

# Vehicle Cockpit Unit (VCU)

## Technical Description and Installers Manual

**Model : VCURH1**



*This technical manual is intended for usage in the context of regulatory approvals (please ensure that the correct model-name reference is used).*

*It does not replace a vehicle- or region-specific OEM owners or user manual.*

*It is the OEMs responsibility (General Motors) to ensure that all mandatory information with regulatory relevance is made available to end-customers in the owners and user manuals.*

|                                              |                                                                         |
|----------------------------------------------|-------------------------------------------------------------------------|
| <b>Business name of device manufacturer:</b> | Robert Bosch GmbH                                                       |
| <b>Address:</b>                              | Robert Bosch GmbH<br>Robert-Bosch-Platz 1<br>70839 Gerlingen<br>Germany |
| <b>Brand:</b>                                | Bosch                                                                   |

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## DEVICE DESCRIPTION

General Motors' ("GM") Vehicle Cockpit Unit (VCU) 1.0 is a technology upgrade for the previous generation GM Cockpit ECU platform ("Info 3.x").

The GM Vehicle Cockpit System ("VCS") is responsible for the user experience in the cockpit of GM vehicles.

The VCU is a silver box solution providing interfaces to displays, speakers, sensors and optional components of the VCS.

The VCU, provides the following capabilities:

- Vehicle and infotainment related information to the slim-IPC, ICS, auxiliary, HVAC, and HUD displays. This includes processing of various vehicle camera viewing streams to certain displays.
- Audio capability that includes processing various radio broadcasts to the vehicle, voice capturing using microphone inputs, user media playback via phone or USB, and integrating audio enhancements (for example ANC) using microphone inputs.
- Wi-Fi, Bluetooth, and GPS connectivity.
- Various analog and digital I/O, including but not limited to switches, HUDs, sensors, etc.

It supports two major GM electrical vehicle architectures (called "Global B" and "CLEA") and is offered in two major product variants: "MID" and "HIGH". In terms of regional support, a distinction is made between North America ("NA"), China ("CN") and RestOfWorld ("RoW") configurations.

The VCU hardware is based on a two-processor approach where Qualcomm's latest ARM-based automotive system-on-chip (SoC) family 8195 (High) and 8155 (Mid) acts as core computing element and Renesas Electronics' latest automotive micro-controller RH850F1KM/KH (Vehicle Interface Processor, VIP) is used for real-time processing needs.

The VCU software architecture is mainly based on 3 run-time environments (called SW domains):

- Running on VIP:
  - AUTOSAR OS as real-time processing system
- Running on SoC:
  - Blackberry Hypervisor V2.x based on QNX7.x to realize a host environment and guest environment as virtual machine
  - Host: QNX7.x operating system
  - Guest: Android system based on Linux kernel

The VCU can determine its geographical location:

- In the VCURH1 device, the positioning information is provided by the GNSS chip internal to VCU

Operational conditions of the device:

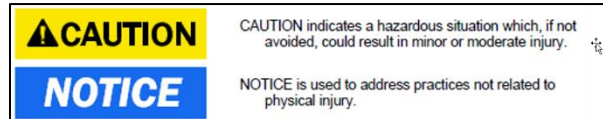
- Nominal supply voltage: 13.5 V DC
- Extended voltage range: 6.0 V to 16.0 V DC
- Max. Current consumption: <15A
- Nominal supply current: 1 ... 2 A
- Sleep current consumption: <200µA
- Speaker output: 40hm with 13,5V → 21W (10%THD).
- Operating Temperature Range: -40°C to +85°C (Note: Feature degradation expected from +50°C)
- Storage Temperature: -40°C to +85°C
- IP protection class: IP5K2
- ASIL level: B
- Device class: Class B
- Lowest internal frequency 1Hz
- Highest clock frequency for data bus connected of external display: 7.55 GHz

External Antenna Information:

|                                                                   |                                       |
|-------------------------------------------------------------------|---------------------------------------|
| Description                                                       | External WiFi Antenna                 |
| Manufacturer                                                      | TE Connectivity                       |
| Part number                                                       | 2310901                               |
| Antenna Type                                                      | Dipole printed (Passive unfiltered)   |
| Antenna Pigtail Length                                            | 125 mm                                |
| Antenna Pigtail Type                                              | RG174LL                               |
| Specified coax length from pigtail connection to radio connection | 1 - 1.5 m                             |
| Coax type                                                         | RTK044                                |
| Antenna Frequency Ranges                                          | 2.4 GHz (2401-2483) and 5 GHz (5-5.9) |

## SAFETY AND WARNING NOTES

This paragraph contains important safety and warning notes for handling and operating the device in series applications.



