

TEST A.5: PEAK-TO-AVERAGE POWER RATIO (PAPR)									
		Product stand	ard:		oclause (g)				
LIN	IITS:	Test standar	d:		ANSI C63.2	26-2015			
LIMITS In additior procedure Function) values we	n to the pow in Section measureme re recorded.	ver limits in Section 96 5.2.6 of ANSI C63.26 nt was utilized in the s	6.41, CBSDs -2015 is acc pectrum ana	s need to r ceptable. C lyzer and th	neet a PAPR limit. F CDF (Complementa he maximum PAPR l	For this measurement, the ry Cumulative Distribution evel with 0.1 % probability			
The peak-	to-average p	power ratio (PAPR) of a	any CBSD tra	ansmitter o	utput power must no	t exceed 13 db.			
	TEST S	SETUP							
Spectrum Analyzer EUT Non-Conducted Table Ground Reference Plane									
	TESTED S	SAMPLES:			S/01				
TES	TED CONDI	TIONS MODES:	TC#01 (Band 48)						
	TEST RE	ESULTS:	PASS						
<u>10 MHz E</u>	10 MHz BW Peak (dBm) Mean (dBm)			Lowest frequency 3555 MHzMiddle frequency 3625 MHzHighest frequency 3695 MHz29.4029.7129.6818.3619.2418.43					
	PAPR at 0.1% probability (dB)			9.86 9.22 10.14					
	Measurer	nent uncertainty (dB)			<±1.11				



20MHz BW

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
Peak (dBm)	27.11	26.43	26.48
Mean (dBm)	15.33	15.24	15.90
PAPR at 0.1% probability (dB)	10.64	10.20	9.80
Measurement uncertainty (dB)		<±1.11	

10 MHz BW

Lowest Channel (3555 MHz)





Middle Channel (3625 MHz)



Highest Channel (3695 MHz)





20 MHz BW





Middle Channel (3625 MHz)





Highest Channel (3690 MHz)





TEST A.6: 3.5 GH	Z EMISSION AND INTERFEI								
LIMITS.	Product standard:	Part 96.41 Subclause (e)							
	Test standard: ANSI C63.26-2015								
<u>LIMITS</u>									
The radio frequency vershall be checked at the or equivalent data sha when the equipment is spurious emissions whether the second se	oltage or powers generated within the equipment output terminals when I show the magnitude of each harm operated under the conditions spenich are attenuated more than 20 dE	he equipment and appearing on a spurious frequency properly loaded with a suitable artificial antenna. Curves nonic and other spurious emission that can be detected cified in § 2.1049 as appropriate. The magnitude of 3 below the permissible value need not be specified.							
Confirm that the device sizes, at the lowest an for the measurement a	Confirm that the device satisfies the emission limits specified in Section 96.41(e) for all declared channel sizes, at the lowest and highest edges of the band, and in the middle of the band. The RMS detector was used for the measurement at each frequency with 400 MHz span.								
A narrower RBW is p integrated over the full	ermitted in all cases to improve n reference bandwidth.	neasurement accuracy, provided the measured power is							
The limits for emission within 0-10 MH greater than 1 any emission I	 The limits for emission outside the fundamental are stated below. within 0-10 MHz above and below the assigned channel ≤ -13 dBm/MHz greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz 								
TEST S	SETUP								
	Spectrum Analyzer	EUT nducted ble erence Plane							
The maximum equiva antenna gain (dBi) and in the average power r The duty cycle correct	lent isotropically radiated power (1 10 log (1/duty cycle) was added in measurement. ion = 10 log (1/0.5) = 3.01 (dB)	(e.i.r.p.) is calculated by adding the declared maximum RF level offset to get the accurate measured power level							



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (Band 48)
TEST RESULTS:	PASS

<u>10 MHz BW</u>

The spurious signals detected were more than 10 dB below the reference limit for the lowest, middle and highest operating channels were shown in the plots.

<u>20 MHz BW</u>

The spurious signals detected were more than 10 dB below the reference limit for the lowest, middle and highest operating channels were shown in the plots.

