

XMit 2019.09.05

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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.

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.

Per RSS-130 section 4.6, the PAPR shall not exceed 13 dB for more than 0.1% of the time.



						TbtTx 2019.08.30.0	XMit 2019.09.05
	AHBOA Remote Radio Head (RR	<b>₹H)</b>			Work Order:		
	r: BL1934X1001					23-Oct-19	
Custome	r: Nokia				Temperature:	22 °C	
Attendees	: Hobert Smith, John Rattanavong	g, Mitchell Hill			Humidity:	38.7% RH	
Projec	t: None				Barometric Pres.:	1020 mbar	
Tested by	: Jonathan Kiefer		Power:	48VDC	Job Site:	TX09	
TEST SPECIFICA	TIONS			Test Method			
FCC 27:2019				ANSI C63.26:2015			
COMMENTS							
Band 71 PAPR m	easurements for LTE5 channel ban	dwidth at mid channel for for	ur modulation types	(QPSK, 16QAM, 64QAM, 256QAM). T	ested at highest antenna port (Port 1)	FUT is operated at	100% duty cycle
Dana I I I I I I I I I I I I I I I I I I			ar moundaidh ypoc				loo // auty cyclo.
DEVIATIONS FRC	OM TEST STANDARD						
None							
			11				
Configuration #	1		Jonathan	Kiefen			
		Signature	0	0			
					PAPR	PAPR	
					Value (dB)	Limit (dBm)	Results
Band 71							
	QPSK Modulation						
	LTE5 Bandwidth				7.24	13	Pass
	16QAM Modulation						
	LTE5 Bandwidth				7.22	13	Pass
	64QAM Modulation						
	LTE5 Bandwidth				7.23	13	Pass
	256QAM Modulation						
	LTE5 Bandwidth				7.25	13	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**

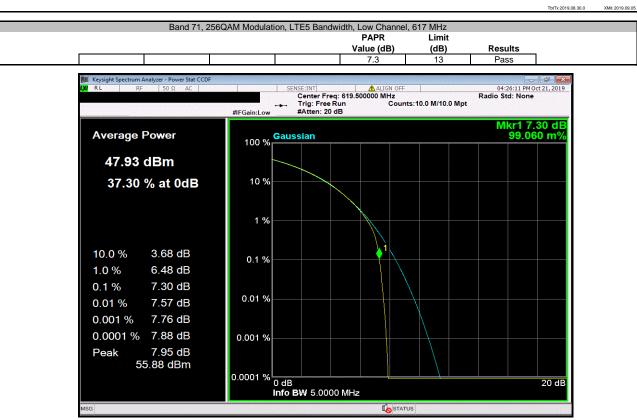
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum 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.

Per RSS-130 section 4.6, the PAPR shall not exceed 13 dB for more than 0.1% of the time.