### CAUTION

- The product is intended, and has been approved, for installation and operation in vehicles with a rated voltage of 12 volts. It may be necessary to adapt the product's factory-set state to suit the specific country.
- Only connecting cables and external devices that are appropriate for the device in question may be used (e.g.: proper current carrying capability, proper EMC shielding, flammability verified with appropriate certificates). Compliance with the applicable standards can no longer be guaranteed if the device – including the software – is modified without the agreement of Bosch.
- Bosch assumes no responsibility for damage as a result of incorrect indicators/displays. These may arise if the device has not been connected or has been incorrectly connected, or if the device receives false or erroneous signals from the system.

### NOTICE

- Do not cover ventilation openings and heat sinks. Otherwise, a build-up of heat that could lead to malfunction may occur in the device.
- Do not insert foreign bodies into the insertion slots or openings of the device. Injury, or damage to the device, may occur otherwise.
- The device must not come into contact with hot or burning objects (e.g. cigarettes).
- Never use hard or sharp objects that could scratch or damage the protective pane or housing to clean the device. Do not use aggressive cleaning agents such as thinners, gasoline, abrasive cleaners, spray cleaners, acidic or alkaline solutions, or wax. Do not spray any liquids onto the device. To clean the housing, moisten a soft cloth with tepid water and wipe off the dirt. Make sure that no liquid enters the inside of the device. Afterwards, wipe the cleaned surface with a clean, dry cloth.
- The housing/surface of the VCU may be very hot when the device is operational. Please exercise caution and use appropriate protective equipment (PPE).

## OPERATING MODES AND WIRELESS CHARACTERISTICS

Bluetooth and WiFi can work together. The device operates with two Antennas (one internal and one external Antenna). Bluetooth signals are sent over the internal Antenna. WiFi signals are sent over both, internal and external Antenna.

A Bluetooth and WiFi combined module is integrated in the VCU: Alps UGKZDA2001AC.

### Bluetooth

- Bluetooth operates in the 2.4 GHz band (2402 ~ 2480)
- Bluetooth works in both the BDR and EDR
- In the VCU the Bluetooth operates in the Classic and Low Energy modes. Bluetooth operates in the 2.4GHz ISM Band: (2402 – 2480MHz)

Declaration of Power:

Bluetooth 2402 – 2480 MHz <8 dBm EIRP

### WiFi

In the VCU, the WIFI has the following operating Modes. The device can connect to the external Access points in Station mode. The device can also operate as an Access point.

Declaration of WiFi Transmission Power:

|                      |              |
|----------------------|--------------|
| WLAN 2412 – 2462 MHz | <19 dBm EIRP |
| WLAN 5180 – 5240 MHz | <12 dBm EIRP |
| WLAN 5745 – 5825 MHz | <12 dBm EIRP |

Used WLAN Modes:

- Station Mode (STA)
  - Device does not connect to external AP on DFS Channels
- Access Point Mode (AP)
  - DFS channels are not used

## INSTALLATION

Please follow the safety and warning notices as documented above when handling and installing this device.

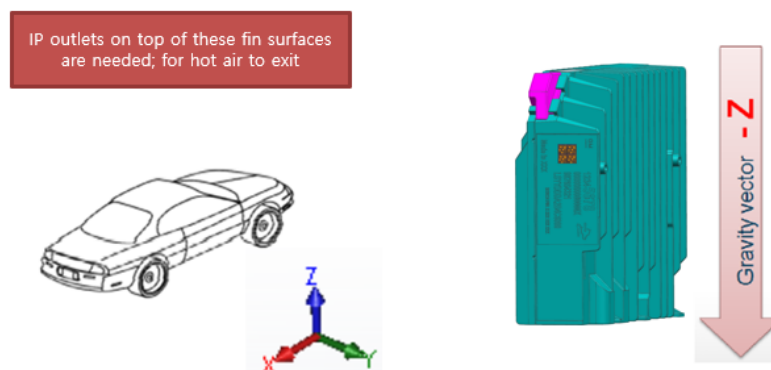
The VCU will be installed behind the dashboard (e.g. behind glove box) and is not exposed to the cabin. It will be fixed to the vehicle using a plastic bracket which is carline specific.

