 12:01:03



Spectrum	п							
<b>Ref Level</b> Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10 SWT 1	0.70 dB 🖷 89.6 μs 🖷	RBW 10 kHz VBW 30 kHz	Mode	Auto FFT		· · · · · ·
●1Rm AvgP	wr							
20 dBm						M1[1]		-34.85 dBm 1.84998050 GHz
10 dBm						M2[1]		-61.93 dBm 1.84900000 GHz
0 dBm						+		
-10 dBm								
-20 dBm	D1 -19.000	dBm						
-30 dBm								X
-40 dBm								
-50 dBm						м	2	
-70 dBm-								
Start 1.84	7 GHz			1001	pts			Stop 1.85 GHz
Marker								
Type Re	f Trc	X-value		Y-value	Fur	nction	Fu	nction Result
M1 M2	1	1.84998	05 GHz 49 GHz	-34.85 dBr -61.93 dBr	m m			
	][]					Ready		

Date: 24.JAN.2020 11:38:22



## Frequency Band = Band 2, Direction = Uplink, Signal Type = LTE, Band Edge = lower (S01\_AA01)



Date: 23.JAN.2020 19:06:10



Spectrum									
Ref Level : Att SGL Count :	25.00 dBm 30 dB 2000/2000	Offset 10 SWT 1	1.70 dB 👄 18.9 μs 👄	RBW 100 kHz VBW 300 kHz	Mode /	Auto FFT			
●1Rm AvgPv	/r								$\neg$
20 dBm-					M	1[1]		-28.10 d 1.84999850	iBm GHz
10 dBm					M	2[1]		-42.31 d 1.84900000	iBm GHz
0 dBm				+ +			+		$\neg$
-10 dBm							-		$\neg$
-20 dBm1	01 -19.000	dBm							M
-30 dBm									-
-40 dBm						M2			_
-50 d8m									$\neg$
-60 dBm				+ +			+		$\neg$
-70 dBm									
Start 1.847	GHz			1001	pts			Stop 1.85 G	<u>Hz</u>
Marker	1 True 1	N	1	M	1 5.000	ten 1	<b>F</b>	ation Beault	_
Type Ref	1	1 940000	DE CH2	-29.10 dBn	Funct	tion	Fun	iction Result	-
M2	1	1.84	19 GHz	-42.31 dBn	n				
	][]				- P	eady	00000	24.01.2020	

Date: 24.JAN.2020 10:54:23



## Frequency Band = Band 4, Direction = Uplink, Signal Type = GSM, Band Edge = upper (S01\_AA01)



Date: 24.JAN.2020 16:08:01

## Frequency Band = Band 4, Direction = Uplink, Signal Type = LTE, Band Edge = upper (S01\_AA01)

Spectrun	n						
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10 SWT 1	).70 dB 👄 l8.9 μs 👄	RBW 100 kHz VBW 300 kHz	Mode Auto F	FT	
●1Rm AvgP	wr						
20 dBm					M1[1]		-24.04 dBm 1.75500150 GHz
10 dBm					M2[1]		-33.60 dBm 1.75600000 GHz
0 dBm							
-10 dBm							
1-20 dBm	D1 -19.000	dBm					
-30 dBm			M2				
-40 dBm							+
-50 dBm							
-60 dBm							
-70 dBm-	5 CH2			1001	ats		Stop 1 759 GHz
Marker	0 0112			1001			500p 1.756 GHz
Type   Re	f Trc	X-value	. 1	Y-value	Function	l Fun	ction Result
M1 M2	1	1.75500	15 GHz 56 GHz	-24.04 dBn -33.60 dBn	1		
	][]				Ready		24.01.2020

Date: 24.JAN.2020 16:19:00



## Frequency Band = Band 4, Direction = Uplink, Signal Type = CDMA, Band Edge = upper (S01\_AA01)



Date: 24.JAN.2020 16:24:54



Spectrur	n								
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10.70 SWT 189.6	)dB <b>e RBW</b> öµs <b>e VBW</b>	10 kHz 30 kHz	Mode /	Auto FFT			
●1Rm AvgP	wr								
20 dBm					<u> </u>	11[1]		- 1.709	34.61 dBm 98050 GHz
10 dBm					N	12[1]		1.709	61.84 dBm 00000 GHz
0 dBm									
-10 dBm—									
-20 dBm	D1 -19.000	) dBm							
-30 dBm									M:
-40 dBm									
-50 dBm-						M2			
-70 dBm-							~~~~~~		
Start 1.70	7 GHz			1001 p	ts			Stop	1.71 GHz
Marker									
Type Re	f Trc	X-value	Y-	value	Fun	ction	Fund	ction Result	
M1 M2	1	1.7099805 (	GHZ - GHZ -	34.61 dBm 61.84 dBm					
						Ready			4.01.2020

Date: 24.JAN.2020 16:02:03



## Frequency Band = Band 4, Direction = Uplink, Signal Type = LTE, Band Edge = lower (S01\_AA01)



Date: 24.JAN.2020 12:22:37



Spectrum									
Ref Level 2 Att SGL Count 2	25.00 dBm 30 dB 2000/2000	Offset 10 SWT 1	.70 dB 👄 8.9 μs 👄	RBW 100 kH: VBW 300 kH:	Z Mode	Auto FFT			
●1Rm AvgPw	r								
20 dBm-					M	1[1]		- 1.709	28.79 dBm 99850 GHz
10 dBm					M	2[1]		- 1.709	42.97 dBm 00000 GHz
0 dBm									
-10 dBm									
-20 dBm0	01 -19.000	dBm							м
-30 dBm									
-40 dBm						M2			
-50 dBm									
-60 dBm									
-70 dBm									
Start 1.707	GHz			1001	pts			Stop	1.71 GHz
Marker									
Type Ref	Trc	X-value		Y-value	Func	tion	Fund	ction Result	
M1 M2	1	1.709998	IS GHZ	-28.79 dBi -42.97 dBi	n n				
	J					teady			4.01.2020

Date: 24.JAN.2020 12:28:30



### Frequency Band = Band 5, Direction = Uplink, Signal Type = GSM, Band Edge = upper (S01\_AA01)



Date: 24.JAN.2020 17:18:20

Note: Wrong offset, actual value is 0.3 dB lower

Frequency Band = Band 5, Direction = Uplink, Signal Type = LTE, Band Edge = upper (S01\_AA01)



Date: 24.JAN.2020 17:27:35

Note: Wrong offset, actual value is 0.3 dB lower



### Frequency Band = Band 5, Direction = Uplink, Signal Type = CDMA, Band Edge = upper (S01\_AA01)



Date: 24.JAN.2020 17:33:26

Note: Wrong offset, actual value is 0.3 dB lower

Frequency Band = Band 5, Direction = Uplink, Signal Type = GSM, Band Edge = lower (S01\_AA01)



Date: 24.JAN.2020 17:13:23

Note: Wrong offset, actual value is 0.3 dB lower



# Frequency Band = Band 5, Direction = Uplink, Signal Type = LTE, Band Edge = lower (S01\_AA01)

Spectrum						E ∀
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10.70 dB ( SWT 18.7 μs (	• RBW 100 kHz • VBW 300 kHz	Mode Auto FF	т	•
●1Rm AvgPv	vr					
20 dBm-				M1[1]		-22.24 dBm 823.999850 MHz
10 dBm				M2[1]		-25.72 dBm 823.900000 MHz
0 dBm					_	
-10 dBm					_	
-20 dBm	D1 -19.000	dBm			12	
-30 dBm						
-40 dBm					_	
-50 dBm						
-60 dBm						
-70 dBm						
start 823.7	MHZ		1001 p	ts		Stop 824.0 MHz
Type Ref	Tre	X-value	Y-value	Eunction	Eu	Inction Result
M1 M2	1	823.99985 MHz 823.9 MHz	-22.24 dBm -25.72 dBm	Function	Fu	medon Result
	J			Ready	ann	21.01.2020

