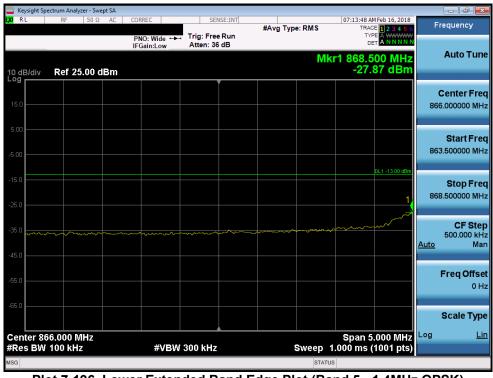


Band 5 – Antenna 2

Keysight Spectrum Analyzer - Swe					
RL RF 50 Ω	AC CORREC	SENSE:INT	#Avg Type: RMS	07:10:57 AM Feb 16, 2018 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide ↔ IFGain:Low	Trig: Free Run Atten: 40 dB		TYPE A WWWWW DET A N N N N N	
0 dB/div Ref 30.00 d	IBm		Mk	r1 869.000 MHz -20.418 dBm	Auto Tur
.og		m	m	en la	Center Fre
20.0					869.000000 MH
10.0					Start Fre
0.00				<u> </u>	867.000000 MF
10.0					
		/ /1		DL1 -13.00 dBm	Stop Fre 871.000000 MH
20.0				M.	
30.0		vann.		a manual and a second and a second and a second	CF Ste 400.000 kl
40.0					Auto Ma
50.0					Freq Offs
60.0					01
					Scale Typ
enter 869.000 MHz Res BW 30 kHz	#VBW	01 kHz	Sween	Span 4.000 MHz 5.533 ms (1001 pts)	Log <u>L</u>
	#4044	3 T KHZ	statu		

Plot 7-195. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK)



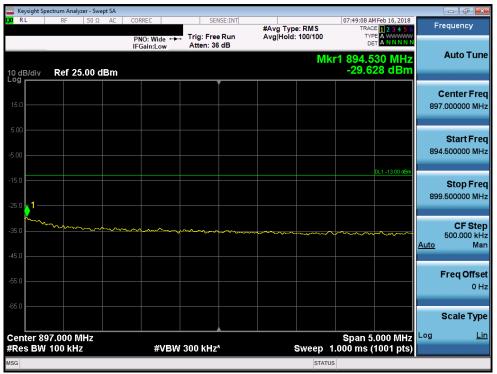
Plot 7-196. Lower Extended Band Edge Plot (Band 5 - 1.4MHz QPSK)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dage 120 of 175			
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	ectrum Analyzer - S									_	- 6 -
LXI RL	RF 50 :	Ω AC	CORREC			#Avg Typ Avg Hold		TRAC	M Feb 16, 2018 CE 1 2 3 4 5 6 PE A WWWWWW ET A N N N N N	Fre	equency
10 dB/div	Ref 30.00	dBm	IFGain:Low _	Atten: 40	dB		Μ	kr1 894.0 -19.8			Auto Tun
20.0			umquen								enter Fre 000000 МН
0.00										892.	Start Fre 000000 M⊢
20.0					1				DL1 -13.00 dBm	896.	Stop Fre 000000 M⊦
30.0 40.0	- And W				ho may	m		·····	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>Auto</u>	CF Ste 400.000 k⊦ Ma
50.0										F	F req Offs 0 H
Center 89	94.000 MHz		#)/P)	W 91 kHz*			Puraan	Span 4 5.533 ms (Log	Scale Typ
SG	JU KHZ		#VB	9 T KHZ"			Sweep		(100 Pits)		

Plot 7-197. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK)



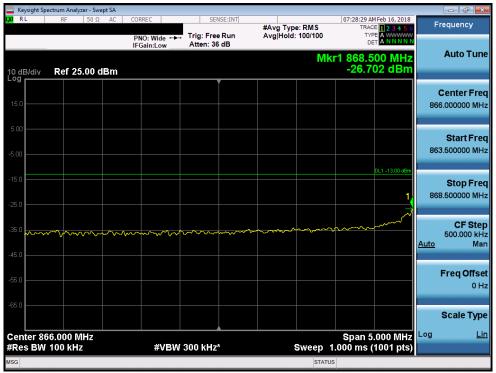
Plot 7-198. Upper Extended Band Edge Plot (Band 5 - 1.4MHz QPSK)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 101 of 175				
1M1801290011-02.QLJ	2/5-2/22/2018	Remote Radio Head		Page 121 of 175				
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	ht Spect																			e ē 🔀
l <mark>XI</mark> RL		RF		50 Ω	AC	COF	RREC				NSE:II		#Avg	Гуре	RMS	07:2	TRAC	HFeb 16, 2018	F	requency
10 dB/d	liv	Ref	30.	00 d	Bm		NO: Wi Gain:L	de ⊶⊷ ow		g: Free en: 40		ı			Mki	r1 8 -1	DE	00 MHz 50 dBm		Auto Tune
20.0												hu	·····	v~^	www					Center Freq 9.000000 MHz
10.0																			86	Start Freq 57.000000 MHz
-10.0											1-						h.	DL1 -13.00 dBm	87	Stop Freq 1.000000 MHz
-30.0	~~~	w	-^~_/b~	۸ <i>.</i> ۰۰۰	ጉሌሌ	y www.	m	n na	, horeste	- Aur							N _v	www	<u>Auto</u>	CF Step 400.000 kHz Man
-50.0																				Freq Offset 0 Hz
-60.0																				Scale Type
Center #Res E				Iz			#	VBW	91 k	Hz				ş	Sweep 5	Sp .533	an 4 ms (.000 MHz 1001 pts)	Log	Lin
MSG															STATUS					

Plot 7-199. Lower Band Edge Plot (Band 5 - 1.4MHz 16-QAM)



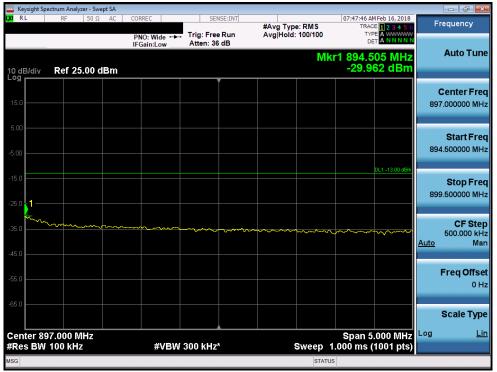
Plot 7-200. Lower Extended Band Edge Plot (Band 5 - 1.4MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 100 of 175				
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PNO: Wide Trig: Free Run IFGain:Low Avg Hold: 100/100 Tree Z 34330 Aut 10 dB/div Ref 30.00 dBm Cent State Cent State State <t< th=""><th>eysight Spectrum</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>- đ 💌</th></t<>	eysight Spectrum												- đ 💌
Instantion Mkr1 894.000 MHz -20.759 dBm Auto 0 dB/div Ref 30.00 dBm -20.759 dBm Cent 894.000 100	L R	F 50 9	Ω AC	PNO: W		Trig: Fre	e Run			TRA	CE 1 2 3 4 5 6	F	requency
Center 894.000 MHz	B/div Re	f 30.00	dBm	IFGain:L	Low	Atten: 4	0 dB		Μ	kr1 894.(000 MHz		Auto Tun
0.00 10.0			from	n n n n n n n n n n n n n n n n n n n	~~~~								Center Fre 4.000000 MH
200 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1												89	Start Fre 2.000000 M⊢
40.0 40.0 50.0 60.0 60.0 Center 894.000 MHz Span 4.000 MHz Log							1				DL1 -13.00 dBm	89	Stop Fre 6.000000 M⊢
Senter 894.000 MHz Span 4.000 MHz	m	n n n n n n n n n n n n n n n n n n n					Ywwww	Muran M.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<u>Auto</u>	CF Ste 400.000 kH Ma
enter 894.000 MHz Span 4.000 MHz													Freq Offs 0 H
Res BW 30 kHz #VBW 91 kHz* Sweep 5.533 ms (1001 pts)	iter 894 <u>.00</u>	00 MHz								Span 4			Scale Typ
SG STATUS					#VBW	91 kHz*				5.533 ms	(1001 pts)		

Plot 7-201. Upper Band Edge Plot (Band 5 - 1.4MHz 16-QAM)



Plot 7-202. Upper Extended Band Edge Plot (Band 5 - 1.4MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 102 of 175				
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	ectrum Analyze							
LXI RL	RF	50 Ω AC	CORREC	SENSE:	INT #Avg Typ		:49 AM Feb 16, 2018 TRACE 1 2 3 4 5 6	Frequency
			PNO: Wide ↔ IFGain:Low	Trig: Free Ru Atten: 40 dB	in Avg Hold			
10 dB/div	Ref 30.	00 dBm	1			Mkr1 86 -1	9.000 MHz 9.438 dBm	Auto Tune
20.0						menun		Center Freq 869.000000 MHz
0.00				/				Start Freq 867.000000 MHz
-10.0							DL1 -13.00 dBm	Stop Freq 871.000000 MHz
-30.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.mar				hann	CF Step 400.000 kHz <u>Auto</u> Mar
-50.0								Freq Offse 0 Ha
-60.0								Scale Type
Center 86 #Res BW		lz	#VBW	91 kHz*		Spa Sweep 5.533 r		Log <u>Lin</u>
MSG						STATUS		

Plot 7-203. Lower Band Edge Plot (Band 5 - 1.4MHz 64-QAM)