Exact mounting location of the VCU and its peripherals is carline specific. The below picture shows an schematic / example.

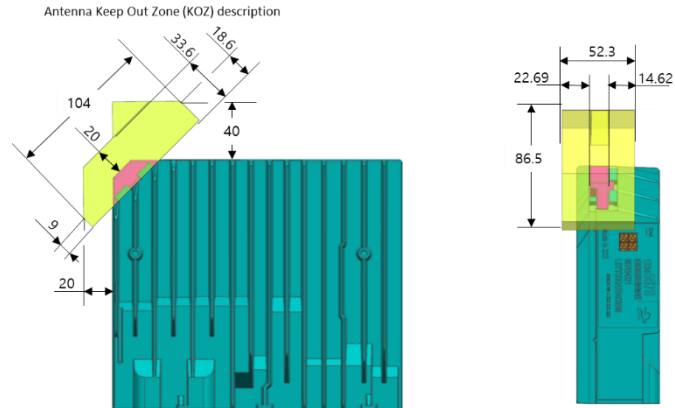


*VCU Example VCU and external antenna mounting location*

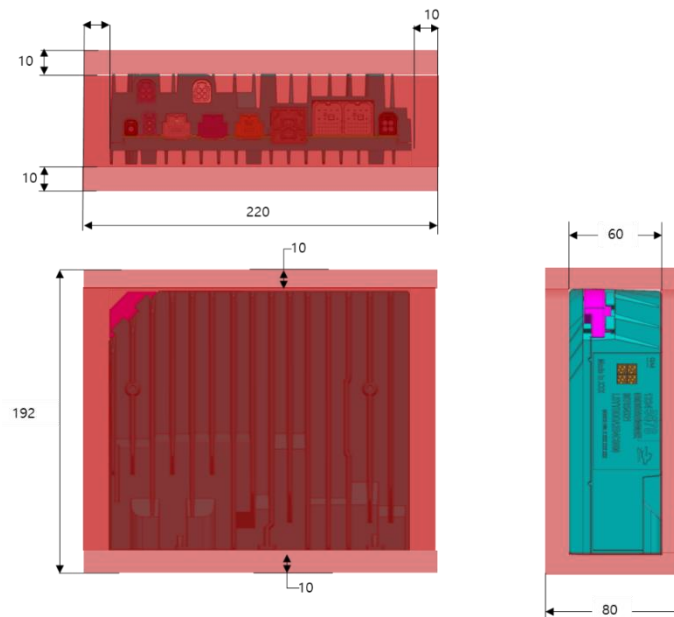
Mounting direction shall be vertical with the connectors facing down and with the antenna pointing up towards the vehicle compartment as shown below.



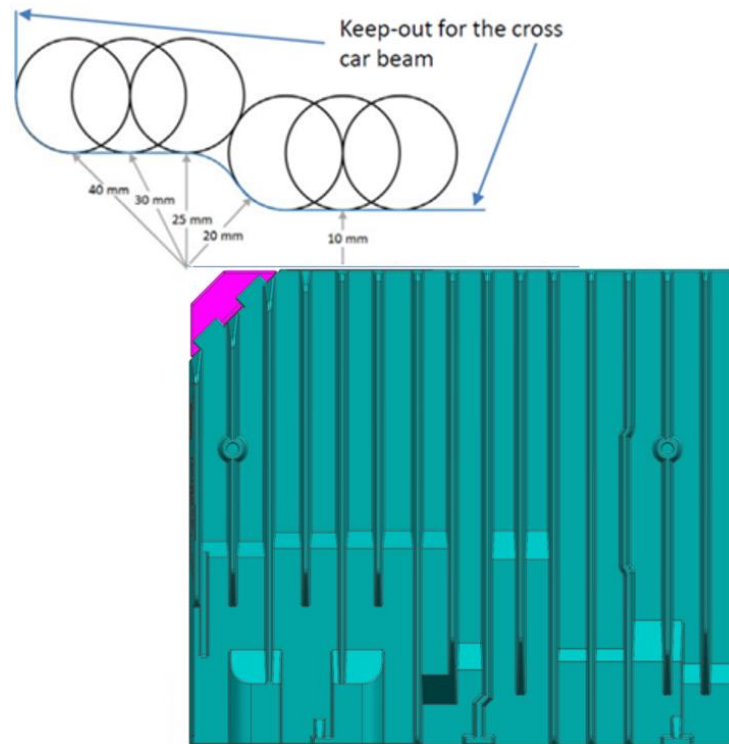
The OEM shall adhere to the below depicted keep-out zones when designing the packaging and when mounting the VCU in individual carlines during production.



