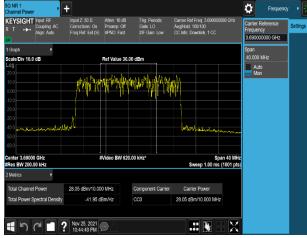
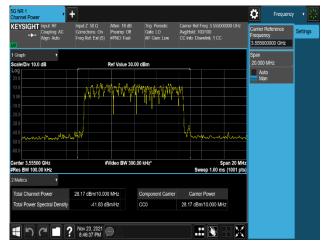


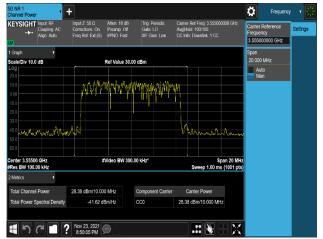
Plot 8-117. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_10M\_64QAM – Low Channel, Port 2)



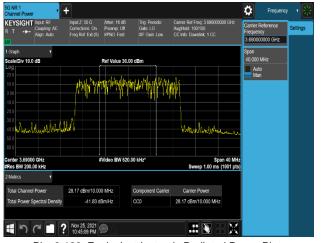
Plot 8-119. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_20M\_16QAM – High Channel, Port 0)



Plot 8-116. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_10M\_64QAM – Low Channel, Port 1)



Plot 8-118. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_10M\_64QAM – Low Channel, Port 3)



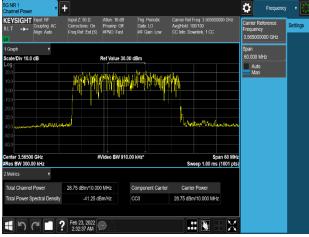
Plot 8-120. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_20M\_16QAM – High Channel, Port 1)

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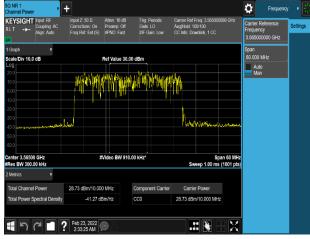




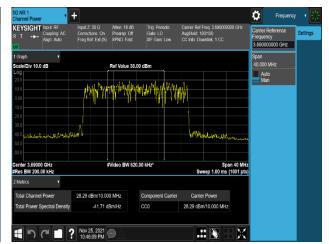
Plot 8-121. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_20M\_16QAM - High Channel, Port 2)



Plot 8-123. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_30M\_16QAM - Low Channel, Port 0)



Plot 8-125. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_30M\_16QAM - Low Channel, Port 2)



Plot 8-122. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_20M\_16QAM - High Channel, Port 3)



Plot 8-124. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_30M\_16QAM - Low Channel, Port 1)



Plot 8-126. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_30M\_16QAM - Low Channel, Port 3)

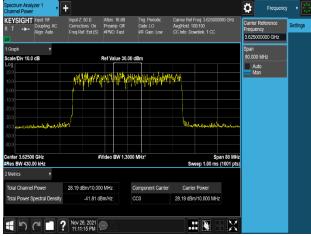
FCC: A3LRT4401-48A		MEASUREMENT REPORT (Class II Permissive Change)	SAMSUNG	Approved by: Technical Manager
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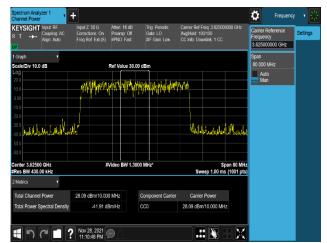
Plot 8-127. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_40M\_16QAM – Mid Channel, Port 0)



Plot 8-129. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_40M\_16QAM – Mid Channel, Port 2)



Plot 8-131. Equivalent Isotropic Radiated Power Plot (LTE\_B48\_2C\_5M+5M\_16QAM – High Channel, Port 0)



Plot 8-128. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_40M\_16QAM – Mid Channel, Port 1)



Plot 8-130. Equivalent Isotropic Radiated Power Plot (NR\_n48\_1C\_40M\_16QAM – Mid Channel, Port 3)



Plot 8-132. Equivalent Isotropic Radiated Power Plot (LTE\_B48\_2C\_5M+5M\_16QAM – High Channel, Port 1)