Date: 24.JAN.2020 17:05:08

## Frequency Band = Band 5, Direction = Uplink, Signal Type = CDMA, Band Edge = lower (S01\_AA01)

Spectr	um										
Ref Lev Att SGL Cou	<b>el</b> 2 unt 2	25.00 dBm 30 dB 2000/2000	Offset 1 SWT	.0.70 dB ∈ 18.7 μs ∈	RBW 100 ki VBW 300 ki	Hz Hz M	1ode A	uto FFT			
⊖1Rm Av	gPw	r									
20 dBm-	+						M1	[1]		823.	-26.64 dBm 999850 MHz
10 dBm-	+				-		M2	2[1]	1	823.	-28.57 dBm 900000 MHz
0 dBm—	+										
-10 dBm-	+										
-20 dBm-	P	1 -19.000	dBm====					M2			M
-30 dBm-	╪										
-50 dBm-											
-60 dBm-	$\downarrow$										
-70 dBm·	_										
Start 82	23.7	MHz			100	1 pts				Stop	824.0 MHz
Marker											
Туре	Ref	Trc	X-valu	e	Y-value		Funct	ion	Fur	iction Resu	lt
M1 M2		1	823.999	3.9 MHz	-26.64 di -28.57 di	am am					
		J						eady.			24.01.2020

Date: 24.JAN.2020 16:51:09



## Frequency Band = Band 12, Direction = Uplink, Signal Type = GSM, Band Edge = upper (S01\_AA01)



Date: 27.JAN.2020 18:43:21

Frequency Band = Band 12, Direction = Uplink, Signal Type = LTE, Band Edge = upper (S01\_AA01)

Spectrum	٦						
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10 SWT 6	).40 dB ● 53.1 µs ●	RBW 30 kHz VBW 100 kHz	Mode Auto FF	г	, , , , , , , , , , , , , , , , , , ,
●1Rm AvgP	wr						
20 dBm					M1[1]		-25.99 dBm 716.0000150 MHz
10 dBm				+	M2[1]		-27.64 dBm 716.1000000 MHz
0 dBm				+			
-10 dBm							
1 <sup>20 dem</sup>	D1 -19.000	dBm	M2				
-30 dBm							
-40 dBm							
-50 dBm				+			
-60 dBm				+			
-70 dBm-	0.000						
Markor	UMHZ			10001	ots		Stop 716.3 MHz
	flTrc	X-value		Y-value	Eunction	Eun	ction Result
M1 M2	1	716.00001 716.	5 MHz 1 MHz	-25.99 dBm -27.64 dBm	. anotion		
	)[				Ready	CIIIIII	27.01.2020

Date: 27.JAN.2020 18:55:36



# Frequency Band = Band 12, Direction = Uplink, Signal Type = CDMA, Band Edge = upper (S01\_AA01)

Spectrur	n				
Ref Level Att SGL Count	25.00 dBr 30 d 2000/200	n Offset 10.40 dB ( 3 SWT 63.1 µs ( 0	• RBW 30 kHz • VBW 100 kHz	Mode Auto FFT	
●1Rm AvgP	wr				
20 dBm				M1[1]	-27.73 dBm 716.0000150 MHz
10 dBm				M2[1]	-29.88 dBm 716.1000000 MHz
0 dBm					
-10 dBm—					
-20 dBm	D1 -19.00	0 dBm			
-30 dBm		¥	++		
-40 dBm					
-50 dBm					
-60 dBm—					
-70 dBm					
Start 716.	0 MHz		10001 p	ots	Stop 716.3 MHz
Marker					
Type Re	f Trc	X-value	Y-value	Function	Function Result
M1 M2	1	716.000015 MHz 716.1 MHz	-27.73 dBm -29.88 dBm		
	][]			Ready	27.01.2020

Date: 27.JAN.2020 18:48:59



Spectrum								
Ref Level 3 Att SGL Count 3	25.00 dBm 30 dB 2000/2000	Offset 10.40 c SWT 63.5 p	<b>IB 👄 RBW</b> 30 US 👄 <b>VBW</b> 100	kHz kHz <b>Mod</b> e	e Auto FFT			
●1Rm AvgPw	r							
20 dBm					M1[1]		-: 697.99	29.62 dBm 99850 MHz
10 dBm					M2[1]		697.90	45.56 dBm )0000 MHz
0 dBm								
-10 dBm								
-20 dBm0	01 -19.000	dBm <del></del>						M
-30 dBm								
-50 dBm								
-60 dBm								
-70 dBm								
CF 697.85	чHz		10	01 pts			Span (	300.0 kHz
Marker	Tral	M unlue	1 9		antinu I	<b>F</b>	ation Desuit	
M1 M2	1 1	697.99985 MH 697.9 MH	r-value 12 -29.62 12 -45.56	dBm dBm	nction	Fun	ction Result	
	)[				Ready	amm		7.01.2020

Date: 27.JAN.2020 18:24:09



# Frequency Band = Band 12, Direction = Uplink, Signal Type = LTE, Band Edge = lower (S01\_AA01)

Spectrun	ı )					
Ref Level Att SGL Count	25.00 dBr 30 d 2000/200	n Offset 10.40 dB ( 3 SWT 63.5 µs ( 0	• RBW 30 kHz • VBW 100 kHz	Mode Auto FF	т	<b>.</b>
●1Rm AvgP	wr					
20 dBm				M1[1]		-23.88 dBm 697.999850 MHz
10 dBm				M2[1]		-25.05 dBm 697.900000 MHz
0 dBm						
-10 dBm						
-20 dBm	D1 -19.00	0 dBm		P	//2	
-30 dBm						
-40 dBm						
-50 dBm—						
-60 dBm		+				
-70 dBm						
Start 697.	7 MHz		1001 p	ts		Stop 698.0 MHz
Marker						
Type Re	f Trc	X-value	Y-value	Function	Fu	nction Result
M1 M2	1	697.99985 MHz 697.9 MHz	-23.88 dBm -25.05 dBm			
				Ready		27.01.2020

Date: 27.JAN.2020 18:02:34



Spectrum						
<b>Ref Level</b> Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10.40 d SWT 63.5 μ	8 <b>- RBW</b> 30 kH s <b>- VBW</b> 100 kH	iz Iz Mode Auto FF	т	, , , , , , , , , , , , , , , , , , ,
●1Rm AvgP	wr					
20 dBm				M1[1]		-27.82 dBm 697.99850 MHz
10 dBm				M2[1]		-29.92 dBm 697.900000 MHz
0 dBm						
-10 dBm						
-20 dBm	D1 -19.000	dBm		1	12	M
-30 dBm						
-40 dBm						
-50 dBm						
-60 dBm						
-70 dBm	MHz		1001	pts		Span 300.0 kHz
Marker						
Type   Ref	f   Trc	X-value	Y-value	Function	Fur	nction Result
M1 M2	1	697.99985 MH: 697.9 MH:	z -27.82 de z -29.92 de	lm Im		
	][]			Ready		277.011/2020

Date: 27.JAN.2020 18:11:48



## Frequency Band = Band 13, Direction = Uplink, Signal Type = GSM, Band Edge = upper (S01\_AA01)



Date: 27.JAN.2020 19:22:04

Frequency Band = Band 13, Direction = Uplink, Signal Type = LTE, Band Edge = upper (S01\_AA01)