ycle. Note: 256QAM LTE5 BW Mid Channel data shown elsewhere in the report.							TbtTx 2019.08.30.0	XMit 201
Custome:       Nokin       Temperature:       124.*C         Attendees:       Inbert Smith, John Rattanavong, Mitchell Hill       Humdity:       1020 mbar         Project:       None       Job Site:       Txos         Tested by:       Jonathan Kiefer       Job Site:       Txos         Str SPECIFICATIONS       Test Method       Job Site:       Txos         Str SPECIFICATIONS       Test Method       Job Site:       Txos         OMMENTS       ANSI C63.26:2015       Job Site:       Txos         DMMENTS       ANSI C63.26:2015       Job Site:       Txos         DMMENTS       Signature       Job Site:       Txos         Origonal       TTEST STANDARD       Job Site:       Txos         One       Signature       Signature       PAPR       Limit         Value (dB)       (dB)       (dB)       Job Site:       Txos         Infiguration #       1       Signature       Tai day       Job Site:       Txos         Signature       Value (dB)       (dB)       Job Site:       Txos       Job Site:       Txos         Infiguration #       1       Signature       Tai day       Job Site:       Txos       Job Site:       Txos       Job Site:			ead (RRH)					
Attendees:       Holent Smith, John Rattanavong, Mitchell Hill       Humidity: 37.8% RH         Project:       None       Barometric Pres:       1000 mbar         Tested by:       John Stress (1020 mbar)       Job Site:       TX09         ST SPECIFICATIONS       Test Method       Job Site:       TX09         SC 27.2019       ANSI C63.26:2015								
Project     None     Barometric Press: 1 (202 mbar       Tested by:     Jonathan Kiefer     Job Site:     TX09       ST SPECIFICATIONS     Test Method     Job Site:     TX09       C 27:2019     ANSI C63:26:2015     International Control Cont								
Tested by: Jonathan Kiefer         Power: IdvDC         Job Site: TX09           ST SPECIFICATIONS         Test Method         IdvDC	Attendees:	Hobert Smith, John Ratta	anavong, Mitchell Hill					
Test Method       CC 27:2019         OMMENTS       ANSI C63.26:2015         OMMENTS       AnSI C63.26:2015         OMM ENTS       and 71 PAPR measurements for 256QAM modulation type at Low, Mid and High channels for four (5,10,15, 20MHz) channel bandwidths. Tested at highest antenna port (Port 1). EUT is operated at rycle. Note: 256QAM LTE5 BW Mid Channel data shown elsewhere in the report.         EVIATIONS FROM TEST STANDARD       For the report.         one       One         0ne       Signature         Value (dB)       (dB)         and 71       Signature         Value (dB)       (dB)         and 71       Signature         UETES Bandwidth       7.3         LTE16 Bandwidth       7.3         LTE16 Bandwidth       7.41         LTE16 Bandwidth       7.42         LTE16 Bandwidth <td>Project:</td> <td>None</td> <td></td> <td></td> <td></td> <td>Barometric Pres.:</td> <td>1020 mbar</td> <td></td>	Project:	None				Barometric Pres.:	1020 mbar	
CC 27:2019     ANSI C63.26:2015       OMMENTS     and 71 PAPR measurements for 256QAM modulation type at Low, Mid and High channels for four (5,10,15, 20MHz) channel bandwidths. Tested at highest antenna port (Port 1). EUT is operated at 7       Visit C63.26:2015       OMMENTS       and 71 PAPR measurements for 256QAM modulation       Visit C63.26:2015       Onfiguration #       Onfiguration #       1       Signature       PAPR       Limit       Visit C63.26:2015				Power:	48VDC	Job Site:	TX09	
OMMENTS           OMMENTS           OMMENTS           and 71 PAPR measurements for 256QAM ITE5 BW Mid Channel data shown elsewhere in the report.           EVIATIONS FROM TEST STANDARD           Ontiguration #         1         Signature         PAPR Limit           Value (dB)         (dB)           Ontiguration #         1         Signature           PAPR Limit           Value (dB)         (dB)           Ontiguration #         1         Signature           PAPR Limit           Value (dB)         (dB)           Colspan="2">Ontiguration #         PAPR Limit           Value (dB)         Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan= 2"Colspan="2">Colspan="2"Colspan=	EST SPECIFICAT	IONS			Test Method			
and 71 PAPR measurements for 256QAM modulation type at Low, Mid and High channels for four (5,10,15, 20MHz) channel bandwidths. Tested at highest antenna port (Port 1). EUT is operated at a cycle. Note: 256QAM LTES BW Mid Channel data shown elsewhere in the report.	CC 27:2019				ANSI C63.26:2015			
tand 71 PAPR measurements for 256QAM modulation type at Low, Mid and High channels for four (5,10,15, 20MHz) channel bandwidths. Tested at highest antenna port (Port 1). EUT is operated at a cycle. Note: 256QAM LTES BW Mid Channel data shown elsewhere in the report.								
ycle. Note: 256QAM LTE5 BW Mid Channel data shown elsewhere in the report.  EVIATIONS FROM TEST STANDARD  one  onfiguration #  1  Signature  Si	OMMENTS							
EVIATIONS FROM TEST STANDARD  one  onfiguration #  1  Signature  Dontflue (dB)  PAPR Limit Value (dB) (dB)  PAPR Limit (dB) (dB)  Inter 5 Bandwidth  LUTE 5 Bandwidth LUTE 10					(5,10,15, 20MHz) channel bandwidths.	Tested at highest antenna port (Port	1). EUT is operated	I at 100% duty
onfiguration # 1 Signature Southan Kiefon Signature Southan Kiefon and 71 256OAM Modulation LTE5 Bandwidth Low Channel, 617 MHz Low Channel, 634,5 MHz High Channel, 635 MHz LTE15 Bandwidth LTE15 Bandwidth LTE15 Bandwidth LTE15 Bandwidth LTE15 Bandwidth LCW Channel, 634,5 MHz LOW Channel, 617 MHz LOW Channel, 634,5 MHz LOW Channel, 617 MHz LOW Channel, 617 MHz LOW Channel, 617 MHz LOW Channel, 628 MHz LOW Channel, 617 MHz LOW Channel, 617 MHz LOW Channel, 617 MHz Mid Channel, 628 MHz LOW Channel, 617 MHz Mid Channel Channel Channel Channel Channel Channel Mid Channel Channel Channel Channel Mid Channel C								
Image: signature         Signature         PAPR Value (dB)         Limit (dB)           and 71         256QAM Modulation         7.3         13           LTES Bandwidth         7.3         13           Low Channel, 617 MHz         7.3         13           High Channel, 652 MHz         7.31         13           LTE10 Bandwidth         7.41         13           Low Channel, 634.5 MHz         7.24         13           High Channel, 634.5 MHz         7.41         13           LTE15 Bandwidth         7.48         13           LTE15 Bandwidth         7.22         13           LTE15 Bandwidth         7.22         13           LTE20 Bandwidth         7.45         13           LTE20 Bandwidth         7.2         13		I TEST STANDARD						
Signature         PAPR Limit Value (dB)         Limit (dB)           and 71         256QAM Modulation	one							
