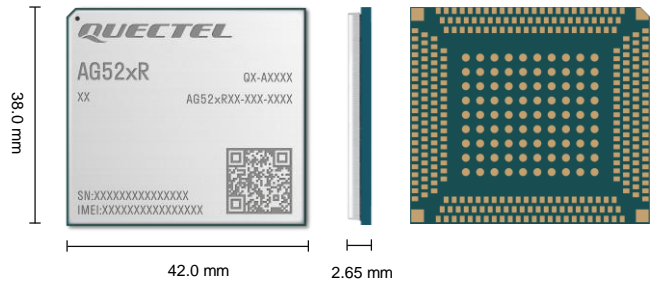


# Quectel AG52xR Series

IATF 16949 Compliant  
 Automotive Grade  
 LTE Cat 6/12 + C-V2X Module  
 Based on AEC-Q100 Qualified Chipset



AG52xR is a series of automotive grade LTE category 6/12 modules developed by Quectel. Designed and manufactured according to IATF 16949:2016 automotive quality management system, it is targeted at the IoV (Internet of Vehicles) applications. Adopting the 3GPP Rel-14 technology, it provides maximum 600 Mbps downlink and 150 Mbps uplink data rates. Supporting optional C-V2X PC5 direct communications, AG52xR series makes traffic smoother and more efficient through paving the way for automated driving and achieving the goal of fully connected traffic. It provides abundant interfaces for customers to develop applications, and its excellent performance in ESD and EMI protection ensures great robustness even in harsh environments.

AG52xR series consists of AG520R (LTE-A + C-V2X), AG521R (LTE-A only) and AG525R-GL (LTE-A only) variants, which contains multiple models to meet market demands. It is backward compatible with existing UMTS and GSM networks, enabling it to be connected even in remote areas devoid of 4G coverage.

AG52xR series supports multiple-input multiple-output (MIMO) technology. The use of multiple antennas at the receiver end at the same time and on the same frequency band greatly minimizes errors and optimizes the data speed. While supporting dual-frequency and multi-constellation GNSS (GPS, GLONASS, BDS, Galileo and QZSS) based on Qualcomm® IZat™ location technology Gen8C-Lite, the module additionally supports PPE (RTK) and GNSS/QDR integrated navigation solutions. This greatly simplifies product design and provides quicker, more accurate and more dependable positioning capability.

A rich set of Internet protocols, industry-standard interfaces and abundant functions (USB drivers for Windows 7/8/8.1/10, Linux, eCall, etc.) extend the applicability of AG52xR series to a wide range of M2M applications in automotive, industrial and consumer markets. It is especially suitable for auto-related applications, such as fleet management, vehicle tracking, in-vehicle navigation system, vehicle remote monitoring, vehicle remote control, security monitoring and alarming, remote vehicle diagnostics, vehicle wireless routing, in-car entertainment, and more.



## Key Features

- ✓ IATF 16949 qualified and compliant with automotive quality processes such as APQP, PPAP, etc.
- ✓ Based on AEC-Q100 qualified Qualcomm SA415M chipset
- ✓ Support up to LTE Cat 12 (optionally Cat 16) with 3G/2G fallback
- ✓ Optional C-V2X PC5 mode 4 direct communications
- ✓ A great variety of navigation solutions (single or dual-frequency GNSS, PPE (RTK), GNSS/QDR integrated navigation, etc.) ensure fast and accurate positioning in any environment
- ✓ Feature refinements: DFOTA, VoLTE, QuecOpen®, High Security, etc.
- ✓ MIMO technology meets demands for data rate and link reliability
- ✓ Extended operating temperature range (-40 °C to +85 °C) meets the demanding requirements for automotive devices and excellent EMC protection



LTE Cat 12  
(Optional: Cat 16)



USB 3.0 Super Speed Interface



AEC-Q100 Qualified Chipset



C-V2X Enhances Driving Safety



eCall



Dual-Frequency GNSS (Optional)



