

AVERAGE POWER



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

Per FCC sections 27.50(c)(3) and 90.542, the Effective Radiated Power (ERP) of the transceiver cannot exceed 1000 Watts/MHz.

AVERAGE POWER



TMTx 2019.08.30.0 XMI 2019.09.05

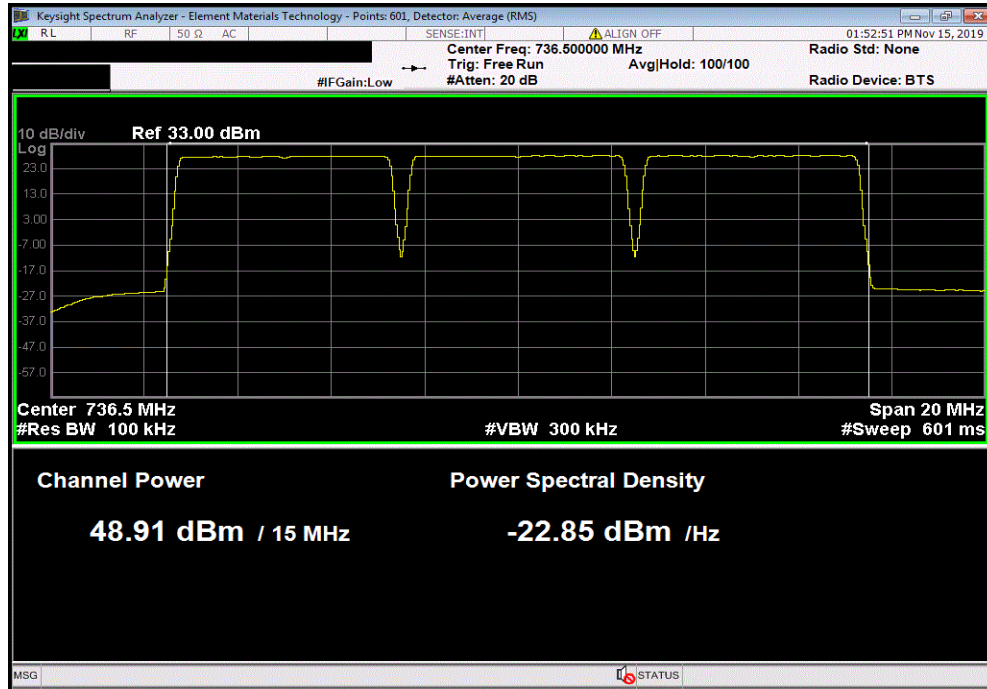
EUT: AHLBBA RRRH			Work Order: NOKI0004		
Serial Number: K9193514835			Date: 18-Nov-19		
Customer: Nokia Solutions and Networks			Temperature: 22.7 °C		
Attendees: John Rattanavong			Humidity: 29.9% RH		
Project: None			Barometric Pres.: 1019 mbar		
Tested by: Jonathan Kiefer		Power: 54VDC	Job Site: TX09		
TEST SPECIFICATIONS		Test Method			
FCC 27:2019		ANSI C63.26:2015			
COMMENTS					
Band 12 Multicarrier average power measurements. Tested on highest power antenna port (Port 1). EUT is operated at 100% duty cycle. ERP depends on antenna gain, which is unknown. Only the highest dBm value is plotted per customer requirements and a Watt/MHz calculation was not made due to the unknown antenna value. Average power measurements were made for the multicarrier test cases on four modulation types (QPSK, 16QAM, 64QAM, 256QAM): The first multicarrier test case is with three Band 12 LTE5 carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the Band 12 lower band edge [731.5MHz and 736.5MHz] and a third carrier with maximum spacing between the other two carrier frequencies [741.5MHz] at the Band 12 upper band edge. The third multicarrier test case is with three Band 29/Band 12 LTE5 carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the Band 29 lower band edge [720.5MHz and 725.5MHz] and a third carrier with maximum spacing between the other two carrier frequencies [741.5MHz] at the Band 12 upper band edge.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	2	Signature 			
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (W ERP/MHz) Results
Band 12					
QPSK Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 736.5 MHz		48.91	0	48.9	1000 Pass
Multicarrier Test Case 3					
Mid Channel, 741.5 MHz		49.03	0	49	1000 Pass
Mid Channel, 723.0 MHz		43.57	0	43.6	1000 Pass
16QAM Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 736.5 MHz		48.89	0	48.9	1000 Pass
Multicarrier Test Case 3					
Mid Channel, 741.5 MHz		49.03	0	49	1000 Pass
Mid Channel, 723.0 MHz		43.57	0	43.6	1000 Pass
64QAM Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 736.5 MHz		48.92	0	48.9	1000 Pass
Multicarrier Test Case 3					
Mid Channel, 741.5 MHz		49.04	0	49	1000 Pass
Mid Channel, 723.0 MHz		43.61	0	43.6	1000 Pass
256QAM Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 736.5 MHz		48.92	0	48.9	1000 Pass
Multicarrier Test Case 3					
Mid Channel, 741.5 MHz		49.03	0	49	1000 Pass
Mid Channel, 723.0 MHz		43.51	0	43.5	1000 Pass

AVERAGE POWER

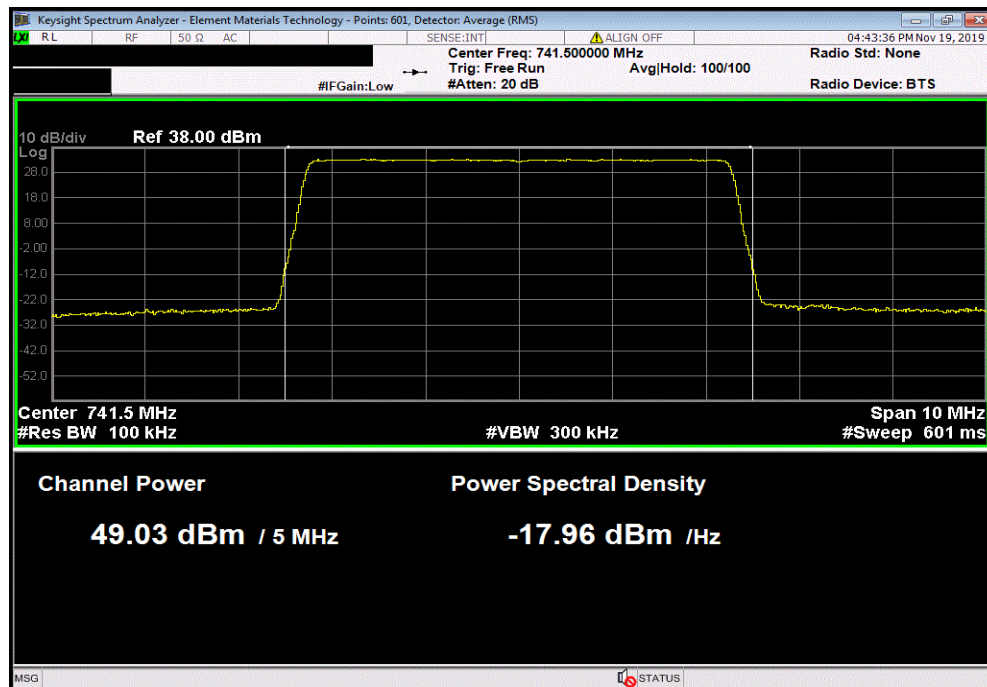


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Band 12, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.91	0	48.9	1000	Pass		



Band 12, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 741.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
49.03	0	49	1000	Pass		

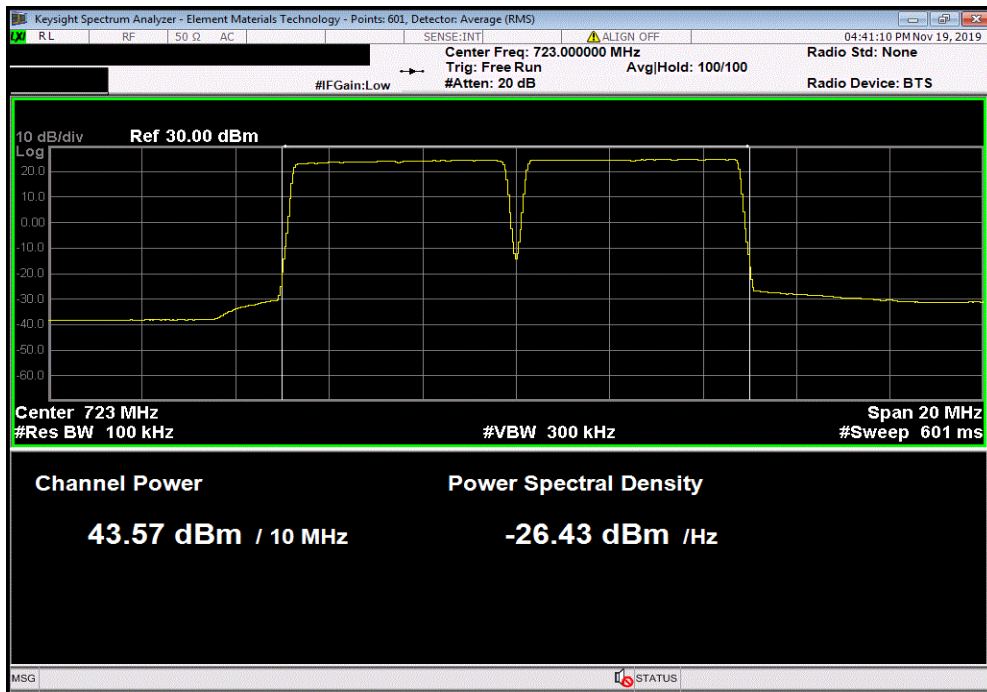


AVERAGE POWER

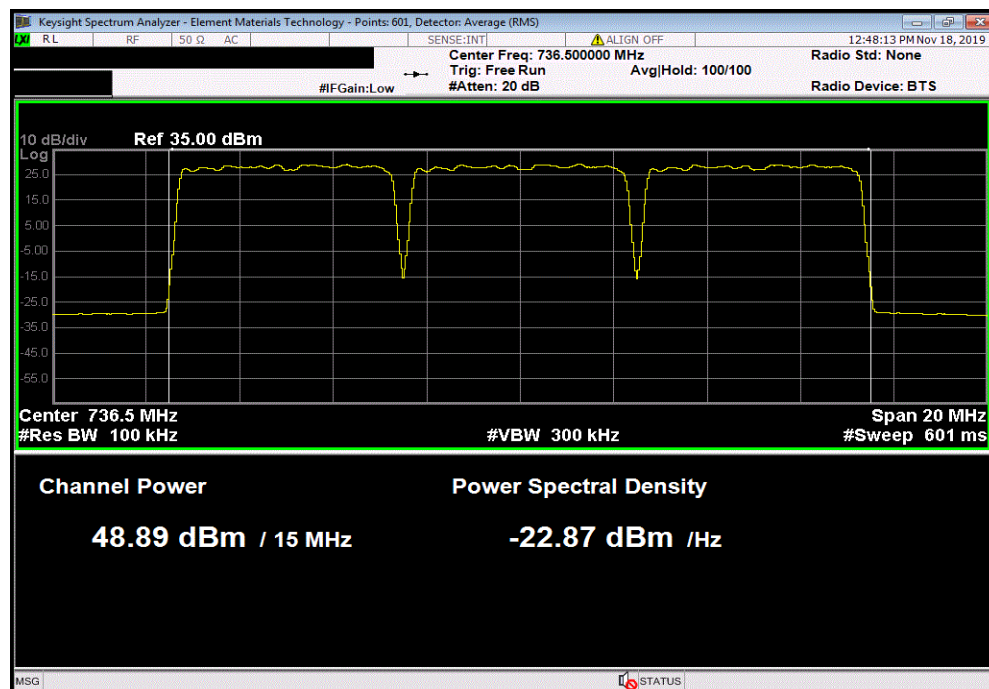


TbTx 2019.08.30.0 XMI 2019.09.05

Band 29, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.57	0	43.6	1000	Pass		



Band 12, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.89	0	48.9	1000	Pass		

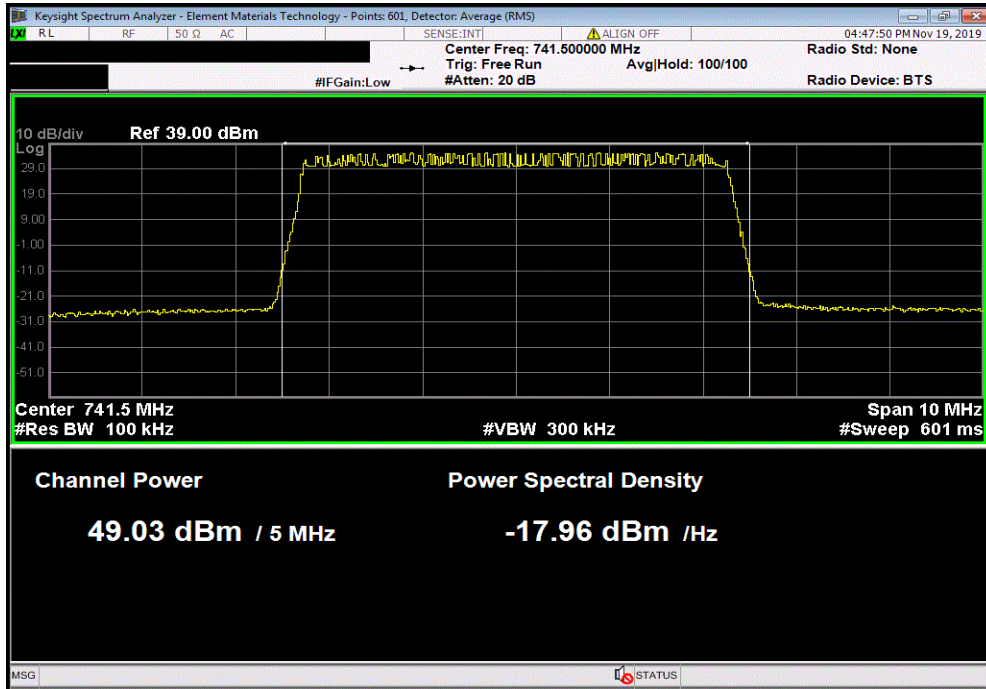


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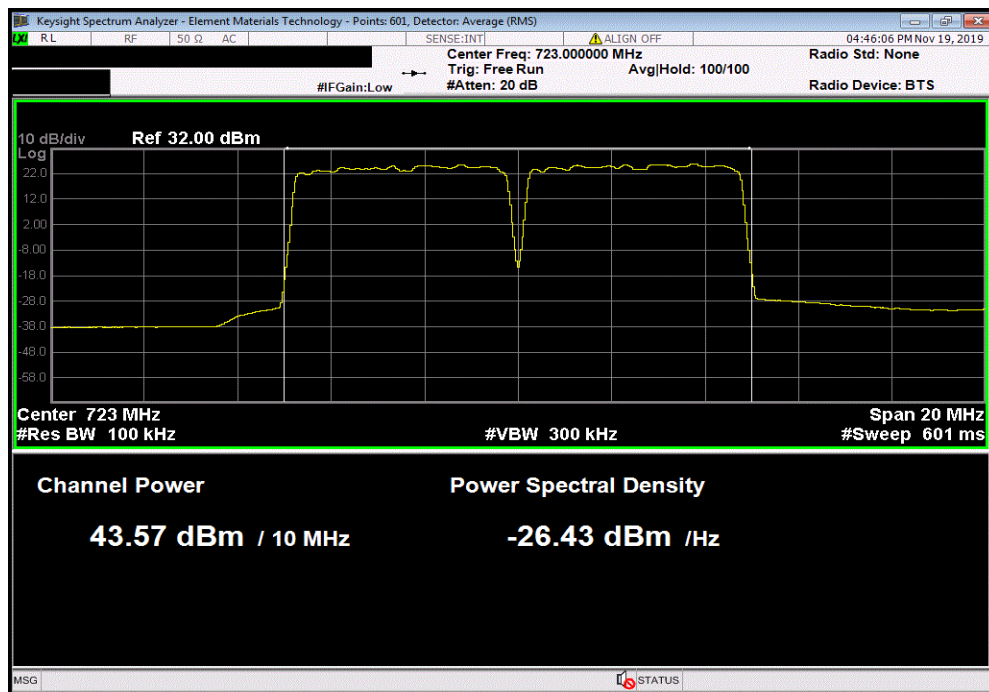


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Band 12, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 741.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
49.03	0	49	1000	Pass		



Band 29, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.57	0	43.6	1000	Pass		

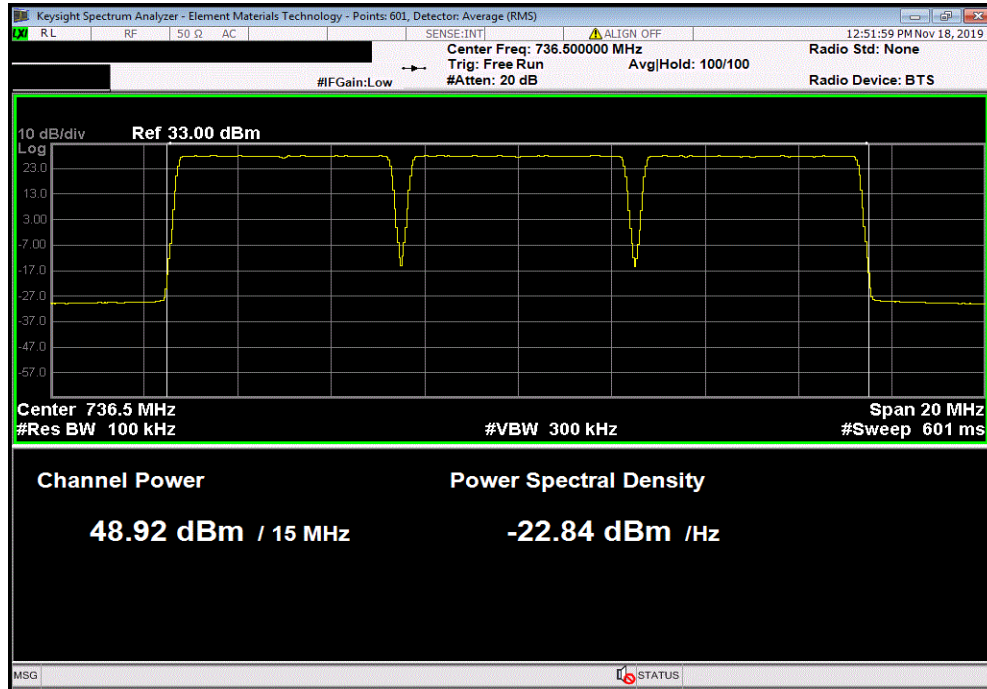


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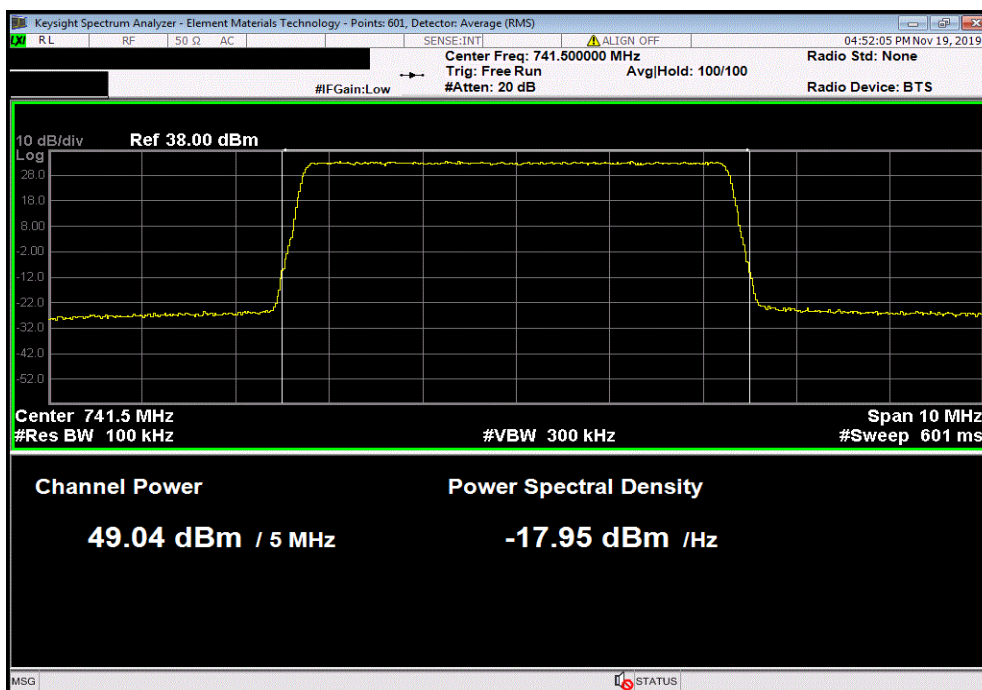


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.92	0	48.9	1000	Pass		



Band 12, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 741.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
49.04	0	49	1000	Pass		

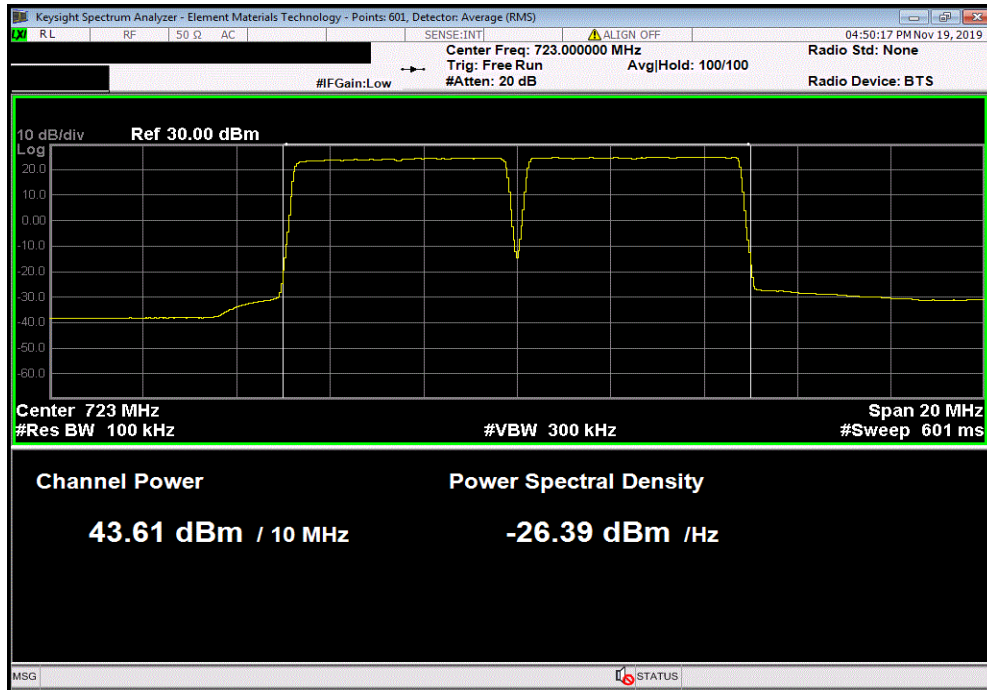


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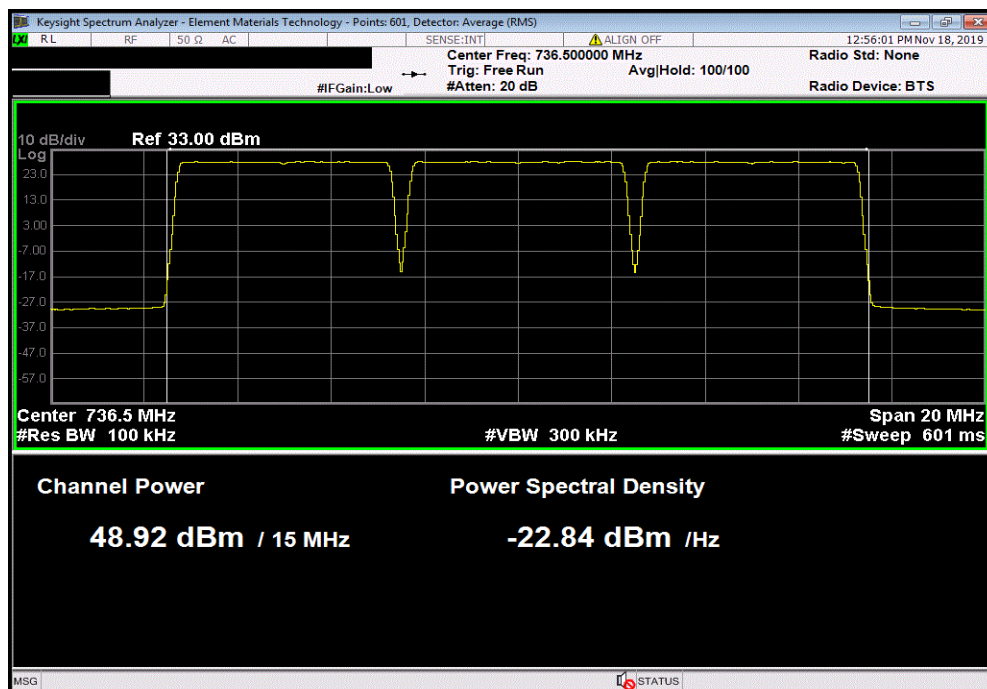


