

# SA8700 C-V2X Test Solution

## Develop C-V2X with Confidence as 5G Evolves

This document provides information about how to configure for C-V2X Test Solution which enables functional, protocol and RF measurements on Release 14 C-V2X devices. This solution is based on Keysight's UXM 5G platform and MXG/EXG X-Series Sources with Global Navigation Satellite Systems Signal Studio.

### Utilize a comprehensive and holistic approach to C-V2X testing.

The foundation is the proven Keysight UXM 5G wireless test set. We couple this with the C-V2X test application (C8732114A), a suite of Keysight X-Apps C-V2X RF measurements (C87320R1A), C-V2X waveform generation (C87320R2A), an Intelligent Transportation System (ITS) stack, and application-layer testing.

### SA8700A C-V2X Test Solution



Keysight C-V2X test solution provides holistic C-V2X test approach, like application layer, standards based parametric, and custom scenario testing.

C-V2X application layer testing enables congestion, day one, and complex scenario testing through intelligent transportation system (ITS) stack.

## Step by Step Guide to Configure a C-V2X Test Solution.

1. Select required System Core Software for UXM 5G.
2. Select required hardware option for UXM 5G.
3. Select accessories kits.
4. Select X-series Signal Generator and Signal Studio option.
5. Select ITS Functional Test Application option.

			Units
SW	<b>Software licenses for C-V2X Test Solution</b>		
	C8700200A	Test Application Framework R-C5C-001-A Node-locked perpetual license R-C6D-001-L 12-months, node-locked, software support subscription	1
	C8732114A	C-V2X Rel 14 - PC5 signaling R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C87320R1A	C-V2X UL RF measurements R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C87320R2A	C-V2X waveform generation R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C8730115A	LTE Rel 15 - core signaling R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C87300R1A	LTE UL RF measurements R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C87300R2A	LTE waveform generation R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C8735115A	5G NR Rel 15 - core signaling ( <b>Optional</b> ) R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C8735115A	5G NR Rel 15 - core signaling ( <b>Optional</b> ) R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C8735315A	5G NR Rel 15 - supplementary SA signaling ( <b>Optional</b> ) R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C87350R1A	5G NR UL RF measurements ( <b>Optional</b> ) R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1
	C87350R2A	5G NR waveform generation ( <b>Optional</b> ) R-C5A-001-A Node-locked perpetual license R-C6B-001-L 12-months, node-locked, software support subscription	1

<b>E7515B UXM 5G wireless test platform and accessories</b>				
<b>HW</b>	E7515B-506	Frequency range 300 MHz - 6 GHz	1	
	E7515B-R81	RF up-down converter (8 out/4 in)	1	
	E7515B-SA1	Signal Processing Module A	1	
	E7515B-SB1	Signal Processing Module B	1	
	E7515B-PA1	Protocol Processor A	1	
	E7515B-PB1	Protocol Processor B	1	
	E7515B-PC1	Protocol Processor C	1	
	E7515B-PD1	Protocol Processor D	1	
	E7515B+R-C7A-001-L	Standard Hardware Support Plan – 1 year	1	
	E7515B-AC3	Accessory Kit for C-V2X (includes 3 cables (LAN MXG/UXM, trigger signal))	1	
	<b>MXG X-Series Signal Generator and Signal Studio</b>			
	N5182B	MXG X-Series RF Vector Signal Generator	1	
	N5182B-503	Frequency range, 9 kHz to 3 GHz <b>(Required)</b>	1	
	N5182B-656	ARB baseband generator (80 MHz RF bandwidth, 32 MSa) <b>(Required)</b>	1	
	N5182B-660	Upgrade baseband generator with real-time capability <b>(Required)</b>	1	
	N5182B-009	Internal solid state memory	1	
	N5182B-1EQ	Low specified power (less than -110 dBm)	1	
	N5182B-403	Calibrated AWGN, fixed perpetual license	1	
	N5182B-UNX	Low phase noise	1	
	N5182B+R-55A-001-1	KeysightCare Assured First Year Support	1	
N7609EMBC	Signal Studio for Global Navigation Satellite System (GNSS), waveform playback R-Y5B-001-A Node-locked perpetual license R-Y4B-001-L KeysightCare software support subscription, node-locked - 12 months	1		
<b>SW</b>	<b>CA8700A ITS Functional Test Application</b>			
	CA8701A	ITS Common Components <b>(Required)</b> R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1	
	CA8702A	ETSI ITS Stack R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*	
	CA8703A	IEEE ITS Stack R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*	
	CA8704A	SAE-C ITS Stack R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*	
	CA8705A	ETSI waveBEE Creator R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*	

CA8706A	IEEE waveBEE Creator R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*
CA8707A	SAE-C waveBEE Creator R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*
CA8708A	ETSI WaveBEE Touch R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*
CA8709A	IEEE WaveBEE Touch R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*
CA8710A	SAE-C WaveBEE Touch R-X5B-001-A Node-locked perpetual license R-X6B-001-L 12-months, node-locked, software support subscription	1*

\*Select ITS stack, wavBEE Creator and wave Touch with same or multiple region.