(See Plots below)



<u>10 MHz BW</u>

Lowest Channel (3555 MHz)



Middle Channel (3625 MHz)

Ref Level 29.72	dBm Offset 2	0.00 dB	Mode #	uto Sweep	Input 1 DC		``````````````````````````````````````
PS							
O1Rm View							
Limit Check		PASS					
20 dBr6 200							
10 dBm					<u> </u>		
0 dBm							
0 0000							
-10 dBm		+ +					
00 d0m							
-20 dBm						_	
-30 dBm							
			- /1				
-40 dBm			- 1	100	<u> </u>		
-50 dBm			<u></u>				
60 dBm							
-00 0811							
CF 3.625 GHz			1000	0 pts	· · ·		Span 400.0 MHz
Spectrum Emiss	ion Mask		Standa	ard: None			
Tx Power	19.27 dBm	Tx Ba	andwidth	10.000 M	1Hz	RBW	100.000 kHz
Range Low	Range Up	RBW	Freq	uency	Power Abs	Power R	el 🛛 🛆 Limit
-200.000 MHz	-95.000 MHz	1.000 MHz	3.5	52098 GHz	-50.39 dB	m -69.66	cB -10.39 dB
-95.000 MHz	-15.000 MHz	1.000 MHz	3.60594 GHz		-38.55 dB	m -57.82	cB -13.55 dB
-15.000 MHz	-6.000 MHz	1.000 MHz	3.61898 GHz		-23.82 dB	m -43.09	cB -10.82 dB
-6.000 MHz	-5.000 MHz	100.000 kHz	3.61994 GHz		-33.10 dB	m -52.37	cB -20.10 dB
5.000 MHz	6.000 MHz	100.000 kHz	3.6	53002 GHz	-32.84 dB	m -52.11	cB -19.84 dB
6.000 MHz	15.000 MHz	1.000 MHz	3.6	3102 GHz	-23.84 dB	m -43.11	cB -10.84 dB
15.000 MHz	95.000 MHz	1.000 MHz	3.6	64354 GHz	-39.05 dB	m -58.31	.cB -14.05 dB
95.000 MHz	200.000 MHz	1.000 MHz	3.7	7078 GHz	-51.75 dB	m -71.02	cB -11.75 dB



Highest Channel (3695 MHz)

Ref Level 29.72 dBm Offset 20.00 dB Mode Auto Sweep Input 1 DC PS O1Rm View PASS Limit Check 20 dBm 20 10 dBm 0 dBm--10 dBm--20 dBm--30 dBm 40 dBr -50 dBm--60 dBm-Span 400.0 MHz CF 3.695 GHz 10000 pts Spectrum Emission Mask Standard: None Tx Power 19.93 dBm Tx Bandwidth 10.000 MHz RBW 100.000 kHz Range Low -200.000 MHz -165.000 MHz -15.000 MHz -5.000 MHz 5.000 MHz 15.000 MHz 25.000 MHz
 Fig. 30 dBm

 Range Up

 -165.000 MHz

 -155.000 MHz

 -5.000 MHz

 -5.000 MHz

 6.000 MHz

 15.000 MHz

 25.000 MHz

 200.000 MHz
 Frequency 3.52662 GHz 3.67890 GHz 3.68898 GHz 3.68998 GHz 3.70002 GHz 3.70102 GHz 3.71010 GHz 3.72154 GHz Power Abs -52.03 dBm -38.00 dBm -23.81 dBm -34.06 dBm -33.57 dBm -23.62 dBm -41.88 dBm -47.08 dBm Power Rel -71.96 cB -57.92 cB -43.74 cB -53.98 cB -53.50 cB -43.55 cB -61.81 cB -67.01 cB ▲Limit -12.03 dB -13.00 dB -10.81 dB -21.06 dB -20.57 dB -10.62 dB -16.88 dB -7.08 dB RBW 1.000 MHz 1.000 MHz L 1.000 MHz 1.000 MHz 100.000 kHz 100.000 kHz 1.000 MHz 1.000 MHz 1.000 MHz

20 MHz BW

Lowest Channel (3560 MHz)