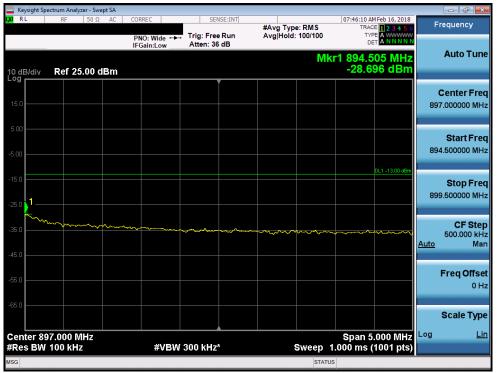
Plot 7-204. Lower Extended Band Edge Plot (Band 5 - 1.4MHz 64-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 104 of 175				
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	ectrum Analyzer -											- ¢ 🗙
X RL	RF 50	Ω AC			Trig: Fre		#Avg Typ Avg Hold		TRA	M Feb 16, 2018 CE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	F	requency
10 dB/div	Ref 30.00) dBm	IFGain:	Low	Atten: 4	0 dB		Μ	kr1 894.0			Auto Tun
20.0		J.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m m	~							Center Fre 4.000000 MH
0.00											892	Start Fre 2.000000 M⊢
20.0						1				DL1 -13.00 dBm	896	Stop Fre 5.000000 MH
30.0 ~~~~ 40.0 	pand					tym	mmmmm		v	····	<u>Auto</u>	CF Ste 400.000 k⊢ Ma
50.0												Freq Offs 0 ⊦
	94.000 MHz	2							Span 4		Log	Scale Typ <u>Li</u>
Res BW	30 kHz			#VBW 9	1 kHz*			Sweep	5.533 ms	(1001 pts)		

Plot 7-205. Upper Band Edge Plot (Band 5 - 1.4MHz 64-QAM)



Plot 7-206. Upper Extended Band Edge Plot (Band 5 - 1.4MHz 64-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 105 of 175				
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🔤 Keysight Spectrum Analyzer - Swep	it SA				
LX RL RF 50 Ω	AC CORREC	SENSE:INT	#Avg Type: RMS	07:22:53 AM Feb 16, 2018 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide ↔	Trig: Free Run Atten: 40 dB	Avg Hold: 100/100	TYPE A WWWWW DET A N N N N N	
	IFGain:Low	Atten: 40 dB	Mk	-1 969 090 MU-	Auto Tune
10 dB/div Ref 30.00 dE	3m		IVIN	r1 868.980 MHz -17.480 dBm	
		- www.	man man	ή Ι	Center Freq
20.0					869.000000 MHz
10.0					Start Freq
0.00					867.000000 MHz
0.00					
-10.0				DL1 -13.00 dBm	Stop Freq
		1		DL1 -13.00 dBm	871.000000 MHz
-20.0		N		<u> </u>	07 1.000000 Mil 12
		mon		home .	CF Step
-30.0	An al way			May	400.000 kHz
	Auron and a second seco				<u>Auto</u> Man
-40.0					
-50.0					Freq Offset
-50.0					0 Hz
-60.0					
					Scale Type
					Log Lin
Center 869.000 MHz #Res BW 30 kHz	#VBW	01 kHz*	Sween 5	Span 4.000 MHz .533 ms (1001 pts)	
#Res BW JU KHZ	#4844	91-K112			
woo .			STATUS		

Plot 7-207. Lower Band Edge Plot (Band 5 - 1.4MHz 256-QAM)



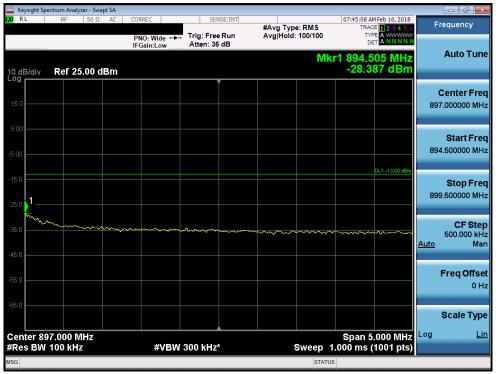
Plot 7-208. Lower Extended Band Edge Plot (Band 5 - 1.4MHz 256-QAM)

FCC ID: QLJ4GRFN-005		(CERTIFICATION)	core	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dega 106 of 175				
1M1801290011-02.QLJ	2/5-2/22/2018	Remote Radio Head		Page 126 of 175				
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Keysight Spectrum Analyzer - Swept SA				- # *
C RL RF 50Ω AC	PNO: Wide Trig: Free		e: RMS TRAG	MFeb 16, 2018 CE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N
10 dB/div Ref 30.00 dBm	IFGain:Low Atten: 40) dB	Mkr1 894.0	
20.0	m manus			Center Fre 894.000000 MH
0.00				Start Fre 892.000000 MH
20.0		1		011 -1300 dem Stop Fre 896.000000 MH
30.0		Law ward ward ward	mmm	CF Ste 400.000 kH <u>Auto</u> Ma
50.0				Freq Offs 0 F
60.0 Senter 894.000 MHz			Span 4	.000 MHz
Res BW 30 kHz	#VBW 91 kHz*		Sweep 5.533 ms ((1001 pts)

Plot 7-209. Upper Band Edge Plot (Band 5 - 1.4MHz 256-QAM)



Plot 7-210. Upper Extended Band Edge Plot (Band 5 - 1.4MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dega 107 of 175				
1M1801290011-02.QLJ 2/5-2/22/2018		Remote Radio Head		Page 127 of 175				
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	trum Analyzer - Sw									_	- 6 -
DXI RL	RF 50 Ω		DRREC		ISE:INT	#Avg Typ		TRAC	Feb 16, 2018	Fr	equency
		i I	PNO: Wide G FGain:Low	Trig: Free Atten: 40		Avg Hold					Auto Tune
10 dB/div	Ref 30.00 (dBm					Mł	(r1 869.0 -21.24	00 MHz 40 dBm		Auto Tuli
					man	man and and	m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mm	C	enter Free
20.0										869	.000000 MH
10.0											Start Fre
0.00					1					866	.000000 MH
10.0											
					1				DL1 -13.00 dBm	872	Stop Fre 000000 MH
-20.0				ļ							
-30.0			unouno	and and a start and a start and a start and a start a st						0	CF Ste 600.000 kH Ma
-40.0										<u>Auto</u>	Ivia
-50.0											Freq Offse
-60.0											0 H
-00.0											Scale Typ
	9.000 MHz		<i>40 (1</i> 714					Span 6.	000 1911 121	Log	Li
#Res BW 3	SU KHZ		#VBW	91 kHz*			Sweep	8.267 ms (*	iour pts)		

Plot 7-211. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK)

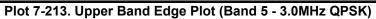


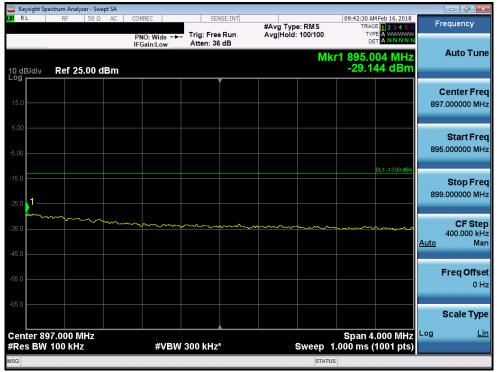
Plot 7-212. Lower Extended Band Edge Plot (Band 5 - 3.0MHz QPSK)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 109 of 175				
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	Spectrum Analy										_	- ¢ ×
X/RL	RF	50 Ω		ORREC	Trig: Fre		#Avg Typ Avg Hold		TRAC	Feb 16, 2018 1 2 3 4 5 6 A WWWWWW A NNNNN	Fr	equency
10 dB/div	Ref 30).00 dB		FGain:Low	Atten: 4	0 dB		М	kr1 894.0			Auto Tune
20.0	man	menhan Pro	/weme_~~									Center Fre .000000 MH
0.00											891	Start Fre .000000 MH
20.0						1				DL1 -13.00 dBm	897	Stop Fre .000000 MH
30.0							Morrison	an was	Vernenenen	••••/~···/~	<u>Auto</u>	CF Ste 600.000 kH Ma
50.0												F req Offs 0 H
60.0												Scale Typ Li
	394.000 N V 30 kHz	IHZ		#VBW	91 kHz*			Sweep	Span 6. 8.267 ms (000 MHz 1001 pts)	Log	
SG								STAT	US			





Plot 7-214. Upper Extended Band Edge Plot (Band 5 - 3.0MHz QPSK)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	re	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Page 129 of 175				
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	Spectrum Analyzer - Sv										
L <mark>XI</mark> RL	RF 50 \$	Ω AC C	ORREC		NSE:INT	#Avg Typ		TRAC	Feb 16, 2018	F	requency
			PNO: Wide 🖵 FGain:Low	Trig: Free Atten: 40		Avg Hold	:>100/100	TYP DE	A WWWWW A N N N N N		
10 dB/div Log	Ref 30.00	dBm					Mk	r1 869.0 -21.4	00 MHz 64 dBm		Auto Tune
20.0								n mont	~~~~~		Center Free 9.000000 MH
0.00										86	Start Fre 6.000000 MH
-10.0					1				DL1 -13.00 dBr	87:	Stop Fre 2.000000 MH
30.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		marchan	and a start of the						<u>Auto</u>	CF Ste 600.000 k⊢ Ma
50.0											Freq Offso 0 ⊦
-60.0											Scale Typ
	369.000 MHz N 30 kHz		#VBW	91 kHz*			Sweep	Span 6. 8.267 ms (000 1911 121	Log	Li
ISG							STATU			-	

Plot 7-215. Lower Band Edge Plot (Band 5 - 3.0MHz 16-QAM)



Plot 7-216. Lower Extended Band Edge Plot (Band 5 - 3.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 120 of 175				
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	Spectrum Analyze			1					ē e
X/ RL	RF	50 Ω AC	CORREC PNO: Wide ↔	Trig: Free		#Avg Typ Avg Hold		09:35:58 AM Feb 16, 201 TRACE 2 3 4 TYPE A WWW DET A N N N	Frequency
10 dB/div	Ref 30.	00 dBm	IFGain:Low	Atten: 40) dB		Μ	kr1 894.000 MH -21.368 dBi	Auto Tun
-	and an an	many	mannayan	mannamana					Center Free 894.000000 MH
0.00									Start Free 891.000000 MH
20.0					1			DL1 -13.00 d8	Stop Fre 897.000000 MH
30.0					Ju Junior	Mannalazber	mm	mannan	CF Ste 600.000 k⊢ <u>Auto</u> Ma
50.0									Freq Offse 0 ⊢
-60.0									Scale Typ
	394.000 MI V 30 kHz	HZ	#VBV	V 91 kHz*			Sweep	Span 6.000 MH 8.267 ms (1001 pt	s)
ISG							STAT	US	