QDR + PPE (RTK) (Optional)



RGMII



LGA Package

# Quectel AG52xR Series

AG52xR Series	AG520R Series	AG521R Series	AG525R-GL
General Overview	<ul style="list-style-type: none"> <li>LTE-A + C-V2X</li> <li>Single-Frequency GNSS (optional)</li> <li>Dual-Frequency GNSS (optional)</li> <li>QDR 3.0 (optional)</li> <li>PPE (RTK) (optional)</li> <li>Ethernet (optional)</li> <li>-CN/ -EU/ -NA/ -JP/ -LA <sup>Planning</sup></li> </ul>	<ul style="list-style-type: none"> <li>LTE-A Only</li> <li>Single-Frequency GNSS (optional)</li> <li>Dual-Frequency GNSS (optional)</li> <li>QDR 3.0 (optional)</li> <li>PPE (RTK) (optional)</li> <li>Ethernet (optional)</li> <li>-CN/ -EU/ -NA/ -JP <sup>Planning</sup> / -LA <sup>Planning</sup></li> </ul>	<ul style="list-style-type: none"> <li>LTE-A Only</li> <li>Single-Frequency GNSS (optional)</li> <li>Dual-Frequency GNSS (optional)</li> <li>QDR 3.0 (optional)</li> <li>Ethernet (optional)</li> </ul>