Spectrun	ı )					
Ref Level Att SGL Count	25.00 dBm 30 dB 2000/2000	Offset 10.40 dB SWT 63.5 μs	<ul> <li>RBW 30 kHz</li> <li>VBW 100 kHz</li> </ul>	Mode Auto FF1	r	
●1Rm AvgP	wr					
20 dBm				M1[1]	787.0	-27.85 dBm 300150 MHz
10 dBm				M2[1]	787.:	-30.31 dBm 100000 MHz
0 dBm						
-10 dBm						
-20 dBm	D1 -19.00	D dBm M2				
-30 dBm						
-40 dBm						
-50 dBm						
-60 dBm						
-70 dBm	0 MHz		1001 p	ts	Stop	787.3 MHz
Marker						
Type   Re	f Trc	X-value	Y-value	Function	Function Resu	lt 🛛
M1 M2	1	787.00015 MHz 787.1 MHz	-27.85 dBm -30.31 dBm			
				Ready		27.01.2020

Date: 27.JAN.2020 19:33:57



## Frequency Band = Band 13, Direction = Uplink, Signal Type = CDMA, Band Edge = upper (S01\_AA01)



Date: 27.JAN.2020 19:28:29



Spectru	m								
Ref Leve Att SGL Cour	l 25.00 dBr 30 d it 2000/200	n Offset 10.4 3 SWT 63. 0	ю dB 👄 RBN .5 µs 👄 VBN	₩ 30 kHz ₩ 100 kHz	Mode :	Auto FFT			
●1Rm Avg	Pwr								
20 dBm—					M	1[1]		- 776.9	29.70 dBm 99850 MHz
10 dBm—		+			M	2[1]		776.9	46.25 dBm 00000 MHz
0 dBm		+							
-10 dBm—									
-20 dBm	=D1 -19.00	0 dBm							M
-30 dBm—									3
-40 dBm—						M2			
-50 dBm—									
-60 dBm-		+							
-70 dBm-	7 MU3			1001	ote				77 0 MHz
Marker	.7 Piriz			1001				atop	77.0 MHZ
	ef   Trc	X-value	Y	-value	Eunc	tion	Eupr	tion Result	1
M1 M2	1	776.99985	MHz MHz	-29.70 dBm -46.25 dBm	1				
						leady			7.01.2020

Date: 27.JAN.2020 19:16:33



### Frequency Band = Band 13, Direction = Uplink, Signal Type = LTE, Band Edge = lower (S01\_AA01)



Date: 27.JAN.2020 19:06:57

Frequency Band = Band 13, Direction = Uplink, Signal Type = CDMA, Band Edge = lower (S01\_AA01)



Date: 27.JAN.2020 19:09:58

### 5.5.5 TEST EQUIPMENT USED

- R&S TS8997



### 5.6 CONDUCTED SPURIOUS EMISSIONS

Standard

The test was performed according to: KDB 935210 D03

### 5.6.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission limits per § 2.1051

The EUT was connected to the test setup according to the following diagram:



FCC Part 20.21; Consumer Signal Booster – Test Setup 7.6; Conducted Spurious Emissions

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

### 5.6.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1051; Measurement required: Spurious emissions at antenna terminal:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

#### FCC Part 20, § 20.21(e)(8)(i)(E)

*Out of Band Emission Limits.* Booster out of band emissions (OOBE) shall be at least 6 dB below the FCC's mobile emission limits for the supported bands of operation. Compliance to OOBE limits will utilize high peak-to-average CMRS signal types.



Part 22, Subpart H – Cellular Radiotelephone Service; Band 5 (Cellular)

§ 22 917 – Emission limitations for cellular equipment

(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  $43 + 10 \log(P) dB$ .

Part 24 E – Personal Communication Services

§ 24.238 – Emission limitations for Broadband PCS equipment; Band 2 (Broadband PCS)

(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  $43 + 10 \log(P) dB$ .

Part 27 – Miscellaneous Wireless Communication Services;

Band 4 (AWS-1) § 27.53 (h) – 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.

(2) Additional protection levels. Notwithstanding the foregoing paragraph (h)(1) of this section:

(i) Operations in the 2180-2200 MHz band are subject to the out-of-band emission requirements set forth in §27.1134 for the protection of federal government operations operating in the 2200-2290 MHz band.

(ii) For operations in the 2000-2020 MHz band, the power of any emissions below 2000 MHz shall be attenuated below the transmitter power (P) in watts by at least 70 + 10 log<sub>10</sub>(P) dB. (iii) For operations in the 1915-1920 MHz band, the power of any emission between 1930-1995 MHz shall be attenuated below the transmitter power (P) in watts by at least 70 + 10 log<sub>10</sub>(P) dB.

(iv) For operations in the 1995-2000 MHz band, the power of any emission between 2005-2020 MHz shall be attenuated below the transmitter power (P) in watts by at least 70 + 10  $\log_{10}(P)$  dB.

Band 12 (Lower 700 MHz) § 27.53 (g) – Emission limits

For operations in the 600 MHz band and the 698-746 MHz band, 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. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed



Band 13 (Upper 700 MHz) § 27.53 (c), (f) – Emission limits

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the 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, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P) dB$ ;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.



### 5.6.3 TEST PROTOCOL

Ambient temperature:	23 °C
Air Pressure:	1030 hPa
Humidity:	34 %

Band 2, downlink; Center frequency: 1960.00 MHz

Spurious Freq.	Spurious Level	Pin	Detector	RBW	Limit	Margin to Limit
LIMHZ	[aBm]	[asm]		[KHZ]	[asm]	[ab]
0.027	-70.7	-23	PEAK	2	-46	24.7
477.7	-34.8	-23	PEAK	1000	-19	15.8
5902.1	-29.4	-23	PEAK	1000	-19	10.4
6950.3	-28.8	-23	PEAK	1000	-19	9.8
19706.3	-30.7	-23	PEAK	1000	-19	11.7

#### Band 4, downlink; Center frequency: 2132.50 MHz

Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
0.014	-67.8	-23.9	PEAK	2	-46	21.8
203.5	-35.6	-23.9	PEAK	1000	-19	16.6
961.7	-34.3	-23.9	PEAK	1000	-19	15.3
5830.4	-29.6	-23.9	PEAK	1000	-19	10.6
6996.7	-28.3	-23.9	PEAK	1000	-19	9.3
19665.3	-30.2	-23.9	PEAK	1000	-19	11.2

#### Band 5, downlink; Center frequency: 881.5.0 MHz

Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
0.009	-68.8	-23.4	PEAK	2	-36	32.8
116.4	-46.2	-23.4	PEAK	100	-19	27.2
193.1	-45.8	-23.4	PEAK	100	-19	26.8
397.1	-44.9	-23.4	PEAK	100	-19	25.9
908.3	-44.1	-23.4	PEAK	100	-19	25.1
6960.5	-38.1	-23.4	PEAK	100	-19	19.1

#### Band 12, downlink; Center frequency: 737.00 MHz

Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
0.009	-68.2	-21.7	PEAK	2	-36	32.2
13.1	-58.9	-21.7	PEAK	100	-19	39.9
658.9	-44.6	-21.7	PEAK	100	-19	25.6
890.6	-43.7	-21.7	PEAK	100	-19	24.7
6934.3	-38.2	-21.7	PEAK	100	-19	19.2

Band 13, downlink; Center frequency: 751.00 MHz

rious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]	
0.009	-83.4	-22.2	PEAK	2	-36	47.4	
322.5	-60.1	-22.2	PEAK	100	-19	41.1	
764.4	-69.7	-22.2	PEAK	10	-41	28.7	
794.5	-71.0	-22.2	PEAK	10	-41	30.0	
1598.5	-63.0	-22.2	PEAK	100	-56	7.0	1)
1807.3	-61.2	-22.2	PEAK	100	-19	42.2	
6924.4	-54.4	-22.2	PEAK	100	-19	35.4	



