

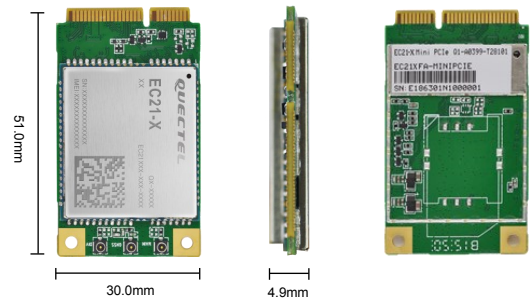


# Quectel

## EC21 Mini PCIe Series

IoT/M2M-optimized

LTE Cat 1 Module



Quectel EC21 Mini PCIe is a series of LTE category 1 module adopting standard PCI Express® Mini Card form factor (Mini PCIe). Specially optimized for M2M and IoT applications, it features cost-effective, low-power LTE connectivity, and delivers M2M-optimized speeds of 10Mbps downlink and 5Mbps uplink. These make it ideal for numerous IoT applications that are not reliant on high speed connectivity but still require the longevity and reliability of LTE networks.

EC21 Mini PCIe contains 10 variants: EC21-E Mini PCIe, EC21-EU Mini PCIe, EC21-EUX Mini PCIe, EC21-A Mini PCIe, EC21-V Mini PCIe, EC21-AUT Mini PCIe, EC21-AU Mini PCIe, EC21-AUX Mini PCIe, EC21-KL Mini PCIe and EC21-J Mini PCIe. This makes it backward-compatible with existing EDGE and GSM/GPRS networks, ensuring that it can easily migrate from LTE to 2G or 3G network.

EC21 Mini PCIe supports Qualcomm® IZat™ location technology Gen8C Lite (GPS, GLONASS, BeiDou/Compass, Galileo and QZSS). The integrated GNSS greatly simplifies product design, and provides quicker, more accurate and more dependable positioning.

A rich set of Internet protocols, industry-standard interfaces and abundant functionalities (USB serial drivers for Windows 7/8/8.1/10, Linux, Android/eCall\*) extend the applicability of the module to a wide range of M2M applications such as smart metering, tracking and tracing, fleet management, wearable devices, smart home gateways, digital signs, and even drones.



### Key Benefits

- ✓ Cost-effective, lower-power LTE connectivity optimized for broadband IoT applications
- ✓ Worldwide LTE, UMTS/HSPA(+) and GSM/GPRS/EDGE coverage
- ✓ Standard PCI Express® Mini Card form factor (Mini PCIe) ideal for manufacturers to easily integrate wireless connectivity into their devices
- ✓ MIMO technology meets demands for data rate and link reliability in modem wireless communication systems
- ✓ Multi-constellation GNSS receiver available for applications requiring fast and accurate fixes in any environment



LTE Cat 1  
Max 10Mbps (DL)  
Max 5Mbps (UL)



Max 42Mbps (DL)  
Max 5.76Mbps (UL)