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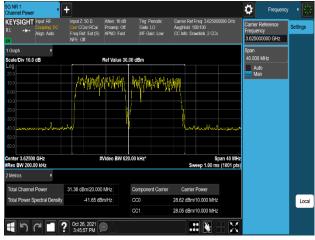


Likraph         *         Span         20000 M           Scale Dyr 10.0 dB         Ref Value 30.00 dBm         20000 M           200         Amountain and a straight of the	tz
Log 2020 2	
0.00	
100 200 400 400 500 500 500 500 500 500 500 5	
300	
000 000 201 5.09500 GHz #Video BW 900.00 KHz** Span 20 MHz	
Center 3.69500 GHz #Video BW 300.00 kHz* Span 20 MHz	
2 Metrics v	
Total Channel Power 28.07 dBm/10.000 MHz Component Carrier Carrier Power	
Total Power Spectral Density _41.93 dBm/Hz CC0 _28.07 dBm/10.000 MHz	Lo

Plot 8-133. Equivalent Isotropic Radiated Power Plot (LTE\_B48\_2C\_5M+5M\_16QAM – High Channel, Port 2)



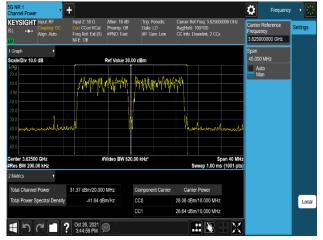
Plot 8-135. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+10M\_QPSK – Mid Channel, Port 0)



Plot 8-137. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+10M\_QPSK – Mid Channel, Port 2)



Plot 8-134. Equivalent Isotropic Radiated Power Plot (LTE\_B48\_2C\_5M+5M\_16QAM – High Channel, Port 3)



Plot 8-136. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+10M\_QPSK – Mid Channel, Port 1)



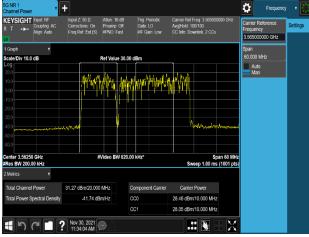
Plot 8-138. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+10M\_QPSK – Mid Channel, Port 3)

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Plot 8-139. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+20M\_16QAM – Low Channel, Port 0)



Plot 8-141. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+20M\_16QAM – Low Channel, Port 2)



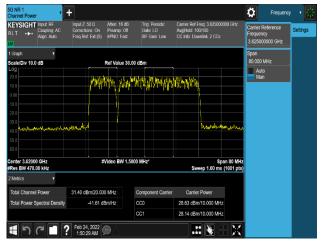
Plot 8-143. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+30M\_16QAM – Mid Channel, Port 0)



Plot 8-140. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+20M\_16QAM – Low Channel, Port 1)



Plot 8-142. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+20M\_16QAM – Low Channel, Port 3)



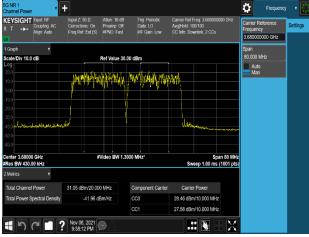
Plot 8-144. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+30M\_16QAM – Mid Channel, Port 1)

FCC: A3LRT4401-48A		MEASUREMENT REPORT (Class II Permissive Change)	SAMSUNG	Approved by: Technical Manager
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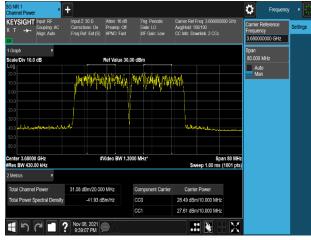