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Band 29, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.61	0	43.6	1000	Pass		



Band 12, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.92	0	48.9	1000	Pass		

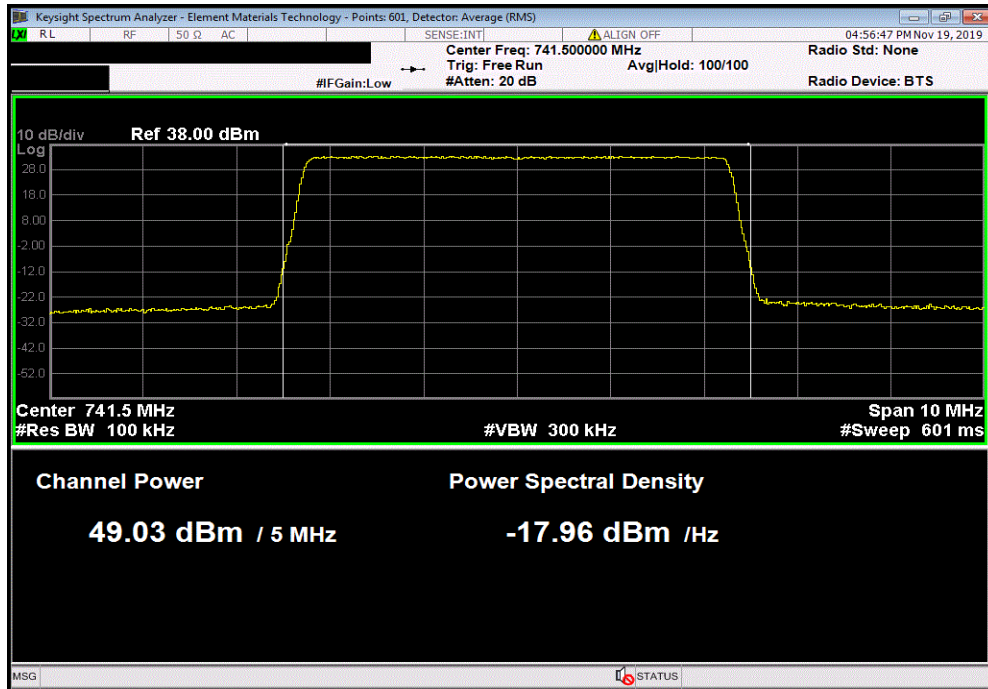


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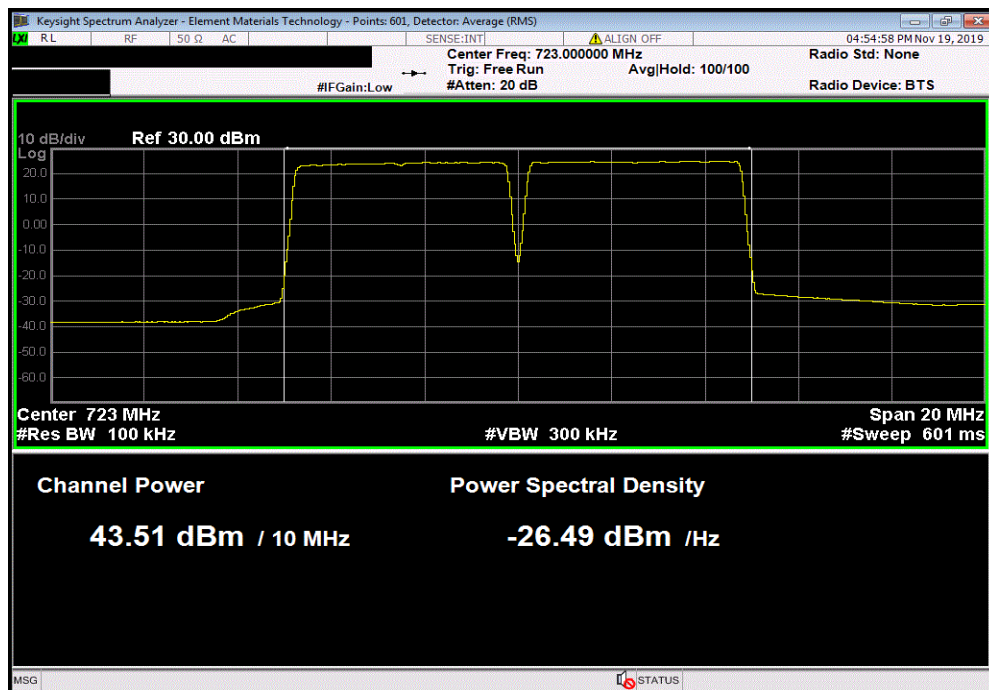


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Band 12, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 741.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
49.03	0	49	1000	Pass		



Band 29, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.51	0	43.5	1000	Pass		



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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

Per FCC sections 27.50(c)(3) and 90.542, the Effective Radiated Power (ERP) of the transceiver cannot exceed 1000 Watts/MHz.

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TMTx 2019.08.30.0 XMI 2019.09.05

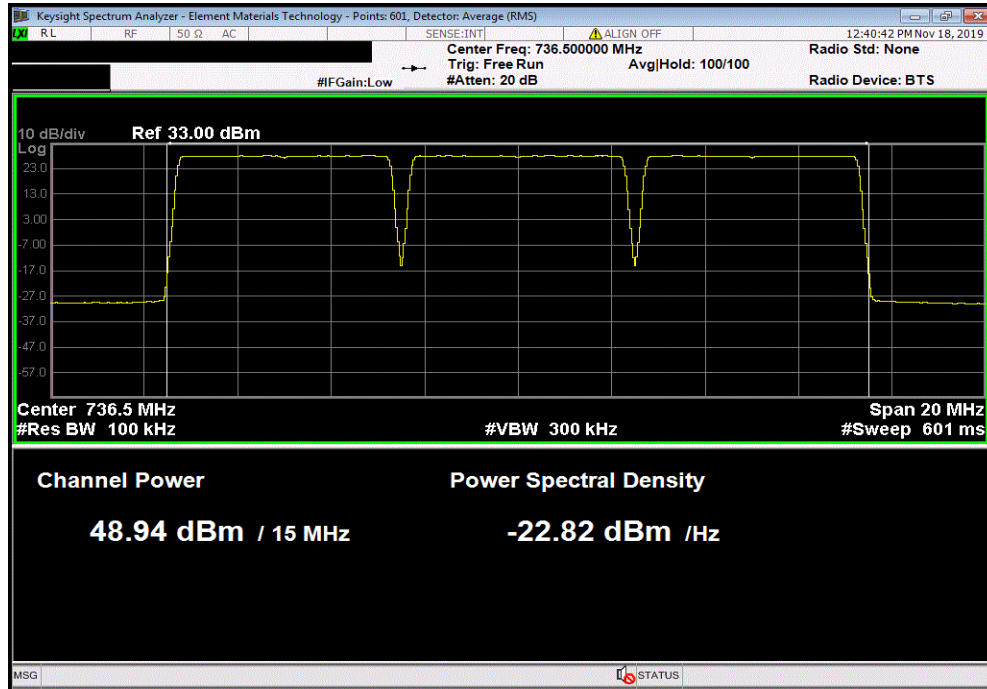
EUT: AHLBBA RRRH			Work Order: NOKI0004				
Serial Number: K9193514835			Date: 18-Nov-19				
Customer: Nokia Solutions and Networks			Temperature: 22.7 °C				
Attendees: John Rattanavong			Humidity: 29.9% RH				
Project: None			Barometric Pres.: 1019 mbar				
Tested by: Jonathan Kiefer		Power: 54VDC	Job Site: TX09				
TEST SPECIFICATIONS			Test Method				
FCC 27:2019			ANSI C63.26:2015				
FCC 90:2019			ANSI C63.26:2015				
COMMENTS							
Band 12 Multicarrier average power measurements. Tested on highest power antenna port (Port 2). EUT is operated at 100% duty cycle. ERP depends on antenna gain, which is unknown. Only the highest dBm value is plotted per customer requirements and a Watt/MHz calculation was not made due to the unknown antenna value. Average power measurements were made for the multicarrier test cases on four modulation types (QPSK, 16QAM, 64QAM, 256QAM):							
The first multicarrier test case is with three Band 12 LTE5 carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the Band 12 lower band edge [731.5MHz and 736.5MHz] and a third carrier with maximum spacing between the other two carrier frequencies [741.5MHz] at the Band 12 upper band edge.							
The second multicarrier test case is with three Band 12/Band 14 LTE5 carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the Band 12 lower band edge [731.5MHz and 736.5MHz] and a third carrier with maximum spacing between the other two carrier frequencies [765.5MHz] at the Band 14 upper band edge.							
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #	2	Signature 					
			Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (W ERP/MHz)	Results
Band 12							
QPSK Modulation							
LTE5 Bandwidth							
Multicarrier Test Case 1							
Mid Channel, 736.5 MHz			48.94	0	48.9	1000	Pass
Multicarrier Test Case 2							
Mid Channel, 734.0 MHz			47.08	0	47.1	1000	Pass
Mid Channel, 765.5 MHz			43.58	0	43.6	1000	Pass
16QAM Modulation							
LTE5 Bandwidth							
Multicarrier Test Case 1							
Mid Channel, 736.5 MHz			48.93	0	48.9	1000	Pass
Multicarrier Test Case 2							
Mid Channel, 734.0 MHz			47.22	0	47.2	1000	Pass
Mid Channel, 765.5 MHz			43.6	0	43.6	1000	Pass
64QAM Modulation							
LTE5 Bandwidth							
Multicarrier Test Case 1							
Mid Channel, 736.5 MHz			48.93	0	48.9	1000	Pass
Multicarrier Test Case 2							
Mid Channel, 734.0 MHz			47.09	0	47.1	1000	Pass
Mid Channel, 765.5 MHz			43.6	0	43.6	1000	Pass
256QAM Modulation							
LTE5 Bandwidth							
Multicarrier Test Case 1							
Mid Channel, 736.5 MHz			48.91	0	48.9	1000	Pass
Multicarrier Test Case 2							
Mid Channel, 734.0 MHz			47.2	0	47.2	1000	Pass
Mid Channel, 765.5 MHz			43.58	0	43.6	1000	Pass

AVERAGE POWER

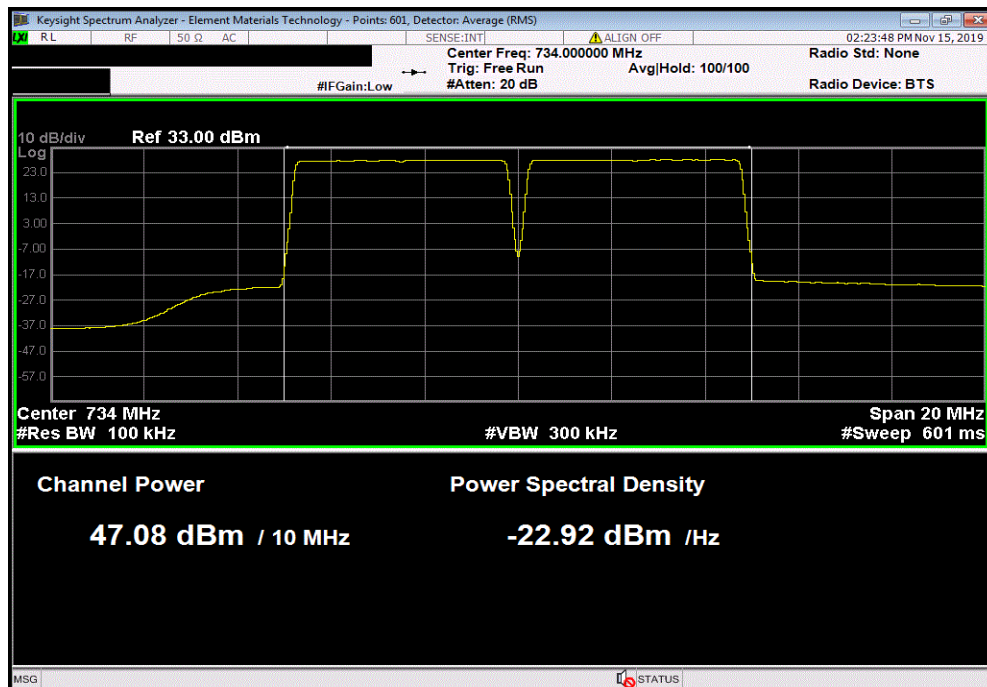


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Band 12, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.94	0	48.9	1000	Pass		



Band 12, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.08	0	47.1	1000	Pass		

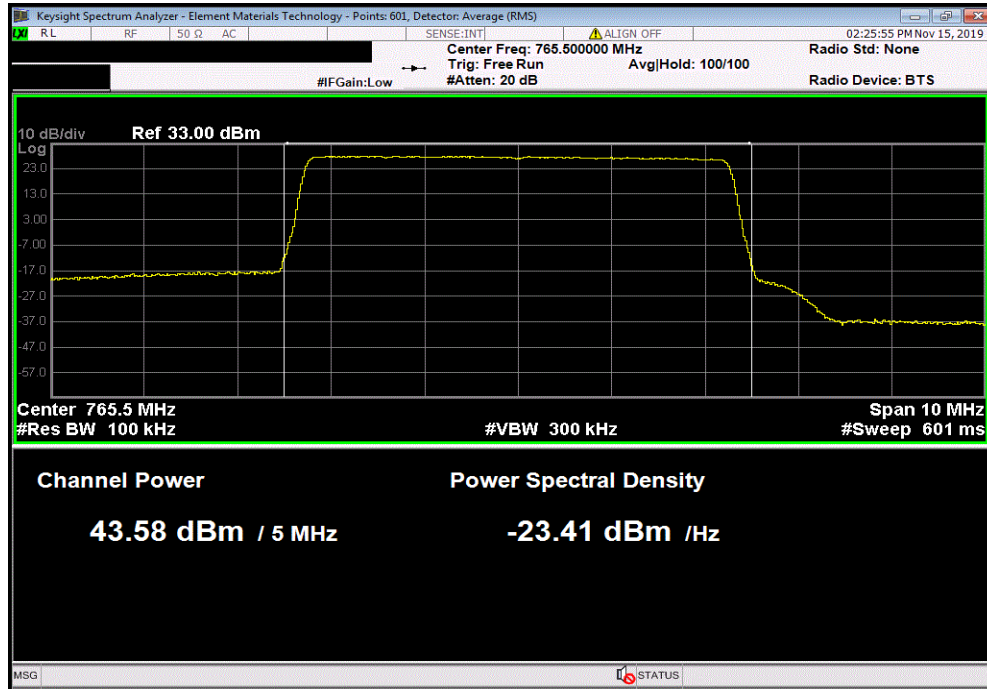


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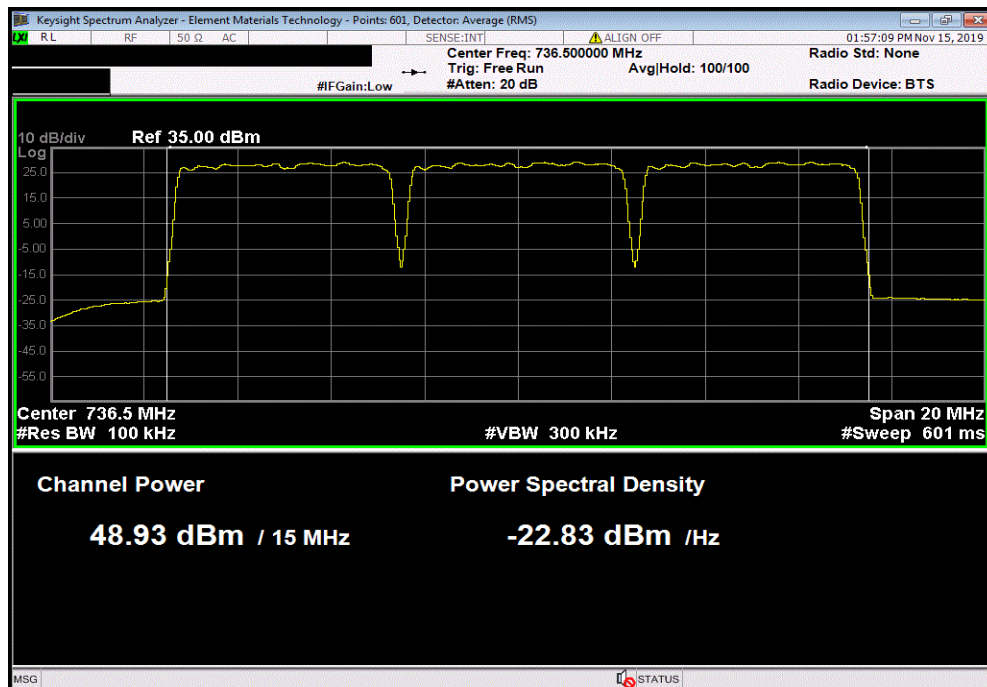


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Band 14, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.58	0	43.6	1000	Pass		



Band 12, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.93	0	48.9	1000	Pass		

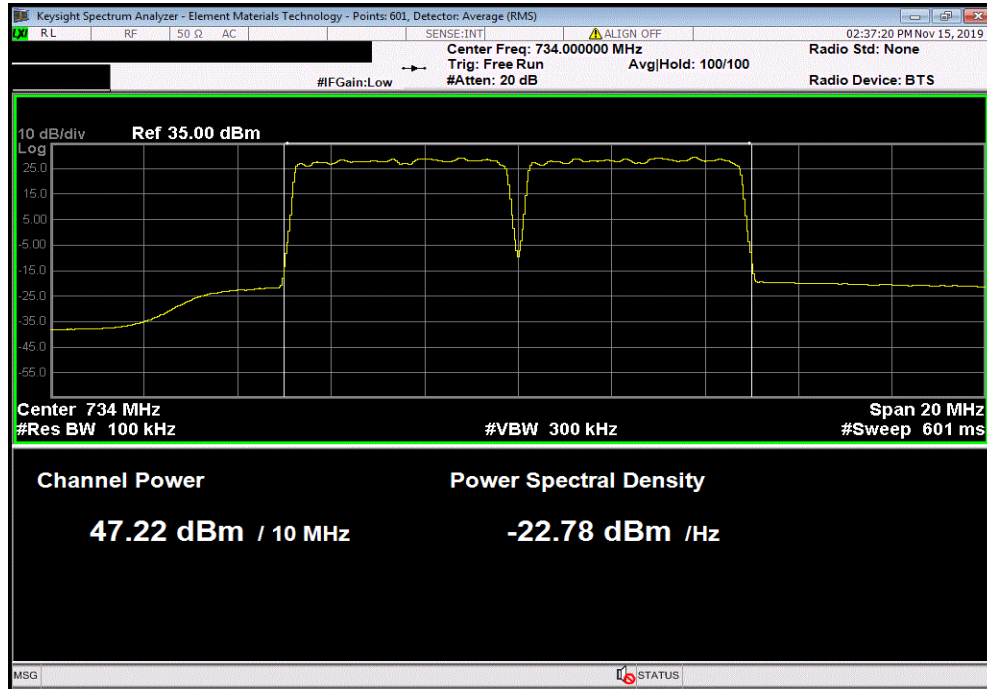


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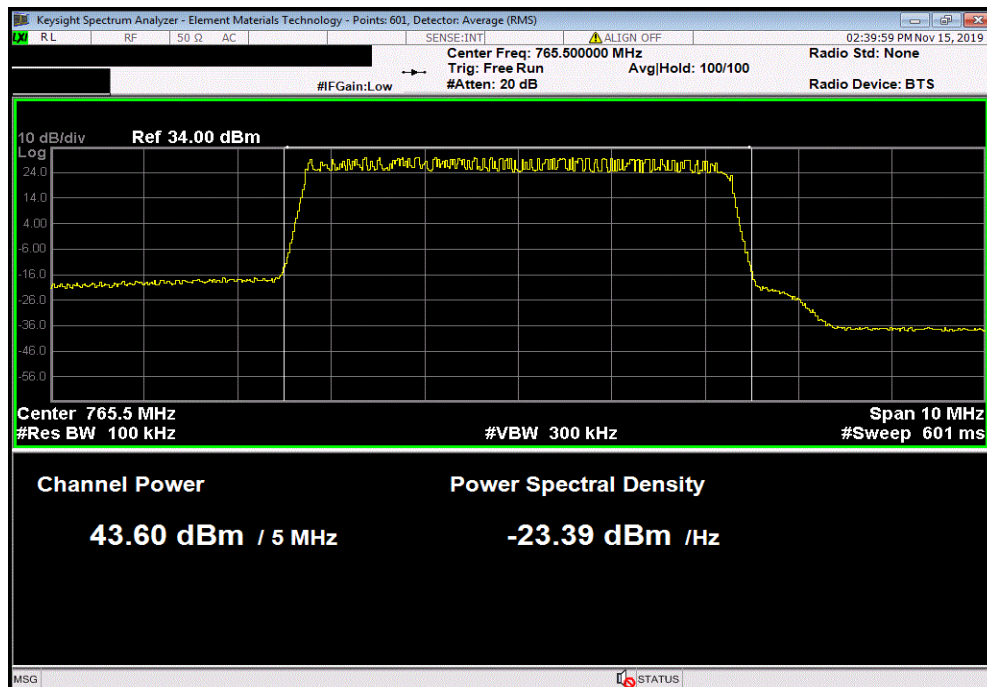


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Chanel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.22	0	47.2	1000	Pass		



Band 14, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.6	0	43.6	1000	Pass		

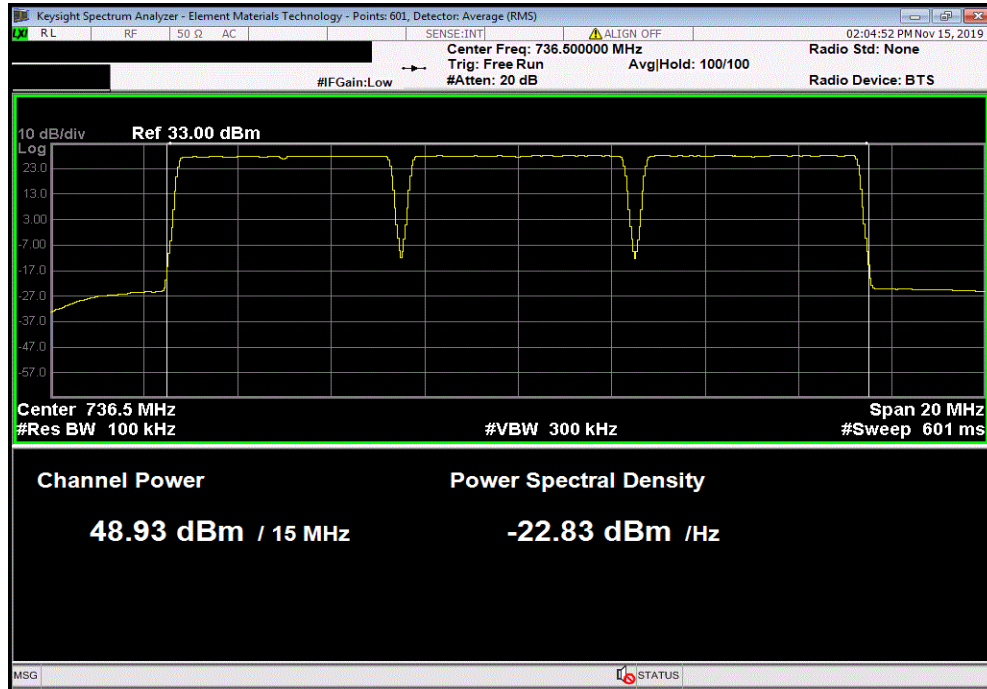


AVERAGE POWER

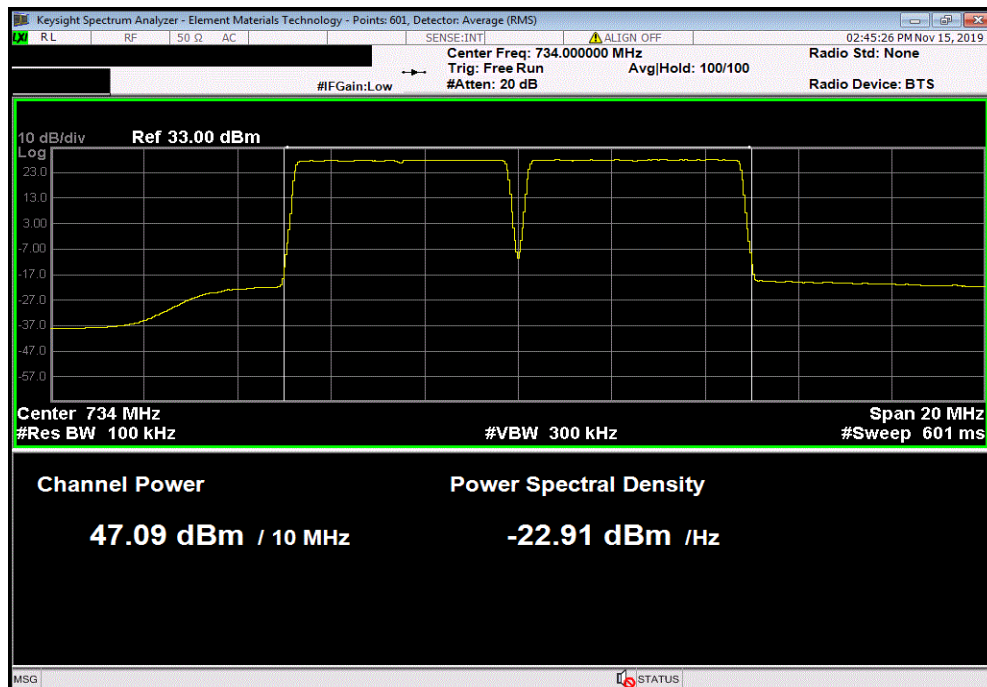


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.93	0	48.9	1000	Pass		



Band 12, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Chanel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.09	0	47.1	1000	Pass		