Mini PCIe Package



Embedded Abundant Protocols



eCall\*



Multi-constellation GNSS



USB 2.0 High Speed Interface



USB Drivers



Quectel Enhanced AT Commands

Rev.: V1.5 | Status: Released

# Quectel EC21 Mini PCIe Series

| LTE Cat 1                                | EC21-E Mini PCIe   | EC21-EU Mini PCIe  | EC21-EUX Mini PCIe  | EC21-A Mini PCIe   | EC21-V Mini PCIe   |
|--|--|--|---|--|--|
| <b>Region/Operator</b>                   | EMEA/Thailand/India  | EMEA/Thailand  | EMEA/Thailand   | North America  | Verizon  |
| <b>Dimensions (mm)</b>                   | 51.0 × 30.0 × 4.9  | 51.0 × 30.0 × 4.9  | 51.0 × 30.0 × 4.9   | 51.0 × 30.0 × 4.9  | 51.0 × 30.0 × 4.9  |
| <b>Temperature Range</b>                 |  |  |   |  |  |
| <b>Operation Temperature</b>             | -35°C ~ +75°C  | -35°C ~ +75°C  | -35°C ~ +75°C   | -35°C ~ +75°C  | -35°C ~ +75°C  |
| <b>Extended Temperature</b>              | -40°C ~ +80°C  | -40°C ~ +80°C  | -40°C ~ +80°C   | -40°C ~ +80°C  | -40°C ~ +80°C  |
| <b>Frequency Bands</b>                   |  |  |   |  |  |
| <b>LTE-FDD</b>                           | B1/B3/B5/B7/B8/B20   | B1/B3/B7/B8/B20/B28A   | B1/B3/B7/B8/B20/B28A  | B2/B4/B12  | B4/B13   |
| <b>WCDMA</b>                             | B1/B5/B8   | B1/B8  | B1/B8   | B2/B4/B5   | \  |
| <b>GSM/EDGE</b>                          | B3/B8  | B3/B8  | B3/B8   | \  | \  |
| <b>GNSS</b>                              | GPS/GLONASS/BeiDou (Compass)/Galileo/QZSS (Optional)                   | GPS/GLONASS/BeiDou (Compass)/Galileo/QZSS (Optional)   | GPS/GLONASS/BeiDou (Compass)/Galileo/QZSS (Optional)                            | GPS/GLONASS/BeiDou (Compass)/Galileo/QZSS (Optional)                                 | GPS/GLONASS/BeiDou (Compass)/Galileo/QZSS (Optional)           |
| <b>Certifications</b>                    |  |  |   |  |  |
| <b>Carrier</b>                           | <b>Global:</b> Vodafone<br><b>Europe:</b> Deutsche Telekom/Telefónica* | <b>Europe:</b> Deutsche Telekom  | \   | <b>North America:</b> AT&T/T-Mobile/<br>U.S. Cellular<br><b>Canada:</b> Rogers/Telus | <b>North America:</b> Verizon                                  |
| <b>Regulatory</b>                        | <b>Global:</b> GCF<br><b>Europe:</b> CE<br><b>Russia:</b> FAC          | <b>Global:</b> GCF<br><b>Europe:</b> CE<br><b>Taiwan (China):</b> NCC<br><b>Australia/New Zealand:</b> RCM | <b>Global:</b> GCF*<br><b>Europe:</b> CE*<br><b>Australia/New Zealand:</b> RCM* | <b>North America:</b> FCC/PTCRB<br><b>Canada:</b> IC                                 | <b>Global:</b> GCF<br><b>North America:</b> FCC                |
| <b>Others</b>                            | RoHS/WHQL  | RoHS/WHQL  | RoHS/WHQL   | RoHS/WHQL  | RoHS/WHQL  |
| <b>Data Transmission</b>                 |  |  |   |  |  |
| <b>LTE-FDD Data Rate (Mbps)</b>          | Max 10 (DL)/ 5 (UL)  | Max 10 (DL)/ 5 (UL)  | Max 10 (DL)/ 5 (UL)   | Max 10 (DL)/ 5 (UL)  | Max 10 (DL)/ 5 (UL)  |
| <b>DC-HSPA+ Data Rate (Mbps)</b>         | Max 42 (DL)/ 5.76 (UL)   | Max 42 (DL)/ 5.76 (UL)   | Max 42 (DL)/ 5.76 (UL)  | Max 42 (DL)/ 5.76 (UL)   | \  |
| <b>WCDMA Data Rate (Kbps)</b>            | Max 384 (DL)/ 384 (UL)   | Max 384 (DL)/ 384 (UL)   | Max 384 (DL)/ 384 (UL)  | Max 384 (DL)/ 384 (UL)   | \  |
| <b>EDGE Data Rate (Kbps)</b>             | Max 296 (DL)/ 236.8 (UL)   | Max 296 (DL)/ 236.8 (UL)   | Max 296 (DL)/ 236.8 (UL)  | \  | \  |
| <b>GPRS Data Rate (Kbps)</b>             | Max 107 (DL)/ 85.6 (UL)  | Max 107 (DL)/ 85.6 (UL)  | Max 107 (DL)/ 85.6 (UL)   | \  | \  |
| <b>Interfaces</b>                        |  |  |   |  |  |