Ref Level 19.00	dBm Offset 2	0.00 dB	Mode A	uto Sweep	Input 1 D	С		
0 1Pm View								
Limit Check		PAS	S					
			-					
-10 dBm								
-20 dBm								
-30 dBm			5-4-					_
-40 dBm			<u> </u>					
-50 dBm			-					
-60 dBm					-			
-70 dBm							+	
CF 3.56 GHz			1000	0 pts			Spa	n 400.0 MHz
Spectrum Emiss	ion Mask		Standa	ard: None				
Tx Power	22.56 dBm	Тх В	andwidth	20.000 M	IHz		RBW 200	.000 kHz
Range Low	Range Up	RBW	Freq	uency	Power Ab	s Po	wer Rel	∆Limit
-200.000 MHz	-30.000 MHz	1.000 MHz	3.5	52290 GHz	-40.24 d	Bm -	62.80 cB	-0.24 dB
-30.000 MHz	-20.000 MHz	1.000 MHz	3.5	3850 GHz	-30.14 d	Bm -	52.70 cB	-5.14 dB
-20.000 MHz	-11.000 MHz	200.000 kHz	3.5	4898 GHZ	-27.46 0	Bm ·	50.02 CB	-14.46 dB
10.000 MHz	11.000 MHz	200.000 kHz	3.5	7006 GHz	-34.23 d	Bm .	56.79 cB	-21.23 dB
11.000 MHz	20.000 MHz	1.000 MHz	3.5	57102 GHz	-28.33 d	Bm .	50.89 cB	-15.33 dB
20.000 MHz	160.000 MHz	1.000 MHz	3.5	8014 GHz	-32.03 d	Bm -	54.58 cB	-7.03 dB
160.000 MHz	200.000 MHz	1.000 MHz	3.7	2110 GHz	-59.85 d	Bm -	82.41 cB	-19.85 dB











TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (Band 48)
TEST RESULTS:	PASS

<u>10 MHz BW</u>

The spurious signals detected were more than 10 dB below the reference limit for the lowest, middle and highest operating channels were shown in the plots.

<u>20 MHz BW</u>

The spurious signals detected were more than 10 dB below the reference limit for the lowest, middle and highest operating channels were shown in the plots.

(See Plots below)



10MHz BW

Lowest Channel (3555 MHz)

FREQUENCY RANGE 20 MHz-5 GHz

Ref Level	15.00 dBm	Offset	7.00 dB 😑 I	RBW 1 MHz					
Att	25 dB	SWT	5 s 🖷 '	VBW 3 MHz	Mode Au	ito Sweep			
●1Rm View									
10 d0m							1		
10 UBIII-									
0 dBm							-		
-10 dBm									
-20 dBm									
-30 dBm			<u> </u>						
FCC PART 96	SPURIOUS L	IMIT							
ie abiii							1		
-50 dBm									
		-							
-60 dBm-			-						
-70 dBm									
00 40-0									
-80 aBm									
Start 20.0	MHz			3200	1 pts			Sto	p 5.0 GHz
	N/								

FREQUENCY RANGE 5-21 GHz

MIL	20 00 🛑 3141	33		mode At	ito sweep			
1Rm View								
0 dBm								
-10 dBm		_						
-20 dBm								
-20 ubiii								
-30 dBm								
CC Part 96 Spurie	0.05							
CC Parc 50 Span	ous							
E0 d0m								
-50 dBm								
				~~~~	$\sim$	and the second se	$\sim$	
-ou dBm								
-70 dBm								
00 d0m								
-80 ubiii								
Start 5.0 GHz			3200	1 pts			Stop	21.0 GH



# **TEST RESULTS (Cont.):** FREQUENCY RANGE 21-37 GHz Ref Level 10.00 dBm Offset 7.00 dB 🖷 RBW 1 MHz 5 s 👄 VBW 3 MHz Att 20 dB 👄 SWT Mode Auto Sweep 1Rm View 0 dBm -10 dBm--20 dBm· -30 dBm-CC Part 96 Spurious -50 dBm -60 dBm--70 dBm--80 dBm-Stop 37.0 GHz 32001 pts Start 21.0 GHz

# Middle Channel (3625 MHz)

# FREQUENCY RANGE 20 MHz-5 GHz









#### Highest Channel (3695 MHz)

#### FREQUENCY RANGE 20 MHz-5 GHz



# FREQUENCY RANGE 5-21 GHz





#### FREQUENCY RANGE 21-37 GHz

Ref Level 10.00 dBm 
 Offset
 7.00 dB ●
 RBW
 1 MHz

 SWT
 5 s ●
 VBW
 3 MHz
 20 dB 👄 SWT Att Mode Auto Sweep ●1Rm View 0 dBm -10 dBm -20 dBm· -30 dBm-CC Part 96 Spurious -50 dBm -60 dBm -70 dBm -80 dBm-Stop 37.0 GHz 32001 pts Start 21.0 GHz

#### <u>20 MHz BW</u>

#### Lowest Channel (3560 MHz)

#### FREQUENCY RANGE 20 MHz-5 GHz



![](_page_17_Picture_1.jpeg)

![](_page_17_Figure_3.jpeg)

![](_page_17_Figure_4.jpeg)

![](_page_17_Figure_6.jpeg)

![](_page_18_Picture_1.jpeg)