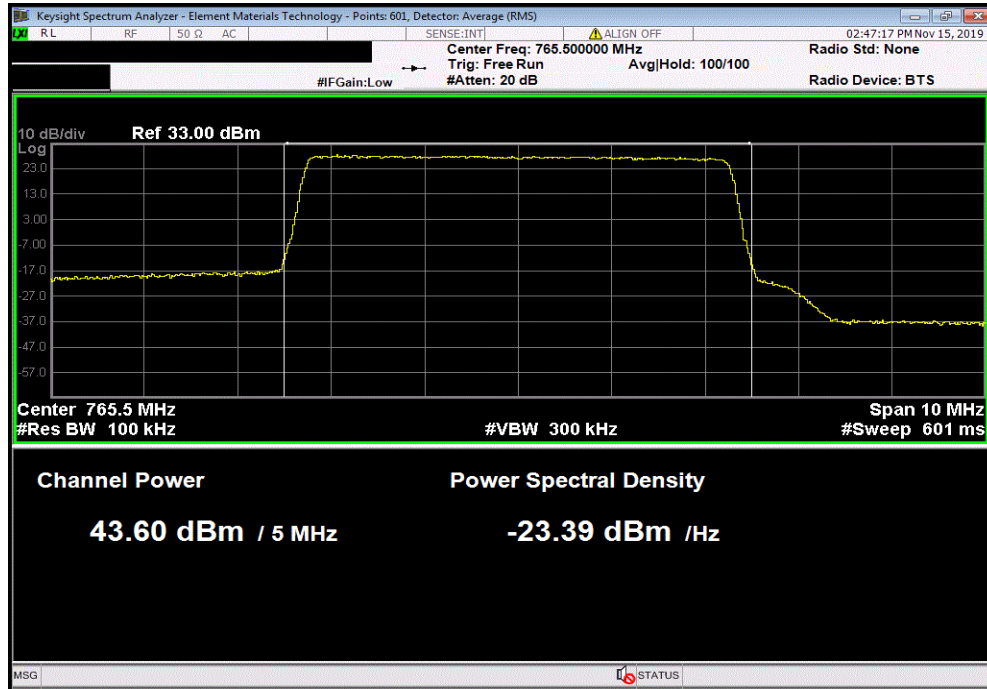


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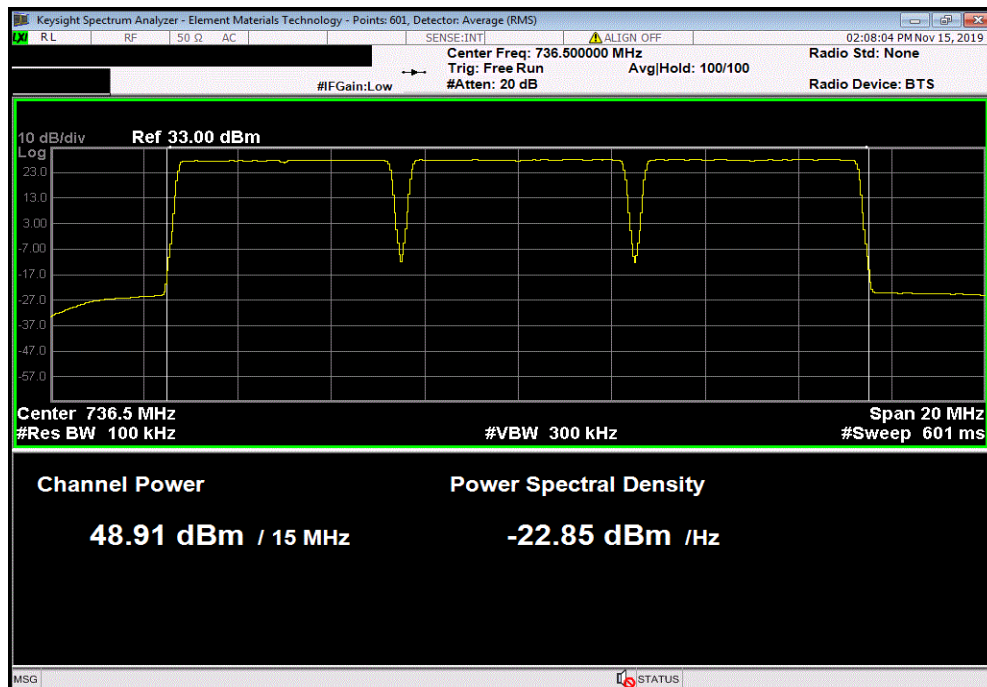


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Band 14, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.6	0	43.6	1000	Pass		



Band 12, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 736.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.91	0	48.9	1000	Pass		

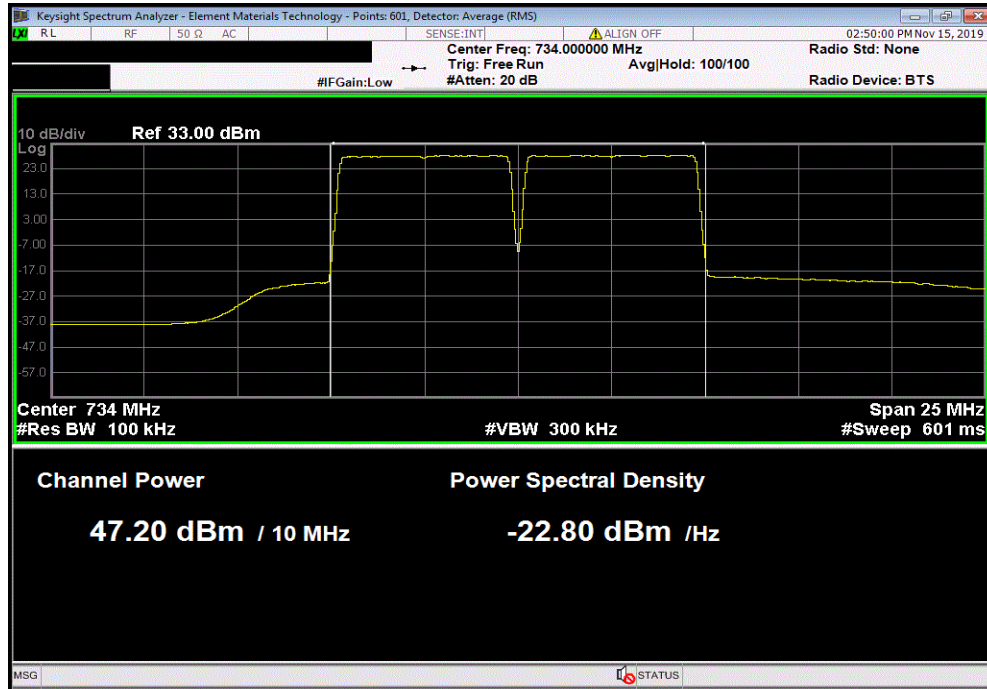


AVERAGE POWER

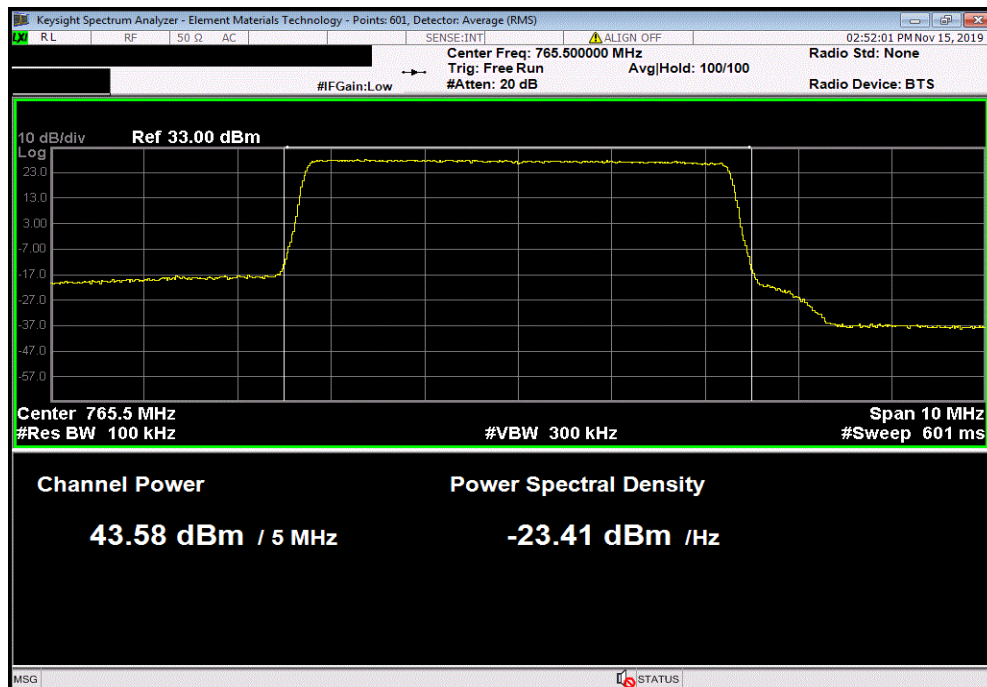


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Chanel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.2	0	47.2	1000	Pass		



Band 14, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.58	0	43.6	1000	Pass		



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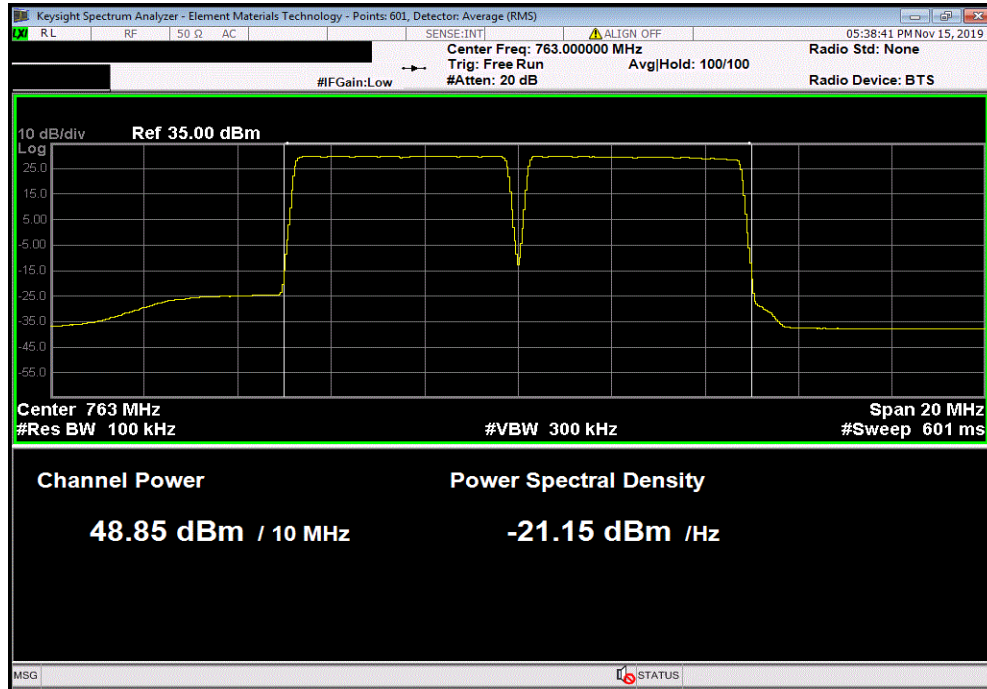
EUT: AHLBBA RRRH		Work Order: NOKI0004	
Serial Number: K9193514835		Date: 19-Nov-19	
Customer: Nokia Solutions and Networks		Temperature: 24 °C	
Attendees: John Rattanavong		Humidity: 31.9% RH	
Project: None		Barometric Pres.: 1015 mbar	
Tested by: Jonathan Kiefer		Job Site: TX09	
Power: 54VDC			
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FCC 27:2019		ANSI C63.26:2015	
FCC 90:2019		ANSI C63.26:2015	
COMMENTS			
Band 14 Multicarrier average power measurements. Tested on highest power antenna port (Port 1). EUT is operated at 100% duty cycle. ERP depends on antenna gain, which is unknown. Only the highest dBm value is plotted per customer requirements and a Watt/MHz calculation was not made due to the unknown antenna value. Average power measurements were made for the multicarrier test cases on four modulation types (QPSK, 16QAM, 64QAM, 256QAM):			
The first multicarrier test case is with two Band 14 LTE5 carriers at the lower and upper band edge channels [760.5MHz and 765.5MHz]. Two carriers cover the entire Band 14 channel bandwidth so three carrier operation is not available.			
The second multicarrier test case is with three Band 12/Band 14 LTE5 carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the Band 12 lower band edge [731.5MHz and 736.5MHz] and a third carrier with maximum spacing between the other two carrier frequencies [765.5MHz] at the Band 14 upper band edge.			
The third multicarrier test case is with three Band 29/Band 14 LTE5 carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the Band 29 lower band edge [720.5MHz and 725.5MHz] and a third carrier with maximum spacing between the other two carrier frequencies [765.5MHz] at the Band 14 upper band edge.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Jonathan Kiefer</i>	
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)
		Value (dBm)	Limit (W ERP/MHz)
			Results
Band 14			
QPSK Modulation			
LTE5 Bandwidth			
Multicarrier Test Case 1			
Mid Channel, 763.0 MHz		48.848	0
		48.8	1000
			Pass
Multicarrier Test Case 2			
Mid Channel, 734.0 MHz		47.305	0
		47.3	1000
			Pass
Mid Channel, 765.5 MHz		43.57	0
		43.6	1000
			Pass
Multicarrier Test Case 3			
Mid Channel, 765.5 MHz		48.45	0
		48.45	1000
			Pass
Mid Channel, 723.0 MHz		43.81	0
		43.81	1000
			Pass
16QAM Modulation			
LTE5 Bandwidth			
Multicarrier Test Case 1			
Mid Channel, 763.0 MHz		48.84	0
		48.8	1000
			Pass
Multicarrier Test Case 2			
Mid Channel, 734.0 MHz		47.29	0
		47.3	1000
			Pass
Mid Channel, 765.5 MHz		43.57	0
		43.6	1000
			Pass
Multicarrier Test Case 3			
Mid Channel, 765.5 MHz		48.44	0
		48.44	1000
			Pass
Mid Channel, 723.0 MHz		43.7	0
		43.7	1000
			Pass
64QAM Modulation			
LTE5 Bandwidth			
Multicarrier Test Case 1			
Mid Channel, 763.0 MHz		48.85	0
		48.8	1000
			Pass
Multicarrier Test Case 2			
Mid Channel, 734.0 MHz		47.31	0
		47.3	1000
			Pass
Mid Channel, 765.5 MHz		43.58	0
		43.6	1000
			Pass
Multicarrier Test Case 3			
Mid Channel, 765.5 MHz		48.44	0
		48.44	1000
			Pass
Mid Channel, 723.0 MHz		43.69	0
		43.69	1000
			Pass
256QAM Modulation			
LTE5 Bandwidth			
Multicarrier Test Case 1			
Mid Channel, 763.0 MHz		48.82	0
		48.8	1000
			Pass
Multicarrier Test Case 2			
Mid Channel, 734.0 MHz		47.33	0
		47.3	1000
			Pass
Mid Channel, 765.5 MHz		43.59	0
		43.6	1000
			Pass
Multicarrier Test Case 3			
Mid Channel, 765.5 MHz		48.43	0
		48.43	1000
			Pass
Mid Channel, 723.0 MHz		43.76	0
		43.76	1000
			Pass

AVERAGE POWER

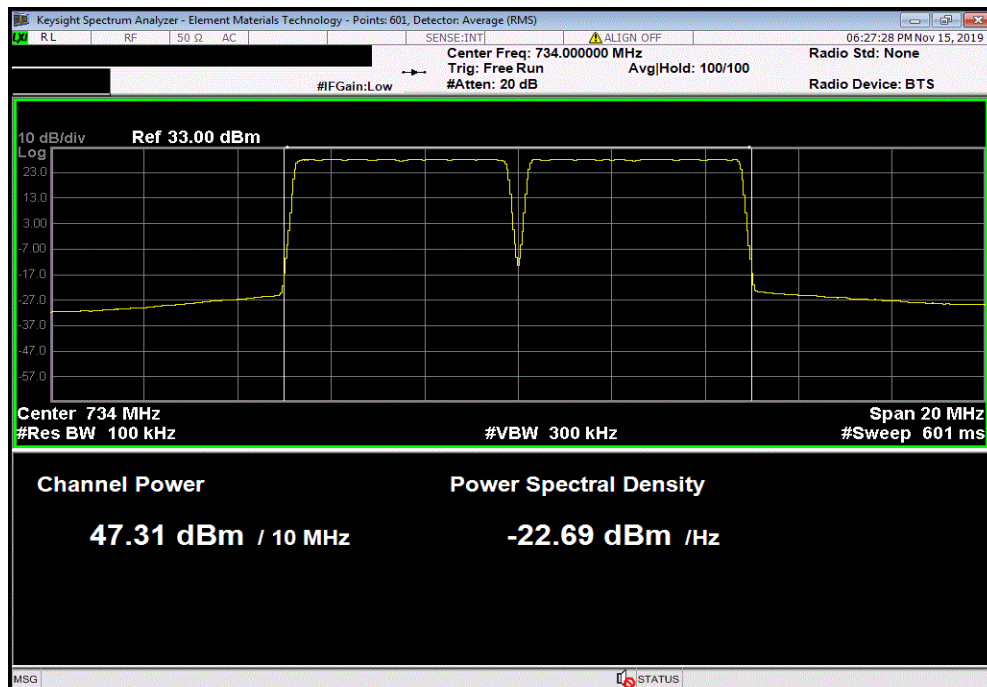


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.85	0	48.8	1000	Pass		



Band 12, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.31	0	47.3	1000	Pass		

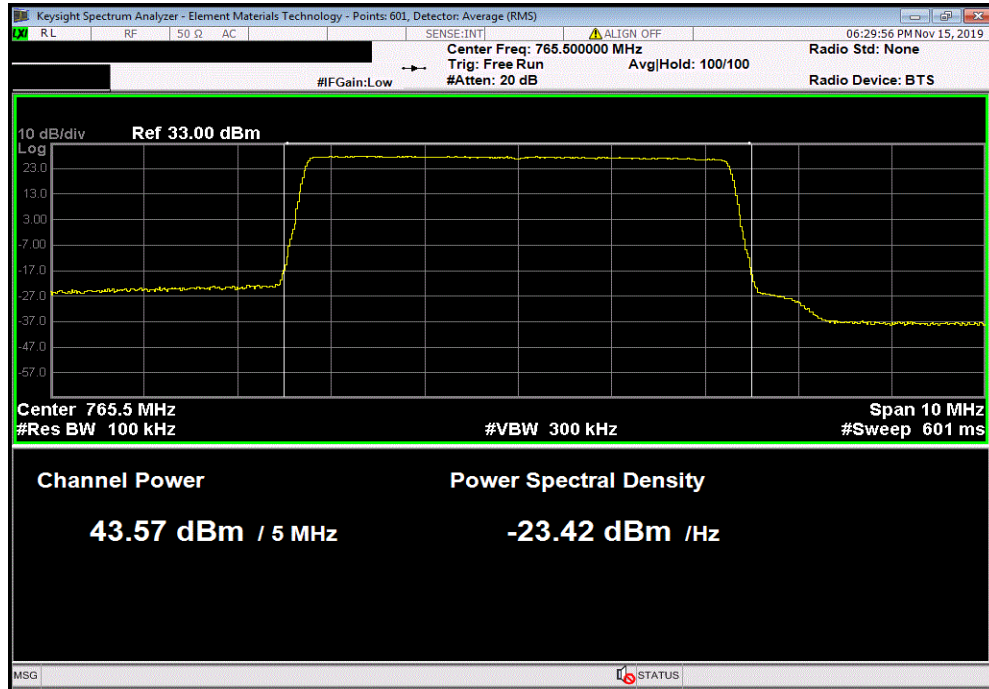


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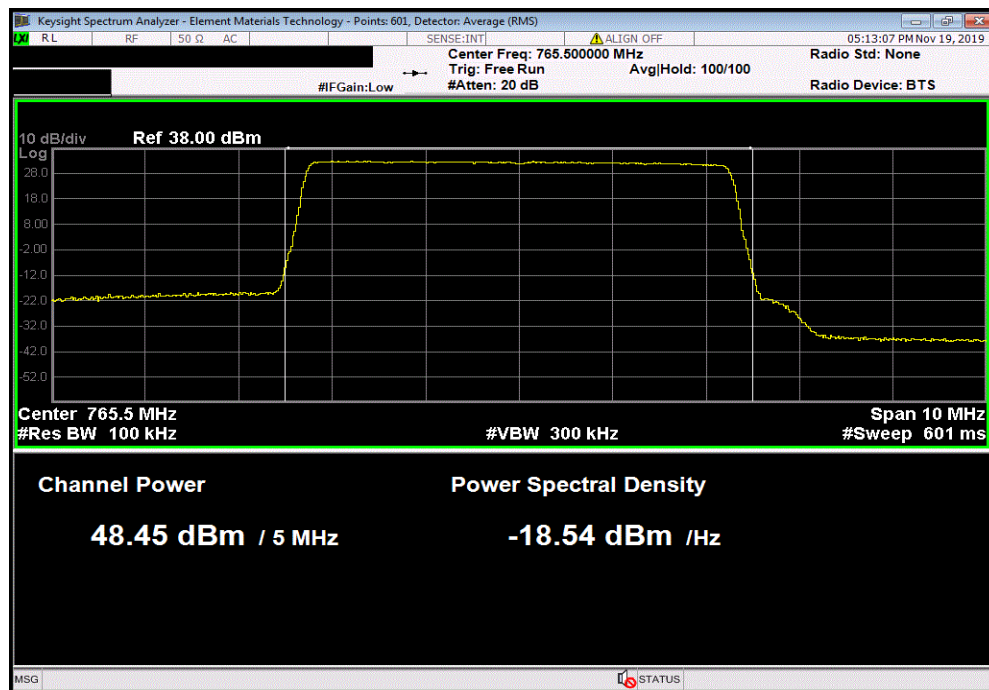


TbTtx 2019.08.30.0 XMI 2019.09.05

Band 14, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.57	0	43.6	1000	Pass		



Band 14, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.45	0	48.45	1000	Pass		

