



KEYSIGHT ILT ↔	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corr Freq Ref: Int (S) NFE: Adaptive	Atten: 36 dB Preamp: Off μW Path: Standard Source: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Pov Avg Hold: 7/10 Trig: Free Run	wer (RMS) ว0 า	1 2 3 4 5 6 M WW WW W A N N N N N	Center Frequency 3.660500000 GHz	Settings
Spectrum	v dB		Ref LvI Offset 1.50 Ref Level 26.00 dE	) dB 3m	Mkr1	3.592	390 GHz .26 dBm	Span 139.000000 MHz	
og								Zero Span	
6.0								Full Span	
.00								Start Freq 3.591000000 GHz	
4.0								Stop Freq 3.730000000 GHz	
4.0							-	AUTO TUNE	
4.0								CF Step 13.900000 MHz	
4.0								Auto Man	
4.0								Freq Offset 0 Hz	
art 3.59100 tes BW 1.0 I	GHz MHz	*	#Video BW 5.0 MI	Hz*	#S	Stop 3 weep 3.00	8.73000 GHz ) s (501 pts)	X Axis Scale	Loc
5	C <b>I</b> (	May 29, 2023 2:26:20 AM	$\square$					Signal Track	

#### HIGH BAND EDGE BLOCK-1RB-HIGH\_offset



#### HIGH BAND EDGE BLOCK-1RB-HIGH\_offset

# **Chongqing Academy of Information and Communication Technology**

 Address:
 No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China, 401336

 Tel:
 0086-23-88069965

 FAX:0086-23-88608777







#### HIGH BAND EDGE BLOCK-1RB-HIGH\_offset



#### HIGH BAND EDGE BLOCK-1RB-HIGH\_offset

# **Chongqing Academy of Information and Communication Technology**





KEYSIGHT ILT +→	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corr Freq Ref: Int (S) NFE: Adaptive	Atten: 36 dB Preamp: Off μW Path: Standard Source: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Pow Avg Hold: 12/1 Trig: Free Run	ver (RMS) 100 1	1 2 3 4 5 6 M WW WW A N N N N N	Center Frequency 3.589500000 GHz	Settings
Spectrum	, R		Ref LvI Offset 1.50	dB	Mkr1	3.550	858 GHz	Span 139.000000 MHz	
pg								Zero Span	
5.0					-		3	Full Span	
00								Start Freq 3.52000000 GHz	
1.0								Stop Freq 3.659000000 GHz	
.0								AUTO TUNE	
.0								CF Step 13.900000 MHz	
1.0		<b>↓</b> 1		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				Auto Man	
1.0								Freq Offset 0 Hz	
rt 3.52000 ( es BW 1.0 N	3Hz 1Hz		#Video BW 5.0 MH	łz*	#S	Stop weep 3.0	3.65900 GHz 0 s (501 pts)	X Axis Scale Log Lin	Lo
5	C [	May 29, 2023 2:29:39 AM	$\square$					Signal Track	

#### LOW BAND EDGE BLOCK-40M-100%RB



#### LOW BAND EDGE BLOCK-40M-100%RB

# **Chongqing Academy of Information and Communication Technology**

 Address:
 No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China, 401336

 Tel:
 0086-23-88069965
 FAX:0086-23-88608777





KEYSIGHT     Input: RF       Coupling: DC       Align: Auto	Input Z: 50 Ω Atten: 36 dB Corr Preamp: Off Freq Ref: Int (S) μW Path: Star NFE: Adaptive Source: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Power (RM Avg Hold: 13/100 Trig: Free Run	S) 1 2 3 4 5 6 M WWWWW A N N N N N	Center Frequency 3.534500000 GHz	Settings
1 Spectrum	Ref Lvi Offset	1.50 dB	Mkr1 3.54	9 000 GHz	29.000000 MHz	
Scale/Div 10 dB	Ref Level 26.0	00 dBm		44.74 dBm	Swept Span Zero Span	
16.0				-	Full Span	
6.00					Start Freq 3.52000000 GHz	
14.0					Stop Freq 3.549000000 GHz	
24.0					AUTO TUNE	
34.0				1	CF Step 2.900000 MHz	
	wwwwwwwwwwwwwwwww	www.www.www.ww	าวบาบบาบบาบบาบบาบบาบบาบบาบบาบบาบบาบบาบบา	unnnnnnn <sub>be</sub>	Auto Man	
64.0					Freq Offset 0 Hz	
tart 3.52000 GHz Res BW 1.0 MHz	#Video BW 5	.0 MHz*	Sto #Sweep 3	p 3.54900 GHz .00 s (501 pts)	X Axis Scale	Loca
	May 29, 2023 9				Signal Track	