Signature         PAPR Limit Value (dB)         Limit Value (dB)           and 71         256QAM Modulation         (dB)           LTE5 Bandwidth         7.3         13           Low Channel, 617 MHz         7.3         13           High Channel, 652 MHz         7.31         13           LTE10 Bandwidth         7.24         13           Low Channel, 634.5 MHz         7.24         13           High Channel, 634.5 MHz         7.41         13           Mid Channel, 634.5 MHz         7.41         13           LTE15 Bandwidth         7.24         13           LTE15 Bandwidth         7.22         13           LTE20 Bandwidth         7.22         13           LTE20 Bandwidth         7.45         13           LTE20 Bandwidth         7.45         13           LTE20 Bandwidth         7.2         13	onfiguration #	1		Jonethan	Kiefer			
Value (dB)         Value (dB)         (dB)           and 71         256QAM Modulation			Signature	0.000				
and 71						PAPR	Limit	
256QAM Modulation           LTEFS Bandwidth           Low Channel, 617 MHz         7.3         13           High Channel, 652 MHz         7.31         13           LTE10 Bandwidth         7.31         13           Low Channel, 617 MHz         7.41         13           Mid Channel, 634.5 MHz         7.24         13           High Channel, 634.5 MHz         7.41         13           Low Channel, 634.5 MHz         7.41         13           LTE15 Bandwidth         7.41         13           Low Channel, 632.5 MHz         7.41         13           Mid Channel, 632.5 MHz         7.41         13           LTE15 Bandwidth         7.42         13           Low Channel, 632.5 MHz         7.22         13           LTE20 Bandwidth         7.45         13           LTE20 Bandwidth         7.45         13           Low Channel, 637.5 MHz         7.45         13           Mid Channel, 634.5 MHz         7.2         13						Value (dB)	(dB)	Results
LTE5 Bandwidth         7.3         13           Ligh Channel, 652 MHz         7.31         13           LTE10 Bandwidth         7.21         13           LTE10 Bandwidth         7.41         13           LOw Channel, 617 MHz         7.24         13           Mid Channel, 634.5 MHz         7.24         13           High Channel, 622 MHz         7.41         13           Mid Channel, 634.5 MHz         7.24         13           High Channel, 622 MHz         7.41         13           LTE15 Bandwidth         7.24         13           LTE15 Bandwidth         7.22         13           LTE15 Bandwidth         7.22         13           LTE15 Bandwidth         7.22         13           LTE20 Bandwidth         7.52         13           LTE20 Bandwidth         7.45         13           LTE20 Bandwidth         7.45         13	and 71						· · ·	
Low Channel, 617 MHz       7.3       13         High Channel, 652 MHz       7.31       13         Lum Channel, 617 MHz       7.41       13         Mid Channel, 634.5 MHz       7.24       13         High Channel, 634.5 MHz       7.41       13         Lum Channel, 634.5 MHz       7.43       13         Lum Channel, 634.5 MHz       7.22       13         Lum Channel, 634.5 MHz       7.45       13		256QAM Modulation						
High Channel, 652 MHz     7.31     13       LTE10 Bandwidth     7.41     13       Low Channel, 617 MHz     7.24     13       Mid Channel, 634.5 MHz     7.24     13       High Channel, 652 MHz     7.41     13       Low Channel, 617 MHz     7.41     13       Low Channel, 634.5 MHz     7.41     13       Low Channel, 632 MHz     7.41     13       Low Channel, 632 MHz     7.43     13       Mid Channel, 634.5 MHz     7.22     13       LTE20 Bandwidth     7.45     13       LTE20 Bandwidth     7.45     13       Mid Channel, 634.5 MHz     7.2     13		LTE5 Bandwi	dth					
LTE10 Bandwidth         7.41         13           Low Channel, 617 MHz         7.41         13           Mid Channel, 634.5 MHz         7.24         13           High Channel, 652 MHz         7.41         13           LTE15 Bandwidth         7.48         13           LTE15 Bandwidth         7.22         13           Mid Channel, 632.5 MHz         7.22         13           Mid Channel, 652 MHz         7.52         13           High Channel, 652 MHz         7.52         13           LTE20 Bandwidth         7.45         13           LTE20 Bandwidth         7.45         13			Low Channel, 617 MHz			7.3	13	Pass
LTE10 Bandwidth         7.41         13           Low Channel, 617 MHz         7.41         13           Mid Channel, 635 MHz         7.24         13           High Channel, 652 MHz         7.41         13           LTE15 Bandwidth         7.48         13           LDW Channel, 634.5 MHz         7.22         13           Mid Channel, 634.5 MHz         7.22         13           Mid Channel, 652 MHz         7.52         13           High Channel, 652 MHz         7.52         13           LTE20 Bandwidth         7.45         13           LtE20 Bandwidth         7.45         13			High Channel, 652 MHz			7.31	13	Pass
Mid Channel, 634.5 MHz     7.24     13       High Channel, 652 MHz     7.41     13       LTE15 Badwidth     7.41     13       LTE15 Badwidth     7.48     13       Mid Channel, 617 MHz     7.48     13       Mid Channel, 634.5 MHz     7.22     13       High Channel, 652 MHz     7.52     13       LTE20 Bandwidth     7.45     13       LDW Channel, 634.5 MHz     7.45     13       Mid Channel, 634.5 MHz     7.2     13								
High Channel, 652 MHz         7.41         13           LTE15 Bandwidth         -			Low Channel, 617 MHz			7.41	13	Pass
High Channel, 652 MHz         7.41         13           LTE15 Bandwidth         -			Mid Channel, 634.5 MHz			7.24	13	Pass
LTE15 Bandwidth         7.48         13           Low Channel, 617 MHz         7.22         13           Mid Channel, 634.5 MHz         7.52         13           High Channel, 652 MHz         7.52         13           LTE20 Bandwidth         7.45         13           Low Channel, 617 MHz         7.45         13           Mid Channel, 634.5 MHz         7.2         13								Pass
Low Channel, 617 MHz         7.48         13           Mid Channel, 634.5 MHz         7.22         13           High Channel, 652 MHz         7.52         13           LTE20 Bandwidth         7.45         13           Low Channel, 617 MHz         7.45         13           Mid Channel, 634.5 MHz         7.2         13								
Mid Channel, 634.5 MHz         7.22         13           High Channel, 652 MHz         7.52         13           LTE20 Bandwidth         7.52         13           Low Channel, 617 MHz         7.45         13           Mid Channel, 634.5 MHz         7.2         13						7.48	13	Pass
High Channel, 652 MHz         7.52         13           LTE20 Bandwidth								Pass
LTE20 Bandwidth         7.45         13           Low Channel, 617 MHz         7.2         13           Mid Channel, 634.5 MHz         7.2         13								Pass
Low Channel, 617 MHz         7.45         13           Mid Channel, 634.5 MHz         7.2         13						1.02	10	1 435
Mid Channel, 634.5 MHz 7.2 13						7 45	13	Pass
								Pass
Link Channel CEO Mile 7 EE 40			High Channel, 652 MHz			7.2	13	Pass