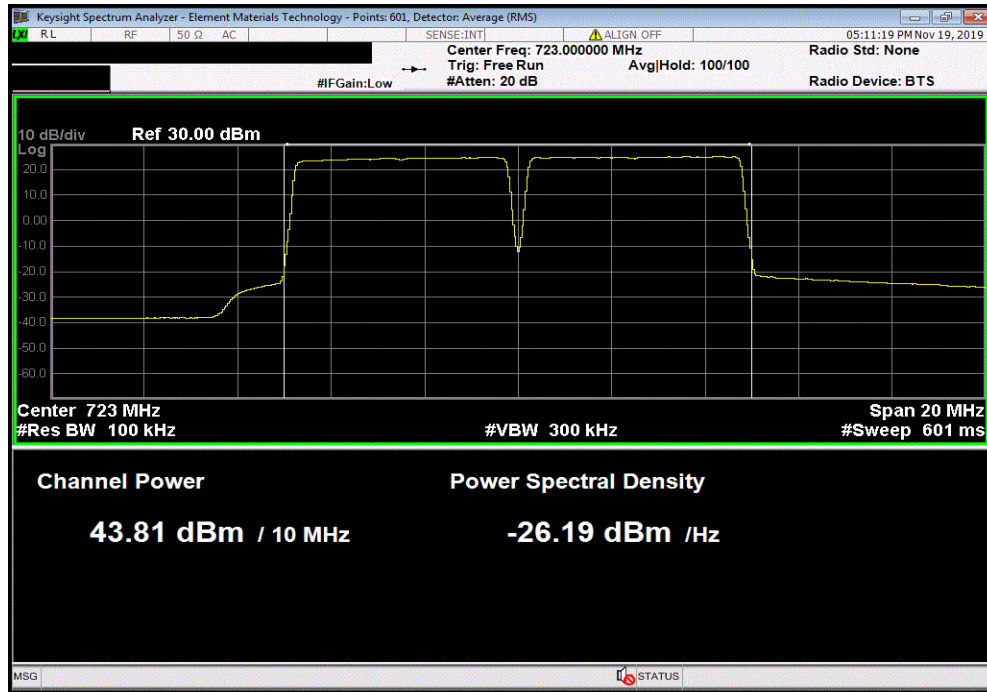


AVERAGE POWER

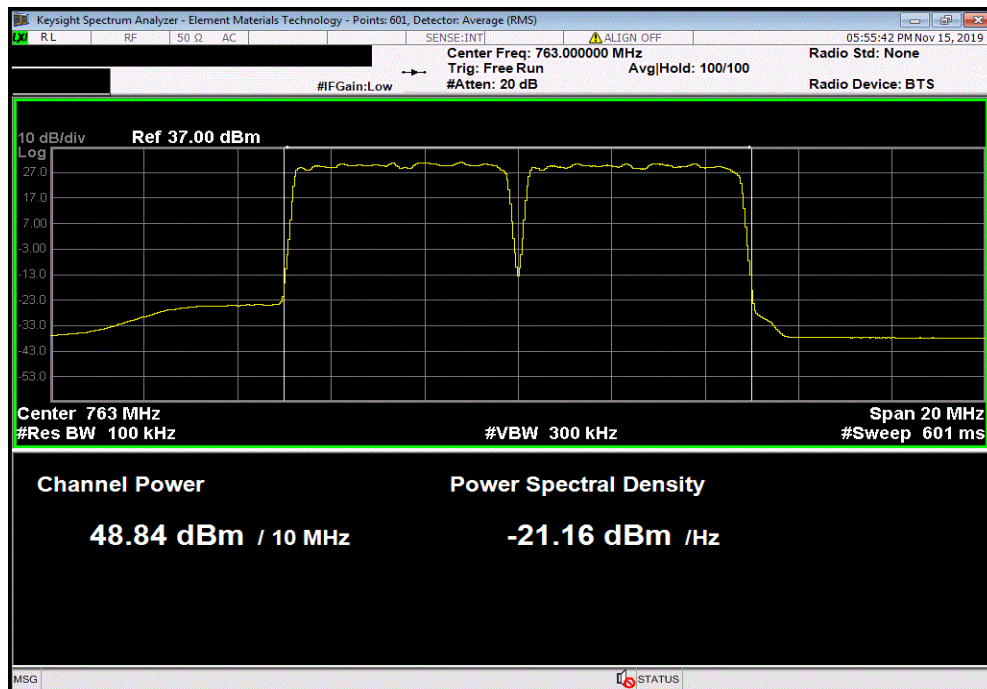


TbTx 2019.08.30.0 XMI 2019.09.05

Band 29, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(W ERP/MHz)		
43.81	0		43.81	1000	Pass	



Band 14, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(W ERP/MHz)		
48.84	0		48.8	1000	Pass	

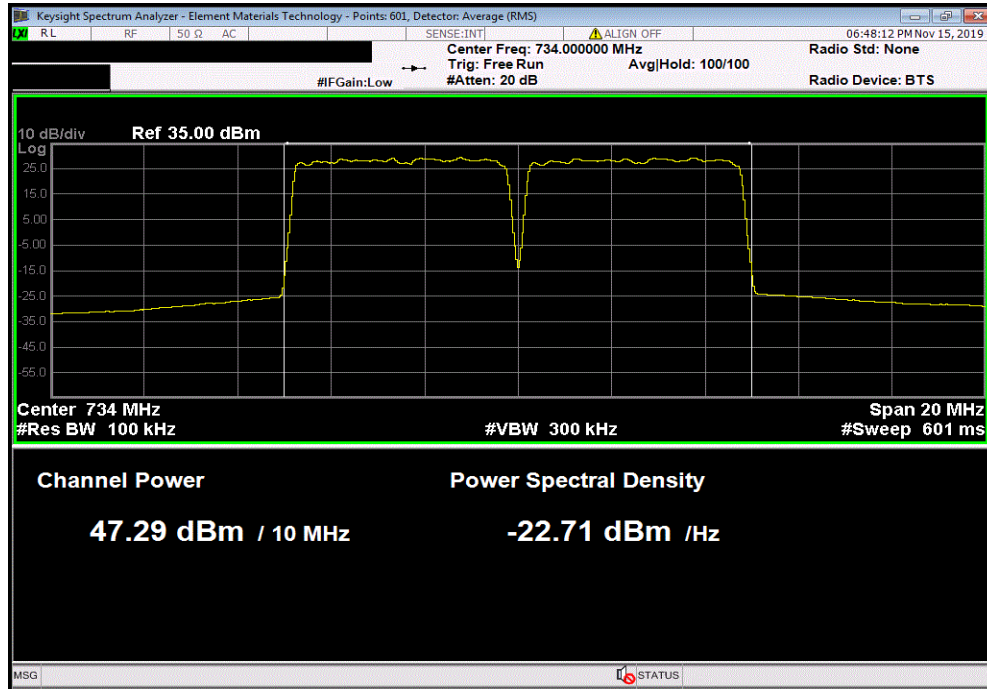


AVERAGE POWER

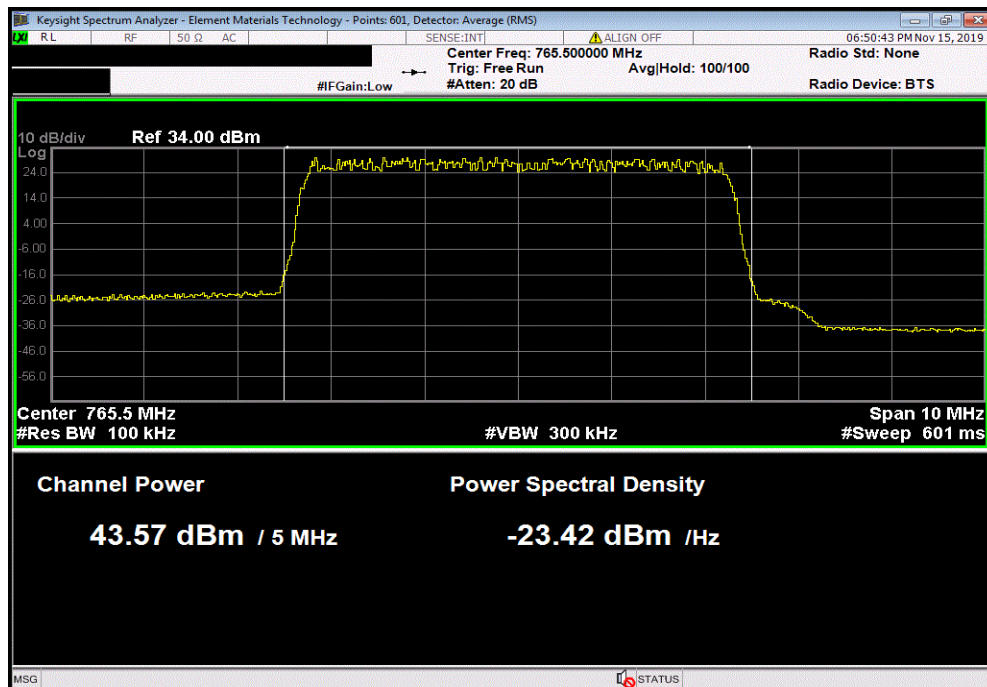


TbTx 2019.08.30.0 XMt 2019.09.05

Band 12, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(W ERP/MHz)		
47.29	0		47.3	1000	Pass	



Band 14, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(W ERP/MHz)		
43.57	0		43.6	1000	Pass	

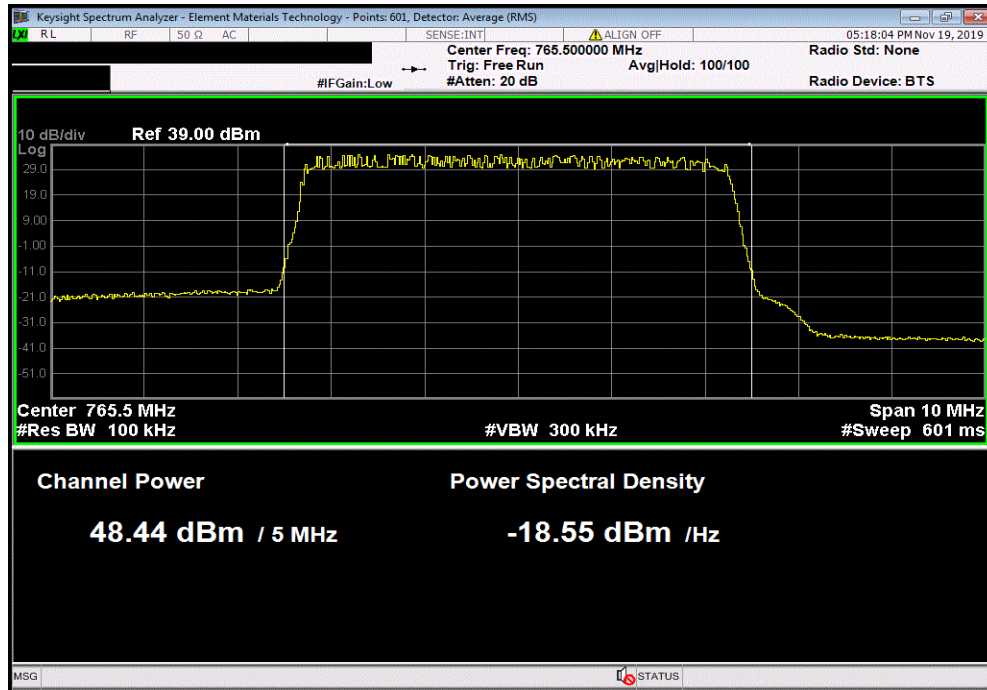


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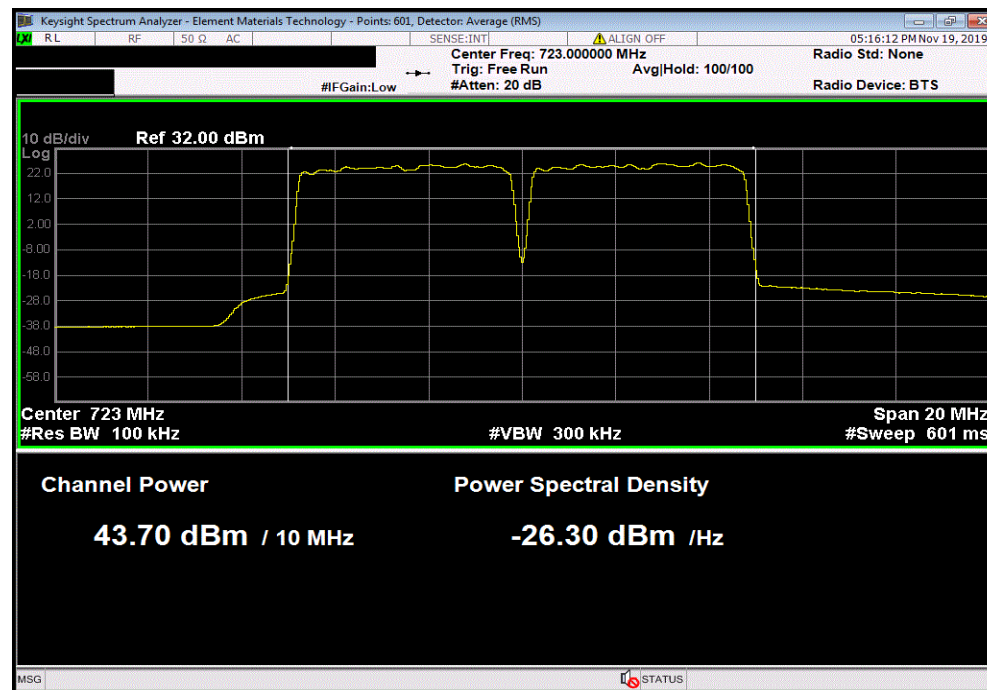


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.44	0	48.44	1000	Pass		



Band 29, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.7	0	43.7	1000	Pass		

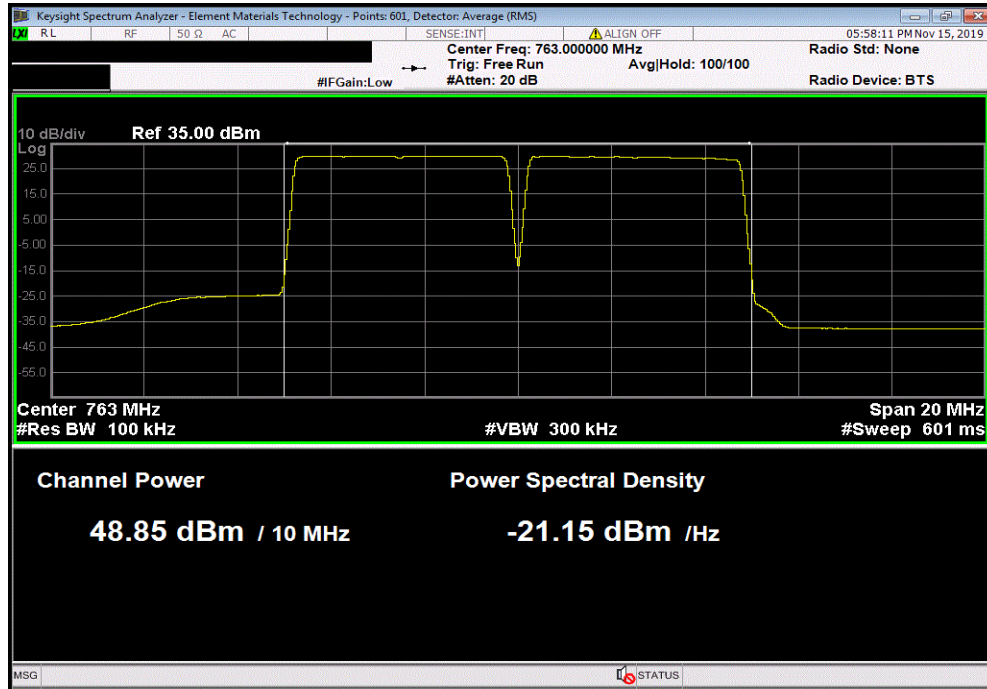


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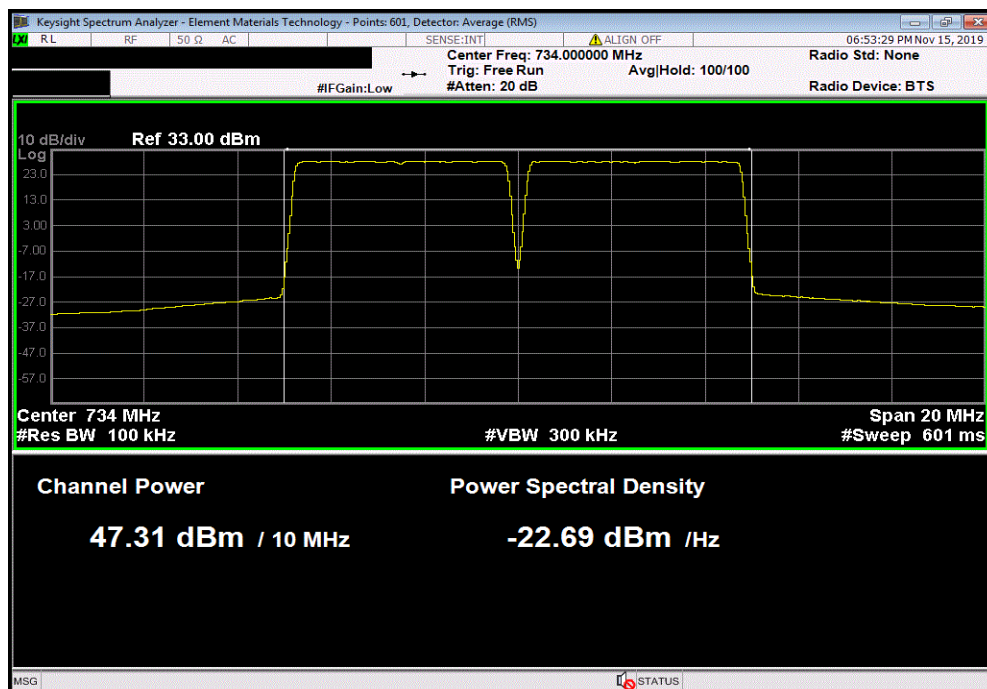


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.85	0	48.8	1000	Pass		



Band 12, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.31	0	47.3	1000	Pass		

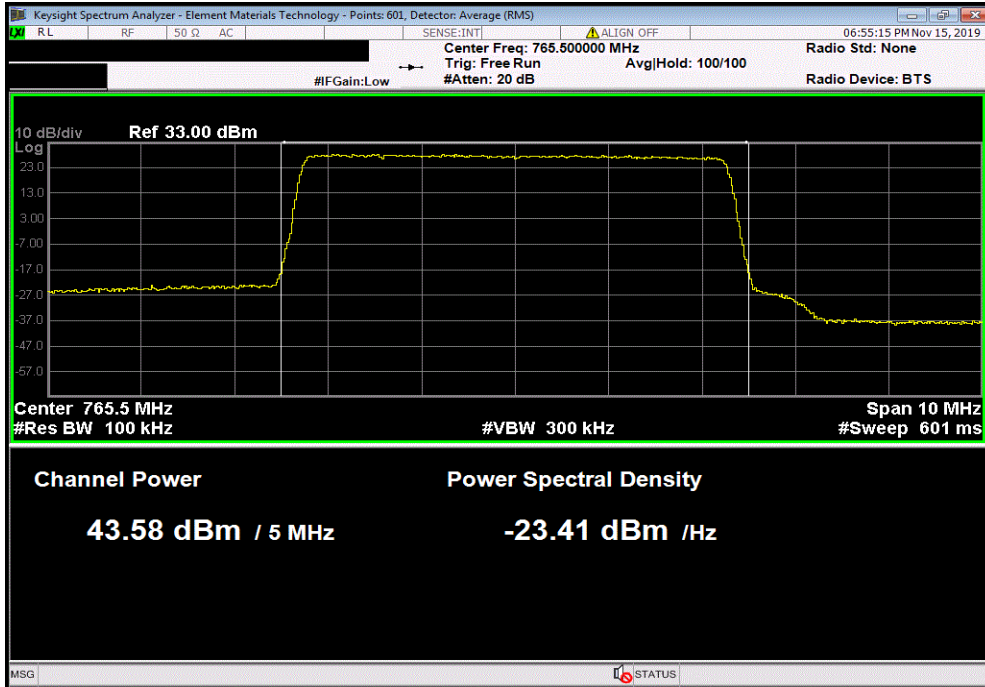


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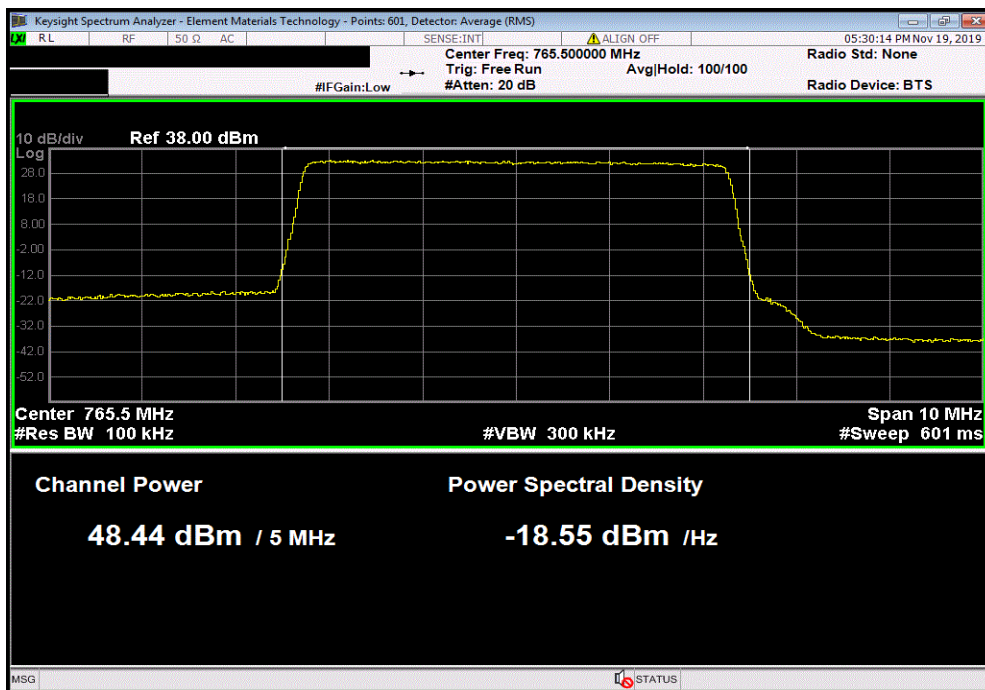


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.58	0	43.6	1000	Pass		



Band 14, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.44	0	48.44	1000	Pass		