KEYSIGHT Input RF	Input Z: 50 0 Atten: 16 d	B Trig: Periodic	Carrier Ref Freg: 3.625000000 GHz	Carrier Reference	_
RLT +++ Coupling: AC Align: Auto	Corrections: On Preamp: O Freq Ref: Ext (S) #PNO: Fas		Avg Hold: 100/100 CC Info: Downlink, 2 CCs	Frequency	Settin
UV IIII				3.625000000 GHz	
1 Graph 🔹 🔻				Span	
Scale/Div 10.0 dB	Ref Value 3	30.00 dBm		80.000 MHz	
20.0	ikatakka at	. And Statis . Die besst seine .	101. a late	Auto Man	
		a Willamary	WARNI		
30.0	manand		1. March Mary M. A. Som	4	
	#Video BW 1	5000 MHz*	Span 80 MH	2	
60.0 Center 3.62000 GHz #Res BW 470.00 kHz	#Video BW 1	1.5000 MHz*	Span 80 MH Sweep 1.00 ms (1001 pt		
Center 3.62000 GHz	#Video BW 1	1.5000 MHz*			
Center 3.62000 GHz #Res BW 470.00 kHz	#Video BW 1	1.5000 MHz* Component Carrier			
Center 3.62000 GHz #Res BW 470.00 kHz 2 Metrics v			Sweep 1.00 ms (1001 pt		
Center 3.62000 GHz Res BW 470.00 kHz 2 Metrics Total Channel Power	31.25 dBm/20.000 MHz	Component Carrier	Sweep 1.00 ms (1001 pt Carrier Power		

Plot 8-145. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+30M\_16QAM – Mid Channel, Port 2)



Plot 8-147. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+20M\_64QAM – High Channel, Port 0)



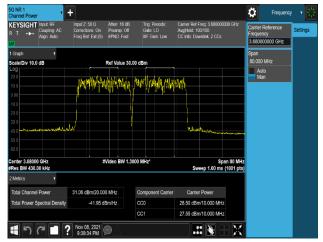
Plot 8-149. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+20M\_64QAM – High Channel, Port 2)



Plot 8-146. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+30M\_16QAM – Mid Channel, Port 3)



Plot 8-148. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+20M\_64QAM – High Channel, Port 1)



Plot 8-150. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+20M\_64QAM – High Channel, Port 3)

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5G NR 1 Channel Power	+			Frequenc	у т 🗄
R T +++ Coupling AC Align: Auto	Input Z: 50 0 Atten: 16 Corrections: On Preamp: 0 Freq Ref: Ext (S) #PNO: Fa	Off Gate: LO	Carrier Ref Freq: 3.57500000 GHz Avg[Hold: 100/100 CC Info: Downlink, 2 CCs	Carrier Reference Frequency 3.575000000 GHz	Settings
1 Graph 🔹				Span	1
Scale/Div 10.0 dB	Ref Value	30.00 dBm		100.00 MHz	
20.0	whether the second	المعطية المعالمة المعال	the second sh	Auto Man	
	philling ing	santan mata			
40.0	white the		Kunningapunally	4	
Center 3.56750 GHz	#Video BW	1.6000 MHz*	Span 100 Mi		
#Res BW 510.00 kHz			Sweep 1.00 ms (1001 pt	5)	
2 Metrics V					
Total Channel Power	31.46 dBm/20.000 MHz	Component Carrier	Carrier Power		
Total Power Spectral Density	-41.55 dBm/Hz	CC0	27.89 dBm/10.000 MHz		
		CC1	28.94 dBm/10.000 MHz		
	Feb 17, 2022 🦱 🛆		<b>H N C N</b>		
	Feb 17, 2022		📲 🚵 🕂 🔀		

Plot 8-151. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+40M\_256QAM – Low Channel, Port 0)



Plot 8-153. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+40M\_256QAM – Low Channel, Port 2)



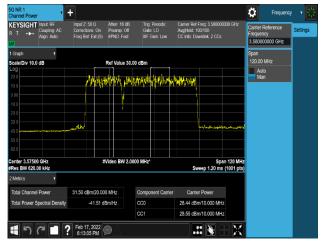
Plot 8-155. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+40M\_256QAM – Low Channel, Port 0)



Plot 8-152. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+40M\_256QAM – Low Channel, Port 1)



Plot 8-154. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_10M+40M\_256QAM – Low Channel, Port 3)



Plot 8-156. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+40M\_256QAM – Low Channel, Port 1)

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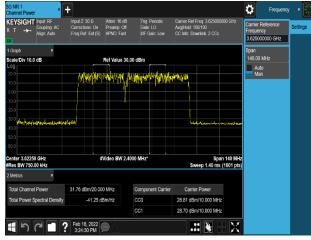




Plot 8-157. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+40M\_256QAM – Low Channel, Port 2)



Plot 8-159. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_30M+40M\_QPSK – Mid Channel, Port 0)