| <b>(U)SIM</b>                            | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>UART</b>                              | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>USB 2.0</b>                           | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>Audio Digital (PCM)</b>               | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>I2C</b>                               | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>LED_WWAN#</b>                         | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>W_DISABLE#</b>                        | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>PERST#</b>                            | x 1  | x 1  | x 1   | x 1  | x 1  |
| <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   |
| <b>Echo Arithmetic</b>                   | Echo Cancellation/<br>Noise Suppression                                | Echo Cancellation/<br>Noise Suppression  | Echo Cancellation/<br>Noise Suppression   | Echo Cancellation/<br>Noise Suppression  | Echo Cancellation/<br>Noise Suppression                        |
| <b>VoLTE</b>                             | Digital Audio and VoLTE (Voice over LTE) (Optional)                    | Digital Audio and VoLTE (Voice over LTE) (Optional)  | Digital Audio and VoLTE (Voice over LTE) (Optional)                             | Digital Audio and VoLTE (Voice over LTE) (Optional)                                  | Digital Audio and VoLTE (Voice over LTE) (Optional)            |
| <b>Enhanced Features</b>                 |  |  |   |  |  |
| <b>eCall *</b>                           | ●  | ●  | ●   | ●  | ●  |
| <b>DTMF</b>                              | ●  | ●  | ●   | ●  | ●  |
| <b>DFOTA</b>                             | ●  | ●  | ●   | ●  | ●  |
| <b>QMI/ Rmnet</b>                        | ●  | ●  | ●   | ●  | ●  |
| <b>Audio Playback*/ Audio Recording*</b> | Optional   | Optional   | Optional  | Optional   | Optional   |
| <b>QuecLocator®</b>                      | ●  | ●  | ●   | *  | *  |
| <b>QuecFile</b>                          | ●  | ●  | ●   | ●  | ●  |
| <b>(U)SIM Card Detection</b>             | ●  | ●  | ●   | ●  | ●  |
| <b>Drivers</b>                           |  |  |   |  |  |
| <b>USB Serial Driver</b>                 | Windows 7/8/8.1/10, Linux 2.6~5.4, Android 4.x/5.x/6.x/7.x/9.x         | Windows 7/8/8.1/10, Linux 2.6~5.4, Android 4.x/5.x/6.x/7.x/9.x   | Windows 7/8/8.1/10, Linux 2.6~5.4, Android 4.x/5.x/6.x/7.x/9.x                  | Windows 7/8/8.1/10, Linux 2.6~5.4, Android 4.x/5.x/6.x/7.x/9.x                       | Windows 7/8/8.1/10, Linux 2.6~5.4, Android 4.x/5.x/6.x/7.x/9.x |
| <b>GNSS Driver</b>                       | Android 4.x/5.x/6.x/7.x/8.x/9.x  | Android 4.x/5.x/6.x/7.x/8.x/9.x  | Android 4.x/5.x/6.x/7.x/8.x/9.x   | Android 4.x/5.x/6.x/7.x/8.x/9.x  | Android 4.x/5.x/6.x/7.x/8.x/9.x                                |
| <b>RIL Driver</b>                        | Android 4.x/5.x/6.x/7.x/8.x/9.x  | Android 4.x/5.x/6.x/7.x/8.x/9.x  | Android 4.x/5.x/6.x/7.x/8.x/9.x   | Android 4.x/5.x/6.x/7.x/8.x/9.x  | Android 4.x/5.x/6.x/7.x/8.x/9.x                                |
| <b>NDIS Driver</b>                       | Windows 7/8/8.1/10   | Windows 7/8/8.1/10   | Windows 7/ 8/ 8.1/ 10   | Windows 7/8/8.1/10   | Windows 7/8/8.1/10   |
| <b>MBIM Driver</b>                       | Windows 8/8.1/10, Linux 3.18~5.4                                       | Windows 8/8.1/10, Linux 3.18~5.4   | \   | Windows 8/8.1/10, Linux 3.18~5.4   | Windows 8/8.1/10, Linux 3.18~5.4                               |
| <b>GobiNet Driver</b>                    | Linux 2.6~5.4  | Linux 2.6~5.4  | Linux 2.6~5.4   | Linux 2.6~5.4  | Linux 2.6~5.4  |
| <b>QMI_WWAN Driver</b>                   | Linux 3.4~5.4  | Linux 3.4~5.4  | Linux 3.4~5.4   | Linux 3.4~5.4  | Linux 3.4~5.4  |
| <b>Electrical Features</b>               |  |  |   |  |  |
| <b>Supply Voltage Range</b>              | 3.0V~3.6V, 3.3V Typ.   | 3.0V~3.6V, 3.3V Typ.   | 3.0V~3.6V, 3.3V Typ.  | 3.0V~3.6V, 3.3V Typ.   | 3.0V~3.6V, 3.3V Typ.   |
| <b>Power Consumption</b>                 | 3.9mA @Sleep, Typ. 30mA @Idle  | 3.4mA @Sleep, Typ. 23mA @Idle  | 3.2mA @Sleep, Typ. 22mA @Idle   | 3.5mA @Sleep, Typ. 32mA @Idle  | 3.8mA @Sleep, Typ. 30mA @Idle                                  |