Plot 7-217. Upper Band Edge Plot (Band 5 - 3.0MHz 16-QAM)



Plot 7-218. Upper Extended Band Edge Plot (Band 5 - 3.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 121 of 175				
1M1801290011-02.QLJ	2/5-2/22/2018	Remote Radio Head		Page 131 of 175				
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Keysight Spectrum Analyzer - Swept S					to to 🗾
XI RL RF 50Ω A		SENSE:INT	#Avg Type: RMS	09:26:40 AM Feb 16, 2018 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide ↔→ IFGain:Low	Trig: Free Run Atten: 40 dB	Avg Hold: 100/100		
10 dB/div Ref 30.00 dB	m		Mk	r1 869.000 MHz -21.561 dBm	Auto Tune
		prom	mm	mound	Center Free
20.0					869.000000 MH
10.0					Start Fre
0.00					866.000000 MH
10.0				DL1 -13.00 dBm	Stop Fre
-20.0		1			872.000000 MH
30.0		- Annon			CF Ste
40.0	man and a second and a second s	·			600.000 k⊢ <u>Auto</u> Ma
					FreqOffse
-50.0					0+
60.0					Scale Typ
Center 869.000 MHz				Opan 0.000 minz	Log <u>Li</u>
#Res BW 30 kHz	#VBW s	91 kHz*	Sweep S	3.267 ms (1001 pts)	

Plot 7-219. Lower Band Edge Plot (Band 5 - 3.0MHz 64-QAM)



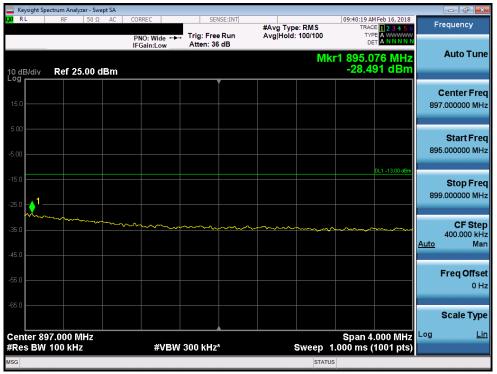
Plot 7-220. Lower Extended Band Edge Plot (Band 5 - 3.0MHz 64-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 122 of 175				
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Keysight S R L	Spectrum Analyz	zer - Swept S 50 Ω /		ORREC		INSE:INT			00.07.01.41	4 Feb 16, 2018	_	- đ 🗙
KL	KF	50 92 4	F	NO: Wide ↔		e Run	#Avg Typ	e:RMS	TRAC	E 1 2 3 4 5 6 E A WWWWW T A N N N N N	Fr	equency
0 dB/div	Ref 30	.00 dBi						М	kr1 894.0 -21.6	00 MHz 76 dBm		Auto Tun
20.0	www.www.www.	hunder	ᠵᡃᠧᢧᡅᢦᠬᠬ	Noongermann	winnyng							Center Fre .000000 M⊢
10.0											891	Start Fre .000000 M⊦
20.0						1				DL1 -13.00 dBm	897	Stop Fre
0.0						he how have	w.a.w.w.	mm	W. Market Wilson	MALWIN	<u>Auto</u>	CF Ste 600.000 kł Ma
0.0												F req Offs 0 I
50.0												Scale Typ
	894.000 M V 30 kHz	Hz		#VBW	91 kHz			Sweep	Span 6 8.267 ms (.000 MHz 1001 pts)	Log	L
SG								STA	rus			

Plot 7-221. Upper Band Edge Plot (Band 5 - 3.0MHz 64-QAM)



Plot 7-222. Upper Extended Band Edge Plot (Band 5 - 3.0MHz 64-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 133 of 175
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	Spectrum Analyzer -										
l <mark>XI</mark> RL	RF 5	0Ω AC	CORREC	SENS	E:INT	#Avg Typ		TRAC	M Feb 16, 2018	F	requency
			PNO: Wide ↔ IFGain:Low	Trig: Free Atten: 40 c		Avg Hold:					
10 dB/div	Ref 30.0	0 dBm					Mł	(r1 869.0 -21.1	00 MHz 27 dBm		Auto Tune
20.0					from		how	mm	menning		Center Free 9.000000 MH
10.0											
										86	Start Fre 5.000000 MH
0.00											
-10.0									DL1 -13.00 dBm		Stop Fre
-20.0					1					87:	2.000000 MH
-30.0											CF Ste
-40.0	mun	v www.dem	Mar March							<u>Auto</u>	600.000 k⊢ Ma
-50.0											Freq Offse
60.0											0 H
											Scale Typ
	369.000 MH: V 30 kHz	Z	#VBW	91 kHz*			Sweep	Span 6 8.267 ms (.000 191112	Log	Li
ISG							STATU	_			

Plot 7-223. Lower Band Edge Plot (Band 5 - 3.0MHz 256-QAM)



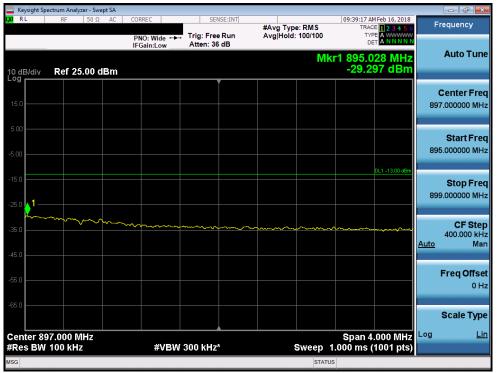
Plot 7-224. Lower Extended Band Edge Plot (Band 5 - 3.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager					
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	pectrum Analy												- 8 💌
LXI RL	RF	50 Ω	AC	CORREC		S		#Avg Typ Avg Hold		09:38:15 AM TRACE	1 2 3 4 5 6	Fre	equency
				PNO: W IFGain:L	ide ↔ .ow	Atten: 4		Avginoid			A WWWWW A N N N N N		Auto Tune
10 dB/div	Ref 30).00 dl	Bm						M	kr1 894.00 -20.60	00 MHz 07 dBm		
- ~	mar	~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m		www	Ĭ						enter Frec
20.0												894.	000000 MH:
10.0													Start Free
0.00												891.	000000 MH:
-10.0											L1 -13.00 dBm		Stop Free
-20.0							1					897.	000000 MH
-30.0							L.						CF Ste
							~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	manne	m	mannanda	menom	<u>Auto</u>	600.000 kH Ma
-40.0												-	req Offse
-50.0													0 H
-60.0													Scale Typ
	94.000 N V 30 kHz	IHZ		\$	≠VBW	91 kHz'			Sweep	Span 6. 8.267 ms (1	000 MHz 001 pts)	Log	Liı
ISG									STAT				

Plot 7-225. Upper Band Edge Plot (Band 5 - 3.0MHz 256-QAM)



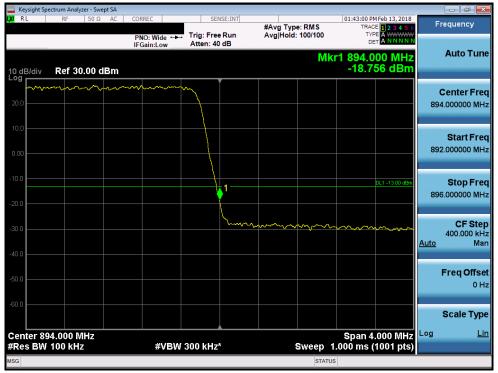
Plot 7-226. Upper Extended Band Edge Plot (Band 5 - 3.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
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	ectrum Analyz	er - Swept	SA										-
LXU RL	RF	50 Ω	AC	CORREC PNO: W IFGain:L	ide ⊶⊶ ₋ow			#Avg Typ	e:RMS	TRA( TY	M Feb 08, 2018 DE <b>1 2 3 4 5</b> 6 PE A WWWWW ET A N N N N N	F	requency
10 dB/div Log	Ref 30	.00 dE	3m						N	lkr1 869 -20.6	.00 MHz 59 dBm		Auto Tune
20.0								~~~~~	Low Mr.	M			Center Free 9.000000 MH
0.00												864	Start Fre
-10.0							1				DL1 -13.00 dBm	874	Stop Fre 1.000000 MH
30.0 <mark>~~~~</mark> 40.0 ——		~~~~~~	<u>^~~~</u>	~^^^^	~~~~~	~~~~~						Auto	CF Ste 1.000000 MH Ma
60.0													FreqOffso 0⊦
	69.000 M / 100 kHz				#VBW	300 kHz			Sweep	Span 1 1.267 ms (	10.00 MHz (1001 pts)		Scale Typ
ISG									STATU				

Plot 7-227. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK)



Plot 7-228. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager					
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	ectrum Analyze		A									
LXI RL	RF	50 Ω A	AC COR	REC	SE	NSE:INT	#Avg Typ	e: RMS		M Feb 13, 2018	F	requency
				IO:Wide ⊷ Gain:Low	Trig: Fre Atten: 4				TYF			
10 dB/div Log	Ref 30.	00 dBr	m					Mk	r1 868.9 -20.	92 MHz 49 dBm		Auto Tune
						~		m	mm	~~~~~		Center Freq
20.0											86	9.000000 MHz
10.0												Start Free
0.00						ſ					86	7.000000 MHz
-10.0										DL1 -13.00 dBm		Stop Freq
-20.0						2 ¹					87	1.000000 MHz
-30.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	, march	$\sim \sim \sim$	v							CF Step 400.000 kHz
-40.0											<u>Auto</u>	400.000 KHZ Mar
												Freq Offset
-50.0												0 Hz
-60.0												Scale Type
Center 86		lz				<u> </u>			Span 4	.000 MHz	Log	Lin
#Res BW	100 KHZ			#VBI	V 300 kHz					1001 pts)		
ISG								STATUS	6			

Plot 7-229. Lower Band Edge Plot (Band 5 - 5.0MHz 16-QAM)