*VCU Antenna Keep-Out Zone*



*VCU Mandatory (Minimum) Thermal Keep-Out Zone*



*VCU Mandatory (Minimum) Keep-Out Zone for metal cross-vehicle beam*

#### Additional Installation Requirements:

- Cable length's to external Antenna: 1 – 1.5 m.
- Distance external Antenna to VCU (center of gravity): 55 cm
- Distance from center of external antenna to the center of internal antenna: 50 cm

Following information are spilled into two different regions:

Rest of World, excepted Canada and US:

- Minimal permissible distance<sup>1</sup> VCU internal / external Antenna and nearest interior Class-A surface<sup>2</sup>: 202.29 mm  
Min distance for external antenna: 202.29 mm(20.2 cm)  
Min distance for internal antenna: 229.90 mm(22.9 cm)

Canada and US market:

- Minimal permissible distance<sup>3</sup> between Class-A surface<sup>4</sup> and external Antenna is 47 mm, the minimal distance between Class-A surface<sup>5</sup> and internal antenna is 12.93 mm

<sup>1</sup> Measured from antenna dipol.

<sup>2</sup> Class-A interior surface is any high-quality component that a passenger inside a vehicle can see, touch, or engage with

<sup>3</sup> Measured from antenna dipol.

<sup>4</sup> Class-A interior surface is any high-quality component that a passenger inside a vehicle can see, touch, or engage with

<sup>5</sup> Class-A interior surface is any high-quality component that a passenger inside a vehicle can see, touch, or engage with

# CERTIFICATION NOTICES AND REGULATORY VERBIAGE

## General Notices

Component Name: GM VCU  
Type Designation: Cockpit Integration Platform ("CIP")

Model Name: **VCURH1**  
Certificate Holder: Robert Bosch GmbH  
Address: Robert-Bosch-Platz 1  
70839 Gerlingen  
Germany

## Information for Regions governed by CE



| Country  | ITU-Code (2 Digit) | ISO-Code | RED - Directive / technical rule | Text RED simplified EU DoC                                                                                                                                                                                                                                                                              |
|----------|--------------------|----------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Austria  | AT                 | DE       | 2014/53/EU                       | Hiermit erklärt Robert Bosch GmbH, dass der Funkanlagentyp VCURH1 der Richtlinie 2014/53/EU entspricht.<br>Der vollständige Text der EU-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                      |
| Belgium  | BE                 | FR       | 2014/53/UE                       | Le soussigné, Robert Bosch GmbH, déclare que l'équipement radioélectrique du type VCURH1 est conforme à la directive 2014/53/UE.<br>Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a> |
| Bulgaria | BG                 | BG       | 2014/53/EC                       | С настоящото Robert Bosch GmbH декларира, че този тип радиосъоръжение VCURH1 е в съответствие с Директива 2014/53/ЕС.<br>Цялостният текст на ЕС декларацията за съответствие може да се намери на следния интернет адрес: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>             |
| Cyprus   | CY                 | EL       | 2014/53/EE                       | Με την παρούσα ο/η Robert Bosch GmbH, δηλώνει ότι ο ραδιοεξοπλισμός VCURH1 πληροί την οδηγία 2014/53/ΕΕ.<br>Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                           |