**Notes:**  
1. \* means under development.  
2. ● means supported.

# Quectel EC21 Mini PCIe Series

| LTE Cat 1                                    | EC21-AUT Mini PCIe   | EC21-AU Mini PCIe  | EC21-AUX Mini PCIe  | EC21-KL Mini PCIe  | EC21-J Mini PCIe   |
|--|--|--|---|--|--|
| <b>Region/Operator</b>                       | Australia  | Latin America/Australia/<br>New Zealand  | Latin America/Australia/<br>New Zealand   | South Korea  | Japan  |
| <b>Dimensions (mm)</b>                       | 51.0 × 30.0 × 4.9  | 51.0 × 30.0 × 4.9  | 51.0 × 30.0 × 4.9   | 51.0 × 30.0 × 4.9  | 51.0 × 30.0 × 4.9  |
| <b>Temperature Range</b>                     |  |  |   |  |  |
| <b>Operation Temperature</b>                 | -35°C ~ +75°C  | -35°C ~ +75°C  | -35°C ~ +75°C   | -35°C ~ +75°C  | -35°C ~ +75°C  |
| <b>Extended Temperature</b>                  | -40°C ~ +80°C  | -40°C ~ +80°C  | -40°C ~ +80°C   | -40°C ~ +80°C  | -40°C ~ +80°C  |
| <b>Frequency Bands</b>                       |  |  |   |  |  |
| <b>LTE-FDD</b>                               | B1/B3/B5/B7/B28  | B1/B2 <sup>①</sup> /B3/B4/B5/B7/B8/B28   | B1/B2 <sup>①</sup> /B3/B4/B5/B7/B8/B28  | B1/B3/B5/B7/B8   | B1/B3/B8/B18/B19/B26   |
| <b>LTE-TDD</b>                               | \  | B40  | B40   | \  | \  |
| <b>WCDMA</b>                                 | B1/B5  | B1/B2/B5/B8  | B1/B2/B4/B5/B8  | \  | \  |
| <b>GSM/EDGE</b>                              | \  | B2/B3/B5/B8  | B2/B3/B5/B8   | \  | \  |
| <b>GNSS</b>                                  | GPS/GLONASS/BeiDou<br>(Compass)/Galileo/QZSS<br>(Optional)           | GPS/GLONASS/BeiDou<br>(Compass)/Galileo/QZSS<br>(Optional)   | GPS/GLONASS/BeiDou<br>(Compass)/Galileo/QZSS<br>(Optional)  | \  | GPS/GLONASS/BeiDou<br>(Compass)/Galileo/QZSS<br>(Optional)           |
| <b>Certifications</b>                        |  |  |   |  |  |
| <b>Carrier</b>                               | Australia: Telstra   | Australia: Telstra   | \   | South Korea: KT/SKT  | Japan: NTT DOCOMO/KDDI   |
| <b>Regulatory</b>                            | Global: GCF<br>Australia/New Zealand: RCM                            | North America: FCC<br>Canada: IC<br>Brazil: Anatel<br>Taiwan (China): NCC<br>Japan: JATE/TELEC<br>Australia/New Zealand: RCM | Europe: CE<br>North America: FCC<br>Brazil: Anatel<br>Taiwan (China): NCC<br>Australia/New Zealand: RCM | South Korea: KC  | Japan: JATE/TELEC  |
| <b>Others</b>                                | RoHS/WHQL  | RoHS/WHQL  | RoHS/WHQL   | RoHS/WHQL  | RoHS/WHQL  |
| <b>Data Transmission</b>                     |  |  |   |  |  |
| <b>LTE-FDD Data Rate (Mbps)</b>              | Max 10 (DL)/ 5 (UL)  | Max 10 (DL)/ 5 (UL)  | Max 10 (DL)/ 5 (UL)   | Max 10 (DL)/ 5 (UL)  | Max 10 (DL)/ 5 (UL)  |
| <b>LTE-TDD Data Rate (Mbps)</b>              | \  | Max 8.96 (DL)/ 3.1 (UL)  | Max 8.96 (DL)/ 3.1 (UL)   | \  | \  |