Automotive LTE-A	AG52xR-CN	AG52xR-EU	AG52xR-NA	AG52xR-JP	AG52xR-LA (Planning)	AG525R-GL
Region/Operator	China	EMEA/Korea/Brazil/India/Australia	North America	Japan	Latin America (excl. Brazil)	Global
Dimensions (mm)	38.0 × 42.0 × 2.65	38.0 × 42.0 × 2.65	38.0 × 42.0 × 2.65	38.0 × 42.0 × 2.65	38.0 × 42.0 × 2.65	38.0 × 42.0 × 2.65
Temperature Range						
Operating Temperature	-35 °C to +75 °C	-35 °C to +75 °C	-35 °C to +75 °C	-35 °C to +75 °C	-35 °C to +75 °C	-35 °C to +75 °C
Extended Temperature	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C
eCall Temperature	-	-40 °C to +95 °C	-	-	-	-40 °C to +95 °C
Frequency Bands						
LTE-FDD	B1/B3/B5/B7/B8	B1/B3/B5/B7/B8/B20/B28/B32 <sup>①</sup>	B2/B4/B5/B7/B12/B13/B14/B25/B26/B29 <sup>②</sup> /B30 <sup>③</sup> /B66/B71	B1/B3/B5/B8/B9/B11/B18/B19/B21/B28	B1/B2/B3/B4/B5/B7/B8/B20/B28	B1/B2/B3/B4/B5/B7/B8/B9/B11/B12/B13/B18/B19/B20/B21/B25/B26/B28/B29 <sup>②</sup> /B30 <sup>③</sup> /B32 <sup>①</sup> /B66/B71
LTE-TDD	B34/B38/B39/B40/B41	B38/B40/B41	-	B41	B38/B40/B41	B34/B38/B39/B40/B41
WCDMA	B1/B8	B1/B3/B5/B8	-	B1/B3/B5/B8/B9/B19	B1/B2/B3/B5/B8	B1/B2/B3/B4/B5/B6/B8/B19
GSM/EDGE	900/1800 MHz	900/1800 MHz	-	-	850/900/1800/1900 MHz	850/900/1800/1900 MHz
C-V2X	B47 (For AG520R only)	B47 (For AG520R only)	B47 (For AG520R only)	TBD	B47 (For AG520R only)	-
Certifications						
Regulatory	SRRC/NAL/CCC	AG520R-EU: TBD AG521R-EU: CE/RCM	AG520R-NA: TBD AG521R-NA: GCF/PTCRB/FCC/IC	TBD	TBD	GCF/CE/PTCRB/FCC/UKCA/IC/IFETEL/SRRC/NAL/CCC/KC/NCC/JATE/TELEC/RCM
Carrier	TBD	TBD	AG520R-NA: TBD AG521R-NA: Verizon/AT&T/T-Mobile	TBD	TBD	Verizon/ AT&T/T-Mobile/Telus/KT/NTT DOCOMO/Telstra
Data Rate (Peak Rate)						
LTE-FDD (Mbps)	Cat 6: 300 (DL)/50 (UL)	Cat 12: AG520R-EU: 600 (DL)/75 (UL) AG521R-EU: 600 (DL)/150 (UL) Cat 16 (optional): AG520R-EU: 1024 (DL)/75 (UL) AG521R-EU: 1024 (DL)/150 (UL)	Cat 12: AG520R-NA: 600 (DL)/75 (UL) AG521R-NA: 600 (DL)/150 (UL) Cat 16 (optional): AG520R-NA: 1024 (DL)/75 (UL) AG521R-NA: 1024 (DL)/150 (UL)	Cat 12: AG520R-JP: 600(DL)/75 (UL) AG521R-JP: 600 (DL)/150 (UL) Cat 16 (optional): AG520R-JP: 1024 (DL)/75 (UL) AG521R-JP: 1024 (DL)/150 (UL)	TBD	Cat 12: 600 (DL)/150 (UL) Cat 16 (optional): 1024 (DL)/150 (UL)