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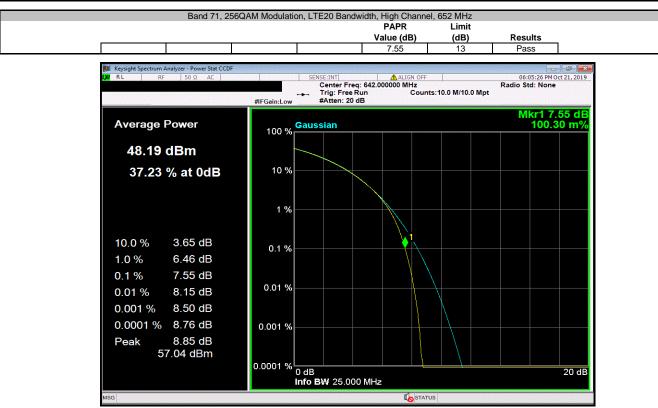














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#### **TEST EQUIPMENT**

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.

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.

Per RSS-130 section 4.6, the PAPR shall not exceed 13 dB for more than 0.1% of the time.



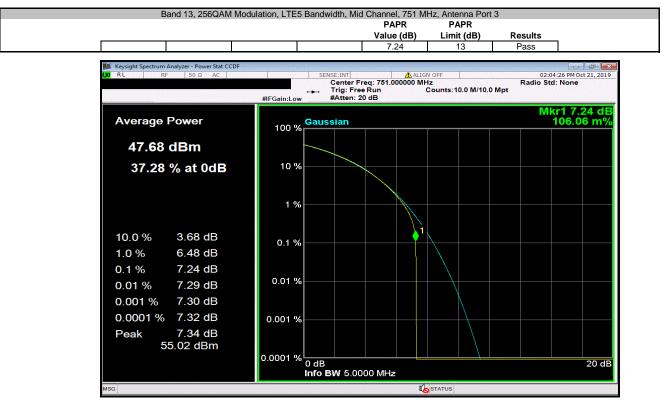
							TbtTx 2019.08.30.0	XMit 2019.09.05
EUT	AHBOA Remote Radio H	lead (RRH)				Work Order:	NOKI0003	
Serial Number	: BL1934X1001					Date:	23-Oct-19	
Customer						Temperature:	22.9 °C	
	Hobert Smith, John Ratt	anavong, Mitchell Hill				Humidity:		
Project					Bar	ometric Pres.:		
	Jonathan Kiefer		Power:			Job Site:	TX09	
TEST SPECIFICAT	TIONS			Test Method				
FCC 27:2019				ANSI C63.26:2015				
COMMENTS								
Band 13 PAPR me	asurements for LTE5 char	nnel bandwidth at Mid channel using	256QAM on all four	antenna ports. EUT is operated at 1	00% duty cycle.			
		-						
DEVIATIONS FRO	M TEST STANDARD							
None								
Configuration #	1		Jonathan	Kiefer				
		Signature	0	0				
						PAPR	PAPR	
						Value (dB)	Limit (dB)	Results
Band 13								
	256QAM Modulation							
	LTE5 Bandw							
		Mid Channel, 751 MHz						
		Antenna Port 1				7.24	13	Pass
		Antenna Port 2				7.23	13	Pass
		Antenna Port 3				7.24	13	Pass
		Antenna Port 4				7.26	13	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.

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						TbtTx 2019.08.30.0	XMit 2019.09.05
	E AHBOA Remote Radio H	lead (RRH)			Work Order:		
	r: BL1934X1001					23-Oct-19	
Custome					Temperature:		
	: Hobert Smith, John Ratt	anavong, Mitchell Hill			Humidity:		
	t: None				Barometric Pres.:	1020 mbar	
Tested by	/: Jonathan Kiefer		Power:	48VDC	Job Site:	TX09	
TEST SPECIFICA	TIONS			Test Method			
FCC 27:2019				ANSI C63.26:2015			
COMMENTS				•			
Band 13 PAPR me	easurements for LTE5 char	nnel bandwidth at Mid channel for fou	r modulation types	. Tested on highest power antenna po	ort (Port 1), EUT is operated at 100% d	utv cvcle.	
						, .,	
DEVIATIONS FRO	M TEST STANDARD						
None							
			11				
Configuration #	1		Jonathan	Kiefen			
		Signature	0	- 0			
					PAPR	PAPR	
					Value (dB)	Limit (dB)	Results
Band 13							
	QPSK Modulation						
	LTE5 Bandw	vidth			7.21	13	Pass
	16QAM Modulation						
	LTE5 Bandw	ridth			7.21	13	Pass
	64QAM Modulation						
	LTE5 Bandw	ridth			7.21	13	Pass
	256QAM Modulation					-	
	LTE5 Bandw	ridth			7.24	13	Pass











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Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

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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.

Per RSS-130 section 4.6, the PAPR shall not exceed 13 dB for more than 0.1% of the time.



						TbtTx 2019.08.30.0	XMit 2019.09.05
	AHBOA Remote Radio H	ead (RRH)			Work Order:		
Serial Number:						23-Oct-19	
Customer:					Temperature:		
	Attendees: Hobert Smith, John Rattanavong, Mitchell Hill					38.2% RH	
Project:					Barometric Pres.:		
	Jonathan Kiefer		Power:	48VDC	Job Site:	TX09	
TEST SPECIFICATI	IONS			Test Method			
FCC 27:2019				ANSI C63.26:2015			
COMMENTS							
Band 13 average p	ower for 256QAM modulat	tion type at Low, Mid and High chann	els for LTE5 and L	TE10 channel bandwidths. For Band 1	3, LTE10 only tested on Mid channel.	Tested on highest	oower antenna
port (Port 1). EUT is	s operated at 100% duty c	cycle. Note: 256QAM LTE5 BW Mid Ch	annel data shown	elsewhere in the report.			
<b>DEVIATIONS FROM</b>	I TEST STANDARD						
None							
Configuration #	1	Signature	Jonathar	Kiefer			
					PAPR Value (dB)	PAPR Limit (dB)	Results
Band 13							
	256QAM Modulation						
	LTE5 Bandw	idth					
		Low Channel, 746 MHz			7.23	13	Pass
		High Channel, 756 MHz			7.24	13	Pass
	LTE10 Bandy						
		Mid Channel, 751 MHz			7.23	13	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 emission bandwidth 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 5.4 of ANSI C63.26 was used to make the measurement.

The spectrum analyzer settings were as follows: RBW = Approx. 1% of the emission bandwidth (B). This was an iterative process to determine the RBW based on the emissions bandwidth (B). VBW= > RBW A peak detector was used Trace max hold.

The spectrum analyzer occupied bandwidth measurement function was then used to measure the 26 dB emission bandwidth.

#### **Band 71 Emission Designators**

	517MHz to 652MHz Band Emission Designators									
Channel Bandwidth	LTE-QPSK	LTE-16QAM	LTE-64QAM	LTE-256QAM						
5M	4M87F9W	4M84F9W	4M86F9W	4M86F9W						
10M	9M65F9W	9M66F9W	9M67F9W	9M67F9W						
15M	14M4F9W	14M3F9W	14M4F9W	14M4F9W						
20M	19M1F9W	19M1F9W	19M1F9W	19M1F9W						
Note: Based on 26	5dB emission bandwid	ith	•							