| <b>DC-HSPA+ Data Rate (Mbps)</b>             | Max 42 (DL)/ 5.76 (UL)   | Max 42 (DL)/ 5.76 (UL)   | Max 42 (DL)/ 5.76 (UL)  | \  | \  |
| <b>WCDMA Data Rate (Kbps)</b>                | Max 384 (DL)/ 384 (UL)   | Max 384 (DL)/ 384 (UL)   | Max 384 (DL)/ 384 (UL)  | \  | \  |
| <b>EDGE Data Rate (Kbps)</b>                 | \  | Max 296 (DL)/ 236.8 (UL)   | Max 296 (DL)/ 236.8 (UL)  | \  | \  |
| <b>GPRS Data Rate (Kbps)</b>                 | \  | Max 107 (DL)/ 85.6 (UL)  | Max 107 (DL)/ 85.6 (UL)   | \  | \  |
| <b>Interfaces</b>                            |  |  |   |  |  |
| <b>(U)SIM</b>                                | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>UART</b>                                  | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>USB 2.0</b>                               | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>Audio Digital (PCM)</b>                   | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>I2C</b>                                   | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>LED_WWAN#</b>                             | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>W_DISABLE#</b>                            | x 1  | x 1  | x 1   | x 1  | x 1  |
| <b>PERST#</b>                                | x 1  | x 1  | x 1   | x 1  | x 1  |
| <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   |
| <b>Echo Arithmetic</b>                       | Echo Cancellation/<br>Noise Suppression                              | Echo Cancellation/<br>Noise Suppression  | Echo Cancellation/<br>Noise Suppression   | Echo Cancellation/<br>Noise Suppression                              | Echo Cancellation/<br>Noise Suppression                              |
| <b>VoLTE</b>                                 | Digital Audio and VoLTE<br>(Voice over LTE) (Optional)               | Digital Audio and VoLTE<br>(Voice over LTE) (Optional)   | Digital Audio and VoLTE<br>(Voice over LTE) (Optional)  | Digital Audio and VoLTE<br>(Voice over LTE) (Optional)               | Digital Audio and VoLTE<br>(Voice over LTE) (Optional)               |
| <b>Enhanced Features</b>                     |  |  |   |  |  |
| <b>eCall *</b>                               | ●  | ●  | ●   | ●  | ●  |
| <b>DTMF</b>                                  | ●  | ●  | ●   | ●  | ●  |
| <b>DFOTA</b>                                 | ●  | ●  | ●   | ●  | ●  |
| <b>QMI/ RmNet</b>                            | ●  | ●  | ●   | ●  | ●  |
| <b>Audio Playback*/<br/>Audio Recording*</b> | Optional   | Optional   | Optional  | Optional   | Optional   |
| <b>QuecLocator<sup>®</sup></b>               | ●  | ●  | ●   | ●  | ●  |
| <b>QuecFile</b>                              | ●  | ●  | ●   | ●  | ●  |
| <b>(U)SIM Detection</b>                      | ●  | ●  | ●   | ●  | ●  |
| <b>Drivers</b>                               |  |  |   |  |  |