#### Band 2, uplink; Center frequency: 1880.00 MHz

Dana Z, uplink, CC	Jana 2, dpinik, benter n'equency. Tobb.ob Minz											
Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]						
0.010	-66.9	-1.9	PEAK	2	-46	20.9						
883.7	-34.5	-1.9	PEAK	1000	-19	15.5						
5635.7	-29.0	-1.9	PEAK	1000	-19	10.0						
6937.8	-29.3	-1.9	PEAK	1000	-19	10.3						
19756.6	-30.5	-1.9	PEAK	1000	-19	11.5						

#### Band 4, uplink; Center frequency: 1732.50 MHz

Spurious Freq.	Spurious Level	Pin	Detector	RBW	Limit	Margin to Limit
[MHz]	[dBm]	[dBm]		[kHz]	[dBm]	[dB]
0.030	-68.5	-2.1	PEAK	2	-46	22.5
21.7	-37.2	-2.1	PEAK	1000	-19	18.2
947.8	-34.2	-2.1	PEAK	1000	-19	15.2
6971.6	-28.5	-2.1	PEAK	1000	-19	9.5
19675.0	-30.3	-2.1	PEAK	1000	-19	11.3

#### Band 5, uplink; Center frequency: 836.50 MHz

Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
0.023	-65.7	-1.3	PEAK	2	-36	29.7
115.7	-45.4	-1.3	PEAK	100	-19	26.4
850.3	-44.4	-1.3	PEAK	100	-19	25.4
933.3	-43.9	-1.3	PEAK	100	-19	24.9
2508.5	-43.0	-1.3	PEAK	100	-19	24.0
6920.8	-37.9	-1.3	PEAK	100	-19	18.9
9426.9	-44.0	-1.3	PEAK	100	-19	25.0

#### Band 12, uplink; Center frequency: 707.00 MHz

Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]
0.033	-67.1	-1.8	PEAK	2	-36	31.1
1.7	-54.3	-1.8	PEAK	100	-19	35.3
716.1	-40.3	-1.8	PEAK	100	-19	21.3
737.4	-45.5	-1.8	PEAK	100	-19	26.5
6982.7	-38.0	-1.8	PEAK	100	-19	19.0

#### Band 13, uplink; Center frequency: 782.00 MHz

Spurious Freq. [MHz]	Spurious Level [dBm]	Pin [dBm]	Detector	RBW [kHz]	Limit [dBm]	Margin to Limit [dB]	
0.012	-67.3	-2.4	PEAK	2	-36	31.3	
1.2	-53.9	-2.4	PEAK	100	-19	34.9	
774.9	-45.8	-2.4	PEAK	10	-41	4.8	
775.8	-29.7	-2.4	PEAK	100	-19	10.7	
787.1	-25.9	-2.4	PEAK	100	-19	6.9	
794.3	-54.2	-2.4	PEAK	10	-41	13.2	
1576.7	-58.9	-2.4	RMS	100	-56	2.9	1)
6945.9	-37.5	-2.4	PEAK	100	-19	18.5	

Remark: Please see next sub-clause for the measurement plot.

Plots show regular mobile emission limit. Limit in table is the 6 dB reduced booster limit.

1) The given Spurious Level is the conducted level without antenna gain. The given limit is the limit for E.I.R.P. narrow band emissions (< 700 Hz, wide band limit is 10 dB higher) emitted by the antenna. While this limit is not applicable to conducted values (actual limit is -19 dBm), the margin to limit gives a rough estimate on possible antenna gain margin.





Frequency Band = Band 4, Direction = Downlink (S01\_AA01)







### Frequency Band = Band 5, Direction = Downlink (S01\_AA01)

Frequency Band = Band 12, Direction = Downlink (S01\_AA01)







#### Frequency Band = Band 13, Direction = Downlink (S01\_AA01)

Frequency Band = Band 2, Direction = Uplink (S01\_AA01)







### Frequency Band = Band 4, Direction = Uplink (S01\_AA01)

Frequency Band = Band 5, Direction = Uplink (S01\_AA01)







### Frequency Band = Band 12, Direction = Uplink (S01\_AA01)

Frequency Band = Band 13, Direction = Uplink (S01\_AA01)







Spectrum	n						
Ref Level	20.00 dBm	Offset	10.00 dB 👄	RBW 100 kHz			
Att	30 dB	SWT	56.9 µs 👄	<b>VBW</b> 300 kHz	Mode FFT		
SGL Count	1000/1000	DC					
Controlled b	у ЕМСЗ2 😑	1Rm AvgP	wr				
					M2[1]		-58.92 dBm
				1 1			1.57666220 GHz
10 dBm			-	+ +	M1[1]		-59.09 dBm
				1 1	1		1.56413410 GHz
0 dBm		<u> </u>		+ +		_	
				1 1			
-10 dBm							
10 00.00				1 1			
co do -				1 1			
-20 dBm							
-30 dBm				+ +			
				1 1			
-40 dBm						_	
				1 1			
50 dBm	D1 50 000	dam					
-50 dbm	01 -50.000	ubili					
M	1		M2				
-60 dBm							
-70 dBm						-	
				1 1			
Start 1.55	9 GHz			32001	pts		Stop 1.61 GHz
	Υ Υ			02001			18 MR 191765 22.01.2020
					Keardy		REF (

Date: 22.JAN.2020 19:11:18

### 5.6.5 TEST EQUIPMENT USED

- R&S TS8997



### 5.7 MAXIMUM TRANSMITTER NOISE POWER

Standard

The test was performed according to: KDB 935210 D03

### 5.7.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the noise limits (uplink) and Transmitter Power Off Mode limits (uplink and downlink noise power) according 20.21(e)(8)(i)(A) and § 20.21 €(8)(i)(H) for wideband consumer signal boosters.

The EUT was connected to the test setups according to the following diagrams:



FCC Part 20.21; Consumer Signal Booster – Test Setup 7.7.1; Maximum Transmitter Noise Power Level

Setup (a); Downlink/uplink noise without presence of an input signal Setup (b); Uplink noise in presence of an input signal

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.



### 5.7.2 TEST REQUIREMENTS / LIMITS

### FCC Part 20, § 20.21(e)(8)(i)(A)

*Noise Limits.* (1) The transmitted noise power in dBm/MHz of consumer boosters at their uplink port shall not exceed -103 dBm/MHz—RSSI. RSSI (received signal strength indication expressed in negative dB units relative to 1 mW) is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation.

(2) The transmitted maximum noise power in dBm/MHz of consumer boosters at their uplink and downlink ports shall not exceed the following limits:

(i) Fixed booster maximum noise power shall not exceed  $-102.5 \text{ dBm/MHz} + 20 \text{ Log}_{10}$  (Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

(ii) Mobile booster maximum noise power shall not exceed-59 dBm/MHz.

(iii) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

FCC Part 20, § 20.21(e)(8)(i)(H)

*Transmit Power Off Mode.* When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power Off Mode." In this mode of operation, the uplink and downlink noise power shall not exceed –70 dBm/MHz and both uplink and downlink gain shall not exceed the lesser of 23 dB or MSCL.