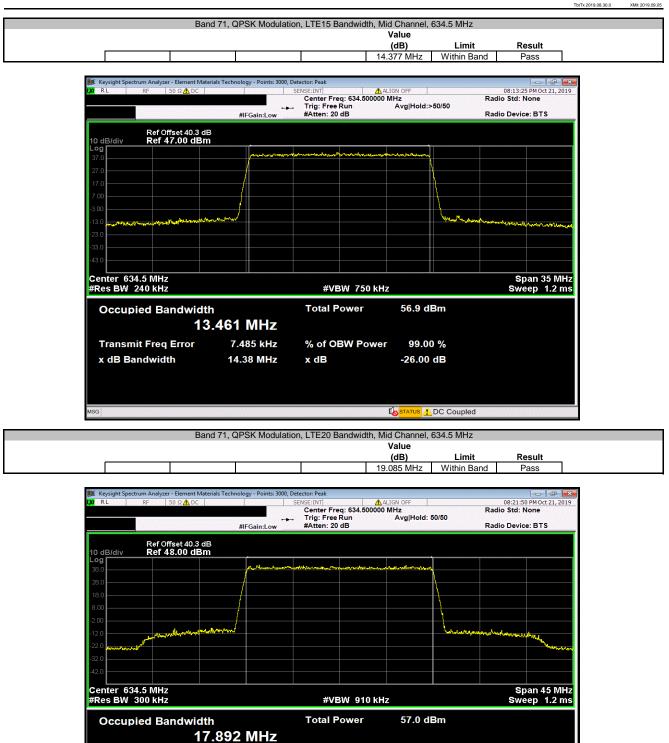
FUT	AHBOA Remote Radio Head (RRH)		Work Order:	TbiTx 2019.08.30.0	XMit 20
Serial Number:				23-Oct-19	
	Nokia Solutions and Networks		Temperature:		
	Hobert Smith, John Rattanavong, Mitchell Hill		Humidity:		
Project			Barometric Pres.:		
	Jonathan Kiefer	Power: 48VDC	Job Site:		
EST SPECIFICAT		Test Method	505 Site.	1703	
CC 27:2019		ANSI C63.26:2015			
50 21.2015		711101 000.2010			
OMMENTS and 71 emission	bandwidth measurements for four modulation types at N	lid frequency for four channel bandwidths. Tested at high	nest antenna port (Port 1). EUT is operated	at 100% duty cycle.	
EVIATIONS FRO	M TEST STANDARD				
one					
onfiguration #	1 Signature	Jonathan Kiefer			
			Value (dB)	Limit	Result
and 71					
	QPSK Modulation				
	LTE5 Bandwidth				
	Mid Channel, 634.5 MHz		4.867 MHz	Within Band	Pass
	LTE10 Bandwidth				
	Mid Channel, 634.5 MHz		9.65 MHz	Within Band	Pass
	LTE15 Bandwidth				
	Mid Channel, 634.5 MHz		14.377 MHz	Within Band	Pass
	LTE20 Bandwidth				
	Mid Channel, 634.5 MHz		19.085 MHz	Within Band	Pass
	16QAM Modulation				
	LTE5 Bandwidth				
	Mid Channel, 634.5 MHz		4.837 MHz	Within Band	Pass
	LTE10 Bandwidth				-
	Mid Channel, 634.5 MHz		9.656 MHz	Within Band	Pass
	LTE15 Bandwidth				
	Mid Channel, 634.5 MHz		14.329 MHz	Within Band	Pass
	LTE20 Bandwidth				
	Mid Channel, 634.5 MHz 64QAM Modulation		19.104 MHz	Within Band	Pass
	LTE5 Bandwidth				
	Mid Channel, 634.5 MHz		4.859 MHz	Within Band	Pass
	LTE10 Bandwidth				
	Mid Channel, 634.5 MHz		9.667 MHz	Within Band	Pass
	LTE15 Bandwidth				
	Mid Channel, 634.5 MHz		14.417 MHz	Within Band	Pass
	LTE20 Bandwidth				
	Mid Channel, 634.5 MHz		19.136 MHz	Within Band	Pass
	256QAM Modulation				
	LTE5 Bandwidth				
	Mid Channel, 634.5 MHz		4.861 MHz	Within Band	Pass
	LTE10 Bandwidth				
	Mid Channel, 634.5 MHz		9.671 MHz	Within Band	Pass
	LTE15 Bandwidth				
	Mid Channel, 634.5 MHz		14.408 MHz	Within Band	Pass
	LTE20 Bandwidth Mid Channel, 634.5 MHz		19.138 MHz	Within Band	Pass





00 .0 .0			- Camer	under work work when when
.0				
enter 634.5 MHz Res BW 200 kHz		#VBW 620 kHz		Span 25 MI Sweep 1.2 n
Occupied Bandwidth	h	Total Power	56.8 dBm	
	9820 MHz			
		% of OBW Power	99.00 %	