#### Middle Channel (3625 MHz)

#### FREQUENCY RANGE 20 MHz-5 GHz

![](_page_18_Figure_5.jpeg)

#### FREQUENCY RANGE 5-21 GHz

1Rm View							
0 dBm		_					
-10 dBm							
-20 dBm		_					
-30 dBm	_	_					
CC Part 96 Spuriou	5						
-50 dBm					 · · · · ·		~
-60 dBm							~
-70 dBm							
-80 dBm	_						
Start 5.0 GHz			320	01 pts		Stop	21.0 GH

![](_page_19_Picture_1.jpeg)

#### FREQUENCY RANGE 21-37 GHz

![](_page_19_Figure_4.jpeg)

#### Highest Channel (3690 MHz)

#### FREQUENCY RANGE 20 MHz-5 GHz

Ref Level 14.00 dBm Offset 7.00 dB - RBW 1 MHz 1 s 👄 VBW 3 MHz Att 25 dB 👄 SWT Mode Auto Sweep ●1Rm View 10 dBm· 0 dBm -10 dBm -20 dBm· -30 dBm-CC PART 96 SPURIOUS LIMIT -50 dBm -60 dBm -70 dBm· -80 dBm Start 20.0 MHz 10000 pts Stop 5.0 GHz

![](_page_20_Picture_1.jpeg)

![](_page_20_Figure_3.jpeg)

![](_page_21_Picture_1.jpeg)

# **TEST A.8: RADIATED SPURIOUS EMISSION**

Product standard:	Part 2.1053
Test standard:	ANSI C63.26-2015

#### <u>LIMITS</u>

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation.

Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate.

The limits for radiated emissions are stated below.

•greater than 10 MHz above and below the assigned channel  $\leq$  70.2 dBµV/m (-25 dBm/MHz: conducted limit)

•any emission below 3530 MHz and above 3720 MHz  $\leq$  55.2 dBµV/m (-40 dBm/MHz: conducted limit)

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and at 1m for the frequency range 1-40 GHz (1 GHz-18 GHz and 18 GHz-40 GHz Double ridge horn antennas).

For radiated emissions in the range 1-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded. The radiated emissions were measured with RMS detector.

![](_page_22_Picture_1.jpeg)

![](_page_22_Figure_2.jpeg)

![](_page_23_Picture_1.jpeg)

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (Band 48)
TEST RESULTS:	PASS

# Frequency range 30 MHz – 1000 MHz

#### <u>10 MHz BW</u>

Radiated spurious signals detected were more than 20 dB below the reference limit for the lowest, middle and highest channels in 10MHz BW.

#### <u>20 MHz BW</u>

Radiated spurious signals detected were more than 20 dB below the reference limit for the lowest, middle and highest channels in 20MHz BW.

#### Frequency range 1GHz – 18GHz

#### <u>10 MHz BW</u>

Lowest Channel (3555 MHz)

Spurious	Detector	Emission Level	Polarization	Measurement
Frequency (MHz)		(dBµV/m)		Uncertainty (dB)
10662.750000	RMS	42.60	V	± 4.87

Middle Channel (3625 MHz)

Spurious	Detector	Emission Level	Polarization	Measurement
Frequency (MHz)		(dBµV/m)		Uncertainty (dB)
10871.035714	RMS	41.40	Н	± 4.87

#### High Channel (3695 MHz)

Spurious	Detector	Emission Level	Polarization	Measurement
Frequency (MHz)		(dBµV/m)		Uncertainty (dB)
7393.339286	RMS	37.40	Н	± 4.87
11082.214286	RMS	40.20	Н	± 4.87

![](_page_24_Picture_1.jpeg)

#### <u>20 MHz BW</u>

Lowest Channel (3560 MHz)

Spurious	Detector	Emission Level	Polarization	Measurement
Frequency (MHz)		(dBµV/m)		Uncertainty (dB)
10682.517857	RMS	41.00	Н	± 4.87

#### Middle Channel (3625 MHz)

Spurious Frequency (MHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
10874.892857	RMS	41.30	Н	± 4.87

#### High Channel (3690 MHz)

Spurious	Detector	Emission Level	Polarization	Measurement
Frequency (MHz)		(dBµV/m)		Uncertainty (dB)
7377.910714	RMS	37.30	Н	4.07
11052.803572	RMS	41.30	V	± 4.87

#### Frequency range 18 GHz – 40 GHz

Radiated spurious signals detected were more than 20 dB below the reference limit for the lowest, middle and highest channels in all two BWs.