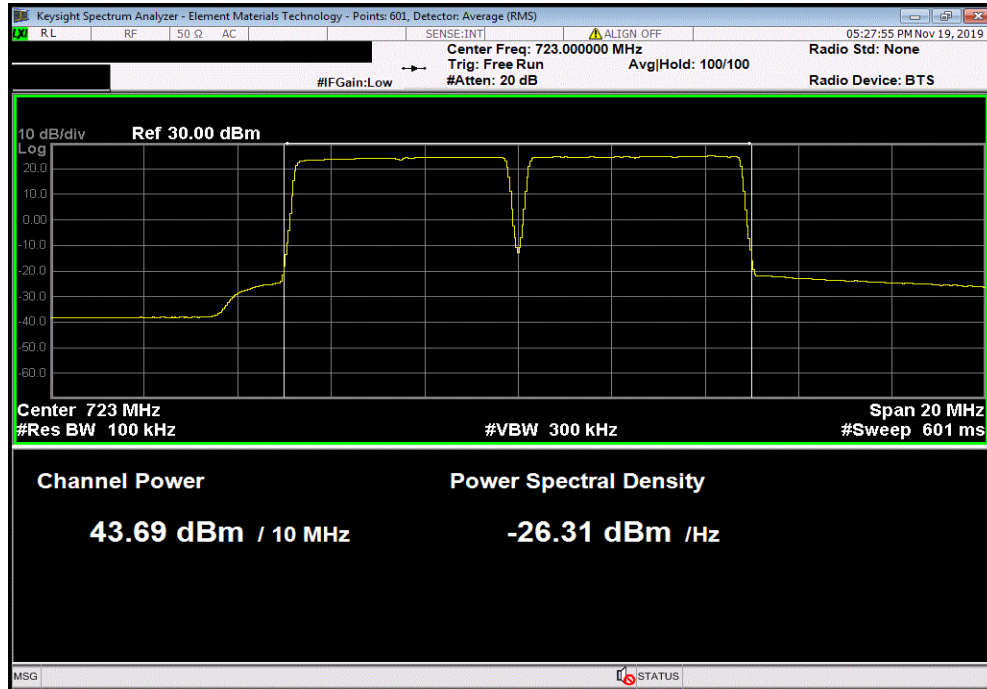


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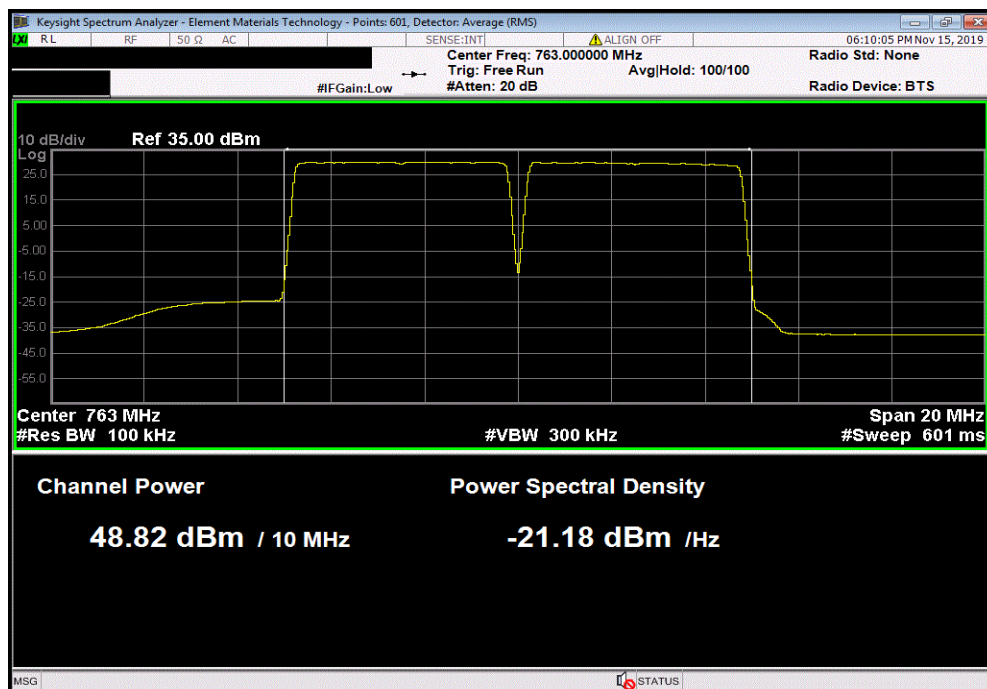


TbTx 2019.08.30.0 XMI 2019.09.05

Band 29, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.69	0	43.69	1000	Pass		



Band 14, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.82	0	48.8	1000	Pass		

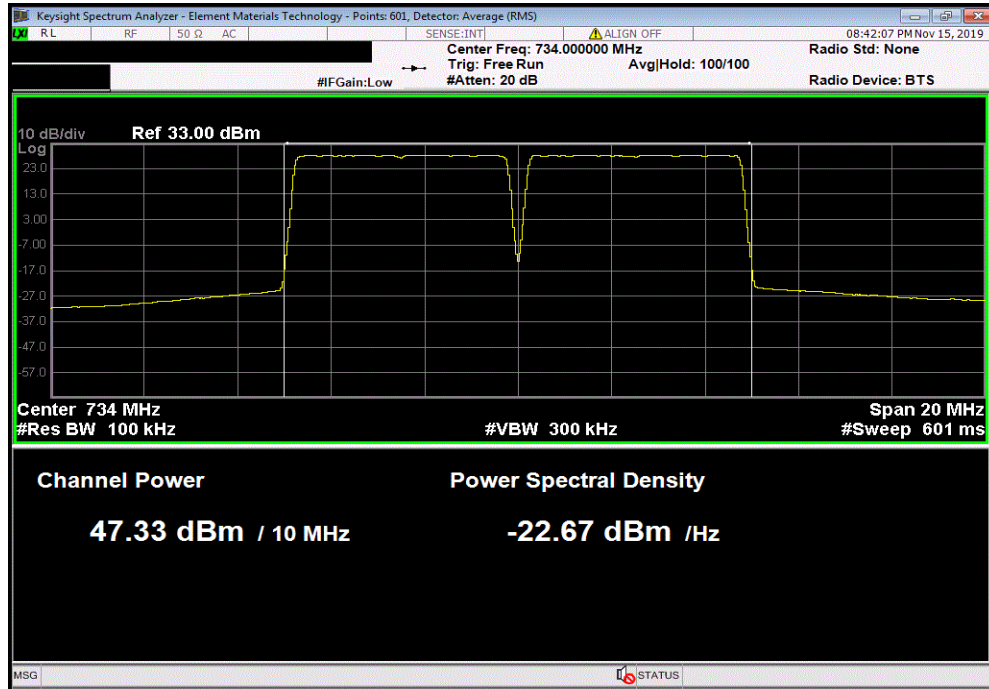


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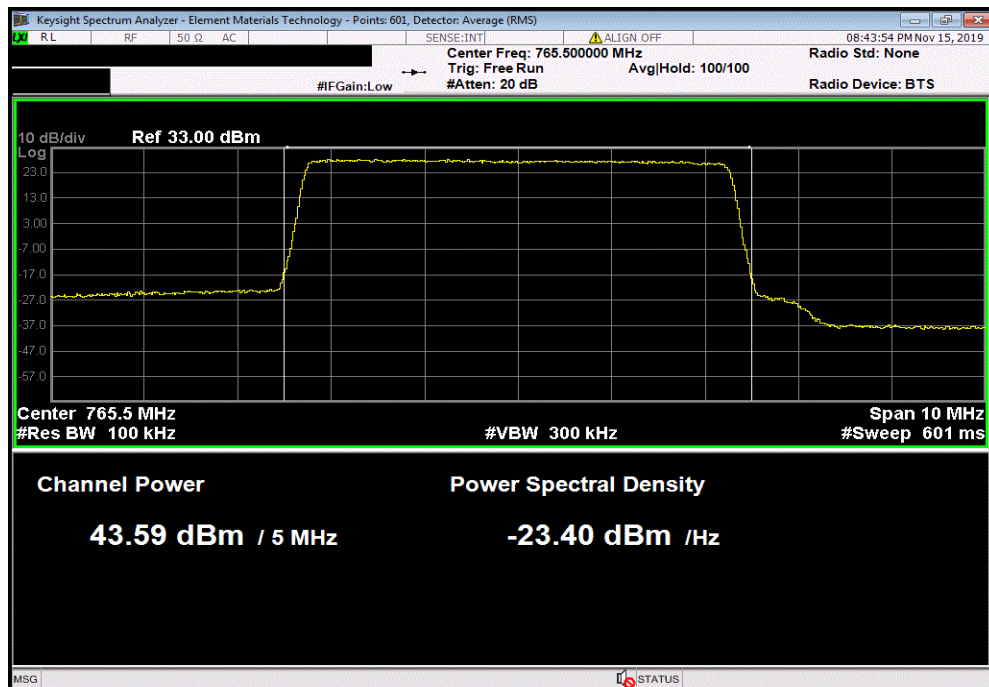


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.33	0	47.3	1000	Pass		



Band 14, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.59	0	43.6	1000	Pass		

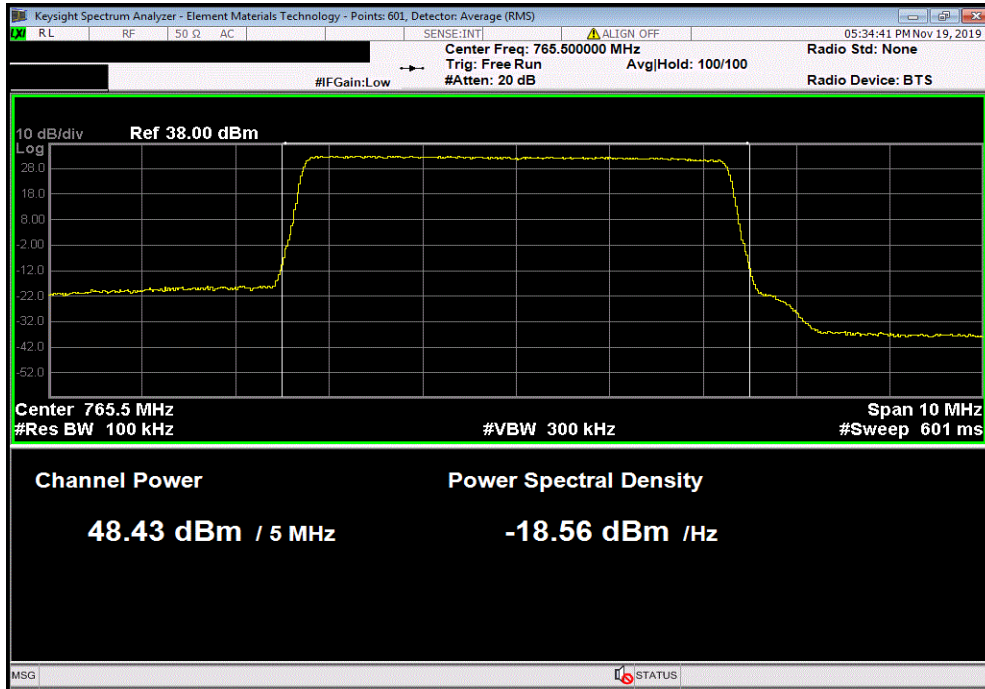


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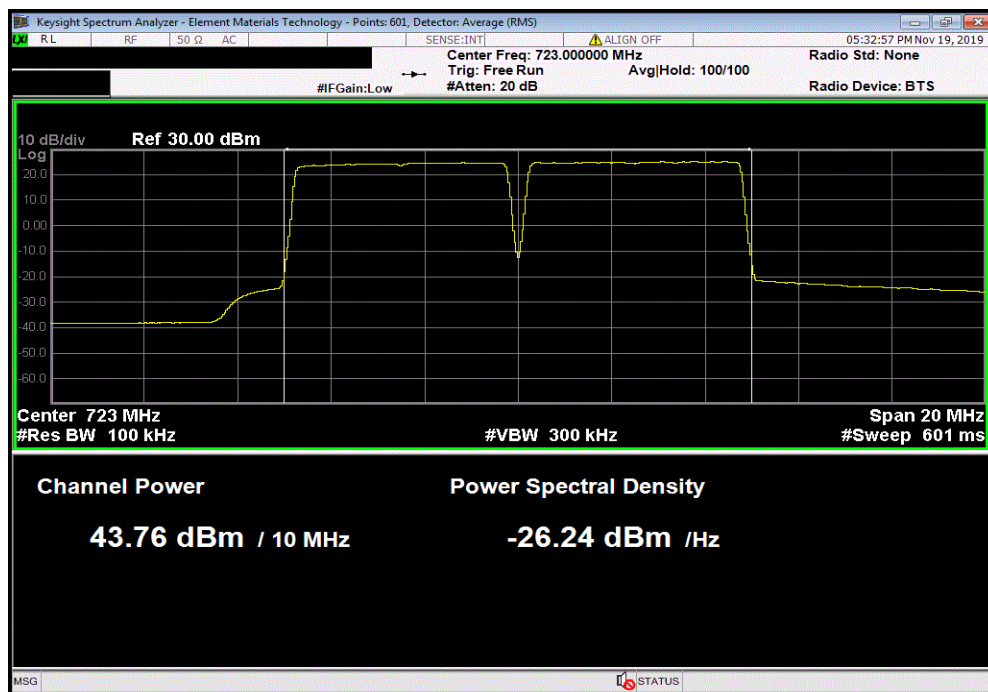


TMTx 2019.08.30.0 XMI 2019.09.05

Band 14, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.43	0	48.43	1000	Pass		



Band 29, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 3, Mid Channel, 723.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.76	0	43.76	1000	Pass		



AVERAGE POWER



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

Per FCC sections 27.50(c)(3) and 90.542, the Effective Radiated Power (ERP) of the transceiver cannot exceed 1000 Watts/MHz.

AVERAGE POWER



TMF 2019.08.30.0 XMI 2019.09.05

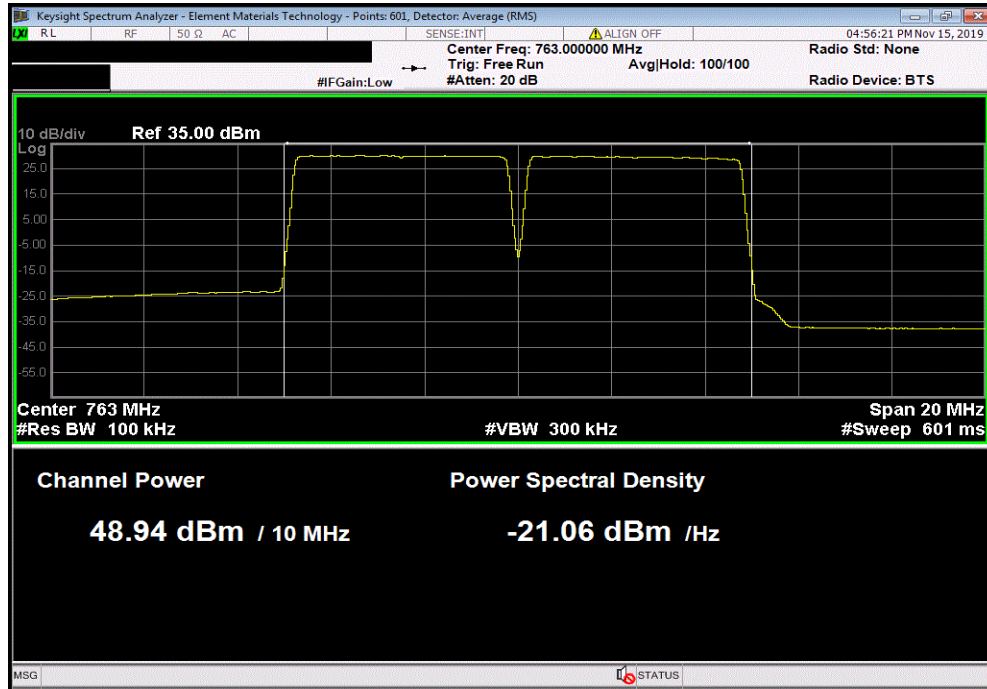
EUT: AHLBBA RRH			Work Order: NOKI0004		
Serial Number: K9193514835			Date: 18-Nov-19		
Customer: Nokia Solutions and Networks			Temperature: 22.6 °C		
Attendees: John Rattanavong			Humidity: 29.9% RH		
Project: None			Barometric Pres.: 1019 mbar		
Tested by: Jonathan Kiefer		Power: 54VDC	Job Site: TX09		
TEST SPECIFICATIONS		Test Method			
FCC 901:2019		ANSI C63.26:2015			
FCC 27:2019		ANSI C63.26:2015			
COMMENTS					
Band 14 Multicarrier average power measurements. Tested on highest power antenna port (Port 2). EUT is operated at 100% duty cycle. ERP depends on antenna gain, which is unknown. Only the highest dBm value is plotted per customer requirements and a Watt/MHz calculation was not made due to the unknown antenna value. Average power measurements were made for the multicarrier test cases on four modulation types (QPSK, 16QAM, 64QAM, 256QAM):					
The first multicarrier test case is with two Band 14 LTE5 carriers at the lower and upper band edge channels [760.5MHz and 765.5MHz]. Two carriers cover the entire Band 14 channel bandwidth so three carrier operation is not available.					
The second multicarrier test case is with three Band 12/Band 14 LTE5 carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the Band 12 lower band edge [731.5MHz and 736.5MHz] and a third carrier with maximum spacing between the other two carrier frequencies [765.5MHz] at the Band 14 upper band edge.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	2	Signature 			
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (W ERP/MHz) Results
Band 14					
QPSK Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 763.0 MHz		48.94	0	48.9	1000 Pass
Multicarrier Test Case 2					
Mid Channel, 734.0 MHz		47.06	0	47.1	1000 Pass
Mid Channel, 765.5 MHz		43.59	0	43.6	1000 Pass
16QAM Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 763.0 MHz		48.86	0	48.9	1000 Pass
Multicarrier Test Case 2					
Mid Channel, 734.0 MHz		47.07	0	47.1	1000 Pass
Mid Channel, 765.5 MHz		43.59	0	43.6	1000 Pass
64QAM Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 763.0 MHz		48.88	0	48.9	1000 Pass
Multicarrier Test Case 2					
Mid Channel, 734.0 MHz		47.16	0	47.2	1000 Pass
Mid Channel, 765.5 MHz		43.59	0	43.6	1000 Pass
256QAM Modulation					
LTE5 Bandwidth					
Multicarrier Test Case 1					
Mid Channel, 763.0 MHz		48.72	0	48.7	1000 Pass
Multicarrier Test Case 2					
Mid Channel, 734.0 MHz		47.05	0	47	1000 Pass
Mid Channel, 765.5 MHz		43.58	0	43.6	1000 Pass

AVERAGE POWER

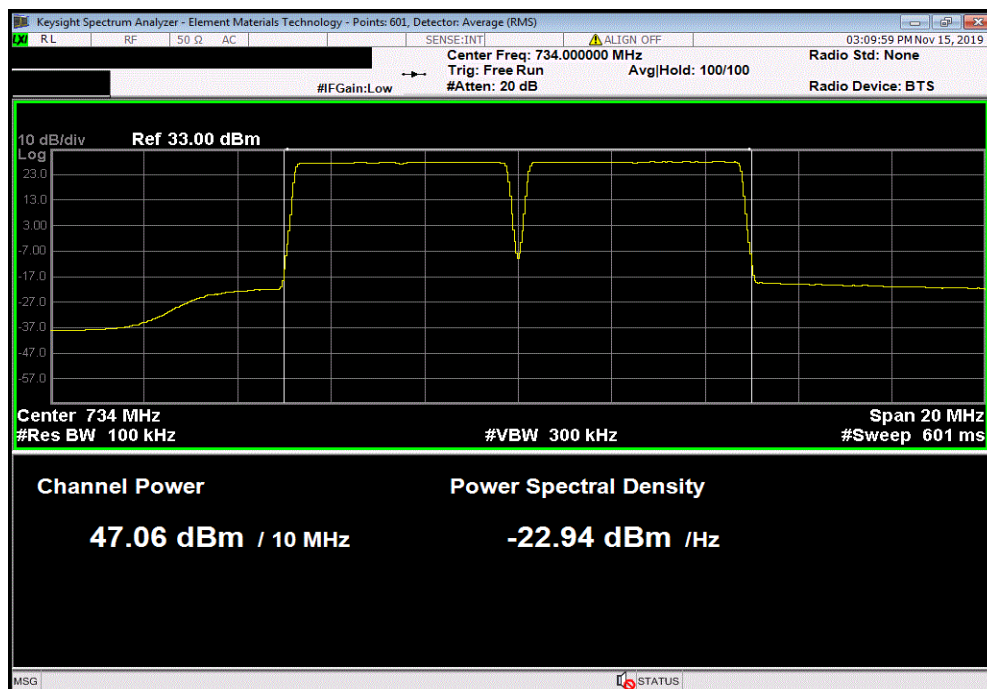


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.94	0	48.9	1000	Pass		



Band 12, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.06	0	47.1	1000	Pass		

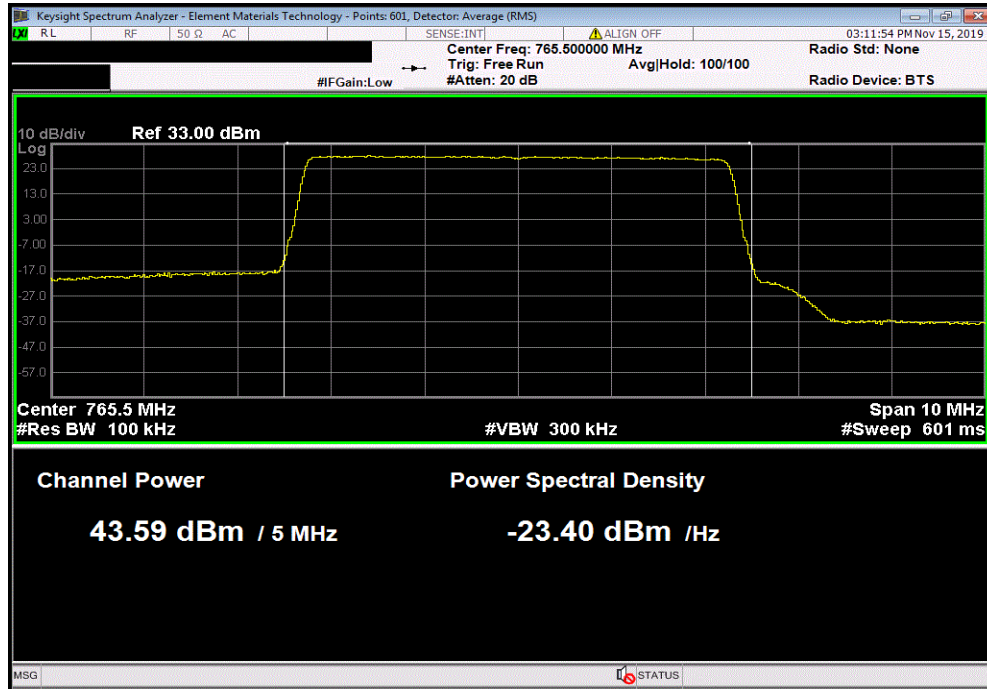


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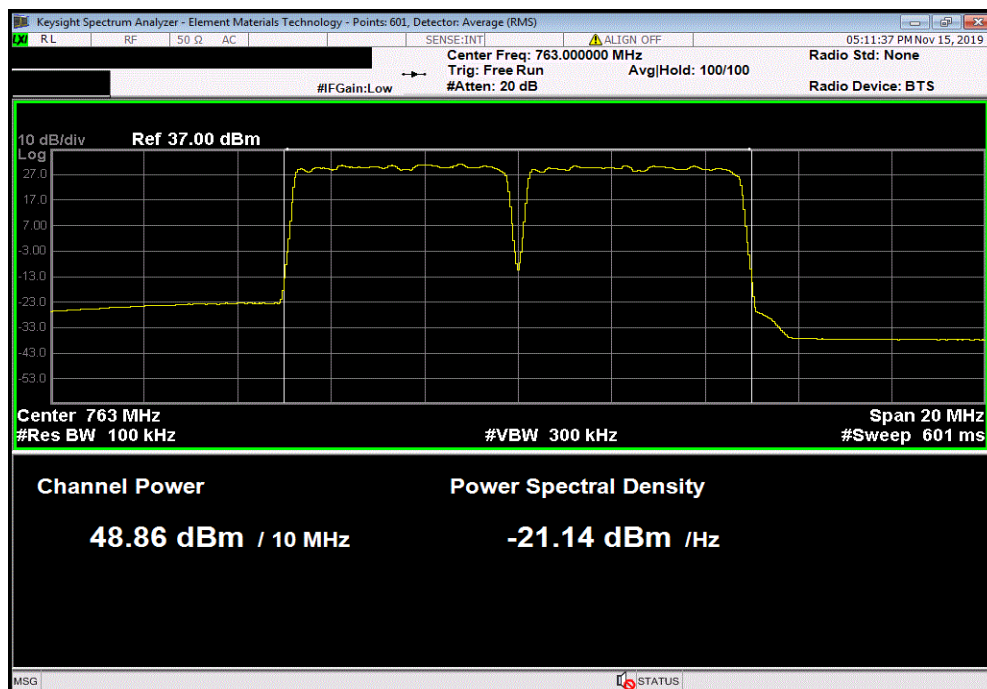


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, QPSK Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.59	0	43.6	1000	Pass		



Band 14, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.86	0	48.9	1000	Pass		