LTE-TDD (Mbps)	Cat 6: 226 (DL)/28 (UL)	Cat 12: AG520R-EU: 447 (DL)/45 (UL) AG521R-EU: 447 (DL)/90(UL) Cat 16 (optional): AG520R-EU: 716 (DL)/45 (UL) AG521R-EU: 716 (DL)/90 (UL)	-	Cat 12: AG520R-JP: 447 (DL)/45 (UL) AG521R-JP: 447 (DL)/90 (UL) Cat 16 (optional): AG520R-JP: 716 (DL)/45 (UL) AG521R-JP: 716 (DL)/90 (UL)	TBD	Cat 12: 447 (DL)/90 (UL) Cat 16 (optional): 716 (DL)/90 (UL)
DC-HSPA+ (Mbps)	42 (DL)/5.76 (UL)	42 (DL)/5.76 (UL)	-	42 (DL)/5.76 (UL)	42 (DL)/5.76 (UL)	42 (DL)/5.76 (UL)
WCDMA (kbps)	384 (DL)/384 (UL)	384 (DL)/384 (UL)	-	384 (DL)/384 (UL)	384 (DL)/384 (UL)	384 (DL)/384 (UL)
EDGE (kbps)	296 (DL)/236.8 (UL)	296 (DL)/236.8 (UL)	-	-	296 (DL)/236.8 (UL)	296 (DL)/236.8 (UL)
GPRS (kbps)	107 (DL)/85.6 (UL)	107 (DL)/85.6 (UL)	-	-	107 (DL)/85.6 (UL)	107 (DL)/85.6 (UL)
C-V2X (Mbps)	30 (Tx)/30 (Rx)	30 (Tx)/30 (Rx)	30 (Tx)/30 (Rx)	TBD	30 (Tx)/30 (Rx)	-
Interfaces						
(U)SIM	× 1 (default) × 2 (optional)	× 1 (default) × 2 (optional)	× 1 (default) × 2 (optional)	× 1 (default) × 2 (optional)	× 1 (default) × 2 (optional)	× 1 (default) × 2 (optional)
UART	× 3	× 3	× 3	× 3	× 3	× 3
USB 2.0/3.0	× 1	× 1	× 1	× 1	× 1	× 1
RGMII	× 1	× 1	× 1	× 1	× 1	× 1
PCIe	× 1	× 1	× 1	× 1	× 1	× 1
GPIO	× 8	× 8	× 8	× 8	× 8	× 11
Antenna	× 1 Main Antenna × 1 Diversity Antenna × 1 GNSS Antenna <sup>③</sup> × 2 C-V2X Antenna <sup>④</sup> × 2 C-V2X Antenna <sup>④</sup>	× 1 Main Antenna × 1 Diversity Antenna × 1 GNSS Antenna <sup>③</sup> × 2 C-V2X Antenna <sup>④</sup> × 2 MIMO Antenna <sup>③</sup>	× 1 Main Antenna × 1 Diversity Antenna × 1 GNSS Antenna <sup>③</sup> × 2 C-V2X Antenna <sup>④</sup> × 2 MIMO Antenna <sup>③</sup>	× 1 Main Antenna × 1 Diversity Antenna × 1 GNSS Antenna <sup>③</sup> × 2 C-V2X Antenna <sup>④</sup> × 2 MIMO Antenna <sup>③</sup>	× 1 Main Antenna × 1 Diversity Antenna × 1 GNSS Antenna <sup>③</sup> × 2 C-V2X Antenna <sup>④</sup> × 2 MIMO Antenna <sup>③</sup>	× 1 Main Antenna × 1 Diversity Antenna × 1 GNSS Antenna <sup>③</sup> × 2 MIMO Antenna <sup>③</sup>