Plot 8-161. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_30M+40M\_QPSK – Mid Channel, Port 2)



Plot 8-158. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_20M+40M\_256QAM – Low Channel, Port 3)



Plot 8-160. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_30M+40M\_QPSK – Mid Channel, Port 1)



Plot 8-162. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_30M+40M\_QPSK – Mid Channel, Port 3)

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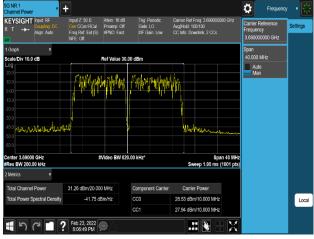


5G NR 1 Channel Power	+				Frequency	′'
KEYSIGHT R T ↔ Coupling AC Align: Auto	Corrections: On	Atten: 16 dB Preamp: Off #PNO: Fast	Trig: Periodic Gate: LO #IF Gain: Low	Carner Ref Freq. 3.66000000 GH Avg Hold: 100/100 CC Info: Downlink; 2 CCs	<sup>12</sup> Carrier Reference Frequency 3.660000000 GHz	Settings
1 Graph 🔹					Span	1
Scale/Div 10.0 dB	F	lef Value 30.00	dBm		160.00 MHz	
20.0	الأقابلية المحاملة		11. Adaptar Sugar	hills.	Auto Man	
	an er ar de der	elasteres fi	Victorianiante	Alunk		
				alda		
-40.0 mostaleranderander	hhi			Nului V		
Center 3.66000 GHz #Res BW 820.00 kHz	#V	ideo BW 2.700	D MHz*	Span 160 Sweep 1.60 ms (1001		
2 Metrics T				Sweep 1.60 ms (1001	pts)	
Total Channel Power	30.78 dBm/20.000 N	(Hz C	component Carrier	Carrier Power		
Total Power Spectral Density	-42.23 dBm	/Hz C	:C0	28.37 dBm/10.000 MHz		
		c	:C1	27.08 dBm/10.000 MHz		
	Nov 09, 2021 🥢	Δ				
50	7:00:58 PM	$\mathbb{P}$			X	

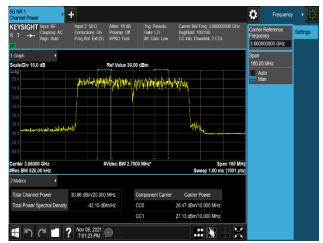
Plot 8-163. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_40M+40M\_64QAM – High Channel, Port 0)



Plot 8-165. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_40M+40M\_64QAM – High Channel, Port 2)



Plot 8-167. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_10M+10M\_QPSK - High Channel, Port 0)



Plot 8-164. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_40M+40M\_64QAM – High Channel, Port 1)



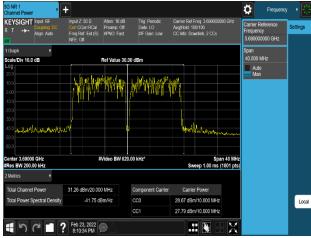
Plot 8-166. Equivalent Isotropic Radiated Power Plot (NR\_n48\_2C\_40M+40M\_64QAM – High Channel, Port 3)



Plot 8-168. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_10M+10M\_QPSK - High Channel, Port 1)

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Plot 8-169. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_10M+10M\_QPSK - High Channel, Port 2)



Plot 8-171. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_20M+40M\_QPSK - High Channel, Port 0)



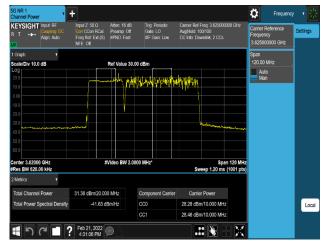
Plot 8-173. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_20M+40M\_QPSK - High Channel, Port 2)



Plot 8-170. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_10M+10M\_QPSK - High Channel, Port 3)



Plot 8-172. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_20M+40M\_QPSK - High Channel, Port 1)



Plot 8-174. Equivalent Isotropic Radiated Power Plot (LTE\_1C+NR\_1C\_20M+40M\_QPSK - High Channel, Port 3)