| <b>USB Serial Driver</b>                     | Windows 7/8/8.1/10,<br>Linux 2.6~5.4,<br>Android 4.x/5.x/6.x/7.x/9.x | Windows 7/8/8.1/10,<br>Linux 2.6~5.4,<br>Android 4.x/5.x/6.x/7.x/9.x   | Windows 7/8/8.1/10,<br>Linux 2.6~5.4,<br>Android 4.x/5.x/6.x/7.x/9.x                                    | Windows 7/8/8.1/10,<br>Linux 2.6~5.4,<br>Android 4.x/5.x/6.x/7.x/9.x | Windows 7/8/8.1/10,<br>Linux 2.6~5.4,<br>Android 4.x/5.x/6.x/7.x/9.x |
| <b>GNSS Driver</b>                           | Android<br>4.x/5.x/6.x/7.x/8.x/9.x                                   | Android<br>4.x/5.x/6.x/7.x/8.x/9.x   | Android<br>4.x/5.x/6.x/7.x/8.x/9.x  | \  | Android<br>4.x/5.x/6.x/7.x/8.x/9.x                                   |
| <b>RIL Driver</b>                            | Android<br>4.x/5.x/6.x/7.x/8.x/9.x                                   | Android<br>4.x/5.x/6.x/7.x/8.x/9.x   | Android<br>4.x/5.x/6.x/7.x/8.x/9.x  | Android<br>4.x/5.x/6.x/7.x/8.x/9.x                                   | Android<br>4.x/5.x/6.x/7.x/8.x/9.x                                   |
| <b>NDIS Driver</b>                           | Windows 7/8/8.1/10   | Windows 7/8/8.1/10   | Windows 7/8/8.1/10  | Windows 7/8/8.1/10   | Windows 7/8/8.1/10   |
| <b>MBIM Driver</b>                           | Windows 8/8.1/10,<br>Linux 3.18~5.4                                  | Windows 8/8.1/10,<br>Linux 3.18~5.4  | \   | Windows 8/8.1/10,<br>Linux 3.18~5.4                                  | Windows 8/8.1/10,<br>Linux 3.18~5.4                                  |
| <b>GobiNet Driver</b>                        | Linux 2.6~5.4  | Linux 2.6~5.4  | Linux 2.6~5.4   | Linux 2.6~5.4  | Linux 2.6~5.4  |
| <b>QMI_WWAN Driver</b>                       | Linux 3.4~5.4  | Linux 3.4~5.4  | Linux 3.4~5.4   | Linux 3.4~5.4  | Linux 3.4~5.4  |
| <b>Electrical Features</b>                   |  |  |   |  |  |
| <b>Supply Voltage Range</b>                  | 3.0V~3.6V, 3.3V Typ.   | 3.0V~3.6V, 3.3V Typ.   | 3.0V~3.6V, 3.3V Typ.  | 3.0V~3.6V, 3.3V Typ.   | 3.0V~3.6V, 3.3V Typ.   |
| <b>Power Consumption</b>                     | 3.2mA @Sleep, Typ.<br>22mA @Idle                                     | 2.8mA @Sleep, Typ.<br>24mA @Idle   | 1.8mA @Sleep, Typ.<br>22mA @Idle  | 3.2mA @Sleep, Typ.<br>22mA @Idle                                     | 3.2mA @Sleep, Typ.<br>32mA @Idle                                     |

#### Notes

- ① LTE-FDD B2 of EC21-AU Mini PCIe and EC21-AUX Mini PCIe does not support Rx-diversity.
- \* means under development.
- means supported.

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[T](#) [CMD-HHCP-418-MD](#) [CMD-HHCP-433-MD](#) [CMD-HHLR-418-MD](#) [2095000000200](#) [XB9X-DMRS-031](#) [20911051101](#) [COM-13909](#)  
[HMC-C033](#) [COM-13910](#) [WRL-14498](#) [SX1276RF1KAS](#) [HMC-C004](#) [HMC-C011](#) [HMC-C014](#) [HMC-C010](#) [HMC-C050](#) [HMC-C001](#) [HMC-](#)  
[C006](#) [HMC-C029](#) [HMC-C030](#) [HMC-C021](#) [HMC-C041](#) [HMC-C042](#) [HMC-C048](#) [HMC-C051](#) [HMC-C071](#)