NOTE:  
 1. <sup>①</sup>: LTE-FDD B29/B30/B32 supports Rx only.  
 2. <sup>②</sup>: LTE-FDD B30 is subject to carrier's deployment.  
 3. <sup>③</sup>: optional.  
 4. <sup>④</sup>: Presently, only AG520R-CN/-EU/-NA supports C-V2X antenna interfaces.  
 5. \*: under development or in progress.



# Quectel AG52xR Series

Automotive LTE-A	AG52xR-CN	AG52xR-EU	AG52xR-NA	AG52xR-JP	AG52xR-LA (Planning)	AG525R-GL
<b>Voice</b>						
<b>Speech Codec Modes</b>	HR/FR/EFR/AMR/AMR-WB	HR/FR/EFR/AMR/AMR-WB	HR/FR/EFR/AMR/AMR-WB	HR/FR/EFR/AMR/AMR-WB	HR/FR/EFR/AMR/AMR-WB	HR/FR/EFR/AMR/AMR-WB
<b>Echo Arithmetic</b>	Echo Cancellation/Noise Suppression	Echo Cancellation/Noise Suppression	Echo Cancellation/Noise Suppression	Echo Cancellation/Noise Suppression	Echo Cancellation/Noise Suppression	Echo Cancellation/Noise Suppression
<b>VoLTE</b>	Digital Audio and VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE
<b>Enhanced Features</b>						
<b>eCall</b>	-	●	-	-	-	●
<b>DFOTA</b>	●	●	●	●	●	●
<b>QuecOpen® (Open Linux)</b>	●	●	●	●	●	●
<b>PCIe for WLAN Function</b>	●	●	●	●	●	●
<b>UART/PCM for Bluetooth Function</b>	●	●	●	●	●	●
<b>Multi-APN</b>	●	●	●	●	●	●
<b>Temperature Management</b>	●	●	●	●	●	●
<b>EAVB</b>	●	●	●	●	●	●
<b>eSIM (eUICC)</b>	Optional	Optional	Optional	Optional	Optional	Optional
<b>DSSS</b>	Optional	Optional	Optional	Optional	Optional	Optional
<b>Gigabit Ethernet</b>	Optional	Optional	Optional	Optional	Optional	Optional
<b>Single-Frequency GNSS (GPS/GLONASS/BDS/Galileo/QZSS)</b>	Optional	Optional	Optional	Optional	Optional	Optional
<b>Dual Frequency GNSS (L1 + L5)</b>	Optional	Optional	Optional	Optional	Optional	Optional
<b>PPE (RTK)</b>	Optional	Planning	Planning	TBD	-	-
<b>QDR 3.0 (External IMU Required)</b>	Optional	Optional	Optional	Optional	Optional	Optional
<b>ESD/EMI Protection</b>	Realized through Internal Specific Circuits and Components	Realized through Internal Specific Circuits and Components	Realized through Internal Specific Circuits and Components	Realized through Internal Specific Circuits and Components	Realized through Internal Specific Circuits and Components	Realized through Internal Specific Circuits and Components
<b>High Security</b>	TrustZone TPM* (External HSM required) Secure Boot SELinux	TrustZone TPM* (External HSM required) Secure Boot SELinux	TrustZone TPM* (External HSM required) Secure Boot SELinux	TrustZone TPM* (External HSM required) Secure Boot SELinux	TrustZone TPM* (External HSM required) Secure Boot SELinux	TrustZone TPM* (External HSM required) Secure Boot SELinux
<b>512 MB NAND + 512 MB DDRAM</b>	●	●	●	●	●	●
<b>Drivers</b>						
<b>USB Serial Driver</b>	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15
<b>USB RNDIS Driver</b>	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15	Windows 7/8/8.1/10 Linux 2.6–5.15
<b>USB ECM Driver</b>	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15
<b>USB GobiNet Driver</b>	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15	Linux 2.6–5.15
<b>USB QMI_WWAN Driver</b>	Linux 3.4–5.15	Linux 3.4–5.15	Linux 3.4–5.15	Linux 3.4–5.15	Linux 3.4–5.15	Linux 3.4–5.15
<b>Electrical Features</b>						
<b>Supply Voltage (V)</b>	<b>VBAT_BB/VBAT_RF:</b> 3.3–4.3 (typ. 3.8) <b>VBAT_C-V2X:</b> 4.75–5.25 (typ. 5.0)	<b>VBAT_BB/VBAT_RF:</b> 3.3–4.3 (typ. 3.8) <b>VBAT_C-V2X:</b> 4.75–5.25 (typ. 5.0)	<b>VBAT_BB/VBAT_RF:</b> 3.3–4.3 (typ. 3.8) <b>VBAT_C-V2X:</b> 4.75–5.25 (typ. 5.0)	<b>VBAT_BB/VBAT_RF:</b> 3.3–4.3 (typ. 3.8) <b>VBAT_C-V2X:</b> 4.75–5.25 (typ. 5.0)	<b>VBAT_BB/VBAT_RF:</b> 3.3–4.3 (typ. 3.8) <b>VBAT_C-V2X:</b> 4.75–5.25 (typ. 5.0)	<b>VBAT_BB/VBAT_RF:</b> 3.3–4.3 (typ. 3.8)
<b>Current Consumption (mA)</b>	<b>Power off:</b> 0.021 <b>LTE Sleep:</b> 2.03 @ PF = 128 1.61 @ PF = 256 <b>Idle:</b> 15.9 @ PF=64 27.2 @ PF=64, USB Active	<b>Power off:</b> 0.021 <b>LTE Sleep:</b> 2.03 @ PF = 128 1.61 @ PF = 256 <b>Idle:</b> 15.9 @ PF=64 27.2 @ PF=64, USB Active	<b>Power off:</b> 0.021 <b>LTE Sleep:</b> 2.03 @ PF = 128 1.61 @ PF = 256 <b>Idle:</b> 15.9 @ PF=64 27.2 @ PF=64, USB Active	<b>Power off:</b> 0.021 <b>LTE Sleep:</b> 2.03 @ PF = 128 1.61 @ PF = 256 <b>Idle:</b> 15.9 @ PF=64 27.2 @ PF=64, USB Active	TBD	<b>Power off:</b> 0.021 <b>LTE Sleep:</b> 2.03 @ PF = 128 1.61 @ PF = 256 <b>Idle:</b> 15.9 @ PF=64 27.2 @ PF=64, USB Active

NOTE:

- \*: under development.
- : supported.