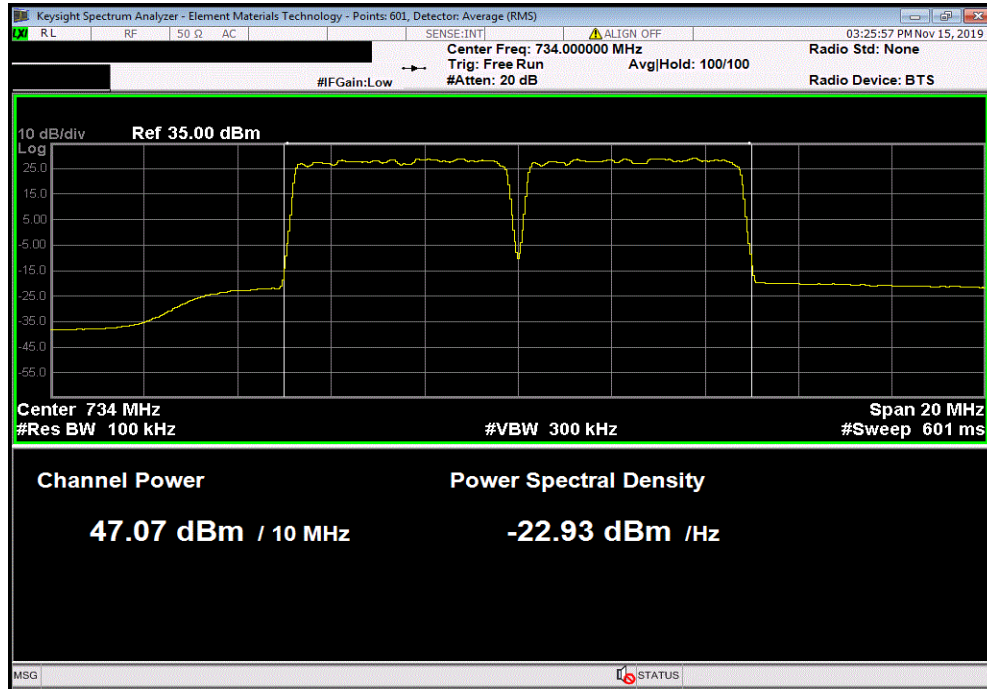


AVERAGE POWER

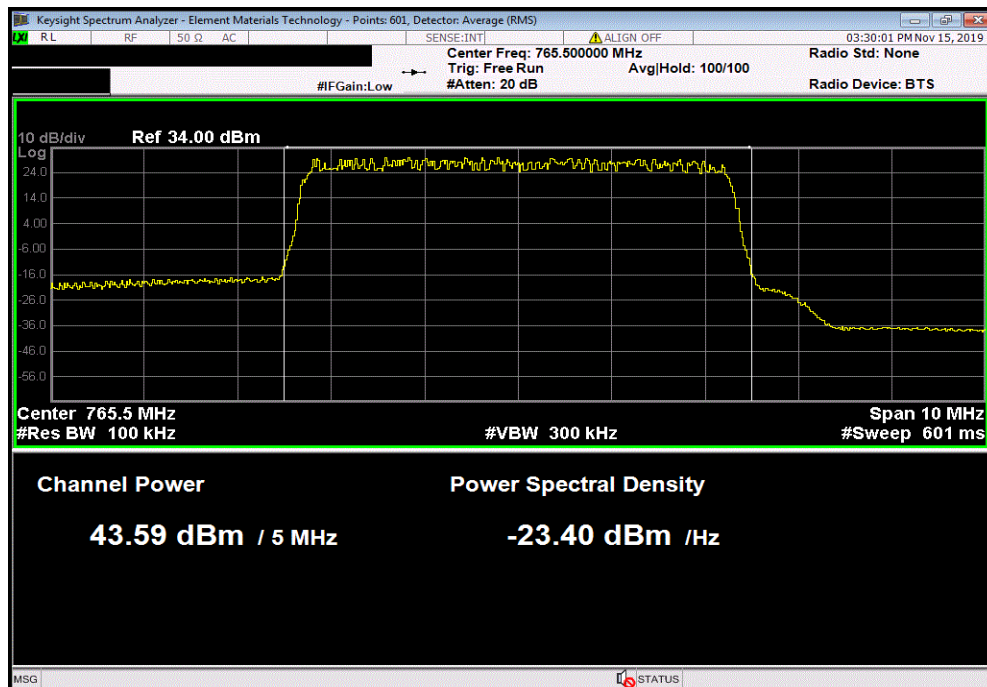


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.07	0	47.1	1000	Pass		



Band 14, 16QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.59	0	43.6	1000	Pass		

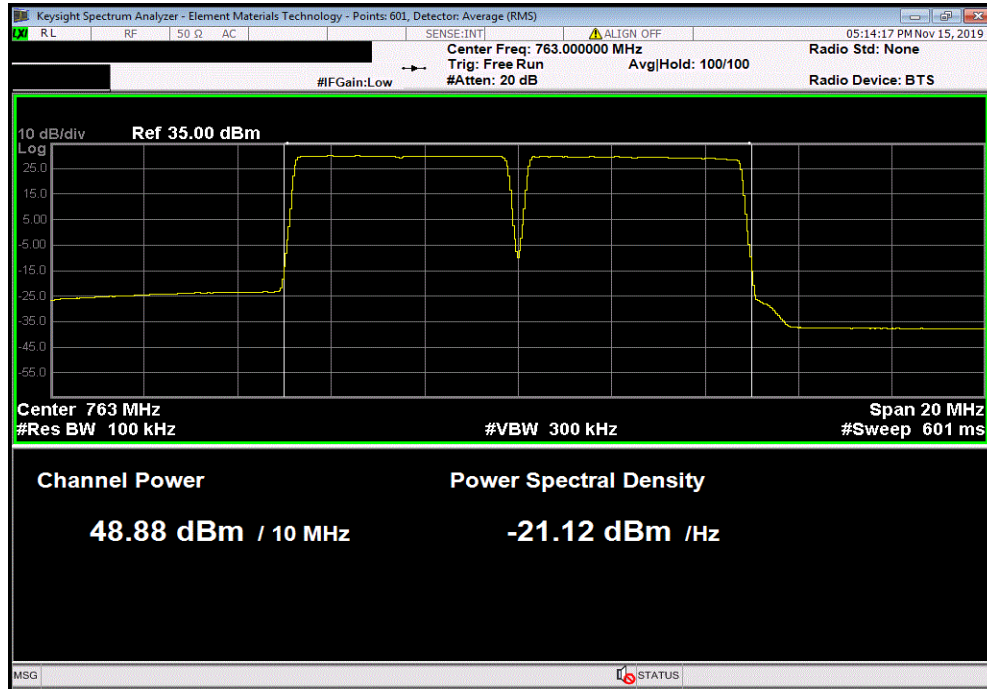


AVERAGE POWER

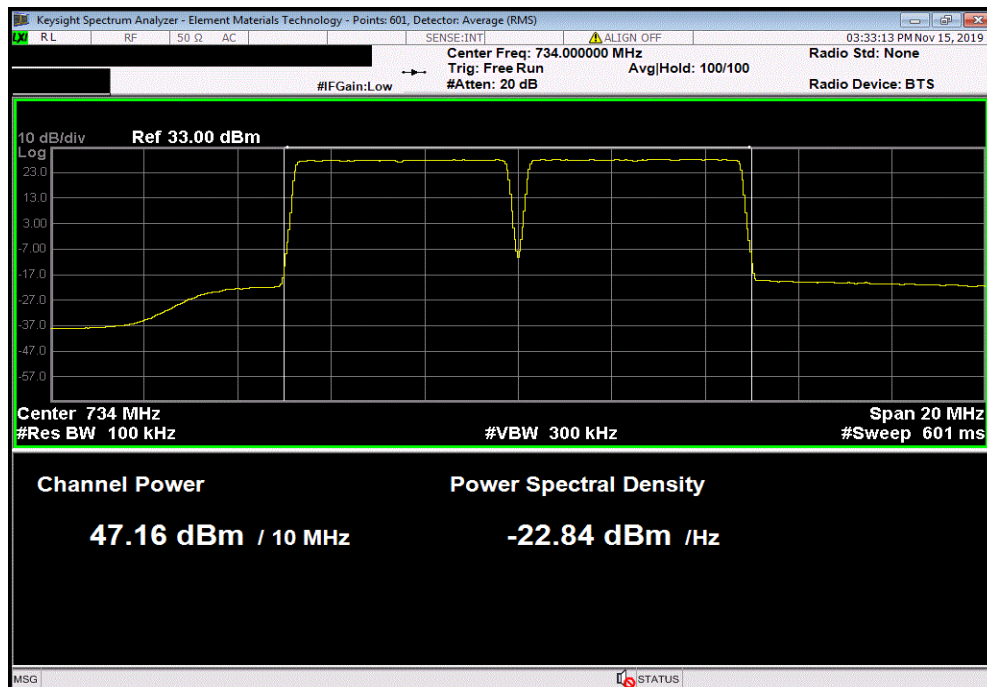


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.88	0	48.9	1000	Pass		



Band 12, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.16	0	47.2	1000	Pass		

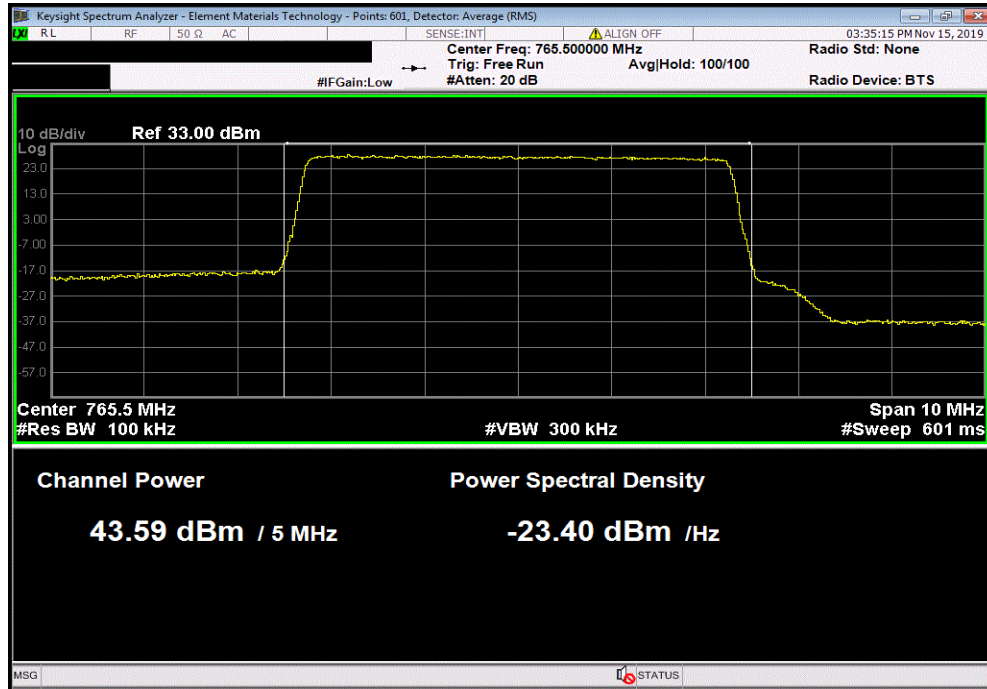


AVERAGE POWER

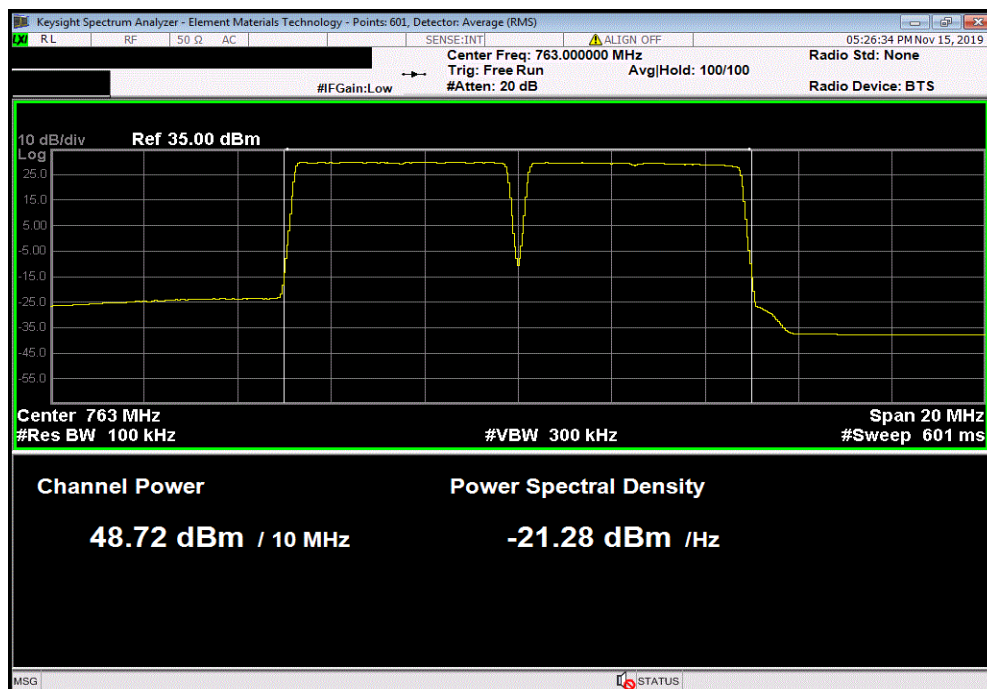


TbTx 2019.08.30.0 XMI 2019.09.05

Band 14, 64QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.59	0	43.6	1000	Pass		



Band 14, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 1, Mid Channel, 763.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
48.72	0	48.7	1000	Pass		

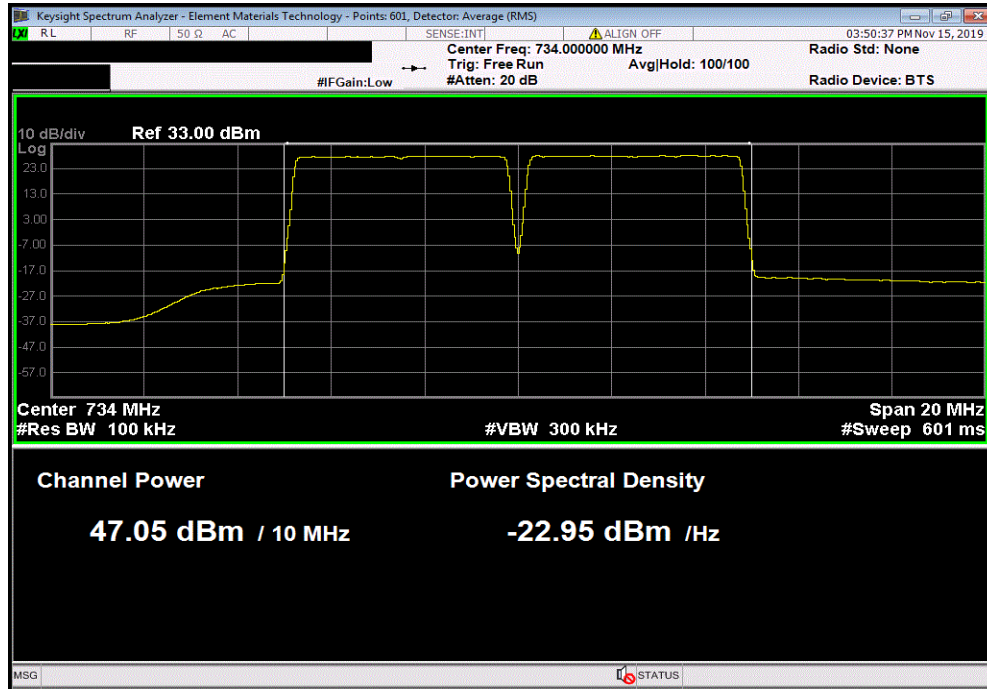


AVERAGE POWER

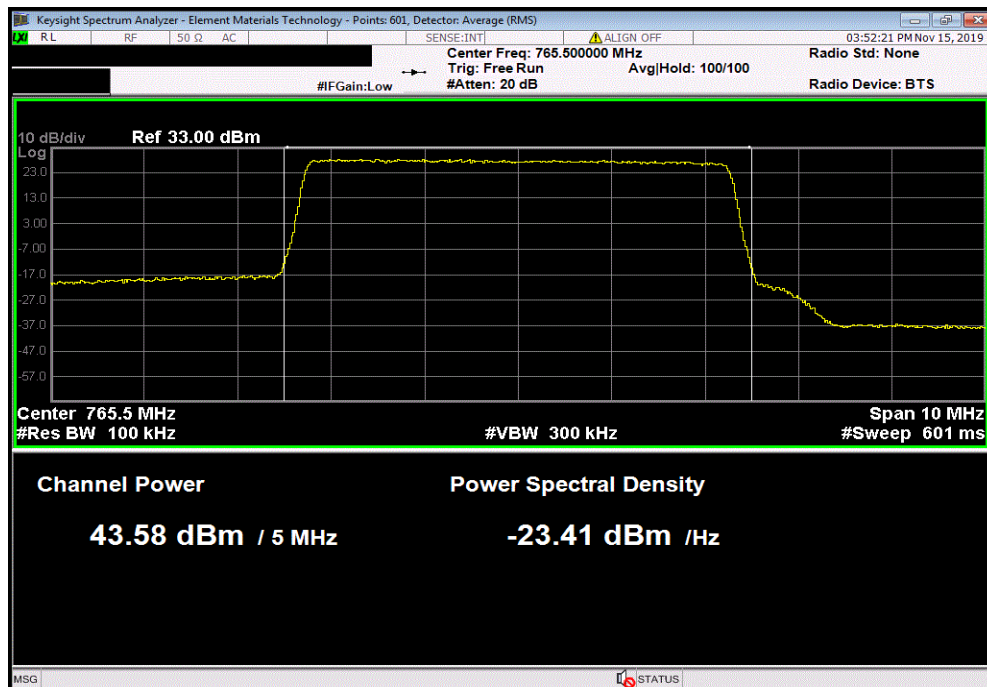


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Band 12, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 734.0 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
47.05	0	47	1000	Pass		



Band 14, 256QAM Modulation, LTE5 Bandwidth, Multicarrier Test Case 2, Mid Channel, 765.5 MHz						
Avg Cond	Duty Cycle	Value	Limit			
Pwr (dBm)	Factor (dB)	(dBm)	(W ERP/MHz)	Results		
43.58	0	43.6	1000	Pass		



PEAK-TO-AVERAGE POWER RATIO (PAPR)



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed 13 dB.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.

The PAPR was measured using the CCDF function of the spectrum analyzer.

PEAK-TO-AVERAGE POWER RATIO (PAPR)



TMTx 2019.08.30.0 XMt 2019.09.05

EUT: AHLBBA RRH		Work Order: NOKI0004	
Serial Number: K9193514835		Date: 18-Nov-19	
Customer: Nokia Solutions and Networks		Temperature: 22.4 °C	
Attendees: John Rattanaavong		Humidity: 29.7% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Jonathan Kiefer		Power: 54VDC	
Job Site: TX09			
TEST SPECIFICATIONS		Test Method	
FCC 27:2019		ANSI C63.26:2015	
COMMENTS			
Band 12 PAPR measurements for LTE5 channel bandwidth at Mid channel using 256QAM on all four antenna ports. EUT is operated at 100% duty cycle.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Jonathan Kiefer</i>	
		PAPR Value (dB)	Limit (dB) Results
Band 12			
256QAM Modulation			
LTE5 Bandwidth			
Mid Channel, 736.5 MHz			
	Antenna Port 1	7.7	13 Pass
	Antenna Port 2	6.7	13 Pass
	Antenna Port 3	6.71	13 Pass
	Antenna Port 4	7.71	13 Pass

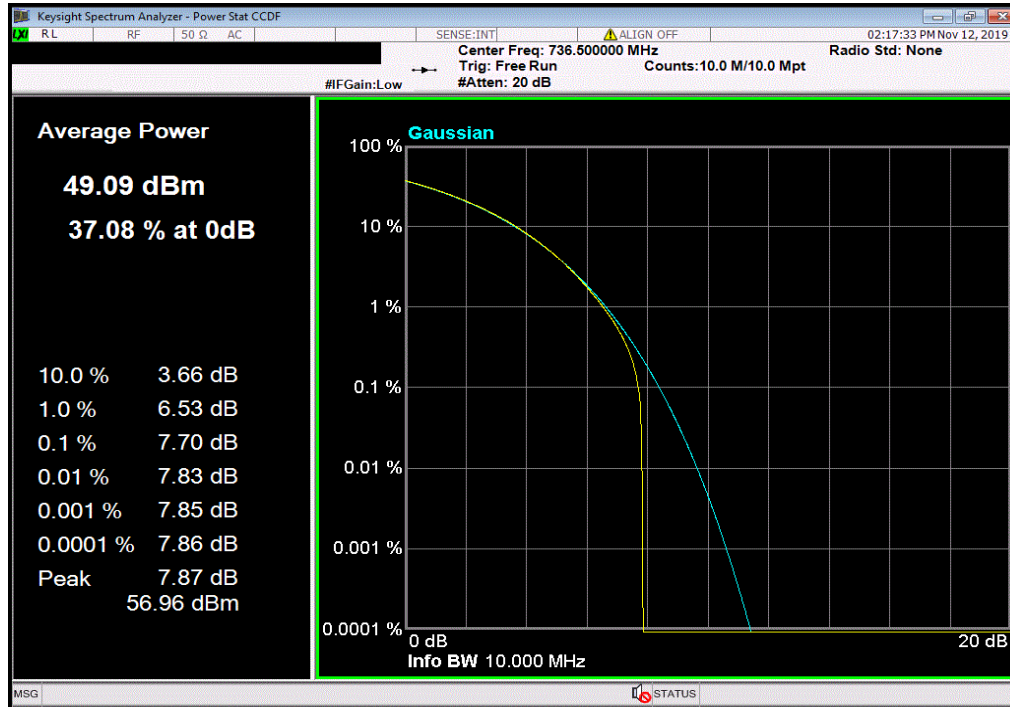
PEAK-TO-AVERAGE POWER RATIO (PAPR)



TbTx 2019.08.30.0 XMI 2019.09.05

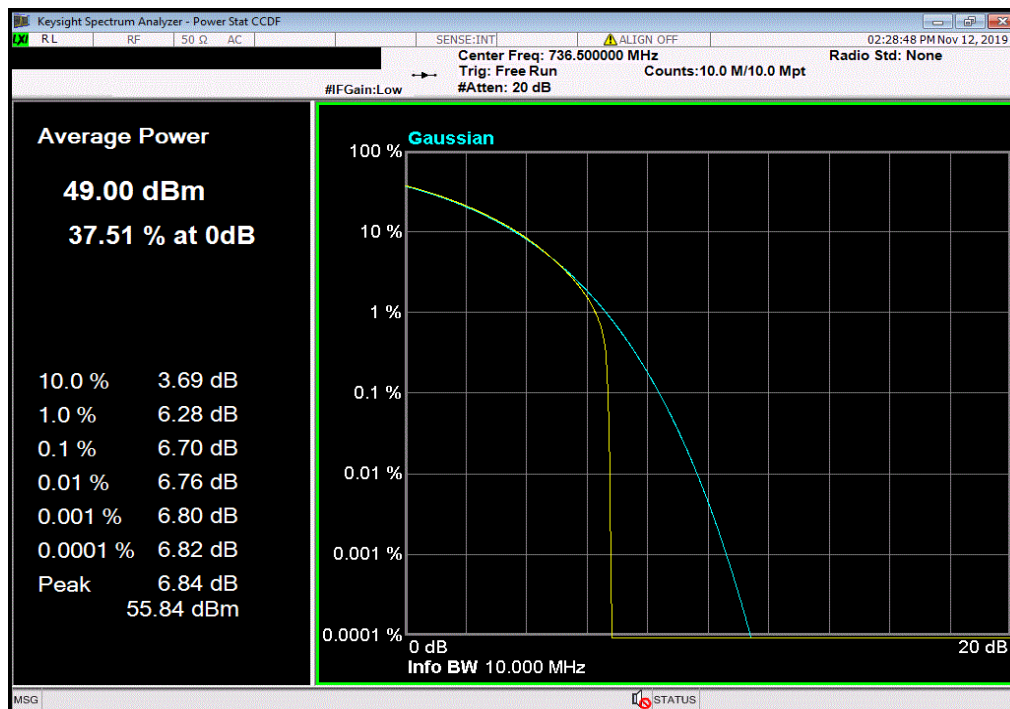
Band 12, 256QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz, Antenna Port 1

			PAPR	Limit	Results
			Value (dB)	(dB)	
			7.7	13	Pass



Band 12, 256QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz, Antenna Port 2