% of OBW Power

x dB

99.00 %

S L DC Coupled

-26.00 dB

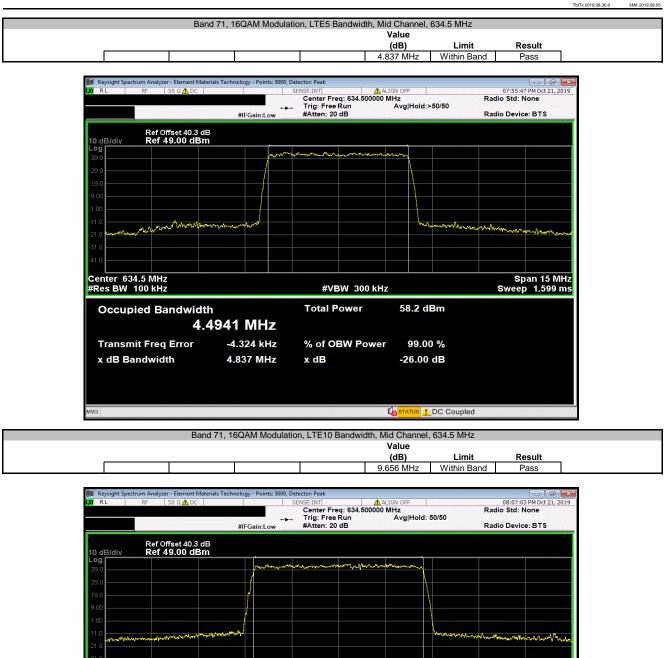
15.885 kHz

19.08 MHz

Transmit Freq Error

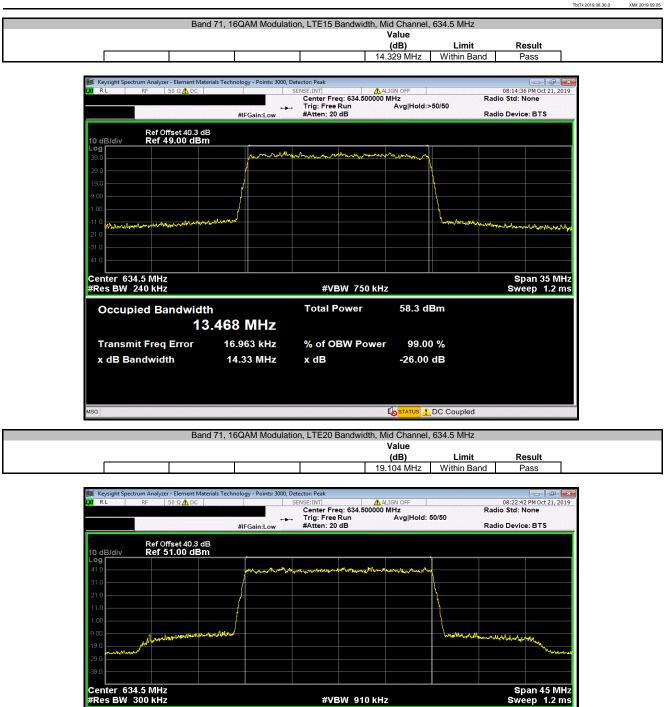
x dB Bandwidth





-21.0							a a serie of the first state of the	and and the first of the second s	whiteword the
-31.0									
41.0									
Center 634.5 MHz #Res BW 200 kHz			#VBW	620 kHz					an 25 Mi ep 1.2 n
Occupied Bandwidt	h		Total Pov	ver	58.0 c	IBm			
9.	0097 I	MHz							
Transmit Freq Error		8 Hz	% of OBV	V Power	99.0	0 %			
x dB Bandwidth	9.65	6 MHz	x dB		-26.00	) dB			
ISG						DC Cou	pled		