Notes:

- C-V2X / LTE UL RF is necessary to perform RF measurements over PC5 and Uu(LTE) connection.
- For ITS Functional Test Application, CA8701A ITS common Components always required for ITS Stack, waveBEE Creator and waveBEE touch.
- ETSI for European region, IEEE for US region and SAE-C for China region

## SA8700A C-V2X Test Solution Product Structure

### SA8700A C-V2X test solution

<b>OPTION A : C-V2X PC5 only</b>	
C8732114A	C-V2X Rel14 – PC5 signaling
C87320R1A	C-V2X UL RF measurement
C87320R2A	C-V2X waveform generation
C8700200A	Test application framework
E7515B	UXM 5G R81/SA1/SB1/PA1/PB1/PC1/PD1/506
E7515B-AC3	Accessory kit for C-V2X
N5182B	X-Series signal generator
N7609EMBC	GNSS SignalStudio
CA8701A	ITS Common Components
<b>ITS Stack</b>	
CA8702A	ETSI
CA8703A	IEEE
CA8704A	SAE-C
<b>wavBEE Ccreator</b>	
CA8705A	ETSI
CA8706A	IEEE
CA8707A	SAE-C
<b>waveBEE Touch</b>	
CA8708A	ETSI
CA8709A	IEEE
CA8710A	SAE-C

<b>OPTION B: C-V2X(PC5)+LTE</b>	
C8732114A	C-V2X Rel14 – PC5 signaling
C87320R1A	C-V2X UL RF measurement
C87320R2A	C-V2X waveform generation
C8700200A	Test application framework
C8730115A	LTE Rel 15 – core signaling
C87300R1A	LTE UL RF measurement
C87300R2A	LTE waveform generation
E7515B	UXM 5G R81/SA1/SB1/PA1/PB1/PC1/PD1/506
E7515B-AC3	Accessory kit for C-V2X
N5182B	X-Series signal generator
N7609EMBC	GNSS SignalStudio
CA8701A	ITS Common Components
<b>ITS Stack</b>	
CA8702A	ETSI
CA8703A	IEEE
CA8704A	SAE-C

<b>wavBEE Ccreator</b>	
CA8705A	ETSI
CA8706A	IEEE
CA8707A	SAE-C
<b>waveBEE Touch</b>	
CA8708A	ETSI
CA8709A	IEEE
CA8710A	SAE-C

<b>OPTION C: C-V2X(PC5)+LTE+5G</b>	
C8732114A	C-V2X Rel14 – PC5 signaling
C87320R1A	C-V2X UL RF measurement
C87320R2A	C-V2X waveform generation
C8700200A	Test application framework
C8730115A	LTE Rel 15 – core signaling
C87300R1A	LTE UL RF measurement
C87300R2A	LTE waveform generation
C8735115A	5G NR Rel 15 - core signaling
C8735315A	5G NR Rel 15 - supplementary SA signaling
C87350R1A	5G NR UL RF measurements
C87300P1A	5G NR waveform generation
E7515B	UXM 5G R81/SA1/SB1/PA1/PB1/PC1/PD1/506
E7515B-AC3	Accessory kit for C-V2X
N5182B	X-Series signal generator
N7609EMBC	GNSS SignalStudio
CA8701A	ITS Common Components
<b>ITS Stack</b>	
CA8702A	ETSI
CA8703A	IEEE
CA8704A	SAE-C
<b>wavBEE Ccreator</b>	
CA8705A	ETSI
CA8706A	IEEE
CA8707A	SAE-C
<b>waveBEE Touch</b>	
CA8708A	ETSI
CA8709A	IEEE
CA8710A	SAE-C

## Accelerates Deployment of V2X Technologies

The most effective C-V2X test solution is always up to date with the latest evolution of the requirements. Keysight's solution offers your team a comprehensive and holistic approach to testing—RF, protocol and application-layer. Five key capabilities enhance your ability to meet stringent goals for quality, performance and safety:

Intuitive user interface to simplify C-V2X measurements (protocol and RF)

Global Navigation Satellite System (GNSS) emulator (Keysight N5182B MXG X-Series RF vector signal generator)

5G measurement platform (UXM 5G wireless test set)

Roadmap to 5G NR V2X

Foundation for C-V2X conformance testing

Keysight is also ready to help your team climb the learning curve and master these standards. We have a series of RF, 5G and C-V2X webcasts available online, and our application experts are available to present face-to-face seminars.

## Related Web Pages

Measurement guides, user's guides, and programming guides can be found on the following web pages under the Document Libraries tab:

LTE-V2X X-app [www.keysight.com/find/N9080EM4E](http://www.keysight.com/find/N9080EM4E)

V2X Waveform Signal Creation and Offline Playback [www.keysight.com/find/N7626C](http://www.keysight.com/find/N7626C)

Signal Studio for Global Navigation Satellite Systems (GNSS) [www.keysight.com/find/N7609C](http://www.keysight.com/find/N7609C)

C-V2X solution web pages [www.keysight.com/find/cv2x](http://www.keysight.com/find/cv2x)

Keysight Test-as-a-Service t [www.keysight.com/find/TestasaService](http://www.keysight.com/find/TestasaService)

Learn more at: [www.keysight.com](http://www.keysight.com)

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