			PAPR	Limit	Results
			Value (dB)	(dB)	
			6.7	13	Pass



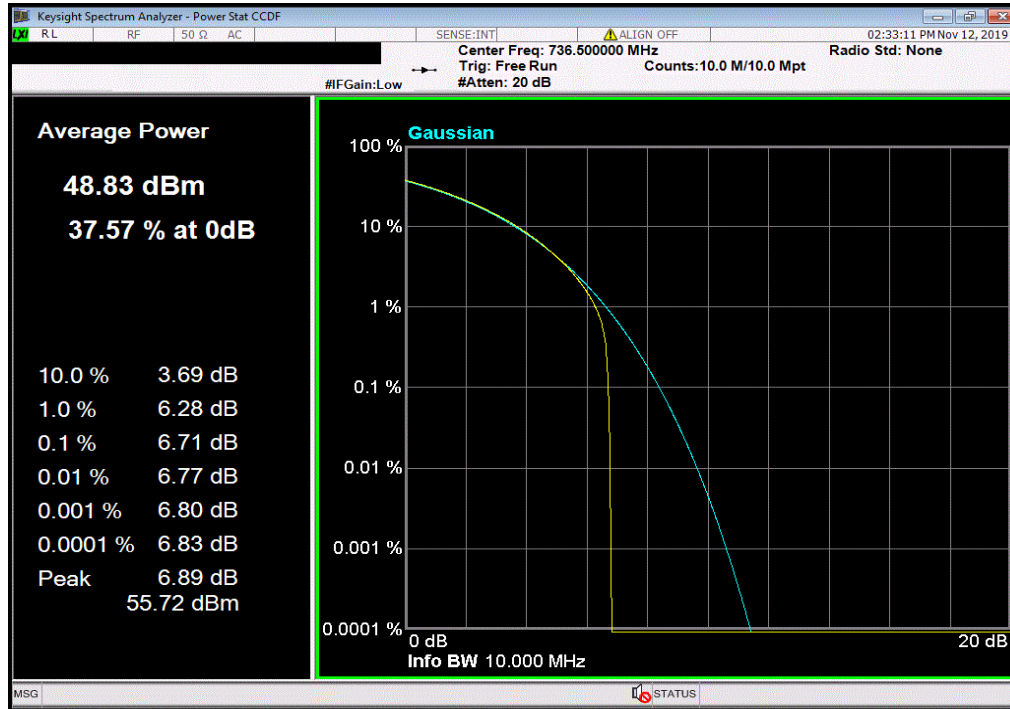
PEAK-TO-AVERAGE POWER RATIO (PAPR)



TbTx 2019.08.30.0 XMI 2019.09.05

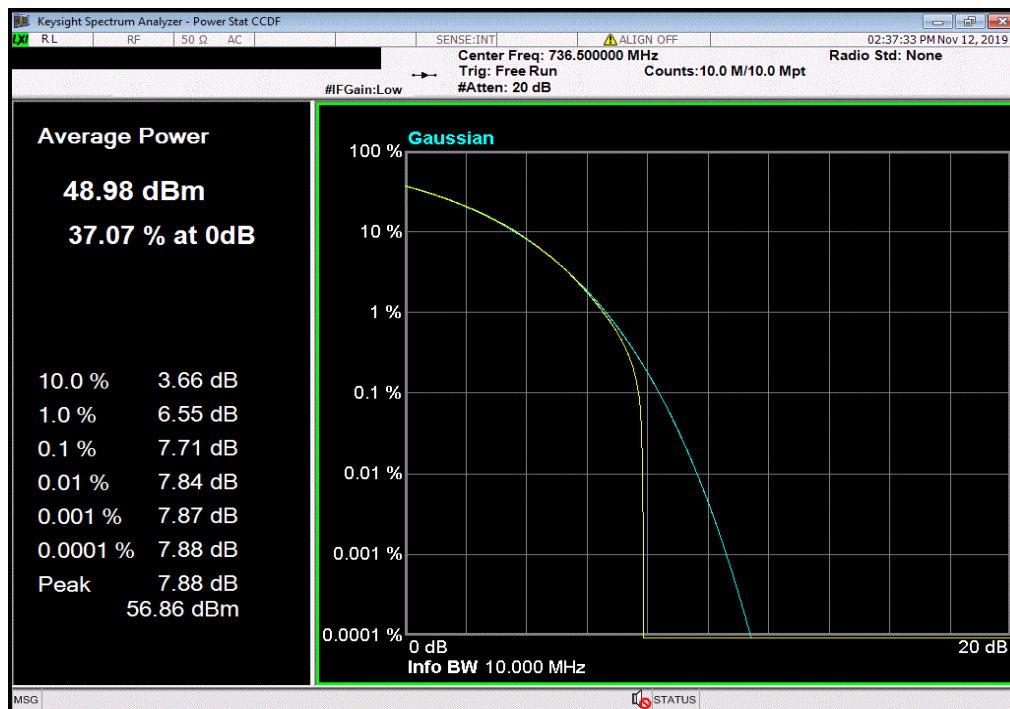
Band 12, 256QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz, Antenna Port 3

			PAPR	Limit	Results
			Value (dB)	(dB)	
			6.71	13	Pass



Band 12, 256QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz, Antenna Port 4

			PAPR	Limit	Results
			Value (dB)	(dB)	
			7.71	13	Pass



PEAK-TO-AVERAGE POWER RATIO (PAPR)



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed 13 dB.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.

The PAPR was measured using the CCDF function of the spectrum analyzer.

PEAK-TO-AVERAGE POWER RATIO (PAPR)



TSMTx 2019.08.30.0 XMM 2019.09.05

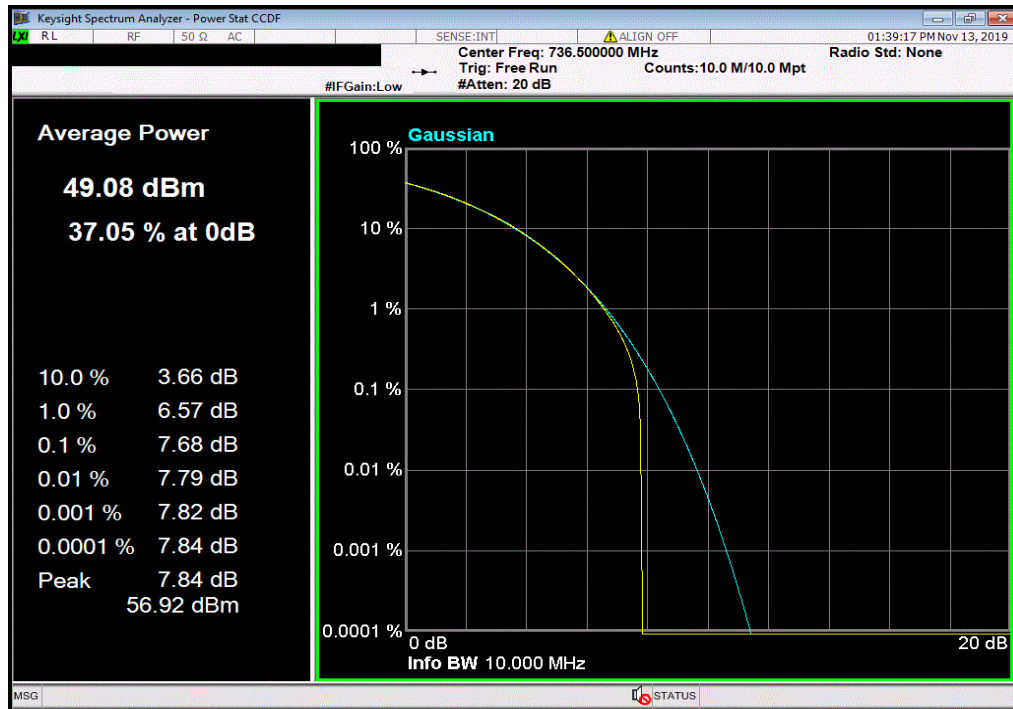
EUT: AHLBBA RRH		Work Order: NOKI0004	
Serial Number: K9193514835		Date: 18-Nov-19	
Customer: Nokia Solutions and Networks		Temperature: 22.4 °C	
Attendees: John Rattanaovong		Humidity: 29.6% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Jonathan Kiefer		Power: 54VDC	
		Job Site: TX09	
TEST SPECIFICATIONS		Test Method	
FCC 27:2019		ANSI C63.26:2015	
COMMENTS			
Band 12 PAPR measurements for LTE5 channel bandwidth at Mid channel for four modulation types. Tested on highest power antenna port (Port 1). EUT is operated at 100% duty cycle.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Jonathan Kiefer</i>	
		PAPR Value (dB)	Limit (dB) Results
Band 12	QPSK Modulation		
	LTE5 Bandwidth		
	Mid Channel, 736.5 MHz	7.68	13 Pass
	16QAM Modulation		
	LTE5 Bandwidth		
	Mid Channel, 736.5 MHz	7.69	13 Pass
	64QAM Modulation		
	LTE5 Bandwidth		
	Mid Channel, 736.5 MHz	7.69	13 Pass

PEAK-TO-AVERAGE POWER RATIO (PAPR)

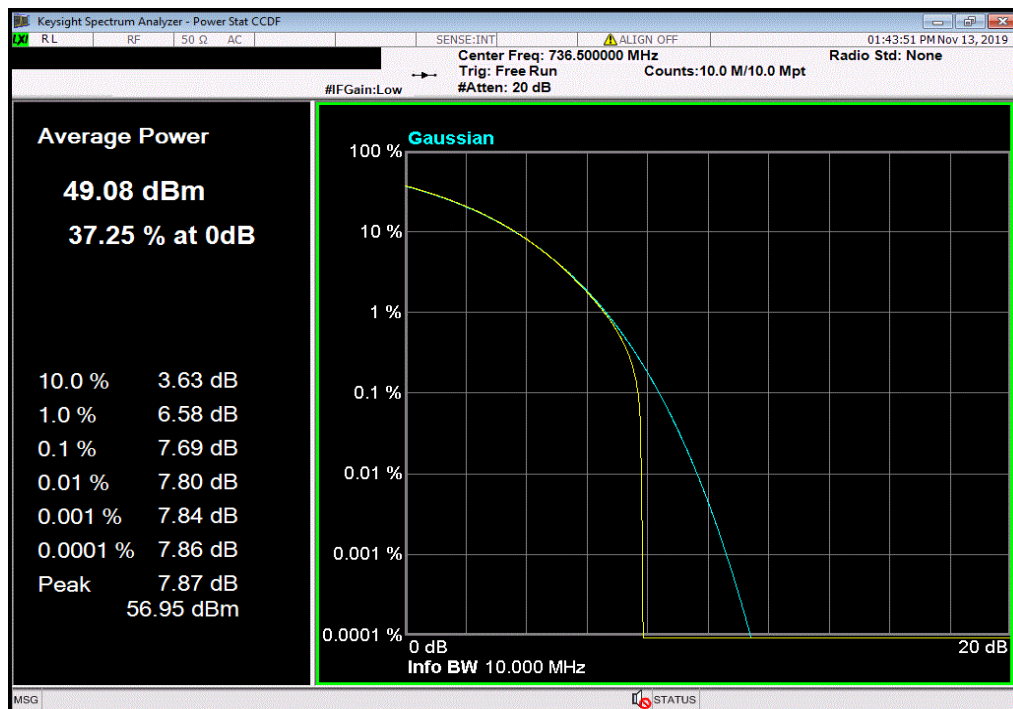


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, QPSK Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz					
PAPR			Limit	Results	
Value (dB)			(dB)		
			7.68	13	Pass



Band 12, 16QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz					
PAPR			Limit	Results	
Value (dB)			(dB)		
			7.69	13	Pass

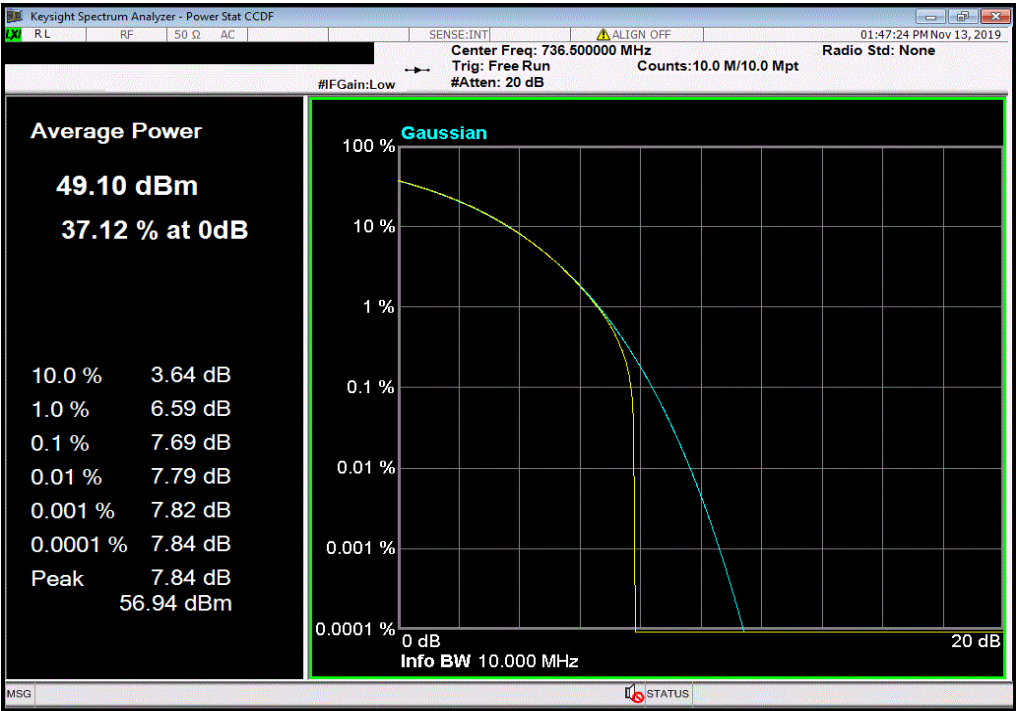


PEAK-TO-AVERAGE POWER RATIO (PAPR)



TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 64QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz						
			PAPR	Limit		
			Value (dB)	(dB)	Results	
			7.69	13	Pass	



PEAK-TO-AVERAGE POWER RATIO (PAPR)



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed 13 dB.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.

The PAPR was measured using the CCDF function of the spectrum analyzer.

PEAK-TO-AVERAGE POWER RATIO (PAPR)



XMM 2019.09.05

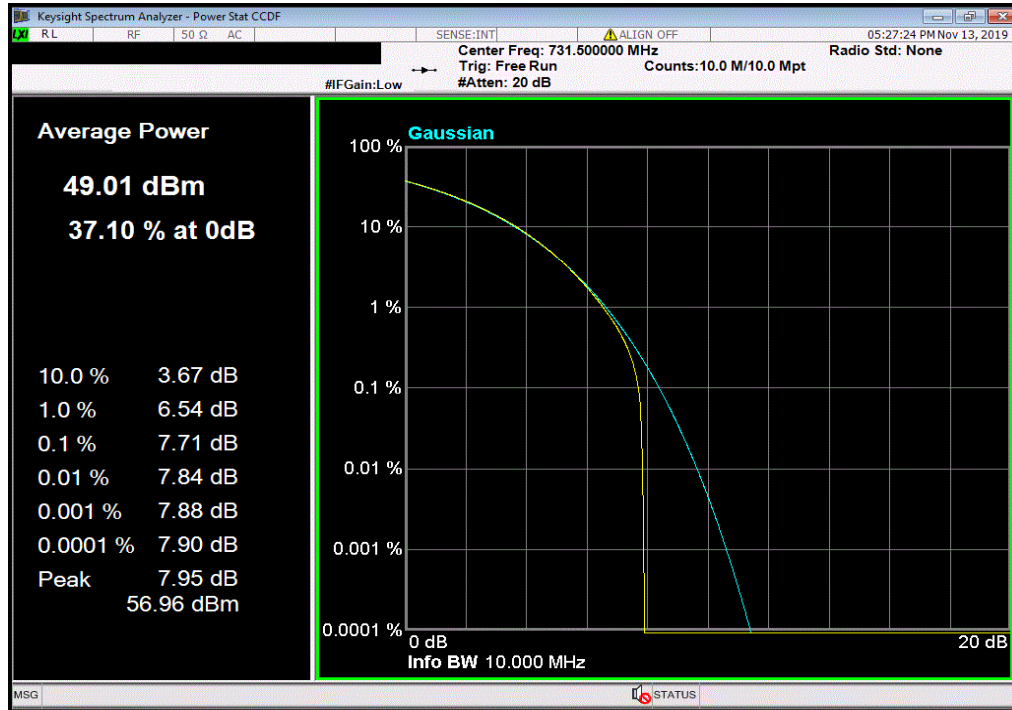
EUT: AHLBBA RRH		Work Order: NOKI0004	
Serial Number: K9193514835		Date: 18-Nov-19	
Customer: Nokia Solutions and Networks		Temperature: 22.4 °C	
Attendees: John Rattanaavong		Humidity: 29.7% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Jonathan Kiefer		Power: 54VDC	
Job Site: TX09			
TEST SPECIFICATIONS		Test Method	
FCC 27:2019		ANSI C63.26:2015	
COMMENTS			
Band 12 PAPR measurements for 256QAM modulation type at Low, Mid, High channels for LTE5 and LTE10 channel bandwidths. Tested on highest power antenna port (Port 1). EUT is operated at 100% duty cycle. Note 256QAM LTE5 BW Mid channel data shown elsewhere in the report.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Jonathan Kiefer</i>	
		PAPR Value (dB)	Limit (dB) Results
Band 12			
256QAM Modulation			
LTE5 Bandwidth			
	Low Channel, 731.5 MHz	7.71	13 Pass
	High Channel, 741.5 MHz	7.69	13 Pass
LTE10 Bandwidth			
	Mid Channel, 736.5 MHz	7.69	13 Pass
	Low Channel, 734.0 MHz	7.7	13 Pass
	High Channel, 739.0 MHz	7.69	13 Pass

PEAK-TO-AVERAGE POWER RATIO (PAPR)

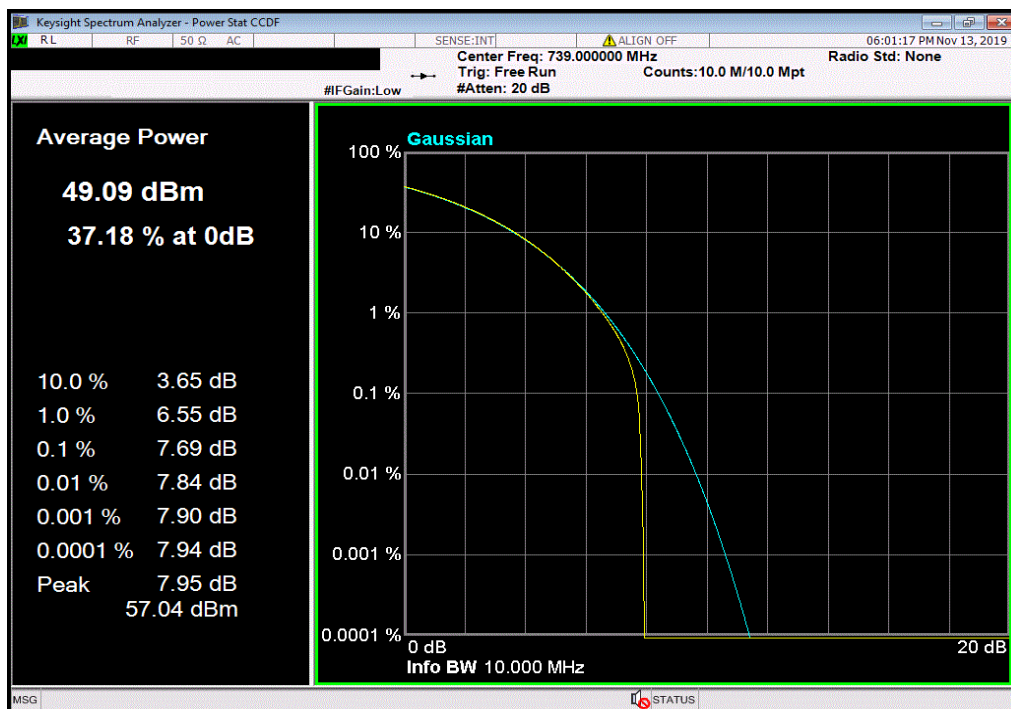


XMM 2019.09.05

Band 12, 256QAM Modulation, LTE5 Bandwidth, Low Channel, 731.5 MHz				
	PAPR Value (dB)	Limit (dB)	Results	
	7.71	13	Pass	

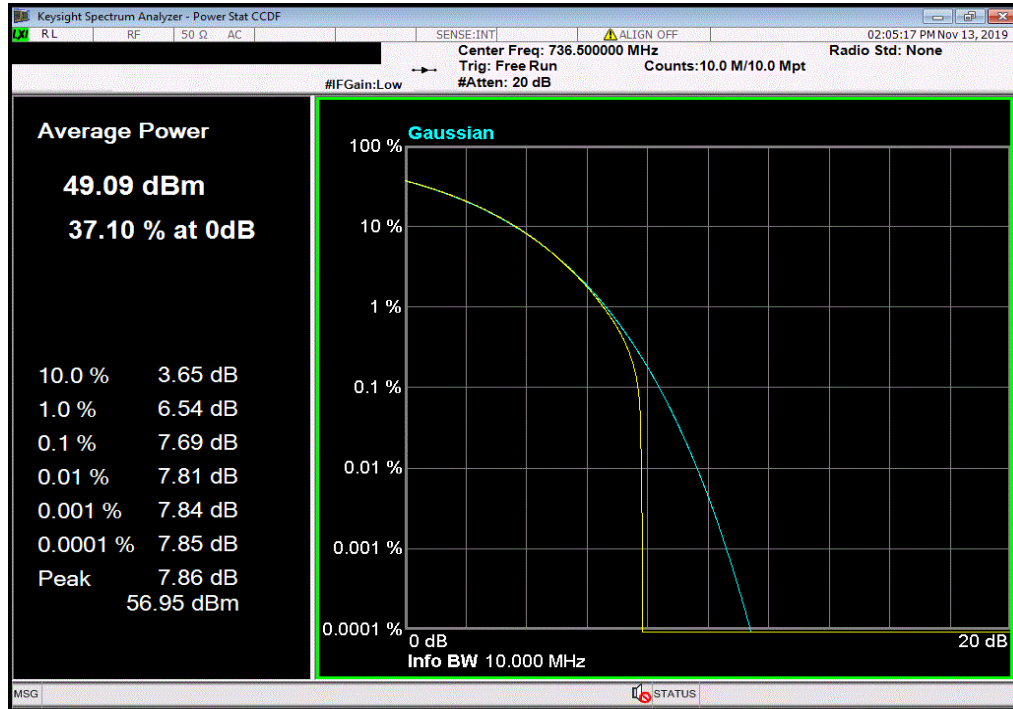


Band 12, 256QAM Modulation, LTE5 Bandwidth, High Channel, 741.5 MHz				
	PAPR Value (dB)	Limit (dB)	Results	
	7.69	13	Pass	

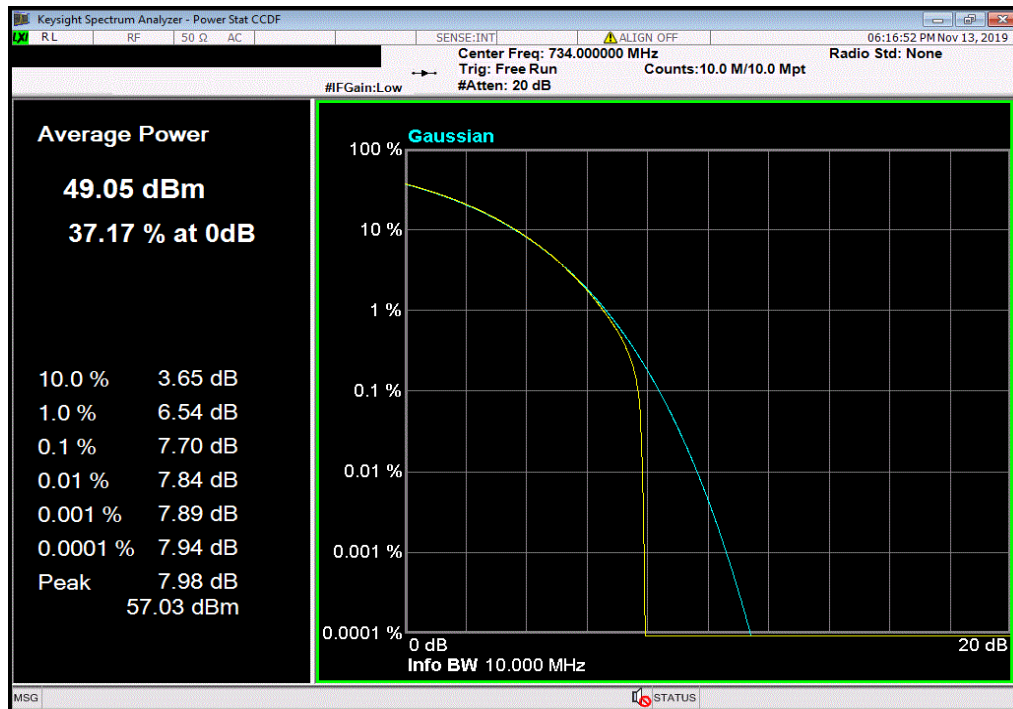


PEAK-TO-AVERAGE POWER RATIO (PAPR)

Band 12, 256QAM Modulation, LTE10 Bandwidth, Mid Channel, 736.5 MHz					
PAPR			Limit	Results	
Value (dB)			(dB)		
			7.69	13	Pass



Band 12, 256QAM Modulation, LTE10 Bandwidth, Low Channel, 734.0 MHz					
PAPR			Limit	Results	
Value (dB)			(dB)		
			7.7	13	Pass

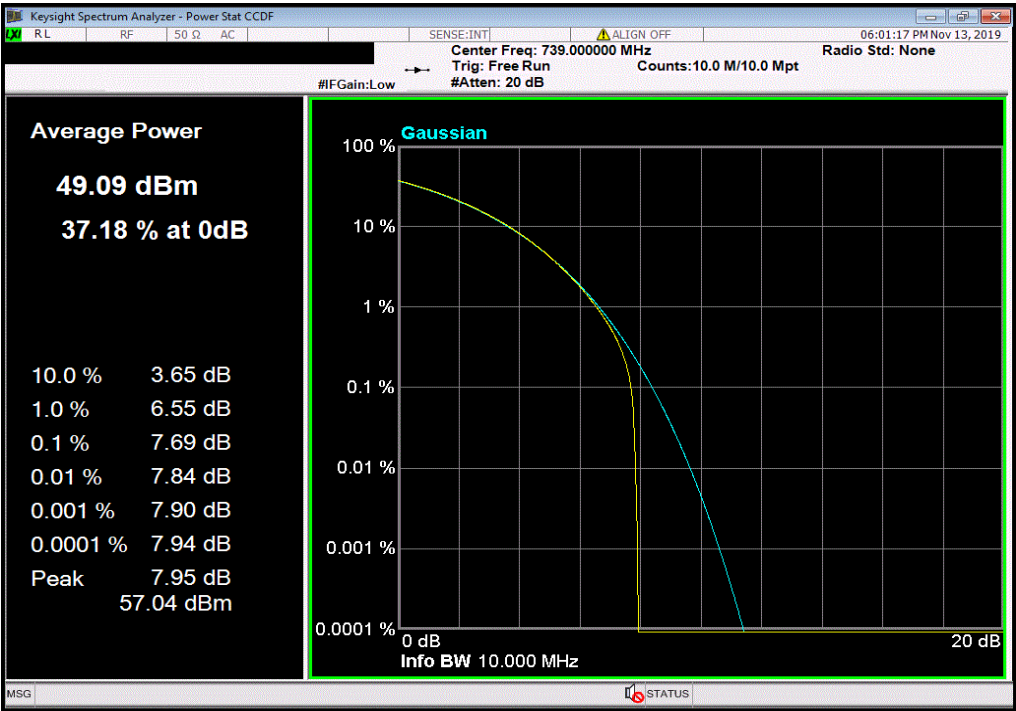


PEAK-TO-AVERAGE POWER RATIO (PAPR)



XMM 2019.09.05

Band 12, 256QAM Modulation, LTE10 Bandwidth, High Channel, 739.0 MHz						
			PAPR	Limit		
			Value (dB)	(dB)	Results	
			7.69	13	Pass	



PEAK-TO-AVERAGE POWER RATIO (PAPR)



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed 13 dB.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.