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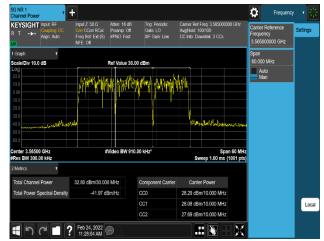
Plot 8-175. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_10M+10M+64QAM-Low Channel, Port 0)



Plot 8-177. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_10M+10M+10M\_64QAM-Low Channel, Port 2)



Plot 8-179. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_20M+20M+40M\_16QAM-Mid Channel, Port 0)



Plot 8-176. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_10M+10M+10M\_64QAM-Low Channel, Port 1)



Plot 8-178. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_10M+10M+10M\_64QAM-Low Channel, Port 3)



Plot 8-180. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_20M+20M+40M\_16QAM-Mid Channel, Port 1)

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iG NR 1 Channel Power	+			Frequency	1
KEYSIGHT Input: RF R T +++ Coupling: DC Align: Auto	Input Z: 50 0 Atten: " Corr CCorr RCal Pream Freq Ref: Ext (S) #PNO: NFE: Off	o: Off Gato: LO	Carrier Ref Freq: 3.625000000 GHz Avg Hold: 100/100 CC Info: Downlink, 3 CCs	Carrier Reference Frequency 3.625000000 GHz	Settings
1 Graph v Scale/Div 10.0 dB	Ref Val	ue 30.00 dBm		Span 160.00 MHz	
20.0 10.0			nariallalan	Auto Man	
0.00					
20.0			anten le avec estatemente		
40.0					
Center 3.62000 GHz Res BW 820.00 kHz	#Video B	W 3.0000 MHz*	Span 160 M Sweep 1.60 ms (1001 p		
2 Metrics					
	33.35 dBm/30.000 MHz	Component Carrier	Carrier Power		
Total Channel Power					
Total Channel Power Total Power Spectral Density	-41.42 dBm/Hz	CC0	28.75 dBm/10.000 MHz		
	-41.42 dBm/Hz	CC0 CC1	28.75 dBm/10.000 MHz 28.85 dBm/10.000 MHz		Local

Plot 8-181. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_20M+20M+40M\_16QAM-Mid Channel, Port 2)



Plot 8-182. Equivalent Isotropic Radiated Power Plot (LTE\_2C+NR\_1C\_20M+20M+40M\_16QAM-Mid Channel, Port 3)

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# 8.6 Peak To Average Power Ratio (PAPR)

## **Test Overview**

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

## Test Procedure Used

ANSI C63.26 - Section 5.2.3.4. KDB 971168 D01 v03r01 - Section 5.7

## Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

- 1. The signal analyzer's CCDF function is enabled.
- 2. Frequency = carrier center frequency
- 3. Measurement BW ≥ OBW or specified reference bandwidth
- 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
- 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

#### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

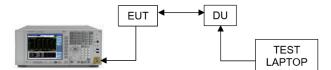


Figure 8-5. Test Instrument & Measurement Setup

## <u>Limit</u>

Peak-to-average power ratio (PAPR) limit shall not exceed 13 dB for more than 0.1% of the time.

#### Test Notes

For multi carriers configuration, the QAM modulation worst case were found while operating with 16QAM mode and only the worst case data were reported.

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Channel	Dort		Limit			
Channel	Port	QPSK	16QAM	64QAM	256QAM	(dB)
	0	8.43	9.13	8.54	8.47	< 13
Low	1	8.48	9.12	8.58	8.20	< 13
Low	2	8.56	9.15	8.54	8.42	< 13
	3	8.44	9.07	8.56	8.47	< 13
	0	8.64	9.14	8.52	8.15	< 13
Middle	1	8.56	9.27	8.61	8.35	< 13
wildule	2	8.45	9.28	8.66	8.39	< 13
	3	8.60	9.33	8.47	8.43	< 13
	0	8.56	9.25	8.73	8.33	< 13
High	1	8.13	9.26	8.70	8.31	< 13
riigh	2	8.53	9.09	8.73	8.49	< 13
	3	8.50	9.06	8.42	8.41	< 13

 Table 8-43. Peak To Average Power Ratio Summary Data (NR\_n48\_1C\_10M)