### 5.7.3 TEST PROTOCOL

Input Signal	
Band 2, downlink	
Humidity:	33 %
Air Pressure:	992 hPa
temperature:	
Ambient	25 °C

Input Signal	DL AWGN	Input Power	Maximum Noise	Noise Limit	Margin to
	Signal [MHz]	[dBm]	Power [dBm]	[dBm]	Limit [dB]
None	-	-	-79.2	-59.0	20.2

Band 4, downlink

Input Signal	DL AWGN	Input Power	Maximum Noise	Noise Limit	Margin to
	Signal [MHz]	[dBm]	Power [dBm]	[dBm]	Limit [dB]
None	-	-	-78.6	-59.0	19.6

Band 5, downlink

Input Signal	DL AWGN	Input Power	Maximum Noise	Noise Limit	Margin to
	Signal [MHz]	[dBm]	Power [dBm]	[dBm]	Limit [dB]
None	-	-	-77.9	-59.0	18.9

#### Band 12, downlink

Input Signal	DL AWGN	Input Power	Maximum Noise	Noise Limit	Margin to
	Signal [MHz]	[dBm]	Power [dBm]	[dBm]	Limit [dB]
None	-	-	-77.3	-59.0	18.3

#### Band 13, downlink

Input Signal	DL AWGN	Input Power	Maximum Noise	Noise Limit	Margin to
	Signal [MHz]	[dBm]	Power [dBm]	[dBm]	Limit [dB]
None	-	-	-78.4	-59.0	19.4

Band 2, uplink

Input Signal	DL AWGN Signal [MHz]	Input Power [dBm]	Maximum Noise Power [dBm]	Noise Limit [dBm]	Margin to Limit [dB]
None	-	-	-71.5	-59.0	12.5
AWGN DL	1960.0	-36.0	-71.7	-67.0	4.7
AWGN DL	1960.0	-35.0	-71.6	-68.0	3.6
AWGN DL	1960.0	-34.0	-71.6	-69.0	2.6
AWGN DL	1960.0	-33.0	-71.9	-70.0	1.9
AWGN DL	1960.0	-30.0	-71.9	-70.0	1.9
AWGN DL	1960.0	-20.0	-71.9	-70.0	1.9

#### Band 4, uplink

Input Power	DL AWGN	Input Power	Maximum Noise	Noise Limit	Margin to
	Signal [MHz]	[dBm]	Power [dBm]	[dBm]	Limit [dB]
None	-	-	-73.1	-59.0	14.1
AWGN DL	2132.5	-36.0	-73.5	-67.0	6.5
AWGN DL	2132.5	-35.0	-72.6	-68.0	4.6
AWGN DL	2132.5	-34.0	-73.1	-69.0	4.1
AWGN DL	2132.5	-33.0	-71.7	-70.0	1.7
AWGN DL	2132.5	-30.0	-73.2	-70.0	3.2
AWGN DL	2132.5	-20.0	-73.1	-70.0	3.1

Band 5, uplink							
Input Power	DL AWGN Signal [MHz]	Input Power [dBm]	Maximum Noise Power [dBm]	Noise Limit [dBm]	Margin to Limit [dB]		
None	-	-	-73.9	-59.0	14.9		
AWGN DL	881.5	-36.0	-73.8	-67.0	6.8		
AWGN DL	881.5	-35.0	-73.9	-68.0	5.9		
AWGN DL	881.5	-34.0	-73.8	-69.0	4.8		
AWGN DL	881.5	-33.0	-74.0	-70.0	4.0		
AWGN DL	881.5	-30.0	-73.9	-70.0	3.9		
AWGN DL	881.5	-20.0	-73.9	-70.0	3.9		


Band 12, uplink							
Input Power	DL AWGN Signal [MHz]	Input Power [dBm]	Maximum Noise Power [dBm]	Noise Limit [dBm]	Margin to Limit [dB]		
None	-	-	-73.9	-59.0	14.9		
AWGN DL	737.0	-36.0	-74.0	-67.0	7.0		
AWGN DL	737.0	-35.0	-74.4	-68.0	6.4		
AWGN DL	737.0	-34.0	-74.2	-69.0	5.2		
AWGN DL	737.0	-33.0	-74.2	-70.0	4.2		
AWGN DL	737.0	-30.0	-74.4	-70.0	4.4		
AWGN DL	737.0	-20.0	-74.0	-70.0	4.0		

#### Band 13, uplink

Input Power	DL AWGN Signal [MHz]	Input Power [dBm]	Maximum Noise Power [dBm]	Noise Limit [dBm]	Margin to Limit [dB]
None	-	-	-73.3	-59.0	14.3
AWGN DL	751.0	-36.0	-73.2	-67.0	6.2
AWGN DL	751.0	-35.0	-73.3	-68.0	5.3
AWGN DL	751.0	-34.0	-73.0	-69.0	4.0
AWGN DL	751.0	-33.0	-73.2	-70.0	3.2
AWGN DL	751.0	-30.0	-73.4	-70.0	3.3
AWGN DL	751.0	-20.0	-73.0	-70.0	3.0

Remark: Please see next sub-clause for the measurement plot.



# 5.7.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE") Frequency Band = Band 2, Direction = Downlink, Signal Type = None



Date: 28.JAN.2020 18:36:25



Spectrum 🔆			
Ref Level -9.90 dBm   Att 0 dB   SGL Count 1000/1000	Offset 10.80 dB ● RBW 1 MH: SWT 13.3 µs ● VBW 3 MH:	z Mode Auto FFT	
1Rm AvgPwr			
		M1[1]	-78.61 dBm 2.1561650 GHz
-20 dBm			
-30 dBm			
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm			M1
-80 dBm			
-90 dBm			
-100 dBm			
CF 2.1325 GHz	500	1 nts	Span 90.0 MHz
		Ready	28.01.2020

Date: 28.JAN.2020 18:32:12



#### Frequency Band = Band 5, Direction = Downlink, Signal Type = None (S01\_AA01)

Spectrum 🔆		·	
Ref Level -10.30 dBm   Att 0 dB   SGL Count 1000/1000	Offset 10.40 dB ● RBW 1 M SWT 7.6 µs ● VBW 3 M	MHz MHz <b>Mode</b> Auto FFT	\
●1Rm AvgPwr			
		M1[1]	-77.91 dBm 894.44700 MHz
-20 dBm			
-30 dBm			
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm-			M1
-80 dBm			
-90 dBm			
-100 dBm			
CF 881.5 MHz	50	01 pts	Span 50.0 MHz
		Ready	23.01/2020

Date: 28.JAN.2020 18:30:56





Date: 28.JAN.2020 18:28:44



#### Frequency Band = Band 13, Direction = Downlink, Signal Type = None (S01\_AA01)

Spectrum 🔆			
Ref Level -10.30 dBm Att 0 dB SGL Count 1000/1000	Offset 10.40 dB ● RBW 1 MH SWT 5.7 µs ● VBW 3 MH	Hz Hz Mode Auto FFT	
1Rm AvgPwr			
		M1[1]	-78.36 dBm 736.72530 MHz
-20 dBm-			
-30 dBm			
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm			
-80 dBm			
-90 dBm			
-100 dBm			
CF 751.0 MHz	500	)1 pts	Span 36.0 MHz
		Ready	23.01.2020

Date: 28.JAN.2020 18:26:55





Date: 28.JAN.2020 18:07:05



#### Frequency Band = Band 4, Direction = Uplink, Signal Type = None (S01\_AA01)

Spectrum	1 🔆				,			
Ref Level Att SGL Count	-10.00 dBm 0 dB 1000/1000	Offset SWT	10.70 dB 👄 13.3 µs 👄	RBW 1 MHz VBW 3 MHz	Mode Auto FFT			
●1Rm AvgP	wr							
					M1[1]		-73.0 1.75233	07 dBm 20 GHz
-20 dBm								
-30 dBm								
-40 dBm								
-50 dBm								
-60 dBm								
-70 dBm	L					M1		/
-80 dBm								
-90 dBm								
-100 d8m—								
CF 1.7325	GHz		1	5001 p	ots	1	Span 90.	0 MHz
	][]				Ready		<b>₩</b> 28.01	2020

Date: 28.JAN.2020 18:12:37





Date: 28.JAN.2020 18:15:24



#### Spectrum 🐳 Offset 10.40 dB ● RBW 1 MHz SWT 5.7 µs ● VBW 3 MHz Ref Level -10.30 dBm Att 0 dB SWT Mode Auto FFT SGL Count 1000/1000 ●1Rm AvgPwr -73.88 dBn 713.61550 MH M1[1] -20 dBm -30 dBm-40 dBm -50 dBm -60 dBm -70 dBm ¥ -80 dBm--90 dBm--100 dBm CF 707.0 MHz Span 36.0 MHz 5001 pts

#### Frequency Band = Band 12, Direction = Uplink, Signal Type = None (S01\_AA01)

Date: 28.JAN.2020 18:18:25





Date: 28.JAN.2020 18:20:44

# 5.7.5 TEST EQUIPMENT USED

- R&S TS8997



## 5.8 VARIABLE UPLINK NOISE TIMING

#### Standard

The test was performed according to: KDB 935210 D03

#### 5.8.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the noise limits (uplink) and Transmitter Power Off Mode limits (uplink and downlink noise power) according 20.21(e)(8)(i)(A) and § 20.21 €(8)(i)(H) for wideband consumer signal boosters.