(See next plots)

![](_page_25_Picture_1.jpeg)

![](_page_25_Figure_2.jpeg)

# <u>10 MHz BW</u>

![](_page_25_Figure_5.jpeg)

![](_page_25_Figure_6.jpeg)

## Middle Channel (3625 MHz)

![](_page_25_Figure_8.jpeg)

![](_page_26_Picture_1.jpeg)

![](_page_26_Figure_2.jpeg)

![](_page_27_Picture_1.jpeg)

![](_page_27_Figure_2.jpeg)

![](_page_28_Picture_1.jpeg)

![](_page_28_Figure_2.jpeg)

![](_page_29_Picture_1.jpeg)

![](_page_29_Figure_2.jpeg)

![](_page_30_Picture_1.jpeg)

![](_page_30_Figure_2.jpeg)

![](_page_31_Picture_1.jpeg)

![](_page_31_Figure_2.jpeg)

![](_page_32_Picture_1.jpeg)

![](_page_32_Figure_2.jpeg)

![](_page_33_Picture_1.jpeg)

![](_page_33_Figure_2.jpeg)

![](_page_34_Picture_1.jpeg)

TEST A.9: FREQUENCY STABILITY							
	Product stand	ard:	Part 2.1055				
LIMITS:	Test standar	[.] d:	ANSI C63.26-2015				
LIMITS							
The frequency stab centigrade for all equ	ility shall be measu uipment except that s	ared with v specified in	ariation of ambient temperature from -30° to +50° paragraphs (a) (2) and (3) of this section.				
The frequency stabil	ity was measured ur	nder the foll	owing conditions:				
a) At 10°C intervals voltage, and	s of temperatures b	etween -30	)°C and +50°C at the manufacturer's rated supply				
b) At +20°C tempera over a range of inpu +15% is applied to th	ature and ±15% supp t voltage, then the -1 ne uppermost voltage	ly voltage v 5% variatio e.	ariations. If a product is specified to operate n is applied to the lowermost voltage and the				
TEST S	SETUP						
The frequency stabil C63.26-2015 and the	ity was measured by e section 9of FCC KI	r following ti DB 971168	he procedure stated in the section 5.6 of ANSI D01 v03 r01.				

![](_page_35_Picture_1.jpeg)

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (Band 48)
TEST RESULTS:	PASS
<u>10 MHz BW</u>	

		Lowest Frequency 3555 MHz					
Temperature (°C)	Input Voltage (V)	Frequency Low (MHz)	Delta to Tnom-Vnom (%)	Frequency High (MHz)	Delta to Tnom-Vnom (%)		
50	48	3550.630	0.001690	3559.410	-0.001124		
40	48	3550.650	0.002253	3559.390	-0.001686		
30	48	3550.510	-0.001690	3559.510	0.001686		
20 (Tnom)	48	3550.570		3559.450			
20	40.8(Vmin)	3550.550	-0.000563	3559.470	0.000562		
20	55.2(Vmax)	3550.530	-0.001127	3559.430	-0.000562		
10	48	3550.490	-0.002253	3559.530	0.002248		
0	48	3550.510	-0.001690	3559.490	0.001124		
-10	48	3550.530	-0.001127	3559.470	0.000562		
-20	48	3550.530	-0.001127	3559.430	-0.000562		
-30	48	3550.550	-0.000563	3559.470	0.000562		

![](_page_36_Picture_1.jpeg)

# <u>10 MHz BW</u>

		Highest Frequency 3695 MHz					
Temperature (°C)	Input Voltage (V)	Frequency Low	Delta to Tnom-Vnom	Frequency High	Delta to Tnom-Vnom		
	(-)	(MHz)	(%)	(MHz)	(%)		
50	48	3690.670	0.003252	3699.430	-0.001081		
40	48	3690.590	0.001084	3699.390	0.002162		
30	48	3690.610	0.001626	3699.370	-0.002703		
20 (Tnom)	48	3690.550		3699.470			
20	40.8(Vmin)	3690.570	0.000542	3699.450	-0.000541		
20	55.2(Vmax)	3690.630	0.002168	3699.410	-0.001622		
10	48	3690.590	0.001084	3699.390	-0.002162		
0	48	3690.530	-0.000542	3699.530	0.001622		
-10	48	3690.650	0.002710	3699.430	-0.001081		
-20	48	3690.510	-0.001084	3699.490	0.000541		
-30	48	3690.490	-0.001626	3699.510	0.001081		