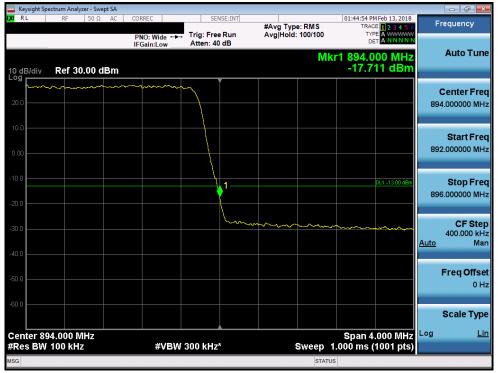
Plot 7-230. Upper Band Edge Plot (Band 5 - 5.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager					
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Keysight Spectrum	n Analyzer - Swep	ot SA									
LXIRL F	RF 50 Ω	AC	CORREC		NSE:INT	#Avg Type	e: RMS	TRAC	M Feb 13, 2018	F	requency
			PNO: Wide ↔ IFGain:Low	Trig: Fre Atten: 40				TYF DE			
10 dB/div Re	ef 30.00 di	Bm					M	kr1 869.0 -19.0	00 MHz 66 dBm		Auto Tune
20.0					$\left[ \right]$	~~~~~	~~~~~	~~~~~			<b>Center Freq</b> 9.000000 MHz
0.00										86	Start Freq 7.000000 MHz
-10.0					1				DL1 -13.00 dBm	87	Stop Fred 1.000000 MHz
-30.0	~~~~~	<u>~~~~</u>		~~~~/						<u>Auto</u>	CF Step 400.000 kH: Mar
-50.0											Freq Offse 0 H
-60.0											Scale Type
Center 869.00 #Res BW 100			#VBW	300 kHz			Sweep	Span 4 1.000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG							STAT	US			

Plot 7-231. Lower Band Edge Plot (Band 5 - 5.0MHz 64-QAM)



Plot 7-232. Upper Band Edge Plot (Band 5 - 5.0MHz 64-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dega 129 of 175				
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	ectrum Analyz	ter - Swept	t SA											- ¢ ×
LXI RL	RF	50 Ω	AC	CORREC		SE	NSE:INT		#Avg Typ	e: RMS		M Feb 13, 2018		Frequency
				PNO: W IFGain:L	ide ↔	Trig: Fre Atten: 40			Avg Hold:		TY			
				IFGain:L	.ow	Atten: 40	u B			M		000 MHz		Auto Tune
10 dB/div	Ref 30	.00 dE	3m								-19.9	13 dBm		
							Ĭ	س ۔	$\sim\sim\sim\sim$	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	······		Center Fred
20.0							ļ.,						8	69.000000 MHz
10.0														Start Free
0.00													86	67.000000 MHz
-10.0							N					DL1 -13.00 dBm		Stop Freq
							1						8	71.000000 MHz
-20.0						(	<b>Y</b>							
-30.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim\sim\sim$	~~~r	$\sim$	~~~~	~~~~~								CF Step
-30.0														400.000 kHz
-40.0													<u>Auto</u>	Man
-50.0														Freq Offset
														0112
-60.0														Scale Type
														Scale Type
Center 8											Span 4	.000 MHz	Log	Lin
#Res BW	100 kHz	-		7	¢VB₩	300 kHz	*			Sweep	1.000 ms	(1001 pts)		
MSG										STAT	JS			

Plot 7-233. Lower Band Edge Plot (Band 5 - 5.0MHz 256-QAM)



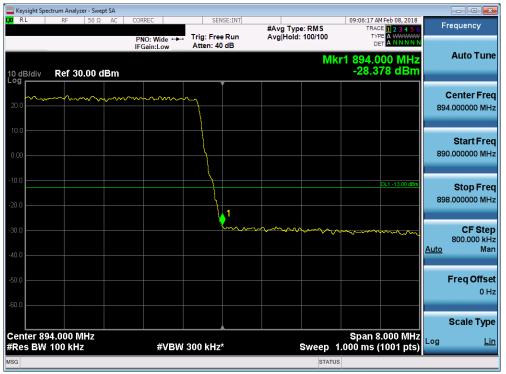
Plot 7-234. Upper Band Edge Plot (Band 5 - 5.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		(CERTIFICATION)	ore	Approved by: Quality Manager				
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		- Swept SA											
RL	RF	50 Ω AC	CORREC PNO: Wie IFGain:Lo		SEN Trig: Free #Atten: 3		;	#Avg Typ	e: RMS	TR/	AM Feb 08, 2018 ACE 1 2 3 4 5 6 YPE A WWWWW DET A NNNNN	F	requency
10 dB/div	Ref 26.0	0 dBm							N	/kr1 868 -28	8.86 MHz .99 dBm		Auto Tune
16.0							/			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	*****		Center Fred 9.000000 MH:
-4.00												86	Start Free 4.000000 MH
-14.0					•	1 /					DL1 -13.00 dBm	87	Stop Fre 4.000000 MH
34.0 44.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~		~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							Auto	CF Ste 1.000000 M⊢ Ma
54.0													FreqOffse 0⊦
Center 86		z		VBW	300 kHz				Sweep	Span 1.267 <u>ms</u>	10.00 MHz (1001 pts)		Scale Typ Li
SG									STAT				

Plot 7-235. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK)



Plot 7-236. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager				
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	ctrum Analyzei									_	
L <mark>XI</mark> RL	RF	50 Ω AC	CORREC	SENSE:	INT	#Avg Typ	e: RMS		Feb 16, 2018	F	requency
			PNO: Wide ↔ IFGain:Low	Trig: Free Ru Atten: 40 dE		Avg Hold:	100/100	TYP DE	AWWWW		
10 dB/div	Ref 30.0	00 dBm					Mk	r1 869.0 -25.76	00 MHz 67 dBm		Auto Tune
20.0					$\int_{-}^{-}$	<b>`````</b>			^		<b>Center Freq</b> 9.000000 MHz
0.00										86	Start Freq 5.000000 MHz
-10.0									DL1 -13.00 dBm	87	Stop Freq 3.000000 MHz
-30.0	~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~						<u>Auto</u>	CF Step 800.000 kHz Mar
-50.0											Freq Offse 0 Ha
-60.0											Scale Type
Center 869 #Res BW		Iz	#VBW	300 kHz*			Sweep 1	Span 8. .000 ms (′	000 MHz 1001 pts)	Log	Lin
MSG							STATU				

Plot 7-237. Lower Band Edge Plot (Band 5 - 10.0MHz 16-QAM)



Plot 7-238. Upper Band Edge Plot (Band 5 - 10.0MHz 16-QAM)

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Keysight Spectrum Analyzer - Swept SA					e ē 💌
<b>XI R L</b> RF 50 Ω AC	CORREC PNO: Wide ↔	SENSE:INT	#Avg Type: RMS Avg Hold: 100/100	10:00:37 AM Feb 16, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
	IFGain:Low	Atten: 40 dB		cr1 869.000 MHz	Auto Tun
10 dB/div Ref 30.00 dBn	1			-26.140 dBm	
		l l			Center Fre
20.0					869.000000 MH
10.0					Start Fre
0.00					865.000000 MH
10.0					
				DL1 -13.00 dBm	Stop Fre 873.000000 MH
-20.0		i			
30.0	·····				CF Ste 800.000 k⊢
40.0					<u>Auto</u> Ma
50.0					Freq Offse
					0 H
60.0					Scale Typ
Center 869.000 MHz				Span 8.000 MHz	Log <u>Li</u>
Res BW 100 kHz	#VBW	300 kHz*	Sweep	1.000 ms (1001 pts)	
SG			STATU	JS	

Plot 7-239. Lower Band Edge Plot (Band 5 - 10.0MHz 64-QAM)



Plot 7-240. Upper Band Edge Plot (Band 5 - 10.0MHz 64-QAM)

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Keysight Sp	ectrum Analyz	er - Swept S	SA											
L <mark>XI</mark> RL	RF	50 Ω A	AC CO	RREC		SE	NSE:INT		#Avg Typ	e RMS		M Feb 16, 2018	F	requency
				NO: Wide Gain:Lov		Trig: Fre Atten: 40			Avg Hold:		TYF DE			
10 dB/div Log	Ref 30	.00 dBi	m							Mk	r1 868.8 -26.0	96 MHz 74 dBm		Auto Tune
20.0								~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	······	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Center Freq 59.000000 MHz
0.00							ß						86	Start Freq 55.000000 MHz
-10.0												DL1 -13.00 dBm	87	Stop Freq 73.000000 MHz
-30.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~^~~	~~~~~		~~~~								<u>Auto</u>	CF Step 800.000 kH Mar
-50.0														<b>Freq Offse</b> 0 H
-60.0														Scale Type
Center 8 #Res BW				#V	BW :	300 kHz	*			Sweep 1	Span 8 1.000 ms (	.000 MHz 1001 pts)	Log	Lir
MSG										STATU	s			

Plot 7-241. Lower Band Edge Plot (Band 5 - 10.0MHz 256-QAM)



Plot 7-242. Upper Band Edge Plot (Band 5 - 10.0MHz 256-QAM)

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## Band 5 – MIMO Coducted Band Edge Measurement