#VBW 910 kHz

57.9 dBm

99.00 %

S 1 DC Coupled

-26.00 dB

Total Power

x dB

% of OBW Power

**Occupied Bandwidth** 

Transmit Freq Error

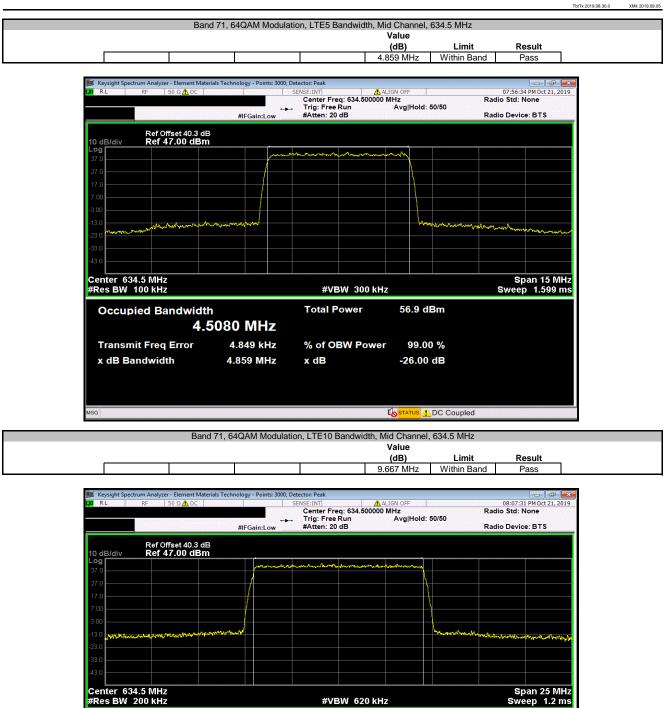
x dB Bandwidth

17.951 MHz

7.273 kHz

19.10 MHz





Total Power

x dB

% of OBW Power

56.8 dBm

99.00 %

S 1 DC Coupled

-26.00 dB

**Occupied Bandwidth** 

Transmit Freq Error

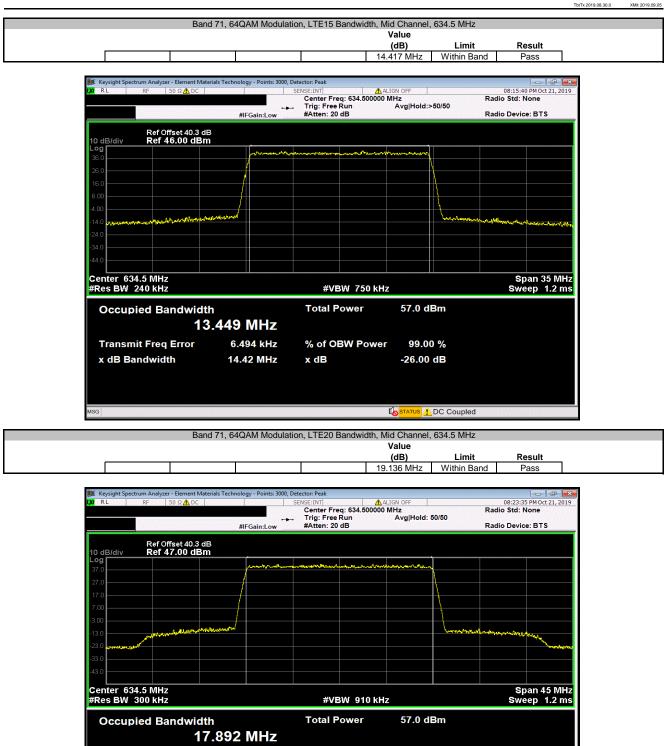
x dB Bandwidth

9.0140 MHz

9.452 kHz

9.667 MHz





% of OBW Power

x dB

99.00 %

S 1 DC Coupled

-26.00 dB

13.599 kHz

19.14 MHz

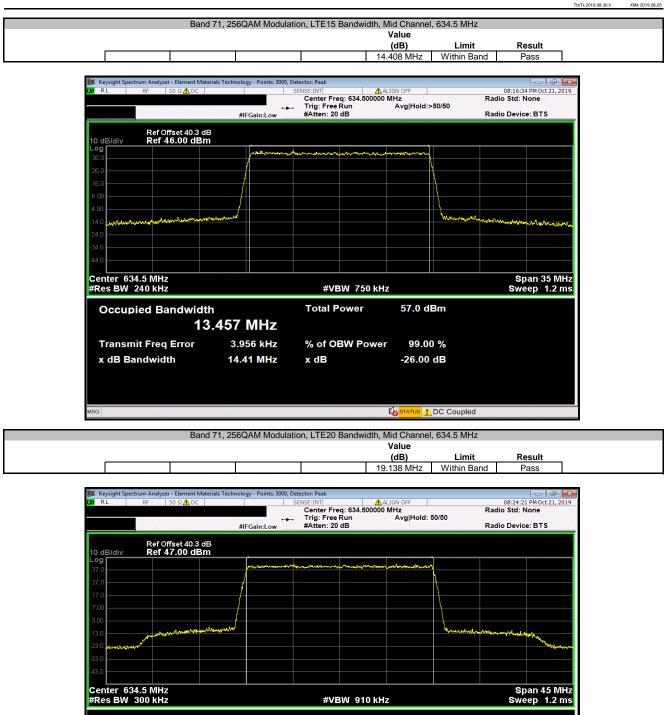
Transmit Freq Error

x dB Bandwidth









#Res BW 300 kHz		#VBW 910 kHz		Sweep 1.2 ms
Occupied Bandwidt	<sup>h</sup> 7.912 MHz	Total Power	57.0 dBm	
Transmit Freq Error	32.819 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	19.14 MHz	x dB	-26.00 dB	
MSG		0	STATUS 1 DC Coupled	



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 emission bandwidth 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 5.4 of ANSI C63.26 was used to make the measurement.

The spectrum analyzer settings were as follows: RBW = Approx. 1% of the emission bandwidth (B). This was an iterative process to determine the RBW based on the emissions bandwidth (B). VBW= > RBW A peak detector was used Trace max hold.

The spectrum analyzer occupied bandwidth measurement function was then used to measure the 26 dB emission bandwidth.

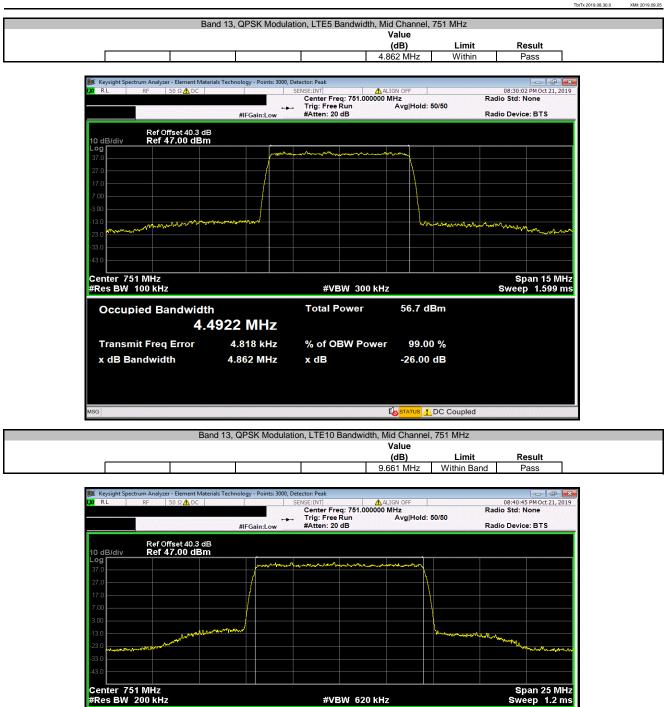
Band 13 Emission Designators

	746MHz	to 756MHz Band Em	ission Designators	
Channel Bandwidth	LTE-QPSK	LTE-16QAM	LTE-64QAM	LTE-256QAM
5M	4M86F9W	4M83F9W	4M87F9W	4M86F9W
10M	9M66F9W	9M67F9W	9M70F9W	9M65F9W
Note: Based on 26	5dB emission bandwid	ith		



EUT:				TbtTx 2019.08.30.0	XMit 20
	AHBOA Remote Radio Head (RRH)		Work Order:		
Serial Number:	BL1934X1001		Date:	23-Oct-19	
Customer:	Nokia Solutions and Networks		Temperature:	22.4 °C	
Attendees:	Hobert Smith, John Rattanavong, Mitchell Hill		Humidity:	38.3% RH	
Project:			Barometric Pres.:	1020 mbar	
	Jonathan Kiefer	Power: 48VDC	Job Site:	TX09	
EST SPECIFICAT	IONS	Test Method			
CC 27:2019		ANSI C63.26:2015			
OMMENTS					
	I TEST STANDARD				
one					
Configuration #	1 Signature	Jonathan Kiefer			
	· · · · ·		Value (dB)	Limit	Result
and 13			(00)		Result
	QPSK Modulation				
	LTE5 Bandwidth				
	Mid Channel, 751 MHz		4.862 MHz	Within	Pass
	LTE10 Bandwidth		4.002 1011 12	vviu in i	
	Mid Chappel 751 MHz		9.661 MHz	Within Band	Pass
	Mid Channel, 751 MHz		9.661 MHz	Within Band	Pass
	16QAM Modulation		9.661 MHz	Within Band	Pass
	16QAM Modulation LTE5 Bandwidth				
	16QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz		9.661 MHz 4.834 MHz	Within Band Within Band	Pass Pass
	16QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth		4.834 MHz	Within Band	Pass
	16QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz				
	16QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz 64QAM Modulation		4.834 MHz	Within Band	Pass
	16QAM Modulation LTES Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz 64QAM Modulation LTE5 Bandwidth		4.834 MHz 9.667 MHz	Within Band	Pass Pass
	16QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz 64QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz		4.834 MHz	Within Band	Pass
	16QAM Modulation LTE5 Bandwidth LTE10 Bandwidth Mid Channel, 751 MHz 64QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth		4.834 MHz 9.667 MHz 4.867 MHz	Within Band Within Band Within Band	Pass Pass Pass
	16QAM Modulation LTES Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz 64QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz		4.834 MHz 9.667 MHz	Within Band	Pass Pass
	16QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz 64QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz 256QAM Modulation		4.834 MHz 9.667 MHz 4.867 MHz	Within Band Within Band Within Band	Pass Pass Pass
	16QAM Modulation LTE5 Bandwidth LTE10 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth LTE5 Bandwidth LTE10 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz LTE5 Bandwidth		4.834 MHz 9.667 MHz 4.867 MHz 9.701 MHz	Within Band Within Band Within Band Within Band	Pass Pass Pass Pass
	16QAM Modulation LTES Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz 64QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz 256QAM Modulation LTE5 Bandwidth Mid Channel, 751 MHz		4.834 MHz 9.667 MHz 4.867 MHz	Within Band Within Band Within Band	Pass Pass Pass
	16QAM Modulation LTE5 Bandwidth LTE10 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth LTE5 Bandwidth LTE10 Bandwidth Mid Channel, 751 MHz LTE10 Bandwidth Mid Channel, 751 MHz LTE5 Bandwidth		4.834 MHz 9.667 MHz 4.867 MHz 9.701 MHz	Within Band Within Band Within Band Within Band	Pass Pass Pass Pass





