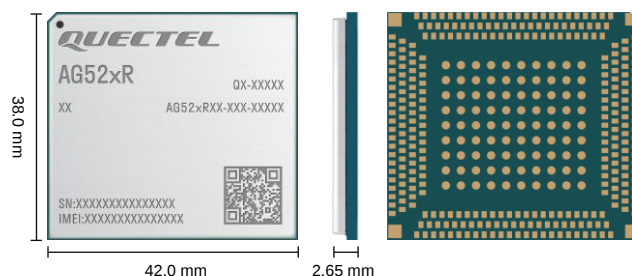




Quectel AG52xR Family

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 1.0 Gbps downlink and 150 Mbps uplink data rates. Supporting optional C-V2X PC5 direct communications, AG52xR family makes traffic smoother and more efficient by paving the way for automated driving and fully connected traffic. It provides abundant interfaces for developing customer applications. Its excellent performance in ESD and EMI protection ensures great robustness in harsh environments.

AG52xR family consists of AG520R series (LTE-A + C-V2X), AG521R series (LTE-A only), AG529R series (LTE Cat 4/6) 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 family 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-band 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/Linux, eCall, etc.) extend the applicability of AG52xR family 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, 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 and PPAP
- ✓ Based on AEC-Q100 qualified Qualcomm SA415M chipset
- ✓ Support up to LTE Cat 6/12 (optionally Cat 16) with 3G/2G fallback
- ✓ Optional C-V2X PC5 mode 4 direct communications
- ✓ A great variety of navigation solutions (single or dual-band 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



Up to LTE Cat 12
(Optional: Cat 16)



USB 3.0 Super
Speed Interface



AEC-Q100
Qualified Chipset



C-V2X Enhances
Driving Safety



eCall



Dual-band GNSS
(Optional)



QDR + PPE (RTK)
(Optional)