Channel Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Band Edge	Ant 1 Cond. Band Edge [dBm]	Ant 2 Cond. Band Edge [dBm]	MIMO Cond. Band Edge [dBm]	MIMO Cond. Band Edge Limit [dBm]	Cond. Band Edge Margin [dB]
869.70	1.4	QPSK	Lower	-20.37	-20.42	-17.38	-13	-4.38
869.70	1.4	QPSK	Lower Extended	-27.44	-27.87	-24.64	-13	-11.64
893.30	1.4	QPSK	Upper	-18.91	-19.85	-16.34	-13	-3.34
893.30	1.4	QPSK	Upper Extended	-27.92	-29.63	-25.68	-13	-12.68
869.70	1.4	16-QAM	Lower	-20.36	-18.85	-16.53	-13	-3.53
869.70	1.4	16-QAM	Lower Extended	-28.36	-26.70	-24.44	-13	-11.44
893.30	1.4	16-QAM	Upper	-20.08	-20.76	-17.40	-13	-4.40
893.30	1.4	16-QAM	Upper Extended	-27.77	-29.96	-25.72	-13	-12.72
869.70	1.4	64-QAM	Lower	-19.92	-19.44	-16.66	-13	-3.66
869.70	1.4	64-QAM	Lower Extended	-28.36	-26.76	-24.48	-13	-11.48
893.30	1.4	64-QAM	Upper	-18.60	-19.14	-15.85	-13	-2.85
893.30	1.4	64-QAM	Upper Extended	-27.86	-28.70	-25.25	-13	-12.25
869.70	1.4	256-QAM	Lower	-20.69	-17.48	-15.79	-13	-2.79
869.70	1.4	256-QAM	Lower Extended	-27.24	-27.19	-24.21	-13	-11.21
893.30	1.4	256-QAM	Upper	-19.61	-19.23	-16.40	-13	-3.40
893.30	1.4	256-QAM	Upper Extended	-27.99	-28.39	-25.17	-13	-12.17
870.50	3	QPSK	Lower	-20.62	-21.24	-17.91	-13	-4.91
870.50	3	QPSK	Lower Extended	-28.75	-27.88	-25.28	-13	-12.28
892.50	3	QPSK	Upper	-22.11	-21.53	-18.80	-13	-5.80
892.50	3	QPSK	Upper Extended	-28.87	-29.14	-25.99	-13	-12.99
870.50	3	16-QAM	Lower	-20.81	-21.46	-18.12	-13	-5.12
870.50	3	16-QAM	Lower Extended	-29.34	-27.62	-25.38	-13	-12.38
892.50	3	16-QAM	Upper	-20.00	-21.37	-17.62	-13	-4.62
892.50	3	16-QAM	Upper Extended	-27.78	-29.46	-25.53	-13	-12.53
870.50	3	64-QAM	Lower	-21.78	-21.56	-18.66	-13	-5.66
870.50	3	64-QAM	Lower Extended	-28.72	-27.12	-24.83	-13	-11.83
892.50	3	64-QAM	Upper	-21.00	-21.68	-18.31	-13	-5.31
892.50	3	64-QAM	Upper Extended	-28.56	-28.49	-25.51	-13	-12.51
870.50	3	256-QAM	Lower	-21.53	-21.13	-18.31	-13	-5.31
870.50	3	256-QAM	Lower Extended	-28.93	-27.30	-25.02	-13	-12.02
892.50	3	256-QAM	Upper	-20.41	-20.61	-17.50	-13	-4.50
892.50	3	256-QAM	Upper Extended	-28.58	-29.30	-25.91	-13	-12.91

Channel Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Band Edge	Ant 1 Cond. Band Edge [dBm]	Ant 2 Cond. Band Edge [dBm]	MIMO Cond. Band Edge [dBm]	MIMO Cond. Band Edge Limit [dBm]	Cond. Band Edge Margin [dB]
871.50	5	QPSK	Lower	-19.18	-20.66	-16.84	-13	-3.84
891.50	5	QPSK	Upper	-19.55	-18.76	-16.12	-13	-3.12
871.50	5	16-QAM	Lower	-18.95	-20.49	-16.64	-13	-3.64
891.50	5	16-QAM	Upper	-20.66	-18.15	-16.21	-13	-3.21
871.50	5	64-QAM	Lower	-18.97	-19.07	-16.01	-13	-3.01
891.50	5	64-QAM	Upper	-19.59	-17.71	-15.54	-13	-2.54
871.50	5	256-QAM	Lower	-19.31	-19.91	-16.59	-13	-3.59
891.50	5	256-QAM	Upper	-18.90	-18.04	-15.44	-13	-2.44
874.00	10	QPSK	Lower	-27.67	-28.99	-25.27	-13	-12.27
889.00	10	QPSK	Upper	-27.71	-28.38	-25.02	-13	-12.02
874.00	10	16-QAM	Lower	-27.08	-25.77	-23.36	-13	-10.36
889.00	10	16-QAM	Upper	-27.63	-27.35	-24.48	-13	-11.48
874.00	10	64-QAM	Lower	-26.78	-26.14	-23.44	-13	-10.44
889.00	10	64-QAM	Upper	-27.42	-27.49	-24.44	-13	-11.44
874.00	10	256-QAM	Lower	-27.50	-26.07	-23.72	-13	-10.72
889.00	10	256-QAM	Upper	-27.45	-27.13	-24.27	-13	-11.27

### Table 7-2. Conducted Band Edge Measurements

#### Note:

Per ANSI C63.26-2015 Section 6.4.3.1 and KDB 662911 v02r01 Section E)1), the conducted emissions at Antenna 1 and Antenna 2 were first measured separately during MIMO transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Lower band edge was investigated at 869MHz, lower extended band edge at 868MHz, upper band edge at 894MHz, and upper extended band edge at 895MHz.

#### Sample MIMO Calculation:

At 869.7MHz in QPSK modulation, the average conducted emission was measured to be -20.37 dBm for Antenna-1 and -20.42 dBm for Antenna-2.

(-20.37 dBm + -20.42 dBm) = (0.00918 mW + 0.00908 mW) = 0.0183 mW = -17.38 dBm

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# 7.6 Peak-Average Ratio

#### **Test Overview**

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

#### **Test Procedure Used**

KDB 971168 D01 v03 - Section 5.7.1

#### **Test Settings**

- 1. The signal analyzer's CCDF measurement profile is enabled
- 2. Frequency = carrier center frequency
- 3. Measurement BW > Emission bandwidth of signal
- 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
- 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

#### Test Setup

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

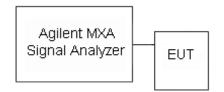


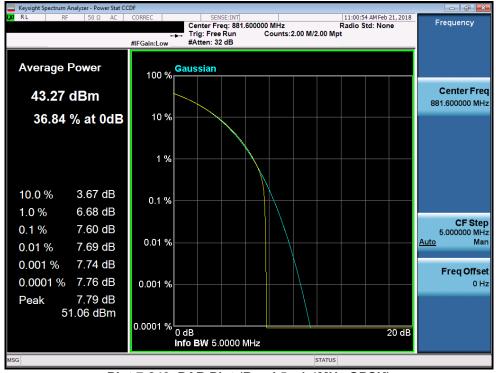
Figure 7-4. Test Instrument & Measurement Setup

#### Test Notes

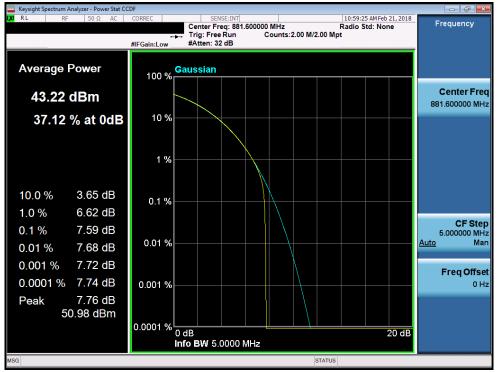
None.

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager	
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Band 5 – Antenna 1



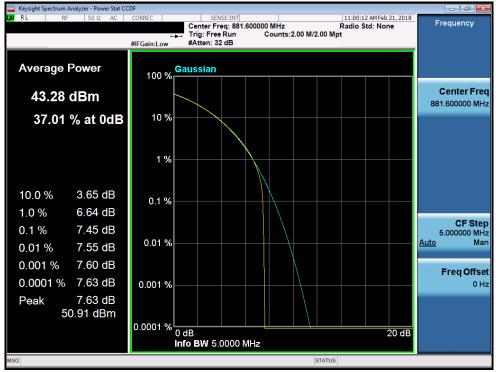




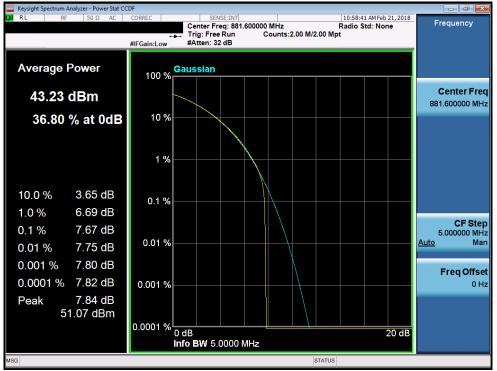
#### Plot 7-244. PAR Plot (Band 5 - 1.4MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager		
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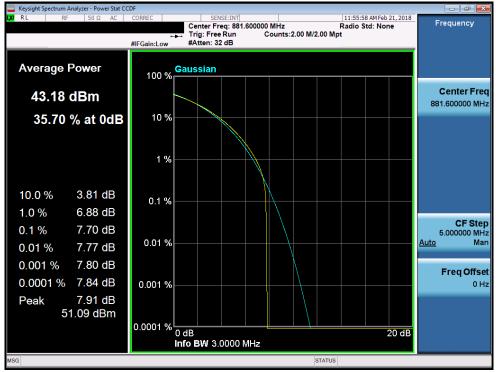




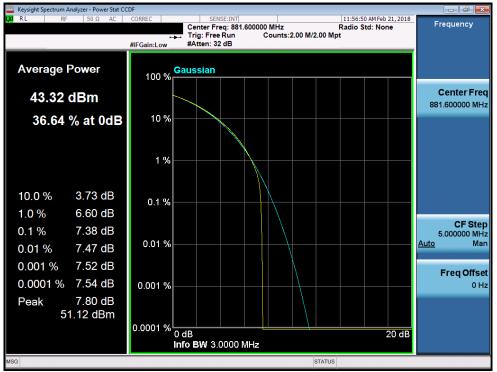
Plot 7-246. PAR Plot (Band 5 - 1.4MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 147 of 175
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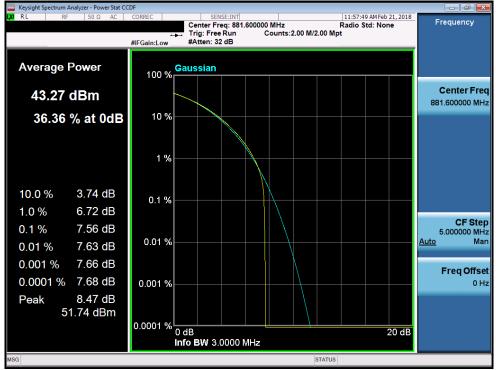