Total Power

x dB

% of OBW Power

56.8 dBm

99.00 %

S 1 DC Coupled

-26.00 dB

**Occupied Bandwidth** 

Transmit Freq Error

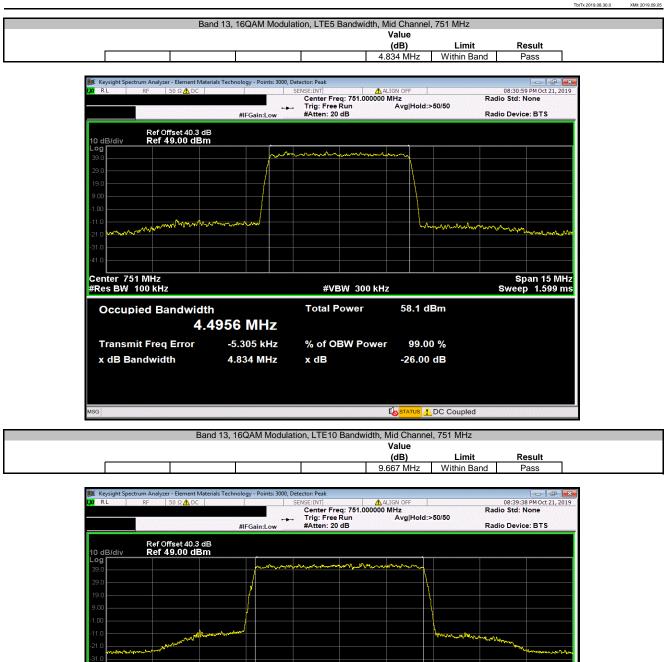
x dB Bandwidth

8.9799 MHz

1.433 kHz

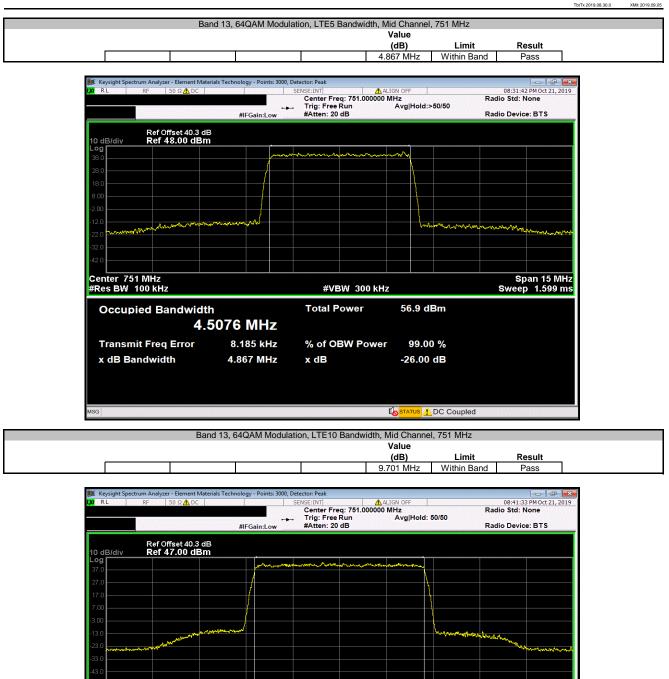
9.661 MHz





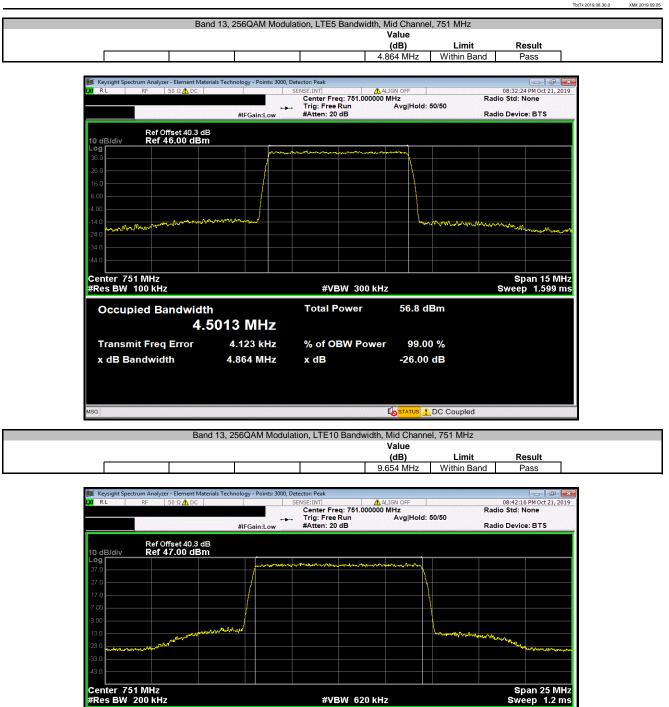
enter 751 MHz Res BW 200 kHz		#VBW 620 kHz		Span 25 M Sweep 1.2 r
Occupied Bandwidt 9.	հ 0042 MHz	Total Power	58.0 dBm	
Transmit Freq Error	42 Hz	% of OBW Power	99.00 %	
x dB Bandwidth	9.667 MHz	x dB	-26.00 dB	





Occupied Bandwidth Total Power 9.0046 MHz	56.8 dBm	
Transmit Freq Error 6.746 kHz % of OBW Powe	ver 99.00 %	
x dB Bandwidth 9.701 MHz x dB	-26.00 dB	





#VBW 620 kHz

56.9 dBm

99.00 %

S 1 DC Coupled

-26.00 dB

Total Power

x dB

% of OBW Power

**Occupied Bandwidth** 

Transmit Freq Error

x dB Bandwidth

8.9790 MHz 14.589 kHz

9.654 MHz