The EUT was connected to the test setup(s) according to the following diagram:



FCC Part 20.21; Consumer Signal Booster – Test Setup 7.7.2; Variable Uplink noise Timing

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

# 5.8.2 TEST REQUIREMENTS / LIMITS

FCC Part 20, § 20.21(e)(8)(i)(A)

*Noise Limits.* (1) The transmitted noise power in dBm/MHz of consumer boosters at their uplink port shall not exceed -103 dBm/MHz—RSSI. RSSI (received signal strength indication expressed in negative dB units relative to 1 mW) is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation.

(2) The transmitted maximum noise power in dBm/MHz of consumer boosters at their uplink and downlink ports shall not exceed the following limits:

(i) Fixed booster maximum noise power shall not exceed -102.5 dBm/MHz + 20 Log<sub>10</sub> (Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum



bands in MHz.

(ii) Mobile booster maximum noise power shall not exceed-59 dBm/MHz.

(iii) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

FCC Part 20, § 20.21(e)(8)(i)(H)

*Transmit Power Off Mode.* When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power Off Mode." In this mode of operation, the uplink and downlink noise power shall not exceed –70 dBm/MHz and both uplink and downlink gain shall not exceed the lesser of 23 dB or MSCL.

KDB 935210 D03 7.7.2 e)

Confirm that the uplink noise decreases to the specified level within 1 second for mobile devices, and within 3 seconds for fixed devices<sup>1</sup>

<sup>1</sup>The time response requirements are provisional and are as determined by the ANSI ASC C63® task group in collaboration and consultation with FCC OET Laboratory Division staff.



# 5.8.3 TEST PROTOCOL

Center Frequency	Input DL P
Band 2, uplink	
Humidity:	33 %
Air Pressure:	992 hPa
Ambient temperature:	25 °C

Center Frequency	Input DL Power	Noise Decrease	Noise Decrease	Margin to
[MHz]	[dBm]	Time [ms]	Time Limit [ms]	Limit [ms]
1880.0	-34.0	0.0	1000.0	1000.0

Band 4, uplink

Center Frequency	Input DL Power	Noise Decrease	Noise Decrease	Margin to
[MHz]	[dBm]	Time [ms]	Time Limit [ms]	Limit [ms]
1732.5	-34.0	0.0	1000.0	1000.0

Band 5, uplink

Center Frequency	Input DL Power	Noise Decrease	Noise Decrease	Margin to
[MHz]	[dBm]	Time [ms]	Time Limit [ms]	Limit [ms]
836.5	-34.0	0.0	1000.0	1000.0

Band 12, uplink				
Center Frequency	Input DL Power	Noise Decrease	Noise Decrease	Margin to
[MHz]	[dBm]	Time [ms]	Time Limit [ms]	Limit [ms]
707.0	-34.0	0.0	1000.0	1000.0

#### Band 13, uplink

Center Frequency	Input DL Power	Noise Decrease	Noise Decrease	Margin to
[MHz]	[dBm]	Time [ms]	Time Limit [ms]	Limit [ms]
782.0	-34.0	0.0	1000.0	1000.0

Remark: Please see next sub-clause for the measurement plot.



# 5.8.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE") Frequency Band = Band 2, Direction = Uplink



Date: 28.JAN.2020 20:23:33

Frequency Band = Band 4, Direction = Uplink (S01\_AA01)

Spectrum	i			· _	,			
Ref Level Att	-10.70 dBm 0 dB	Offset SWT	10.00 dB 👄 10 s 👄	RBW 1 MH VBW 3 MH	łz łz			
9 1Rm Max								
					M	1[1]		-70.09 dBm 4.427500 s
-20 dBm								
-30 dBm								
-40 dBm								
-50 dBm								
-60 dBm								
-70 dBm				M1				
-80 dBm								
-90 dBm								
-100 dBm								
CF 1.7325	GHz			3200	1 pts		 	1.0 s/
	)[					Ready		28.01.2020

Date: 28.JAN.2020 20:08:54





#### Frequency Band = Band 5, Direction = Uplink (S01\_AA01)

Date: 28.JAN.2020 20:22:00





Date: 28.JAN.2020 20:25:18





#### Frequency Band = Band 13, Direction = Uplink (S01\_AA01)

Date: 28.JAN.2020 20:26:49

5.8.5 TEST EQUIPMENT USED - R&S TS8997



# 5.9 UPLINK INACTIVITY

Standard

**The test was performed according to:** KDB 935210 D03

## 5.9.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the Uplink Inactivity limit according § 20.21(e)(8)(i)(I) for wideband consumer signal boosters.

The EUT was connected to the test setup according to the following diagram:



FCC Part 20.21; Consumer Signal Booster – Test Setup 7.8; Uplink Inactivity

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

# 5.9.2 TEST REQUIREMENTS / LIMITS

FCC Part 20, § 20.21(e)(8)(i)(I)

*Uplink Inactivity.* When a consumer booster is not serving an active device connection after 5 minutes the uplink noise power shall not exceed -70 dBm/MHz.



# 5.9.3 TEST PROTOCOL

Center Frequency	Noise Dec
Band 2, uplink	
Humidity:	33 %
Air Pressure:	992 hPa
Ambient temperature:	25 °C

[MHz]	Noise Decrease Time	Noise Decrease Time Limit	Margin to Limit
	[ms]	[ms]	[ms]
1880.0	134.1	1000.0	865.9

Band 4,	uplink
---------	--------

Center Frequency	Noise Decrease Time	Noise Decrease Time Limit	Margin to Limit
[MHz]	[ms]	[ms]	[ms]
1732.5	154.7	1000.0	845.3

Band	5.	up	link
Dana	υ,	up	

Center Frequency	Noise Decrease Time	Noise Decrease Time Limit	Margin to Limit
[MHz]	[ms]	[ms]	[ms]
836.5	144.4	1000.0	855.6

Band 12, uplink			
Center Frequency	Noise Decrease Time	Noise Decrease Time Limit	Margin to Limi
[MHz]	[ms]	[ms]	[ms]
707.0	154.7	1000.0	845.3

#### Band 13, uplink

Center Frequency	Noise Decrease Time	Noise Decrease Time Limit	Margin to Limit
[MHz]	[ms]	[ms]	[ms]
782.0	165.0	1000.0	835.0

Remark: Please see next sub-clause for the measurement plot.