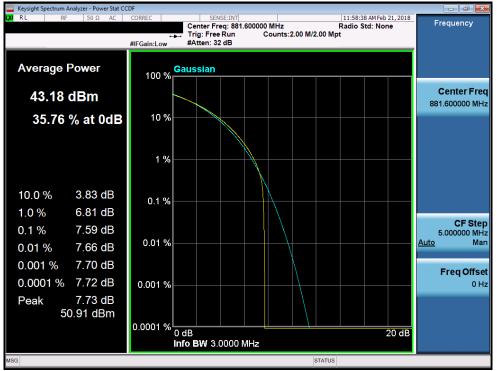
Plot 7-248. PAR Plot (Band 5 - 3.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 149 of 175	
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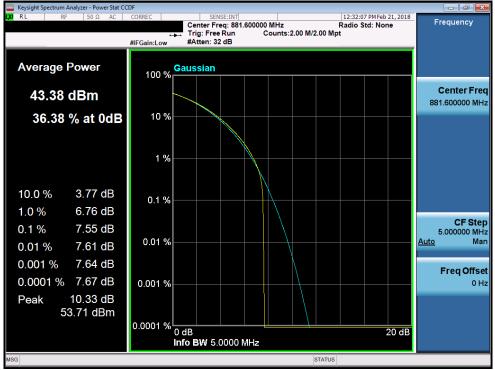




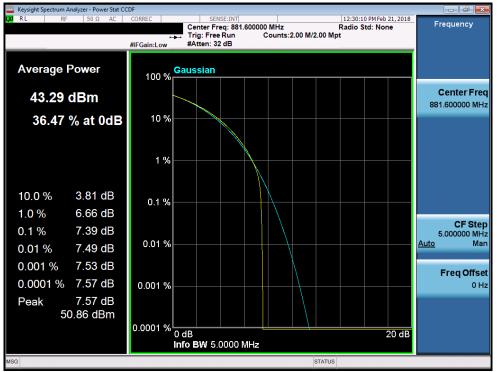
Plot 7-250. PAR Plot (Band 5 - 3.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
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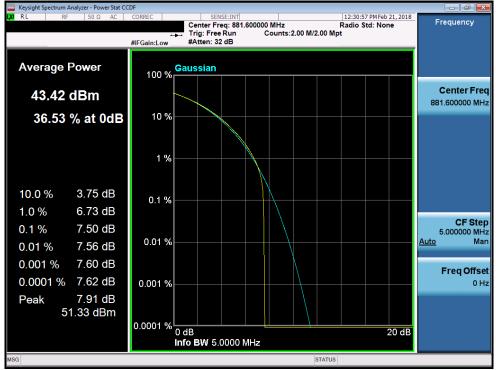




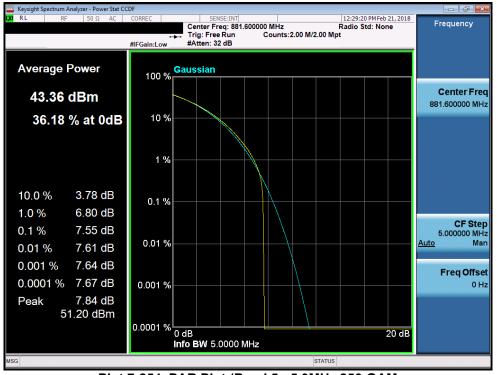
Plot 7-252. PAR Plot (Band 5 - 5.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 150 of 175	
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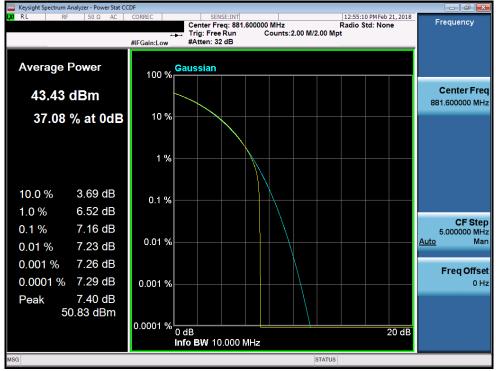




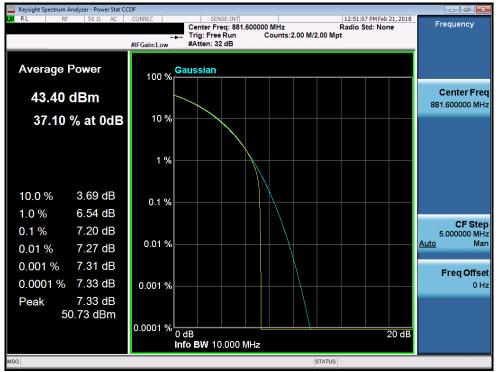
Plot 7-254. PAR Plot (Band 5 - 5.0MHz 256-QAM

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager	
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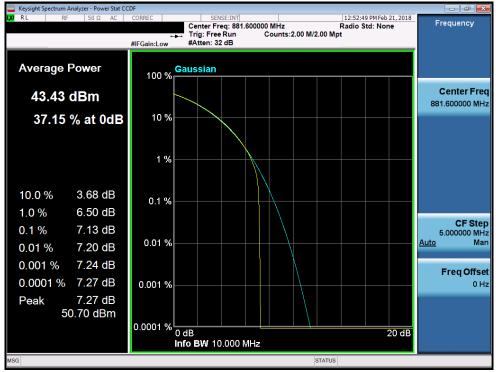




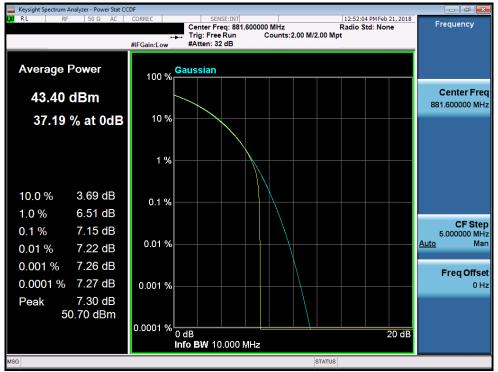
Plot 7-256. PAR Plot (Band 5 - 10.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
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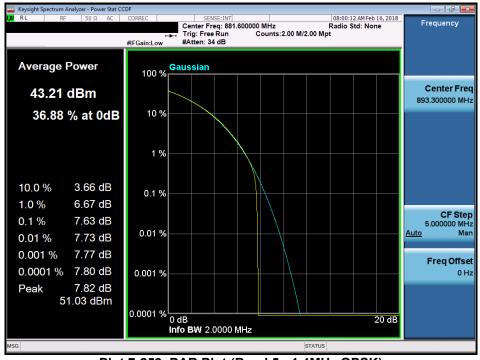




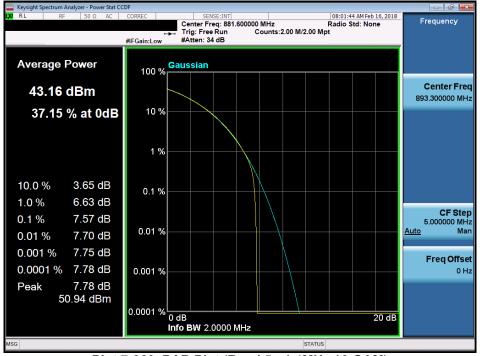
Plot 7-258. PAR Plot (Band 5 - 10.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 153 of 175
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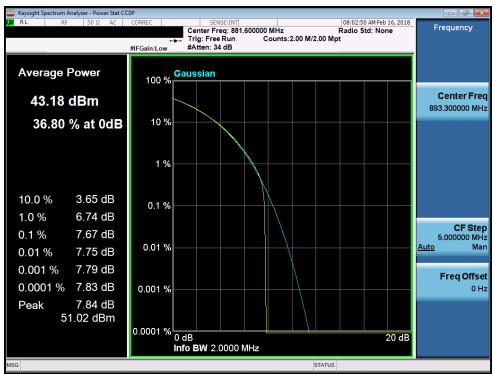
Plot 7-259. PAR Plot (Band 5 - 1.4MHz QPSK)



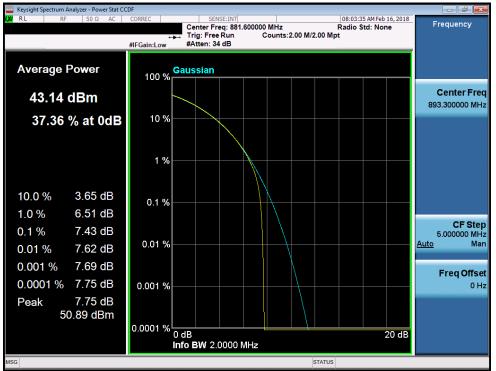
Plot 7-260. PAR Plot (Band 5 - 1.4MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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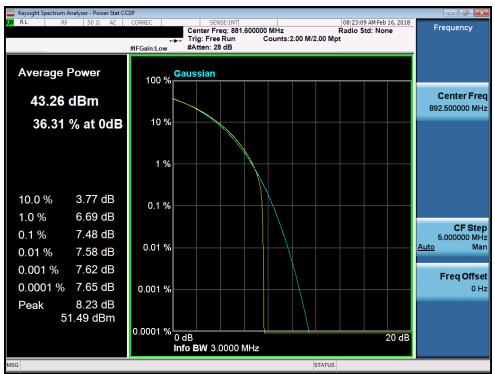