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|                |    |    |            |                                                                                                                                                                                                                                                                                                                |
|----------------|----|----|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Czech Republic | CZ | CS | 2014/53/EU | Tímto Robert Bosch GmbH prohlašuje, že typ rádiového zařízení VCURH1 je v souladu se směrnicí 2014/53/EU.<br>Úplné znění EU prohlášení o shodě je k dispozici na této internetové adrese: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                    |
| Germany        | DE | DE | 2014/53/EU | Hiermit erklärt Robert Bosch GmbH, dass der Funkanlagentyp VCURH1 der Richtlinie 2014/53/EU entspricht.<br>Der vollständige Text der EU-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                             |
| Denmark        | DK | DA | 2014/53/EU | Hermed erklærer Robert Bosch GmbH, at radioudstyrstypen VCURH1 er i overensstemmelse med direktiv 2014/53/EU.<br>EU-overensstemmelseserklæringens fulde tekst kan findes på følgende internetadresse: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                        |
| Estonia        | EE | ET | 2014/53/EL | Käesolevaga deklareerib Robert Bosch GmbH, et käesolev raadioseadme tüüp VCURH1 vastab direktiivi 2014/53/EL nõuetele.<br>ELi vastavusdeklaratsiooni täielik tekst on kättesaadav järgmisel internetiaadressil: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                              |
| Spain          | ES | ES | 2014/53/UE | Por la presente, Robert Bosch GmbH declara que el tipo de equipo radioeléctrico VCURH1 es conforme con la Directiva 2014/53/UE.<br>El texto completo de la declaración UE de conformidad está disponible en la dirección Internet siguiente: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a> |
| Finland        | FI | FI | 2014/53/EU | Robert Bosch GmbH vakuuttaa, että radiolaitetyyppi VCURH1 on direktiivin 2014/53/EU mukainen.<br>EU-vaatimustenmukaisuusvakuutuksen täysimittainen teksti on saatavilla seuraavassa internetosoitteessa: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                     |
| France         | FR | FR | 2014/53/UE | Le soussigné, Robert Bosch GmbH, déclare que l'équipement radioélectrique du type VCURH1 est conforme à la directive 2014/53/UE.<br>Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>        |
| Greece         | GR | EL | 2014/53/EE | Με την παρούσα ο/η Robert Bosch GmbH, δηλώνει ότι ο ραδιοεξοπλισμός VCURH1 πληροί την οδηγία 2014/53/ΕΕ.<br>Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                  |
| Croatia        | HR | HR | 2014/53/EU | Robert Bosch GmbH ovime izjavljuje da je radijska oprema tipa VCURH1 u skladu s Direktivom 2014/53/EU.<br>Cjeloviti tekst EU izjave o sukladnosti dostupan je na sljedećoj internetskoj adresi: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                              |
| Hungary        | HU | HU | 2014/53/EU | Robert Bosch GmbH igazolja, hogy a VCURH1 típusú rádióberendezés megfelel a 2014/53/EU irányelvnek.<br>Az EU-megfelelőségi nyilatkozat teljes szövege elérhető a következő internetes címen: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                 |
| Ireland        | IE | EN | 2014/53/EU | Hereby, Robert Bosch GmbH declares that the radio equipment type VCURH1 is in compliance with Directive 2014/53/EU.<br>The full text of the EU declaration of conformity is available at the following internet address: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                     |
| Italy          | IT | IT | 2014/53/UE | Il fabbricante, Robert Bosch GmbH, dichiara che il tipo di apparecchiatura radio VCURH1 è conforme alla direttiva 2014/53/UE.<br>Il testo completo della dichiarazione di conformità UE è disponibile al seguente indirizzo Internet: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>        |