# 5.9.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE") Frequency Band = Band 2, Direction = Uplink (S01\_AA01)



Date: 28.JAN.2020 20:51:07

#### Frequency Band = Band 4, Direction = Uplink (S01\_AA01)

Spectrum 🐳				
RefLevel -20.00 Att SGL	dBm Offset 0.80 d 0 dB 👄 SWT 330	B 👄 RBW 1 MHz s 🖶 VBW 3 MHz		, , , , , , , , , , , , , , , , , , ,
• 1Rm Max				
-30 dBm			D2[1] —M1[1]	-0.04 dB 154.7 ms -81.84 dBm 14.6803 s
-40 dBm				
-50 dBm				
-60 dBm				
-70 dBm				
-80 dam				
-90 dBm				
-100 d8m	_			
-110 dBm				
CF 1.7325 GHz		32001 pts		33.0 s/
			Ready	28.01.2020

Date: 28.JAN.2020 20:59:25





#### Frequency Band = Band 5, Direction = Uplink (S01\_AA01)

Date: 28.JAN.2020 21:12:47





Date: 28.JAN.2020 21:19:08





#### Frequency Band = Band 13, Direction = Uplink (S01\_AA01)

5.9.5 TEST EQUIPMENT USED - R&S TS8997



## 5.10 VARIABLE BOOSTER GAIN

Standard

The test was performed according to: KDB 935210 D03

## 5.10.1TEST DESCRIPTION

This test case is intended to demonstrate compliance to the Booster Gain limit according § 20.21(e)(8)(i)(C)(1) or Transmit Power Off Mode according §  $20.21 \in (8)(i)(H)$  for wideband consumer signal boosters.

The EUT was connected to the test setup according to the following diagram:



FCC Part 20.21; Consumer Signal Booster – Test Setup 7.9.1; Variable Gain

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.



# 5.10.2TEST REQUIREMENTS / LIMITS

## FCC Part 20, § 20.21(e)(8)(C)(1)

Booster Gain Limits. (1) The uplink gain in dB of a consumer booster referenced to its input and output ports shall not exceed -34 dB—RSSI + MSCL.

*(i)* Where RSSI is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation. RSSI is expressed in negative dB units relative to 1 mW.

*(ii)* Where MSCL (Mobile Station Coupling Loss) is the minimum coupling loss in dB between the wireless device and input port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

FCC Part 20, § 20.21(e)(8)(i)(H)

*Transmit Power Off Mode.* When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power Off Mode." In this mode of operation, the uplink and downlink noise power shall not exceed –70 dBm/MHz and both uplink and downlink gain shall not exceed the lesser of 23 dB or MSCL.



# 5.10.3TEST PROTOCOL

Ambient temperature:	24 °C
Air Pressure:	1005 hPa
Humidity:	34 %
Band 2 unlink	

UL AWGN Signal [MHz]	DL AWGN Signal [MHz]	Input Power UL [dBm]	Input Power DL [dBm]	Output Power UL [dBm]	Maximum UL Gain [dB]	Gain Limit [dBm]	Margin to Limit [dB]
1880.0	1960.0	-6.9	-90.0	14.8	21.7	23.0	1.3
1880.0	1960.0	-6.9	-49.0	14.5	21.4	22.0	0.6
1880.0	1960.0	-6.9	-48.0	13.2	20.1	21.0	0.9
1880.0	1960.0	-6.9	-47.0	11.9	18.8	20.0	1.2
1880.0	1960.0	-6.9	-35.0	0.0	6.9	8.0	1.1
1880.0	1960.0	-6.9	-34.0	-0.5	6.4	7.0	0.6

#### Band 4, uplink

UL AWGN Signal [MHz]	DL AWGN Signal [MHz]	Input Power UL [dBm]	Input Power DL [dBm]	Output Power UL [dBm]	Maximum UL Gain [dB]	Gain Limit [dBm]	Margin to Limit [dB]
1732.5	2132.5	-7.1	-90.0	14.4	21.5	23.0	1.5
1732.5	2132.5	-7.1	-80.0	14.3	21.4	23.0	1.6
1732.5	2132.5	-7.1	-70.0	14.3	21.4	23.0	1.6
1732.5	2132.5	-7.1	-49.0	14.1	21.2	22.0	0.8
1732.5	2132.5	-7.1	-48.0	12.7	19.8	21.0	1.2
1732.5	2132.5	-7.1	-47.0	11.3	18.4	20.0	1.6

#### Band 5, uplink

UL AWGN Signal [MHz]	DL AWGN Signal [MHz]	Input Power UL [dBm]	Input Power DL [dBm]	Output Power UL [dBm]	Maximum UL Gain [dB]	Gain Limit [dBm]	Margin to Limit [dB]
836.5	881.5	-6.3	-48.0	13.9	20.2	21.0	0.8
836.5	881.5	-6.3	-47.0	12.9	19.2	20.0	0.8
836.5	881.5	-6.3	-46.0	12.0	18.3	19.0	0.7
836.5	881.5	-6.3	-45.0	10.8	17.1	18.0	0.9
836.5	881.5	-6.3	-44.0	9.9	16.2	17.0	0.8
836.5	881.5	-6.3	-43.0	8.8	15.1	16.0	0.9

#### Band 12, uplink

UL AWGN Signal [MHz]	DL AWGN Signal [MHz]	Input Power UL [dBm]	Input Power DL [dBm]	Output Power UL [dBm]	Maximum UL Gain [dB]	Gain Limit [dBm]	Margin to Limit [dB]
707.0	737.0	-6.8	-45.0	10.3	17.1	18.0	0.9
707.0	737.0	-6.8	-43.0	8.3	15.1	16.0	0.9
707.0	737.0	-6.8	-42.0	7.4	14.2	15.0	0.8
707.0	737.0	-6.8	-36.0	1.3	8.1	9.0	0.9
707.0	737.0	-6.8	-35.0	0.4	7.2	8.0	0.8
707.0	737.0	-6.8	-34.0	-0.6	6.2	7.0	0.8

#### Band 13, uplink

UL AWGN Signal [MHz]	DL AWGN Signal [MHz]	Input Power UL [dBm]	Input Power DL [dBm]	Output Power UL [dBm]	Maximum UL Gain [dB]	Gain Limit [dBm]	Margin to Limit [dB]
782.0	751.0	-7.4	-43.0	7.5	14.9	16.0	1.2
782.0	751.0	-7.4	-42.0	6.5	13.9	15.0	1.1
782.0	751.0	-7.4	-38.0	2.5	9.9	11.0	1.1
782.0	751.0	-7.4	-36.0	0.5	7.9	9.0	1.1
782.0	751.0	-7.4	-35.0	-0.5	6.9	8.0	1.1
782.0	751.0	-7.4	-34.0	-1.5	6.0	7.0	1.1

Remark: Please see next sub-clause for the measurement plot.



# 5.10.4MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE") Frequency Band = Band 2, Direction = Uplink



Date: 29.JAN.2020 18:30:02

#### Frequency Band = Band 4, Direction = Uplink (S01\_AA01)



Date: 29.JAN.2020 19:34:06





#### Frequency Band = Band 5, Direction = Uplink (S01\_AA01)

Date: 29.JAN.2020 20:49:06



#### Frequency Band = Band 12, Direction = Uplink (S01 AA01)

Date: 29.JAN.2020 20:03:12





#### Frequency Band = Band 13, Direction = Uplink (S01\_AA01)

Date: 29.JAN.2020 20:38:32

5.10.5TEST EQUIPMENT USED

- R&S TS8997



## 5.11 VARIABLE UPLINK GAIN TIMING

#### Standard

The test was performed according to: KDB 935210 D03

## 5.11.1TEST DESCRIPTION

This test case is intended to demonstrate compliance to the Booster Gain limit according § 20.21(e)(8)(i)(C)(1) or Transmit Power Off Mode according §  $20.21 \in (8)(i)(H)$  for wideband consumer signal boosters.

The EUT was connected to the test setup according to the following diagram:



FCC Part 20.21; Consumer Signal Booster – Test Setup 7.9.2; Variable Uplink Gain Timing

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

# 5.11.2TEST REQUIREMENTS / LIMITS

FCC Part 20, § 20.21(e)(8)(C)(1)

Booster Gain Limits. (1) The uplink gain in dB of a consumer booster referenced to its input and output ports shall not exceed -34 dB—RSSI + MSCL.