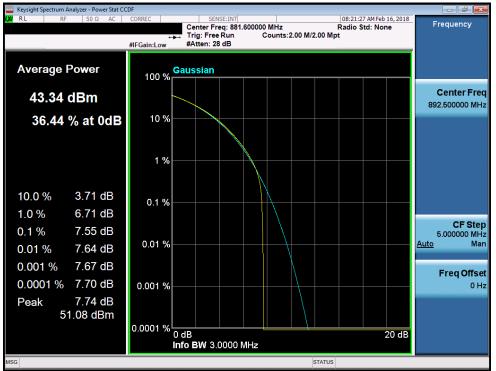
Plot 7-262. PAR Plot (Band 5 - 1.4MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 155 of 175
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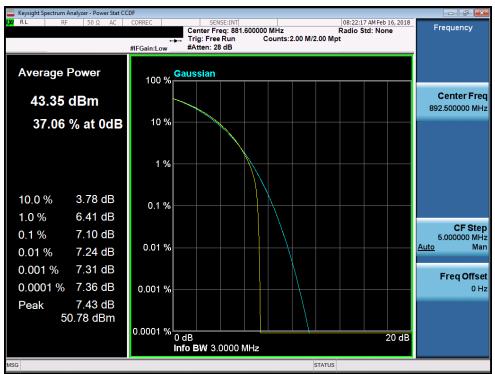




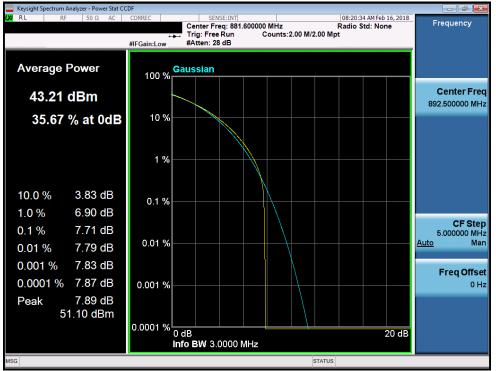
Plot 7-264. PAR Plot (Band 5 - 3.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	ore	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 156 of 175
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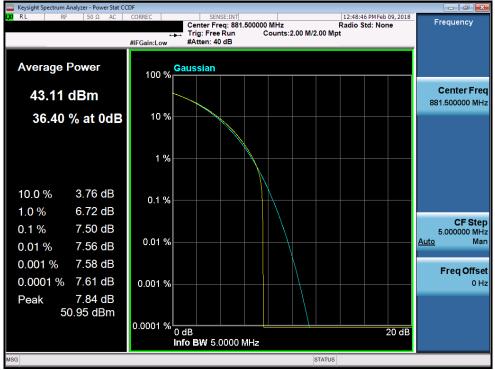


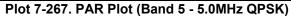


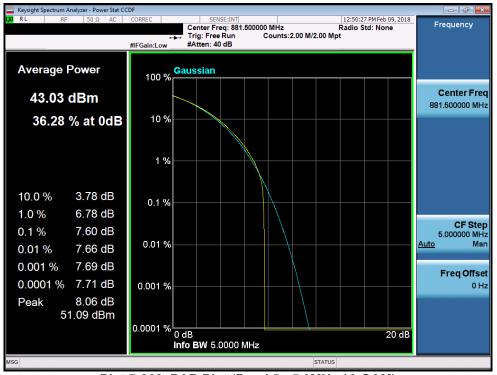
Plot 7-266. PAR Plot (Band 5 - 3.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
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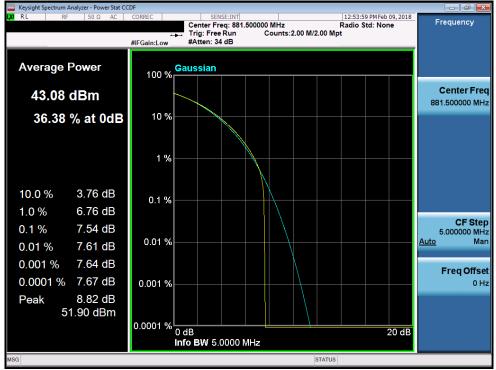




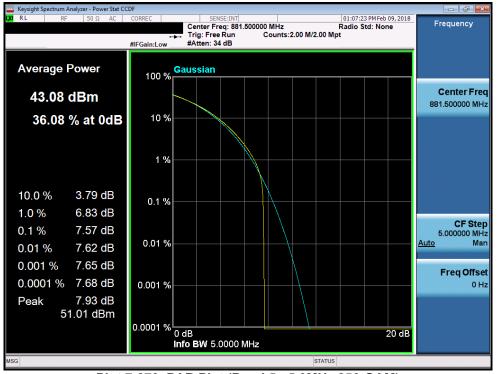
Plot 7-268. PAR Plot (Band 5 - 5.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
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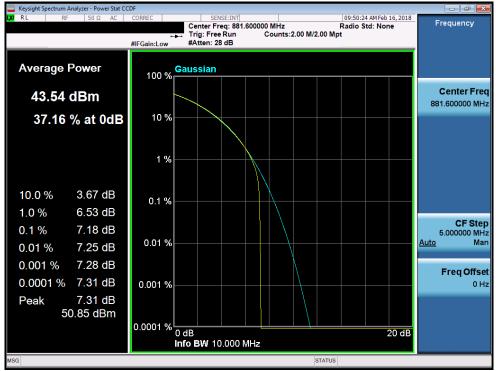




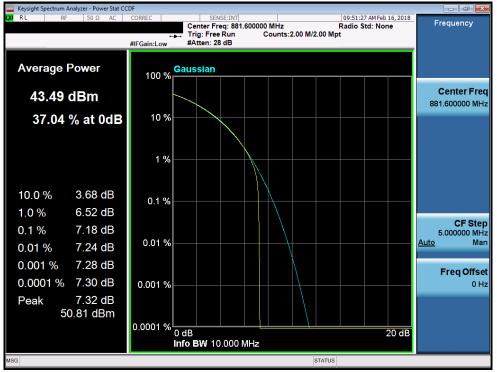
Plot 7-270. PAR Plot (Band 5 - 5.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager	
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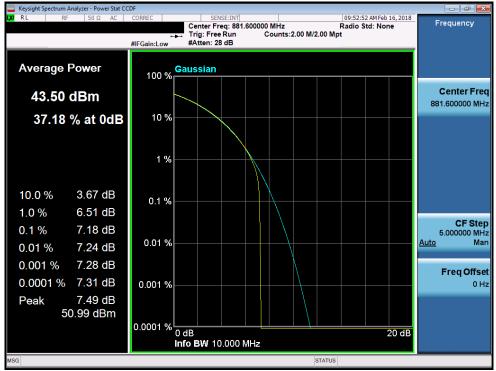




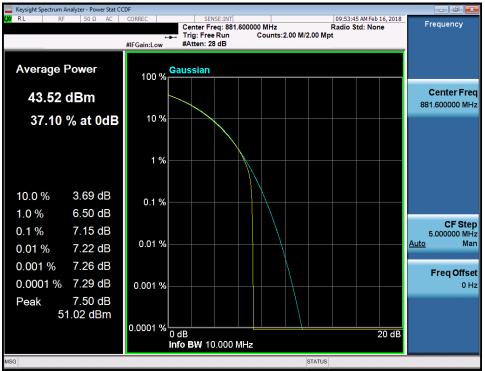
Plot 7-272. PAR Plot (Band 5 - 10.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
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Plot 7-274. PAR Plot (Band 5 - 10.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager
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#### 7.7 Radiated Spurious Emissions Measurements – Above 1GHz §2.1053, 22.917(a), RSS-132(5.5)

#### **Test Overview**

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the antenna output ports terminated in 50ohms while the EUT is transmitting at maximum power. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

#### **Test Procedures Used**

KDB 971168 D01 v03 – Section 5.8

ANSI/TIA-603-E-2016 - Section 2.2.12

#### **Test Settings**

- 1. RBW = 1MHz
- 2. VBW  $\geq$  3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = RMS
- 6. Trace mode = Max Hold
- 7. The trace was allowed to stabilize

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Tecore	Approved by: Quality Manager		
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The EUT and measurement equipment were set up as shown in the diagram below.

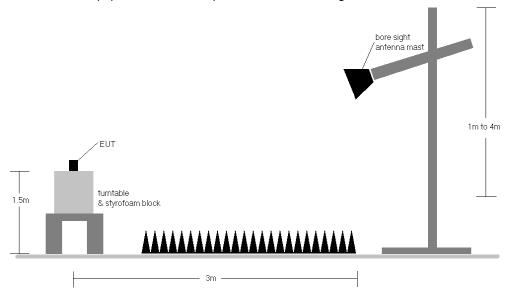


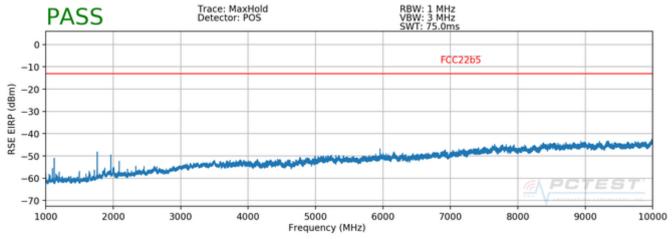
Figure 7-5. Radiated Test Setup > 1GHz

#### Test Notes

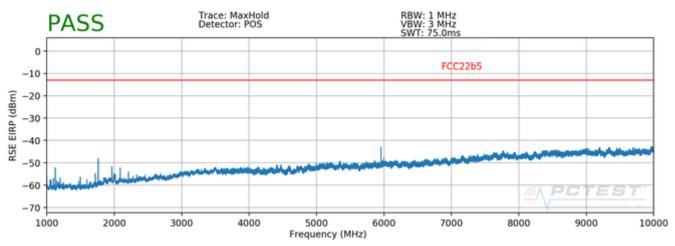
- 1) The EUT was tested all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested while powered by a -48VDC power supply.
- 3) The EUT was tested while transmitting from both antenna ports simultaneously with both ports terminated in 50ohms.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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Plot 7-275. Radiated Spurious Plot 1-18GHz (Band 5 – Mid Channel - 5.0MHz QPSK, Ant. Pol. H)