#### LOW BAND EDGE BLOCK-40M-100%RB



#### LOW BAND EDGE BLOCK-40M-100%RB

# **Chongqing Academy of Information and Communication Technology**

 Address:
 No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China, 401336

 Tel:
 0086-23-88069965
 FAX:0086-23-88608777





EYSIGHT Input: RF L T ↔ Align: Auto	Input Z: 50 Ω         Atten: 36 dB           Corr         Preamp: Off           Freq Ref: Int (S)         µW Path: Standa           NFE: Adaptive         Source: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Power (RMS Avg Hold: 12/100 Trig: Free Run	6) 1 2 3 4 5 6 M WWWW A N N N N N	Center Frequency 3.660500000 GHz	Settings
Spectrum v cale/Div 10 dB	Ref LvI Offset 1. Ref Level 26.00	50 dB dBm	Mkr1 3.59	1 000 GHz I6.36 dBm	139.000000 MHz	
5.0			n	_	Full Span	
00					Start Freq 3.591000000 GHz	
1.0					Stop Freq 3.730000000 GHz	
0					AUTO TUNE	
.0					CF Step 13.900000 MHz	
.0 .					Auto Man	
.0					Freq Offset 0 Hz	
art 3.59100 GHz es BW 1.0 MHz	#Video BW 5.01	MHz*	Stoj #Sweep 3	o 3.73000 GHz 00 s (501 pts)	X Axis Scale Log Lin	Lo
501	<b>?</b> May 29, 2023 <b>.</b> 2:33:21 AM				Signal Track	

#### **Channel power**

	Span		f	l:>10/10 d: None prrection: Off	Avg Ho Radio \$ Noise (	Off in: Low	Gate rd IF Ga	imp: Off Path: Standa ): Best Wide	Prea ) µW I PNC	eq Ref: Int ( E: Adaptive	Auto Fr	Coupli Align:	$\mathbf{P}$	
2	200.000000 MHz						50 dB	vi Offset 1.	Ref Ly		v	dD	w 10 0	Graph
	CF Step 20.000000 MHz			-		·	aem	alue 10.00	Rei Va		-		IV 10.0	
-	Auto Man													0.0
	Freq Offset 0 Hz				-									0.0
1		200 MHz 001 pts)	Span 2 5.00 s (1	, #Sweep 5		•	) kHz*	BW 39.000	Video		-	GHz kHz	.5700 V 390 I	enter : Res B\
		Trace 1	-		œ	easure Tra	М			/40.00 MHz	 5.377 dBm		ar Pwr	Fotal C
		(Active)	verage (	Trace Av		асе Туре	Tr					1	SD	lotal P
				er	Up			er	Low					
			ence	Refere	CP	A	ence	Refer	P .	AC				
		Filter	Car #	dBm	dBm	dBc	Car #	dBm	dBm	dBc	Integ BW	eq	Offs Fr	
		Filter -3 dB	ence Car# 1	Refere dBm 5.377	CP dBm -37.31	A dBc -42.69	ence Car # 1	Refere dBm 5.377	P dBm -35.82	AC dBc -41.20	Integ BW 40.00 MHz	eq MHz	Offs Fr 40.00	A