*(i)* Where RSSI is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation. RSSI is expressed in negative dB units relative to 1 mW.



*(ii)* Where MSCL (Mobile Station Coupling Loss) is the minimum coupling loss in dB between the wireless device and input port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

#### FCC Part 20, § 20.21(e)(8)(i)(H)

*Transmit Power Off Mode.* When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power Off Mode." In this mode of operation, the uplink and downlink noise power shall not exceed –70 dBm/MHz and both uplink and downlink gain shall not exceed the lesser of 23 dB or MSCL.

#### KDB 935210 D03 7.9.2 e)

Confirm that the uplink noise decreases to the specified level within 1 second for mobile devices, and within 3 seconds for fixed devices<sup>1</sup>

<sup>1</sup>The time response requirements are provisional and are as determined by the ANSI ASC C63® task group in collaboration and consultation with FCC OET Laboratory Division staff.

## 5.11.3TEST PROTOCOL

Contor Fraguenay	Input DL Dou
Band 2, uplink	
Humidity:	34 %
Air Pressure:	1005 hPa
Ambient temperature:	24 °C

Center Frequency	Input DL Power	Noise Decrease Time	Noise Decrease	Margin to Limit
[MHz]	[dBm]	[ms]	Time Limit [ms]	[ms]
1960.0	-50.0	420.6	1000.0	579.4

Band 4, uplink				
Center Frequency	Input DL Power	Noise Decrease Time	Noise Decrease	Margin to Limit
[MHz]	[dBm]	[ms]	Time Limit [ms]	[ms]
2132.5	-50.0	468.4	1000.0	531.6

Band 5, uplink				
Center Frequency	Input DL Power	Noise Decrease Time	Noise Decrease	Margin to Limit
EN4L1-1	EdDma 1	Ema a 1	Time a Lineit Franz	F
	Labul	[ms]	Time Limit [ms]	[ms]

Band 12, uplink				
Center Frequency	Input DL Power	Noise Decrease Time	Noise Decrease	Margin to Limit
[MHz]	[dBm]	[ms]	Time Limit [ms]	[ms]
737.0	-50.0	380.0	1000.0	620.0

Band 13, uplink								
Center Frequency	Input DL Power	Noise Decrease Time	Noise Decrease	Margin to Limit				
[MHz]	[dBm]	[ms]	Time Limit [ms]	[ms]				
751.0	-50.0	363.1	1000.0	636.9				

Remark: Please see next sub-clause for the measurement plot.



# 5.11.4MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE") Frequency Band = Band 2, Direction = Uplink



Date: 29.JAN.2020 21:16:05

Frequency Band = Band 2, Direction = Uplink (S01\_AA01)



Date: 29.JAN.2020 21:16:05





#### Frequency Band = Band 4, Direction = Uplink (S01\_AA01)

Date: 29.JAN.2020 21:12:23

Frequency Band = Band 5, Direction = Uplink (S01\_AA01)



Date: 29.JAN.2020 21:01:10





#### Frequency Band = Band 12, Direction = Uplink (S01\_AA01)

Date: 29.JAN.2020 21:07:25

Frequency Band = Band 13, Direction = Uplink (S01\_AA01)



Date: 29.JAN.2020 21:10:42

# 5.11.5TEST EQUIPMENT USED

- R&S TS8997



# 5.12 OCCUPIED BANDWIDTH

Standard

The test was performed according to: KDB 935210 D03

## 5.12.1TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission limits per § 2.1051

The EUT was connected to the test setups according to the following diagram:



FCC Part 20.21; Consumer Signal Booster - Test Setup 7.10; Occupied Bandwidth

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

# 5.12.2TEST REQUIREMENTS / LIMITS

FCC Part 2.1049; Occupied Bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

TEST REPORT REFERENCE: MDE\_MOLEX\_1901\_FCC\_01\_rev01



(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

(i) Transmitters designed for other types of modulation—when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

#### 5.12.3TEST PROTOCOL

25 °C
997 hPa
33 %

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	1960.00	247.1	246.6	-0.5	200.0	200.5
LTE	1960.00	4115.5	4130.8	15.3	200.0	184.7
CDMA	1960.00	1259.0	1261.9	2.9	200.0	197.1

#### Band 4, downlink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	2132.50	246.2	248.6	2.4	200.0	197.6
LTE	2132.50	4143.0	4127.4	-15.6	200.0	215.6
CDMA	2132.50	1260.1	1260.1	0.1	200.0	199.9

#### Band 5, downlink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	881.50	248.7	247.7	-1.0	200.0	201.0
LTE	881.50	4110.5	4127.1	16.6	200.0	183.4
CDMA	881.50	1261.1	1260.5	-0.6	200.0	200.6

#### Band 12, downlink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	737.00	247.4	245.1	-2.2	200.0	202.2
LTE	737.00	4131.4	4132.4	0.9	200.0	199.1
CDMA	737.00	1261.8	1259.2	-2.6	200.0	202.6

#### Band 13, downlink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	751.00	247.4	246.6	-0.8	200.0	200.8
LTE	751.00	4115.5	4115.5	0.0	200.0	200.0
CDMA	751.00	1261.5	1262.5	1.0	200.0	199.0



Band 2, uplink								
Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]		
GSM	1880.00	247.7	245.1	-2.7	200.0	202.7		
LTE	1880.00	4129.6	4150.2	20.6	200.0	179.4		
CDMA	1880.00	1259.9	1261.6	1.7	200.0	198.3		

#### Band 4, uplink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	1732.50	245.6	247.3	1.7	200.0	198.3
LTE	1732.50	4124.2	4119.6	-4.7	200.0	204.7
CDMA	1732.50	1259.6	1261.1	1.5	200.0	198.5

#### Band 5, uplink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	836.50	247.0	246.8	-0.2	200.0	200.2
LTE	836.50	4126.1	4166.1	40.0	200.0	160.0
CDMA	836.50	1258.8	1262.0	3.2	200.0	196.8

#### Band 12, uplink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	707.00	245.9	246.4	0.5	200.0	199.5
LTE	707.00	4112.4	4175.2	62.8	200.0	137.2
CDMA	707.00	1261.4	1262.8	1.4	200.0	198.6

#### Band 13, uplink

Signal Type	Signal Frequency [MHz]	Occupied Bandwidth SG [kHz]	Occupied Bandwidth Booster [kHz]	Delta Occupied Bandwidth [kHz]	Delta Limit Occupied Bandwidth [kHz]	Margin to Limit [kHz]
GSM	782.00	246.1	247.4	1.2	200.0	198.8
LTE	782.00	4119.6	4164.2	44.7	200.0	155.3
CDMA	782.00	1260.9	1259.5	-1.4	200.0	201.4

Remark: Please see next sub-clause for the measurement plot.



# 5.12.4MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE") Frequency Band = Band 2, Direction = Downlink, Signal Type = GSM



Date: 30.JAN.2020 18:42:05



Date: 30.JAN.2020 18:56:05





#### Frequency Band = Band 2, Direction = Downlink, Signal Type = LTE (S01\_AA01)

Date: 30.JAN.2020 18:24:07



Date: 30.JAN.2020 18:06:48





# Frequency Band = Band 2, Direction = Downlink, Signal Type = CDMA (S01\_AA01)

Date: 30.JAN.2020 19:29:41



Date: 30.JAN.2020 19:16:17





# Frequency Band = Band 4, Direction = Downlink, Signal Type = GSM (S01\_AA01)

Date: 30.JAN.2020 18:55:02



Date: 30.JAN.2020 18:43:30





#### Frequency Band = Band 4, Direction = Downlink, Signal Type = LTE (S01\_AA01)

Date: 30.JAN.2020 18:25:21



Date: 30.JAN.2020 18:08:34