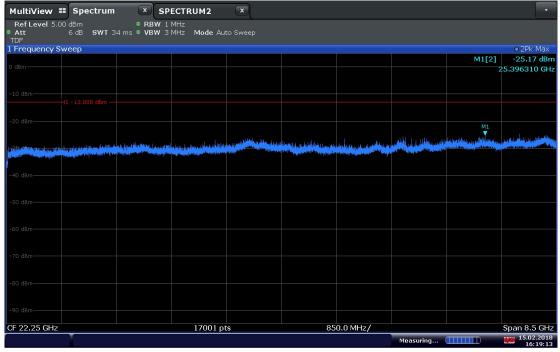
Plot 7-276. Radiated Spurious Plot 1-18GHz (Band 5 – Mid Channel - 5.0MHz QPSK, Ant. Pol. V)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager		
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MultiView	📰 Spectrum	📉 🗶 si	PECTRUM2	×					
RefLevel		● RBW 1							
Att TDF	6 dB SWI 3	34 ms ● VBW 3	MHz Mode Au	ito Sweep					
1 Frequency	Sweep								• 2Pk M
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-40 dBm									
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16:17:49 15.02.2018

Plot 7-277. Radiated Spurious Plot above 18GHz (Band 5 – Mid Channel - 5.0MHz QPSK, Ant. Pol. H)

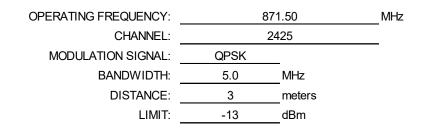


16:19:14 15.02.2018

Plot 7-278. Radiated Spurious Plot above 18GHz (Band 5 – Mid Channel - 5.0MHz QPSK, Ant. Pol. V)

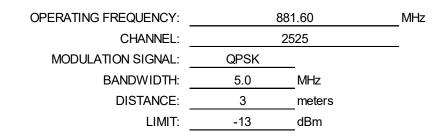
FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager			
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1743.00	Н	135	150	-62.91	8.82	-54.09	-41.1
2614.50	Н	143	30	-69.53	9.75	-59.78	-46.8
3486.00	Н	-	-	-71.51	9.93	-61.58	-48.6
4357.50	Н	151	150	-67.81	10.86	-56.95	-44.0
5229.00	Н	115	212	-67.61	10.73	-56.88	-43.9
6100.50	Н	192	131	-68.99	11.49	-57.50	-44.5
6972.00	Н	110	199	-64.73	11.81	-52.92	-39.9
7843.50	Н	110	199	-63.86	11.31	-52.55	-39.5
8715.00	Н	-	-	-65.62	10.96	-54.66	-41.7

Table 7-3. Radiated Spurious Data (Band 5 – Low Channel)



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1763.20	Н	138	206	-58.98	8.81	-50.18	-37.2
2644.80	Н	139	219	-72.94	9.84	-63.11	-50.1
3526.40	Н	-	-	-72.37	9.96	-62.41	-49.4
4408.00	Н	122	156	-65.57	10.96	-54.61	-41.6
5289.60	Н	111	213	-70.28	10.69	-59.60	-46.6
6171.20	Н	156	191	-69.39	11.44	-57.95	-45.0
7052.80	Н	109	88	-65.81	11.80	-54.01	-41.0
7934.40	Н	-	-	-66.86	11.17	-55.69	-42.7

#### Table 7-4. Radiated Spurious Data (Band 5 – Mid Channel)

	FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)	Ore	Approved by: Quality Manager
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OPERATING FREQUENCY:	89	MHz	
CHANNEL:	26	625	_
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	5.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1783.00	Н	132	208	-60.32	8.79	-51.53	-38.5
2674.50	Н	153	221	-73.23	9.93	-63.30	-50.3
3566.00	Н	-	-	-73.12	9.97	-63.16	-50.2
4457.50	Н	146	147	-64.31	10.99	-53.31	-40.3
5349.00	Н	113	143	-67.43	10.73	-56.70	-43.7
6240.50	Н	175	193	-69.94	11.50	-58.44	-45.4
7132.00	Н	111	196	-63.87	11.69	-52.19	-39.2
8023.50	Н	-	-	-67.89	11.13	-56.76	-43.8

Table 7-5. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: QLJ4GRFN-005	<u>« PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager		
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#### Radiated Spurious Emissions Measurements – Below 1GHz 7.8

§2.1053, §22.917(a), RSS-132(5.5)

#### **Test Overview**

Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized broadband antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

#### **Test Procedures Used**

KDB 971168 D01 v03 - Section 5.8

ANSI/TIA-603-E-2016 - Section 2.2.12

#### **Test Settings**

#### **Quasi-Peak Field Strength Measurements**

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 120kHz (for emissions from 30MHz 1GHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

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

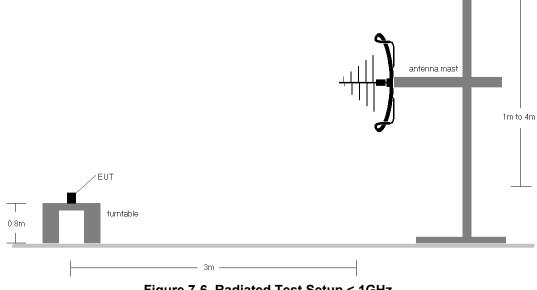
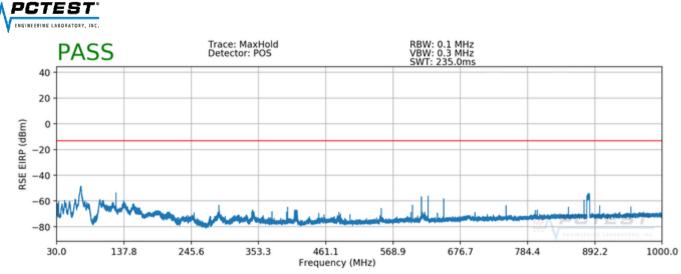


Figure 7-6. Radiated Test Setup < 1GHz

#### **Test Notes**

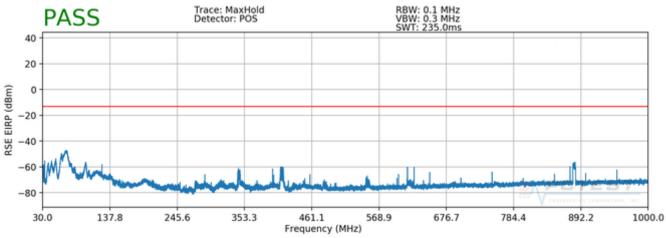
- 1) The EUT was tested all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested while powered by a -48VDC power supply.
- 3) Emissions were measured at a 3m test distance.
- 4) The spectrum is measured from 30MHz to 1GHz. The worst-case emissions are reported.
- The pre-scan plots below are performed using Max Hold traces but final measurements were made using 5) Trace Averaging.

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Plot 7-279. Radiated Spurious Plot Below 1GHz (Band 5 – Mid Channel - 1.4MHz QPSK, Ant. Pol. H)



Plot 7-280. Radiated Spurious Plot Below 1GHz (Band 5 – Mid Channel - 1.4MHz QPSK, Ant. Pol. V)

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OPERATING FREQUENCY:	88	MHz	
CHANNEL:	2	525	
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	5.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
68.33	V	110	115	-37.50	-9.17	-46.67	-33.7
91.08	V	110	12	-52.36	-8.22	-60.58	-47.6
344.46	V	110	154	-57.22	0.37	-56.85	-43.8
412.86	V	110	126	-54.50	0.48	-54.03	-41.0
597.64	V	100	180	-64.62	1.00	-63.62	-50.6
600.00	V	100	180	-64.17	0.98	-63.19	-50.2
883.87	V	100	119	-56.90	1.15	-55.75	-42.7

Plot 7-281. Radiated Spurious Data Below 1GHz

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### 7.9 Frequency Stability / Temperature Variation §2.1055, §22.355, RSS-132(5.3)

#### **Test Overview and Limit**

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the supply voltage. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, RSS-132, the frequency stability of the transmitter shall be maintained within  $\pm 0.00015\%$  ( $\pm 1.5$  ppm) of the center frequency.

#### Test Procedure Used

ANSI C63.26-2015 Section 5.6

#### **Test Settings**

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

#### Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

#### Test Notes

None

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# Band 5 Frequency Stability Measurements §2.1055, §22.355, RSS-132(5.3)

OPERATING FREQUENCY:	881,600,000	Hz
CHANNEL:	2525	
REFERENCE VOLTAGE:	-48.00	VDC
<b>DEVIATION LIMIT</b> :	± 0.00015 % or 1.5 ppm	

VOLTAGE (%)	POWER (VDC)	<b>ТЕМР</b> ( [°] С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	-48.00	+ 20 (Ref)	881,599,911	-89	-0.0000101
100 %		- 30	881,600,196	196	0.0000222
100 %		- 20	881,599,972	-28	-0.0000032
100 %		- 10	881,601,117	1,117	0.0001267
100 %		0	881,600,532	532	0.0000603
100 %		+ 10	881,601,228	1,228	0.0001393
100 %		+ 20	881,600,035	35	0.0000040
100 %		+ 30	881,598,863	-1,137	-0.0001290
100 %		+ 40	881,600,515	515	0.0000584
100 %		+ 50	881,600,107	107	0.0000121
85 %	-40.80	+ 20	881,601,064	1,064	0.0001207
115 %	-55.20	+ 20	881,600,971	971	0.0001101

Table 7-6. Frequency Stability Data (Band 5)

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## Band 5 Frequency Stability Measurements §2.1055, §22.355, RSS-132(5.3)

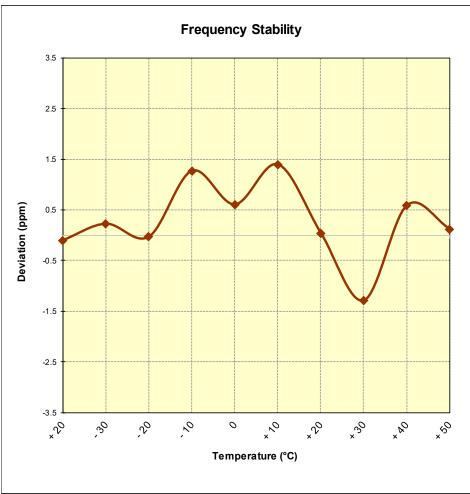


Figure 7-7. Frequency Stability Graph (Band 5)

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### 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Tecore Networks Remote Radio Head FCC ID: QLJ4GRFN-005** complies with all the requirements of Part 22 of the FCC Rules for LTE operation only.

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