### HIGH BAND EDGE BLOCK-40M-100%RB

# **Chongqing Academy of Information and Communication Technology** Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336 Tel: 0086-23-88069965 FAX:0086-23-88608777





KEYSIGHT     Input: RF       Coupling     DC       Align:     Auto	Input Z: 50 Ω         Atten: 36 dB         PN           Corr         Preamp: Off         Ga           Freq Ref: Int (S)         µW Path: Standard         IF           NFE: Adaptive         Source: Off         Sig	O: Best Wide Avg Type: Pov te: Off Avg Hold: 13/ Gain: Low Trig: Free Rur Track: Off	ver (RMS) 1 2 3 4 5 6 100 M WWWW A N N N N N	Center Frequency 3.700500000 GHz	Settings
Spectrum	Ref LvI Offset 1.50 dB	Mkr1	3.700 008 GHz	1.00000000 MHz	
.og	Ref Level 26.00 dBm		-44.49 UDM	Swept Span Zero Span	
16.0			2	Full Span	
5.00				Start Freq 3.700000000 GHz	
14.0				Stop Freq 3.701000000 GHz	
24.0				AUTO TUNE	
34.0				CF Step 100.000 kHz	
14.0 2	and a superior of the superior	<u>มารถคารสูโคริตส์การสะ</u> ครามระการสะ	alim for a low allow and a second	Auto Man	
54.0				Freq Offset 0 Hz	
tart 3.7000000 GHz Res BW 510 kHz	#Video BW 2.4 MHz*	#S	Stop 3.7010000 GHz weep 3.00 s (501 pts)	X Axis Scale	Loca
	May 29, 2023 2:35:57 AM			Signal Track (Span Zoom)	

#### HIGH BAND EDGE BLOCK-40M-100%RB



#### HIGH BAND EDGE BLOCK-40M-100%RB

# **Chongqing Academy of Information and Communication Technology**

 Address:
 No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China, 401336

 Tel:
 0086-23-88069965

 FAX:0086-23-88608777

Page 100 of 97





KEYSIGHT RLT ↔	Input: RF Coupling: DC Align: Auto	Input Ζ: 50 Ω Corr Freq Ref: Int (S) NFE: Adaptive	Atten: 36 dB Preamp: Off μW Path: Standard Source: Off	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Po Avg Hold: 13/ Trig: Free Ru	wer (RMS) '100 n	1 2 3 4 5 6 M WW WW W A N N N N N	Center F 3.65950	requency 0000 GHz	Settings
Spectrum	۲		Ref LvI Offset 1.50	dB	Mkr1	3.659	996 GHz	1.00000	000 MHz	
cale/Div 10 dE	3		Ref Level 26.00 dE	lm		-44	1.04 dBm	Swe	pt Span Span	
16.0								FL	III Span	
3.00					×		-	Start Fre 3.65900	9 0000 GHz	
14.0								Stop Fre 3.66000	9 0000 GHz	
4.0									TO TUNE	
34.0							1	CF Step 100.000	kHz	
4.0	-	hand and an and the second	หลังข้อสมาคารใบคารในอาร์ตอง เสมาร์ของสามาร์ของสามาร์ของสามาร์ตองได้อาง		homen handland	-งาปใจอะกับสามปังหาเป็าไ	allowed for the first for the second second	Auto Man	)	
64.0								Freq Offs	set	
tart 3.6590000 Res BW 510 kl	GHz Hz	*	#Video BW 2.4 Mł	łz*	#5	Stop 3.6 Sweep 3.0	6600000 GHz 0 s (501 pts)	X Axis So Log	cale	Loc
	3	May 29, 2023 2:37:18 AM	$\square$		<b>8</b> 4			Signal Tr	ack	