RGMII



LGA Package

Quectel AG52xR Family

AG52xR Family	AG520R Series	AG521R Series	AG529R Series	AG525R-GL	
General Overview	• LTE-A + C-V2X • Single band GNSS (optional) • Dual-band GNSS (optional) • QDR 3.0 (optional) • PPE (RTK) (optional) • Ethernet • -CN/-EU/-NA/-JP	• LTE-A Only • Single band GNSS (optional) • Dual-band GNSS (optional) • QDR 3.0 (optional) • PPE (RTK) (optional) • Ethernet • -CN/-EU/-NA/-JP ^{Planning}	• LTE Cat 4/6 • Single band GNSS (optional) • QDR 3.0 (optional) • PPE (RTK) (optional) • Ethernet • -CN/-EU	• LTE-A Only • Single band GNSS (optional) • Dual-band GNSS (optional) • QDR 3.0 (optional) • Ethernet	
Automotive LTE-A	AG52xR-CN	AG52xR-EU	AG52xR-NA	AG52xR-JP	AG525R-GL
Region/Operator	China	EMEA/Korea/Brazil/India/ Australia	North America	Japan	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
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
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
eCall Temperature	-	-40 °C to +95 °C	-	-	-40 °C to +95 °C
Frequency Bands					
LTE-FDD	B1/3/5/7 ^① /8	B1/3/5 ^② /7/8/20/28 (B28A for AG529R-EU)/32 ^{②③}	B2/4/5/7/12/13/14/25/26/29 ^③ /30 ^③ /66/71	B1/3/5/8/9/11/18/19/21/28	B1/2/3/4/5/7/8/9/11/12/13/18/19/20/21/25/26/28/29 ^③ /30 ^③ /32 ^③ /66/71
LTE-TDD	B34/38/39/40/41	B38 ^④ /40 ^④ /41 ^④	-	B41	B34/38/39/40/41
WCDMA	B1/8	B1/3 ^② /5 ^② /8	-	B1/3/5/8/9/19	B1/2/3/4/5/6/8/19
GSM/EDGE	900/1800 MHz	900/1800 MHz	-	-	850/900/1800/1900 MHz
C-V2X	B47 (For AG520R only)	B47 (For AG520R only)	B47 (For AG520R only)	TBD	-
Certifications					
Regulatory	China: SRRC/NAL/CCC	AG520R-EU: TBD AG521R-EU: Europe: CE Australia/New Zealand: RCM AG529R-EU: Global: GCF Europe: CE Australia/New Zealand: RCM	AG520R-NA: TBD AG521R-NA: Global: GCF North America: PTCRB America: FCC Canada: IC	TBD	Global: GCF Europe: CE North America: PTCRB America: FCC The UK: UKCA Canada: IC Mexico: IFETEL China: SRRC/NAL/CCC South Korea: KC Taiwan, China: NCC Japan: JATE/TELEC Australia/New Zealand: RCM America: Verizon/AT&T/T-Mobile Canada: Telus South Korea: KT Japan: NTT DOCOMO Australia: Telstra
Carrier	TBD	TBD	AG520R-NA: TBD AG521R-NA: America: Verizon/AT&T/T-Mobile	TBD	
Data Rate (Peak Rate)					
LTE-FDD (Mbps)	Cat 6: 300 (DL)/50 (UL)	Up to 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 6: AG529R-EU: 300 (DL)/75 (UL)	Up to 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)	Up to Cat 12: AG520R-JP: 600 (DL)/75 (UL) Cat 16 (optional): AG520R-JP: 1024 (DL)/75 (UL)	Up to Cat 12: 600 (DL)/150 (UL) Cat 16 (optional): 1024 (DL)/150 (UL)
LTE-TDD (Mbps)	226 (DL)/28 (UL)	AG520R-EU: 447 (DL)/45 (UL) 716 (DL)/45 (UL) (optional) AG521R-EU: 447 (DL)/90 (UL) 716 (DL)/90 (UL) (optional) AG529R-EU: 130 (DL)/45 (UL)	-	AG520R-JP: 447 (DL)/45 (UL) 716 (DL)/45 (UL) (optional)	447 (DL)/90 (UL) 716 (DL)/90 (UL) (optional)
DC-HSDPA/HSUPA (Mbps)	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)
EDGE (kbps)	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)
C-V2X (Mbps)	30 (Tx)/30 (Rx)	30 (Tx)/30 (Rx)	30 (Tx)/30 (Rx)	TBD	-
Interfaces					
(U)SIM	× 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
USB 2.0/3.0	× 1	× 1	× 1	× 1	× 1
RGMII	× 1	× 1	× 1	× 1	× 1
PCIe	× 1	× 1	× 1	× 1	× 1
GPIO	× 8	× 8	× 8	× 8	× 11

NOTE:

1. ①: LTE-FDD B7 is optional on AG529R-CN.
2. ②: LTE-FDD B5/32 and UMTS B3/5 are not supported on AG529R-EU.
3. ③: LTE-FDD B29/30/32 supports Rx only, and B30 is subject to carrier's deployment.
4. ④: LTE-TDD B38/40/41 is optional on AG529R-EU.