Channel	Dort	PAPR (dB)				Limit
Channel	Port	QPSK	16QAM	64QAM	256QAM	(dB)
	0	8.25	8.32	8.24	8.26	< 13
Low	1	8.16	8.21	8.20	8.18	< 13
Low	2	8.17	8.34	8.22	8.16	< 13
	3	8.21	8.56	8.27	8.18	< 13
	0	8.34	8.52	8.30	8.44	< 13
Middle	1	8.28	8.20	8.35	8.34	< 13
IVIIUUIE	2	8.27	8.45	8.27	8.54	< 13
	3	8.28	8.42	8.30	8.65	< 13
	0	8.42	8.42	8.48	8.68	< 13
High	1	8.33	8.43	8.48	8.67	< 13
riigh	2	8.32	8.40	8.48	8.71	< 13
	3	8.39	8.38	8.49	8.69	< 13

 Table 8-44. Peak To Average Power Ratio Summary Data (NR\_n48\_1C\_20M)

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Channel	Dort		Limit			
Channel	Port	QPSK	16QAM	64QAM	256QAM	(dB)
	0	8.28	8.29	8.18	8.46	< 13
Low	1	8.27	8.44	8.13	8.46	< 13
Low	2	8.32	8.29	8.24	8.48	< 13
	3	8.29	8.27	8.15	8.27	< 13
	0	8.22	8.23	8.18	8.25	< 13
Middle	1	8.29	8.29	8.19	8.43	< 13
widdle	2	8.30	8.43	8.21	8.26	< 13
	3	8.22	8.26	8.21	8.28	< 13
	0	8.18	8.22	8.21	8.26	< 13
High	1	8.26	8.15	8.21	8.27	< 13
riigh	2	8.26	8.11	8.18	8.24	< 13
	3	8.19	8.27	8.22	8.26	< 13

 Table 8-45. Peak To Average Power Ratio Summary Data (NR\_n48\_1C\_30M)

Channel	Dert		Limit			
Channel	Port	QPSK	16QAM	64QAM	256QAM	(dB)
	0	8.40	8.26	8.29	8.25	< 13
Low	1	8.27	8.25	8.25	8.25	< 13
LOW	2	8.38	8.24	8.29	8.29	< 13
	3	8.25	8.21	8.26	8.32	< 13
	0	8.32	8.22	8.24	8.24	< 13
Middle	1	8.30	8.22	8.19	8.22	< 13
INIQUIE	2	8.29	8.25	8.27	8.20	< 13
	3	8.37	8.23	8.28	8.24	< 13
	0	8.31	8.29	8.42	8.19	< 13
High	1	8.33	8.27	8.26	8.30	< 13
High	2	8.41	8.29	8.23	8.23	< 13
	3	8.39	8.30	8.19	8.19	< 13

 Table 8-46. Peak To Average Power Ratio Summary Data (NR\_n48\_1C\_40M)

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Configuration	PAPR (dB)		Limit
	QPSK	16QAM	(dB)
LTE_2C_5M+5M	8.55	8.38	< 13

Table 8-47. Peak To Average Power Ratio Summary Data (LTE\_B48\_Multi Carrier)

Configuration	PAPR (dB)		Limit
	QPSK	16QAM	(dB)
NR_2C_10M+10M	8.25	8.53	< 13
NR_2C_10M+20M	8.39	8.07	< 13
NR_2C_10M+30M	7.78	7.78	< 13
NR_2C_20M+20M	8.31	8.37	< 13
NR_2C_10M+40M	7.81	7.79	< 13
NR_2C_20M+40M	7.80	7.81	< 13
NR_2C_30M+40M	7.80	7.81	< 13
NR_2C_40M+40M	8.21	8.24	< 13

 Table 8-48. Peak To Average Power Ratio Summary Data (NR\_n48\_Multi Carrier)

Configuration	PAPR (dB)		Limit
	QPSK	16QAM	(dB)
LTE_1C_10M + NR_1C_10M	8.33	8.16	< 13
LTE_1C_20M + NR_1C_40M	7.82	7.82	< 13
LTE_2C_10M+10M + NR_1C_10M	8.36	8.24	< 13
LTE_2C_20M+20M + NR_1C_40M	7.83	7.86	< 13

Table 8-49. Peak To Average Power Ratio Summary Data (LTE\_B48 + NR\_n48\_Multi-RAT)

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