#### HIGH BAND EDGE BLOCK-40M-100%RB



#### **Channel power**

# **Chongqing Academy of Information and Communication Technology**

 Address:
 No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China, 401336

 Tel:
 0086-23-88069965

 FAX:0086-23-88608777

Page 101 of 97





KEYS RLT M	ight ⊊	Input: F <mark>Couplir</mark> Align: <i>F</i>	RF Ir ng: DC C Auto F N	nput Z: 50 Ω orr req Ref: Int IFE: Adaptiv	Atte Prea (S) µW e PNC	n: 30 dB amp: Off Path: Standar D: Best Wide	Trig: I Gate: d IF Ga	Free Run Off in: Low	Center I Avg Hol Radio S Noise C	Freq: 3.6799 d:>10/10 td: None orrection: Of	80000 G f	Hz	Center Fre	quency 000 GHz	Settings
Graph	)iv 10.0	dB	۲		Ref L	vi Offset 1.5 alue 10.00 d	i0 dB IBm						200.0000	00 MHz	
).00	10.0		-						-	-			CF Step 20.00000	) MHz	
0.0													Auto Man		
0.0		_									-		Freq Offse 0 Hz	t	
enter : Res Bl	3.6800 W 390 H	GHz Hz	,		Video	BW 39.000	kHz*			#Sweep {	Span 5.00 s (*	200 MHz 1001 pts)			
Total C	s Car Pwr			1/40.00 MH	Iz		Me	easure Trac	æ			Trace 1			
Total P	PSD			-			Tra	асе Туре		Trace A	verage	(Active)			
					Low	/er			Upp	er					
	Offe En		Integ DW	d Ro	CP	Refere	nce	A	JP dBm	Refere	ence	Filtor			
A	40.00	≠y MHz	40.00 MHz	-42.40	-36.65	5,750	0ar#	-42.98	-37.23	5.750	0ai #	-3 dB			
															Loc

**Chongqing Academy of Information and Communication Technology** Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336 Tel: 0086-23-88069965 FAX:0086-23-88608777



### 6.8. Frequency Stability

Specifications:	FCC Part 2.1055,96.41
DUT Serial Number:	IMEI:864680060006479
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Li	imit
Frequency deviation [ppm]	±2.5

#### Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	1.54 Hz (k=2)

### **Test Method**

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as FL and FH respectively.

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of CMW500.

1. Measure the carrier frequency at room temperature.

2. Subject the EUT to overnight soak at -30°C.

3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.

5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.

# **Chongqing Academy of Information and Communication Technology**

 Address:
 No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336

 Tel:
 0086-23-88069965

 FAX:0086-23-88608777

Page 103 of 97



6. Subject the EUT to overnight soak at  $+50^{\circ}$ C.

7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call

on the center channel, measure the carrier frequency. These measurements should be made

within 2 minutes of Powering up the EUT, to prevent significant self-warming.

8. Repeat the above measurements at 10 °Cincrements from +50°C to -30°C. Allow at least 1.5

hours at each temperature, unpowered, before making measurements.

9. At all temperature levels hold the temperature to  $\pm -0.5$  °C during the measurement procedure.

### 6.8.1 Frequency Stability over Temperature Variation Results

n48				
Frequency E	rror vs Temperature			
Temperature (°C)	Voltage(V)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)
20			0.07	0.0000
50			14.01	0.0039
40			1.07	0.0003
30			5.61	0.0015
10	3.8	3624.99	2.01	0.0006
0			5.77	0.0016
-10			8.37	0.0023
-20			0.52	0.0001
-30			0.44	0.0001

#### **Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)
3.3	20	2624.00	-2.93	0.0008
4.4	20	3024.99	2.37	0.0007

n48-MIMO

Frequency Error vs Voltage

Temperature(°C)	Voltage(V)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)
20			1.29	0.0004
50	3.8	3624.99	2.37	0.0007
40			1.64	0.0005
30			-2.63	0.0007
10			-2.17	0.0006
0			-3.46	0.0010
-10			3.90	0.0011

# **Chongqing Academy of Information and Communication Technology**





-20		-2.45	0.0007
-30		-4.28	0.0012

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	Center frequency(MHz)	Offset(Hz)	Frequency error(ppm)		
3.3	20	2624.00	1.48	0.0004		
4.4	20	3024.99	5.63	0.0016		