The PAPR was measured using the CCDF function of the spectrum analyzer.

PEAK-TO-AVERAGE POWER RATIO (PAPR)



TSTx 2019.08.30.0 XMI 2019.09.05

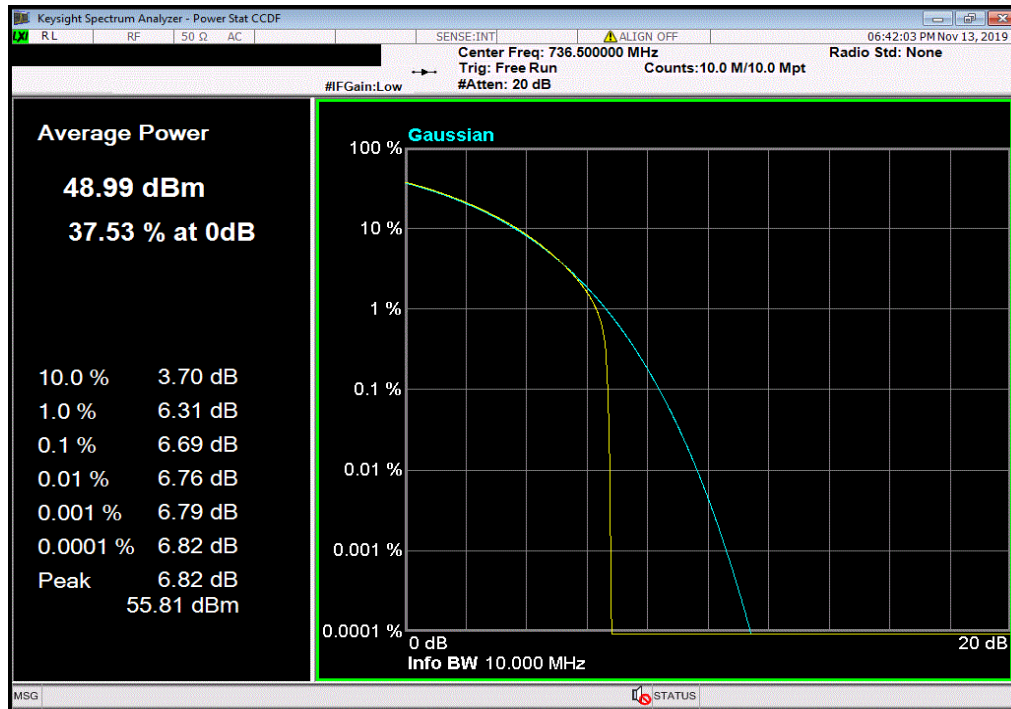
EUT: AHLBBA RRH		Work Order: NOKI0004	
Serial Number: K9193514835		Date: 18-Nov-19	
Customer: Nokia Solutions and Networks		Temperature: 22.4 °C	
Attendees: John Rattanaovong		Humidity: 29.7% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Jonathan Kiefer		Power: 54VDC	
		Job Site: TX09	
TEST SPECIFICATIONS		Test Method	
FCC 27:2019		ANSI C63.26:2015	
COMMENTS			
Band 12 PAPR measurements for LTE5 channel bandwidth at Mid channel for four modulation types. Tested on highest power antenna port (Port 2). EUT is operated at 100% duty cycle.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Jonathan Kiefer</i>	
		PAPR Value (dB)	Limit (dB) Results
Band 12	QPSK Modulation		
	LTE5 Bandwidth		
	Mid Channel, 736.5 MHz	6.69	13 Pass
	16QAM Modulation		
	LTE5 Bandwidth		
	Mid Channel, 736.5 MHz	6.7	13 Pass
	64QAM Modulation		
	LTE5 Bandwidth		
	Mid Channel, 736.5 MHz	6.73	13 Pass

PEAK-TO-AVERAGE POWER RATIO (PAPR)

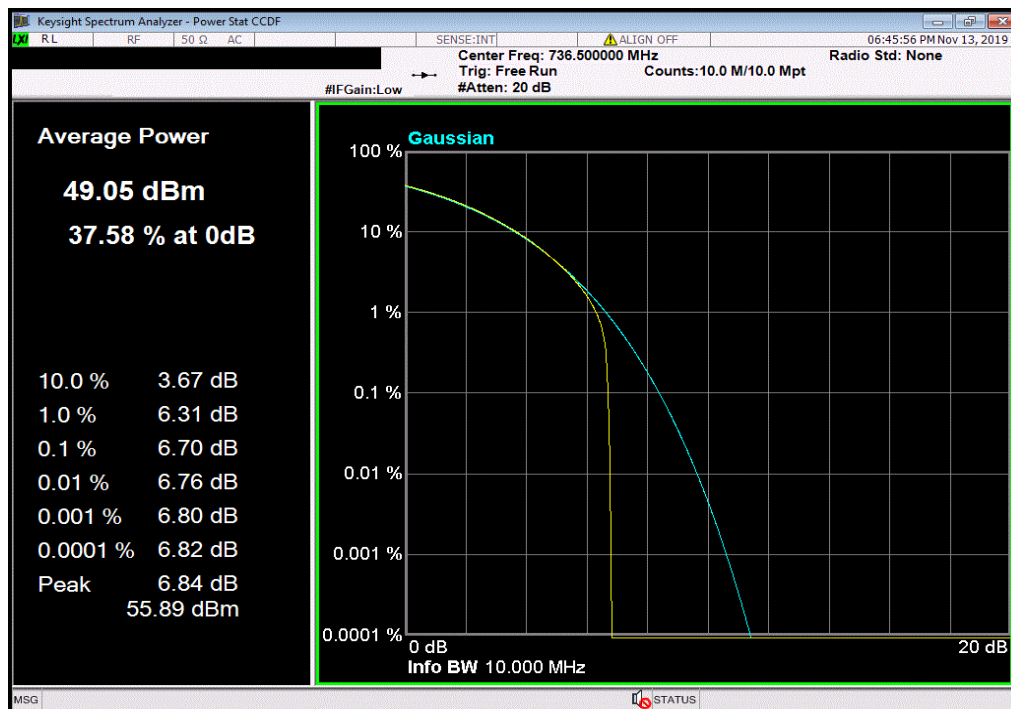


TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, QPSK Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz						
PAPR				Limit	Results	
Value (dB)				(dB)		
			6.69	13	Pass	



Band 12, 16QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz						
PAPR				Limit	Results	
Value (dB)				(dB)		
			6.7	13	Pass	

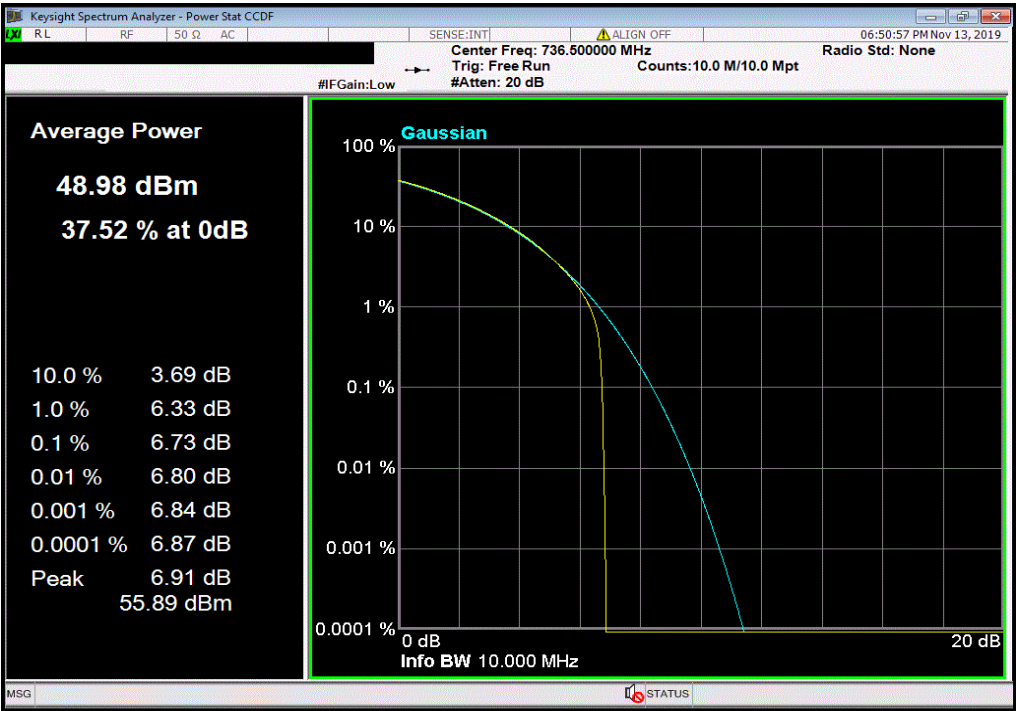


PEAK-TO-AVERAGE POWER RATIO (PAPR)



TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 64QAM Modulation, LTE5 Bandwidth, Mid Channel, 736.5 MHz						
			PAPR	Limit		
			Value (dB)	(dB)	Results	
			6.73	13	Pass	



PEAK-TO-AVERAGE POWER RATIO (PAPR)



XMIT 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed 13 dB.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.

The PAPR was measured using the CCDF function of the spectrum analyzer.

PEAK-TO-AVERAGE POWER RATIO (PAPR)



TMFtx 2019.08.30.0 XMM 2019.09.05

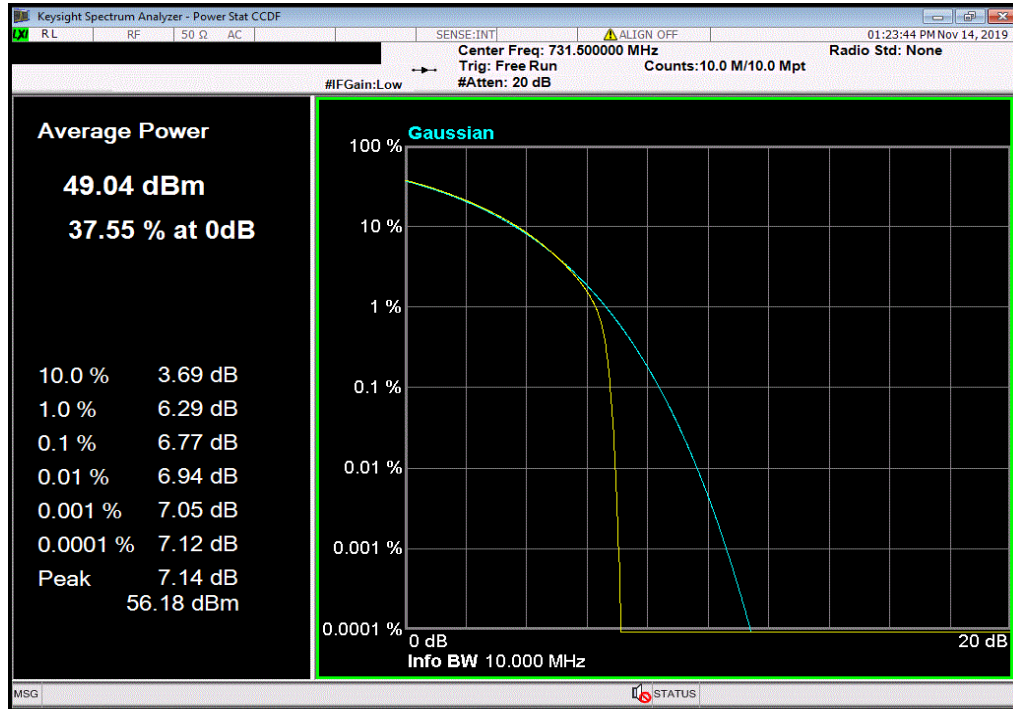
EUT: AHLBBA RRH		Work Order: NOKI0004	
Serial Number: K9193514835		Date: 18-Nov-19	
Customer: Nokia Solutions and Networks		Temperature: 22.4 °C	
Attendees: John Rattanaavong		Humidity: 29.7% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Jonathan Kiefer		Power: 54VDC	
Job Site: TX09			
TEST SPECIFICATIONS		Test Method	
FCC 27:2019		ANSI C63.26:2015	
COMMENTS			
Band 12 PAPR measurements for 256QAM modulation type at Low, Mid and High channels for LTE5 and LTE10 channel bandwidths. Tested on highest power antenna port (Port 2). EUT is operated at 100% duty cycle. Note: 256QAM LTE5 BW Mid Channel data shown elsewhere in the report.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Jonathan Kiefer</i>	
		PAPR Value (dB)	Limit (dB) Results
Band 12			
256QAM Modulation			
LTE5 Bandwidth			
	Low Channel, 731.5 MHz	6.77	13 Pass
	High Channel, 741.5 MHz	6.7	13 Pass
LTE10 Bandwidth			
	Mid Channel, 736.5 MHz	6.79	13 Pass
	Low Channel, 734.0 MHz	6.93	13 Pass
	High Channel, 739.0 MHz	6.75	13 Pass

PEAK-TO-AVERAGE POWER RATIO (PAPR)

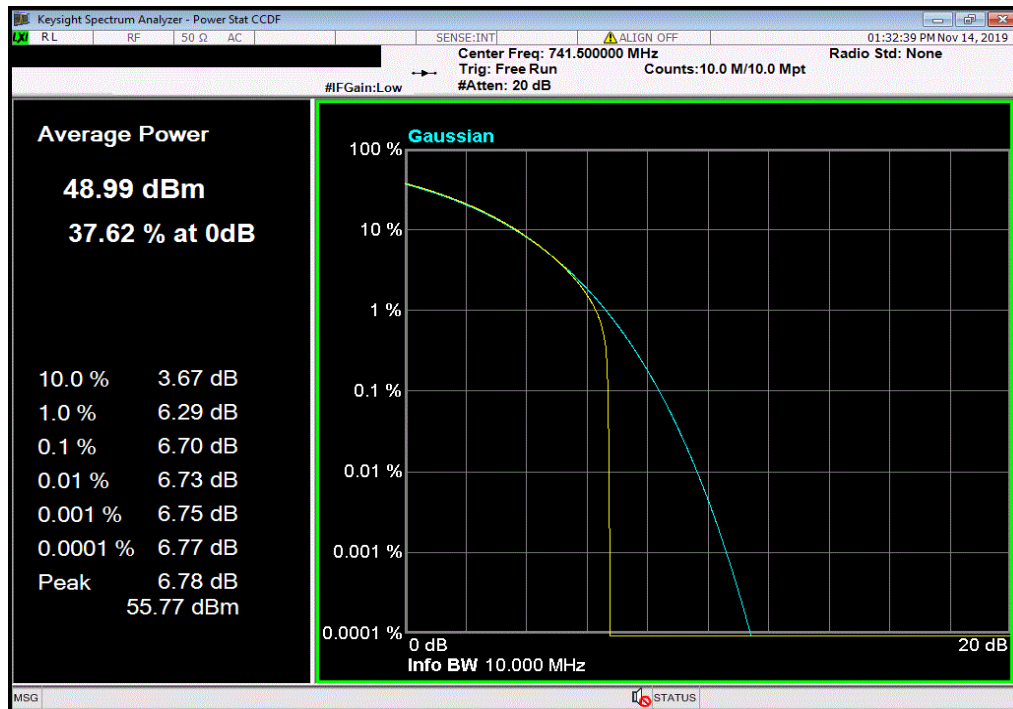


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Band 12, 256QAM Modulation, LTE5 Bandwidth, Low Channel, 731.5 MHz					
PAPR			Limit	Results	
Value (dB)			(dB)		
			6.77	13	Pass



Band 12, 256QAM Modulation, LTE5 Bandwidth, High Channel, 741.5 MHz					
PAPR			Limit	Results	
Value (dB)			(dB)		
			6.7	13	Pass

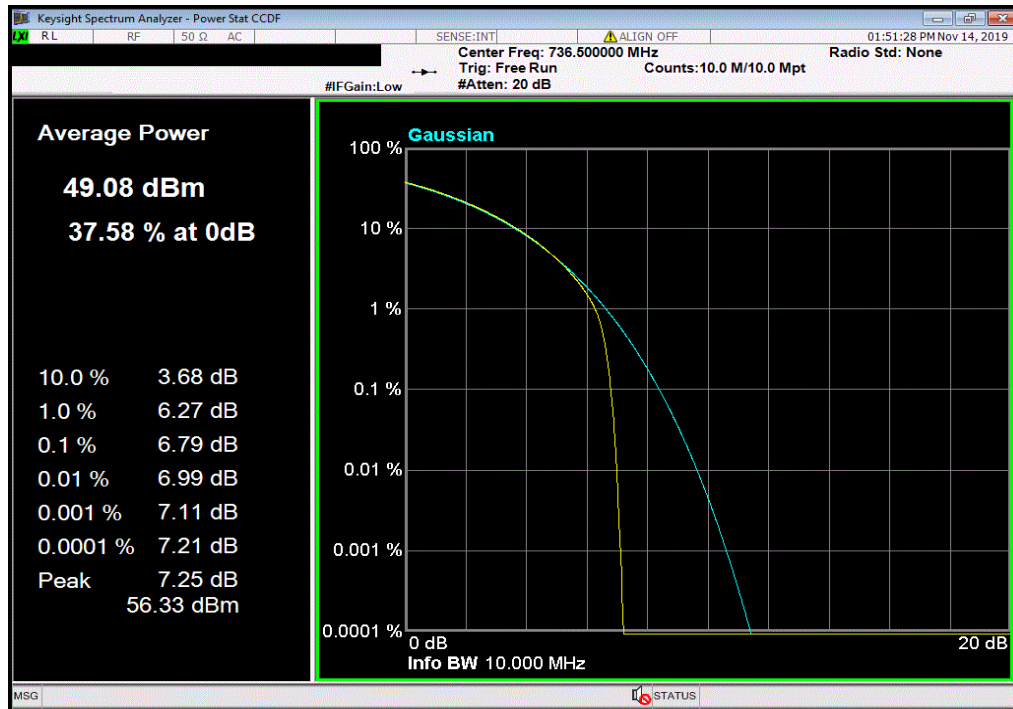


PEAK-TO-AVERAGE POWER RATIO (PAPR)

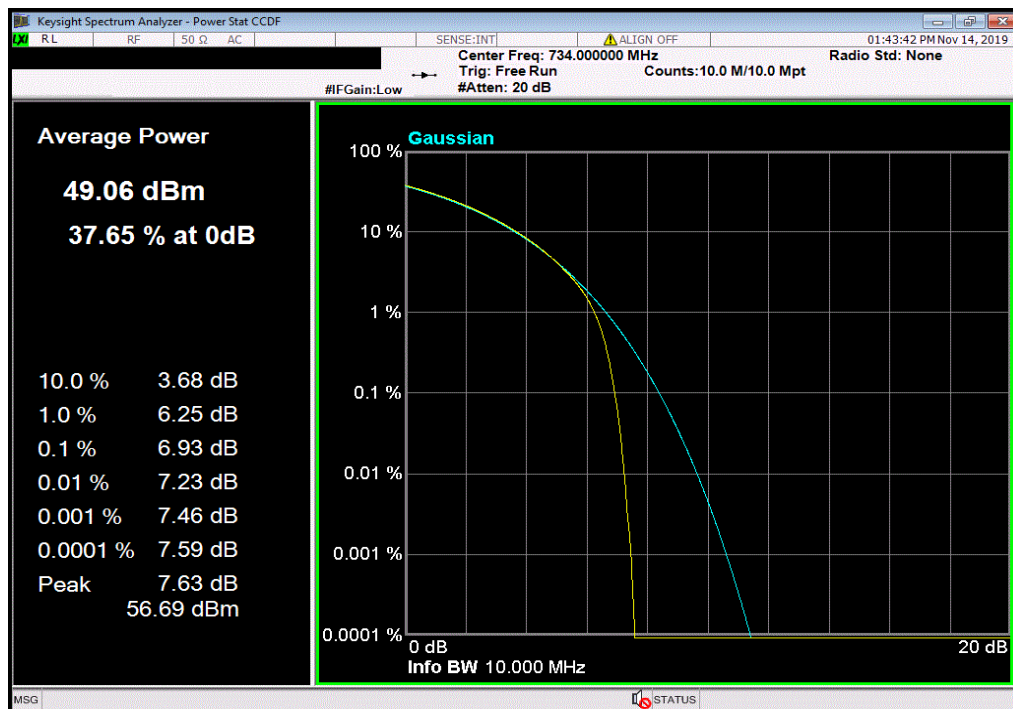


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Band 12, 256QAM Modulation, LTE10 Bandwidth, Mid Channel, 736.5 MHz						
PAPR				Limit	Results	
Value (dB)				(dB)		
				6.79	13	Pass



Band 12, 256QAM Modulation, LTE10 Bandwidth, Low Channel, 734.0 MHz						
PAPR				Limit	Results	
Value (dB)				(dB)		
				6.93	13	Pass



PEAK-TO-AVERAGE POWER RATIO (PAPR)



TbTx 2019.08.30.0 XMI 2019.09.05

Band 12, 256QAM Modulation, LTE10 Bandwidth, High Channel, 739.0 MHz						
				PAPR Value (dB)	Limit (dB)	Results
				6.75	13	Pass