Quectel AG52xR Family

Automotive LTE-A	AG52xR-CN	AG52xR-EU	AG52xR-NA	AG52xR-JP	AG525R-GL
Antenna Interfaces					
Main	× 1	× 1	× 1	× 1	× 1
Diversity	× 1	× 1	× 1	× 1	× 1
MIMO3 ^①	-	× 1	× 1	× 1	× 1
MIMO4 ^①	-	× 1	× 1	× 1	× 1
C-V2X ^②	× 2	× 2	× 2	× 2	-
GNSS ^③	× 1	× 1	× 1	× 1	× 1
Voice					
Speech Codec Modes	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
Echo Arithmetic	Echo Cancellation/ Noise Suppression	Echo Cancellation/ Noise Suppression	Echo Cancellation/ Noise Suppression	Echo Cancellation/ Noise Suppression	Echo Cancellation/ Noise Suppression
VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE	Digital Audio and VoLTE
Enhanced Features					
eCall	-	●	-	-	●
DFOTA	●	●	●	●	●
QuecOpen® (Open Linux)	●	●	●	●	●
PCIe for WLAN Function	●	●	●	●	●
UART/PCM for Bluetooth Function	●	●	●	●	●
Multi-APN	●	●	●	●	●
Temperature Management	●	●	●	●	●
EAVB	●	●	●	●	●
eSIM (eUICC)	○	○	○	○	○
DSSS	○	○	○	○	○
Gigabit Ethernet ^④	●	●	●	●	●
Single Band GNSS (GPS/GLONASS/BDS/Galileo/QZSS)	○	○	○	○	○
Dual-band GNSS (L1 + L5)	○ (Only for AG520R/AG521R)	○ (Only for AG520R/AG521R/ AG529R)	○ (Only for AG520R/AG521R)	○ (Only for AG520R/AG521R)	○
PPE (RTK)	○	Planning	Planning	TBD	-
QDR 3.0 (External IMU Required)	○	○	○	○	○
ESD/EMI Protection	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
High Security	TrustZone	TrustZone	TrustZone	TrustZone	TrustZone
	TPM* (External HSM required)	TPM* (External HSM required)	TPM* (External HSM required)	TPM* (External HSM required)	TPM* (External HSM required)
	Secure Boot	Secure Boot	Secure Boot	Secure Boot	Secure Boot
512 MiB NAND + 512 MiB DDRAM	SELinux	SELinux	SELinux	SELinux	SELinux
	●	● (AG529R-EU supports 1 GiB NAND + 1 GiB DDRAM)	●	●	●
Drivers					
USB Serial Driver	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7
USB RNDIS Driver	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7	Windows 8.1/10/11 Linux 2.6–6.7
USB ECM Driver	Linux 2.6–6.7	Linux 2.6–6.7	Linux 2.6–6.7	Linux 2.6–6.7	Linux 2.6–6.7
USB GobiNet Driver	Linux 2.6–6.7	Linux 2.6–6.7	Linux 2.6–6.7	Linux 2.6–6.7	Linux 2.6–6.7
USB QMI_WWAN Driver	Linux 3.4–6.7	Linux 3.4–6.7	Linux 3.4–6.7	Linux 3.4–6.7	Linux 3.4–6.7
Electrical Features					
Supply Voltage (V)	VBAT_BB/VBAT_RF: 3.3–4.3 (typ. 3.8) VBAT_C-V2X: 4.75–5.25 (typ. 5.0)	VBAT_BB/VBAT_RF: 3.3–4.3 (typ. 3.8) (AG529R-EU: 3.7–4.3, typ. 3.8) VBAT_C-V2X: 4.75–5.25 (typ. 5.0)	VBAT_BB/VBAT_RF: 3.3–4.3 (typ. 3.8) VBAT_C-V2X: 4.75–5.25 (typ. 5.0)	VBAT_BB/VBAT_RF: 3.3–4.3 (typ. 3.8) VBAT_C-V2X: 4.75–5.25 (typ. 5.0)	VBAT_BB/VBAT_RF: 3.3–4.3 (typ. 3.8)
Current Consumption (mA)	Power off: 0.03	Power off: 0.03	Power off: 0.03	Power off: 0.03	Power off: 0.03
	LTE Sleep: 2.03 @ PF = 128 1.61 @ PF = 256	LTE Sleep: 2.03 @ PF = 128 1.61 @ PF = 256	LTE Sleep: 2.03 @ PF = 128 1.61 @ PF = 256	LTE Sleep: 2.03 @ PF = 128 1.61 @ PF = 256	LTE Sleep: 2.03 @ PF = 128 1.61 @ PF = 256
	Idle: 15.9 @ PF = 64	Idle: 15.9 @ PF = 64	Idle: 15.9 @ PF = 64	Idle: 15.9 @ PF = 64	Idle: 15.9 @ PF = 64
	27.2 @ PF = 64, USB Active	27.2 @ PF = 64, USB Active	27.2 @ PF = 64, USB Active	27.2 @ PF = 64, USB Active	27.2 @ PF = 64, USB Active

NOTE:

- ①: MIMO3 and MIMO4 are not supported by AG520R-CN, AG521R-CN, AG529R-CN and AG529R-EU, and optional for other module models.
- ②: C-V2X is supported by AG520R-CN/-EU/-NA/-JP. AG525R-GL does not support C-V2X. AG521R series and AG529R series do not support C-V2X by default.
- ③: AG529R-CN supports single band GNSS L1 by default, but the module is designed to be compatible with dual-band GNSS.
- ④: The module's RGMII interface supports the Gigabit Ethernet protocol, while actual throughput is subject to testing.
- * : Under development.
- : Supported.
- : Optional.