**Chongqing Academy of Information and Communication Technology** Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336 Tel: 0086-23-88069965 FAX:0086-23-88608777

Page 105 of 97



# CAICT

Report No.: I23W00005-NR-RF-Rev1

### 6.9. Peak to Average Ratio

Specifications:	FCC Part 96.41
DUT Serial Number:	IMEI:864680060006479
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

#### Limit

The EUT meets the requirement of having a peak to average ratio of less than 13dB. **Test Setup** 

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



#### **Measurement Uncertainty:**

Item	Uncertainty		
Expanded Uncertainty	0.22 dB (k=2)		

#### **Test Method**

The transmitter output was connected to a CMW500 through a coaxial RF cable and directional coupler, and configured to operate at maximum power. The peak to average ratio was measured at the required operating frequencies in each Band on the Spectrum Analyzer.

# **Chongqing Academy of Information and Communication Technology**





# 6.9.1 Peak to Average Ratio Results n48,40MHz

Frequency (MHz)	PAPR (dB)								
	DFT-s-pi/2		DET 100 MM	DET ALONI	DET OFOOM		00.400.444	05 040 044	CP-256QA
	BPSK	DFT-S-QPSK	DFT-S-16QAM	DF1-s-64QAM	DF1-S-256QAM	CP-QPSK	CP-16QAM	CP-64QAM	М
3624.99	5.31	5.68	6.48	6.73	6.71	7.59	7.70	8.97	9.53

#### Band n48 , 40MHz Bandwidth, DFT-s-pi/2 BPSK



Band n48 , 40MHz Bandwidth, DFT-s-QPSK

# **Chongqing Academy of Information and Communication Technology**

 Address:
 No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China, 401336

 Tel:
 0086-23-88069965

 FAX:0086-23-88608777

Page 107 of 97







#### Band n48 , 40MHz Bandwidth, DFT-s-16QAM



Band n48, 40MHz Bandwidth, DFT-s-64QAM

# **Chongqing Academy of Information and Communication Technology**







#### Band n48, 40MHz Bandwidth, DFT-s-256QAM



Band n48, 40MHz Bandwidth, CP-QPSK

# **Chongqing Academy of Information and Communication Technology**







#### Band n48 , 40MHz Bandwidth, CP-16QAM



Band n48, 40MHz Bandwidth, CP-64QAM

# **Chongqing Academy of Information and Communication Technology**



# CAICT

Report No.: I23W00005-NR-RF-Rev1



#### Band n48 , 40MHz Bandwidth, CP-256QAM



Frequency (MHz)

PAPR (dB)

# **Chongqing Academy of Information and Communication Technology**





	CP-QPSK	CP-16QAM	CP-64QAM	CP-256QA M
3624.99	7.65	8.09	8.98	9.18

#### Band N48 , 40MHz Bandwidth, CP-QPSK



#### Band N48, 40MHz Bandwidth, CP-16QAM

# **Chongqing Academy of Information and Communication Technology**

Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336 Tel: 0086-23-88069965 FAX:0086-23-88608777

Page 112 of 97







#### Band N48 , 40MHz Bandwidth, CP-64QAM



Band N48, 40MHz Bandwidth, CP-256QAM

# **Chongqing Academy of Information and Communication Technology**







**Chongqing Academy of Information and Communication Technology** 

Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336 Tel: 0086-23-88069965 FAX:0086-23-88608777

Page 114 of 97





# **Annex A EUT Photos**

See the document" I23W00005-External Photos". See the document" I23W00005-Internal Photos ".

**Chongqing Academy of Information and Communication Technology** Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336 Tel: 0086-23-88069965 FAX:0086-23-88608777

Page 115 of 97





# **ANNEX B Deviations from Prescribed Test Methods**

No deviation from Prescribed Test Methods.

**\*\*\*END OF REPORT\*\*\*** 

**Chongqing Academy of Information and Communication Technology** Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336 Tel: 0086-23-88069965 FAX:0086-23-88608777

Page 116 of 97