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|-------------|----|----|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lithuania   | LT | LT | 2014/53/ES                                            | Aš, Robert Bosch GmbH, patvirtinu, kad radio įrenginių tipas VCURH1 atitinka Direktyvą 2014/53/ES.<br>Visas ES atitikties deklaracijos tekstas prieinamas šiuo interneto adresu: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                                                                         |
| Luxembourg  | LU | FR | 2014/53/UE                                            | Le soussigné, Robert Bosch GmbH, déclare que l'équipement radioélectrique du type VCURH1 est conforme à la directive 2014/53/UE.<br>Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                    |
| Latvia      | LV | LV | 2014/53/ES                                            | Ar šo Robert Bosch GmbH deklarē, ka radioiekārta VCURH1 atbilst Direktīvai 2014/53/ES.<br>Pilns ES atbilstības deklarācijas teksts ir pieejams šādā interneta vietnē: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                                                                                    |
| Malta       | MT | MT | 2014/53/UE                                            | B'dan, Robert Bosch GmbH, niddikjara li dan it-tip ta' tagħmir tar-radju VCURH1 huwa konformi mad-Direttiva 2014/53/UE.<br>It-test kollu tad-dikjarazzjoni ta' konformità tal-UE huwa disponibbli f'dan l-indirizz tal-Internet li ġej: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                  |
| Netherlands | NL | NL | 2014/53/EU                                            | Hierbij verklaar ik, Robert Bosch GmbH, dat het type radioapparaat VCURH1 conform is met Richtlijn 2014/53/EU.<br>De volledige tekst van de EU-conformiteitsverklaring kan worden geraadpleegd op het volgende internetadres: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                            |
| Poland      | PL | PL | 2014/53/UE                                            | Robert Bosch GmbH niniejszym oświadcza, że typ urządzenia radiowego VCURH1 jest zgodny z dyrektywą 2014/53/UE.<br>Pełny tekst deklaracji zgodności UE jest dostępny pod następującym adresem internetowym: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                                               |
| Portugal    | PT | PT | 2014/53/UE                                            | O(a) abaixo assinado(a) Robert Bosch GmbH declara que o presente tipo de equipamento de rádio VCURH1 está em conformidade com a Diretiva 2014/53/UE.<br>O texto integral da declaração de conformidade está disponível no seguinte endereço de Internet: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                 |
| Romania     | RO | RO | 2014/53/UE                                            | Prin prezenta, Robert Bosch GmbH declară că tipul de echipamente radio VCURH1 este în conformitate cu Directiva 2014/53/UE.<br>Textul integral al declarației UE de conformitate este disponibil la următoarea adresă internet: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                          |
| Sweden      | SE | SV | 2014/53/EU                                            | Härmed försäkrar Robert Bosch GmbH att denna typ av radioutrustning VCURH1 överensstämmer med direktiv 2014/53/EU.<br>Den fullständiga texten till EU-försäkran om överensstämmelse finns på följande webbadress: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                                        |
| Slovenia    | SI | SL | 2014/53/EU                                            | Robert Bosch GmbH potrjuje, da je tip radijske opreme VCURH1 skladen z Direktivo 2014/53/EU.<br>Celotno besedilo izjave EU o skladnosti je na voljo na naslednjem spletnem naslovu: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                                                                      |
| Slovakia    | SK | SK | 2014/53/EÚ                                            | Robert Bosch GmbH týmto vyhlasuje, že rádiové zariadenie typu VCURH1 je v súlade so smernicou 2014/53/EÚ.<br>Úplné EÚ vyhlásenie o zhode je k dispozícii na tejto internetovej adrese: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a>                                                                                                   |
| Moldovia    | MD | RO | Punerea la dispoziție pe piață a echipamentelor radio | Prin prezenta, Robert Bosch GmbH declară că tipul de echipamente radio VCURH1 este în conformitate cu Reglementarea tehnică „Punerea la dispoziție pe piață a echipamentelor radio”.<br>Textul integral al declarației de conformitate este disponibil la următoarea adresă de Internet: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a> |

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|        |    |    |            |                                                                                                                                                                                                                                                                |
|--------|----|----|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Turkey | TK | TR | 2014/53/AB | İşbu belge; Robert Bosch GmbH telsiz ekipmanı tipinin VCURH1 2014/53/AB sayılı Direktif'e uygun olduğunu beyan eder. AB uygunluk beyanının tam metni aşağıdaki internet adresinde mevcuttur: <a href="https://eu-doc.bosch.com/">https://eu-doc.bosch.com/</a> |
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## Additional Country Specific Requirements

### USA

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

To comply with FCC Exposure requirements the OEM is instructed by the Grantee to assure a minimum separation distance of 4.7 cm between the external antenna and 12.93 cm between the housing where the integrated antenna is located and any human body as documented in the filing.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### Canada

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

#### RF Exposure Information:

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. For limbs a minimum distance of 4.7 cm for the external antenna and 12.93 cm for the housing has to be maintained.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps. Pour les membres, une distance minimale de 4,7 cm pour l'antenne extérieure et de 12,93 cm pour le boîtier doit être respectée.

UAE

