Discovery kit with STM32G031J6 MCU

Introduction

The STM32G0316-DISCO Discovery kit helps to discover features of STM32G0 in SO8 package. This Discovery kit offers one SO8 to DIL8 module designed with the STM32G031J6 microcontroller and allows the user to develop and share applications. It includes an on-board ST-LINK/V2-1 to debug and program the embedded STM32 microcontroller.

The STM32G0316-DISCO Discovery kit is operated by plugging it into a PC through a standard USB Type-A to Micro-B cable.

Figure 1. STM32G0316-DISCO top view

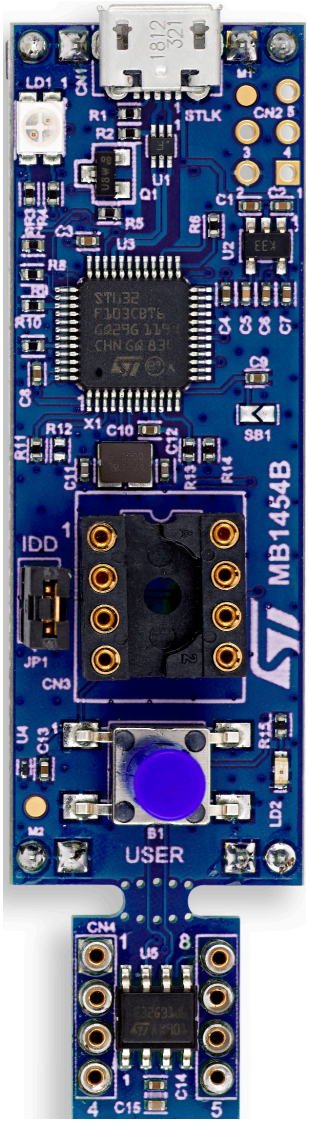


Figure 2. STM32G0316-DISCO bottom view

Pictures are not contractual.

1 Features

- STM32G031J6M6U microcontroller (Arm® Cortex® M0+ at 64 MHz) in S08 package, featuring 32 Kbytes of Flash memory and 8 Kbytes of SRAM
- 1 user LED
- 1 reset or user push-button
- Individual and breakable STM32 SO8 to DIL8 module
- Board connectors:
  - DIL8 socket to ease programming of the STM32 MCU
  - USB with Micro-B
- On-board ST-LINK/V2-1 debugger/programmer with USB re-enumeration capability: mass storage and debug port
- Comprehensive free software libraries and examples available with the STM32Cube
- Support of a wide choice of Integrated Development Environments (IDEs) including IAR™, Keil®, and GCC-based IDEs

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2 Ordering information

To order the STM32G0316-DISCO Discovery kit, refer to Table 1.

Table 1. List of available products

Order code	Board reference	Target STM32
STM32G0316-DISCO	MB1454	STM32G031J6M6U

2.1 Product marking

Evaluation tools marked as “ES” or “E” are not yet qualified and therefore not ready to be used as reference design or in production. Any consequences deriving from such usage will not be at ST charge. In no event, ST will be liable for any customer usage of these engineering sample tools as reference design or in production.

“E” or “ES” marking examples of location:

- On the targeted STM32 that is soldered on the board (for illustration of STM32 marking, refer to the STM32 datasheet “Package information” paragraph at the *www.st.com* website).
- Next to the evaluation tool ordering part number that is stuck or silk-screen printed on the board.

This board features a specific STM32 device version, which allows the operation of any bundled commercial stack/library available. This STM32 device shows a "U" marking option at the end of the standard part number and is not available for sales.

In order to use the same commercial stack in his application, a developer may need to purchase a part number specific to this stack/library. The price of those part numbers includes the stack/library royalties.

2.2 Product codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

STM32XXYYZ-DISCO	Description	Example: STM32G0316-DISCO
XX	MCU series in STM32 Arm Cortex MCUs	STM32G0 Series
YY	MCU product line in the series	STM32G031
Z	STM32 Flash memory size: • 6 for 32 Kbytes	32 Kbytes

The order code is mentioned on a sticker placed on the board.

3 Development environment

3.1 System requirements

- Windows® OS (7, 8 and 10), Linux® 64-bit, or macOS®
- USB Type-A to Micro-B cable

Note: macOS® is a trademark of Apple Inc. registered in the U.S. and other countries.

3.2 Development toolchains

- Keil® **free** MDK-ARM (see note)
- IAR™ EWARM (see note)
- GCC-based IDEs

Note: On Windows® only.

3.3 Demonstration software

The demonstration software, included in the STM32Cube MCU Package corresponding to the on-board microcontroller, is preloaded in the STM32 Flash memory for easy demonstration of the device peripherals in standalone mode. The latest versions of the demonstration source code and associated documentation can be downloaded from *www.st.com*.

4 Conventions

Table 3 provides the conventions used for the ON and OFF settings in the present document.

Table 3. ON/OFF convention

Convention	Definition
Jumper JPx ON	Jumper fitted
Jumper JPx OFF	Jumper not fitted
Jumper JPx [1-2]	Jumper should be fitted between Pin 1 and Pin 2
Solder bridge SBx ON	SBx connections closed by 0 Ω resistor
Solder bridge SBx OFF	SBx connections left open
Resistor Rx ON	Resistor soldered
Resistor Rx OFF	Resistor not soldered

5 Quick start

Before installing and using the product, accept the Evaluation Product License Agreement from the www.st.com/epla webpage. For more information on the STM32G0316-DISCO Discovery kit and for demonstration software, visit the www.st.com/en/products/stm32g0316-disco webpage.

5.1 Getting started

Follow the sequence below to configure STM32G0316-DISCO and launch the demonstration application (refer to Figure 3 for component location):

1. Check the jumper position on the board (refer to Table 4).
2. For the correct identification of the device interfaces from the host PC and before connecting the board, install the ST-LINK/V2-1 USB driver, available on the *www.st.com* website.
3. To power the board, connect the STM32G0316-DISCO Discovery kit to a PC with a USB cable (Type-A to Micro-B) through the USB connector CN1 of the board.
4. Then, red LED LD1 (COM) lights up and green LED LD2 blinks.
5. Press the user button B1 and observe how blinking of the green LED LD2 changes.
6. The demo software as well as others software examples for exploring STM32G0 features are available at www.st.com//en/products/stm32g0316-disco

Table 4. Jumper configuration

Jumper	Definition	Position(1)	Comment(1)
JP1	IDD	**ON**	**For STM32G0 current measurement**

1. *Default jumper state is in bold*

6 Hardware layout and configuration

Figure 3 and Figure 4 show the location of the STM32G0316-DISCO features. The mechanical dimensions of the board are shown in Figure 5.

6.1 PCB layout

Figure 3. Top layout

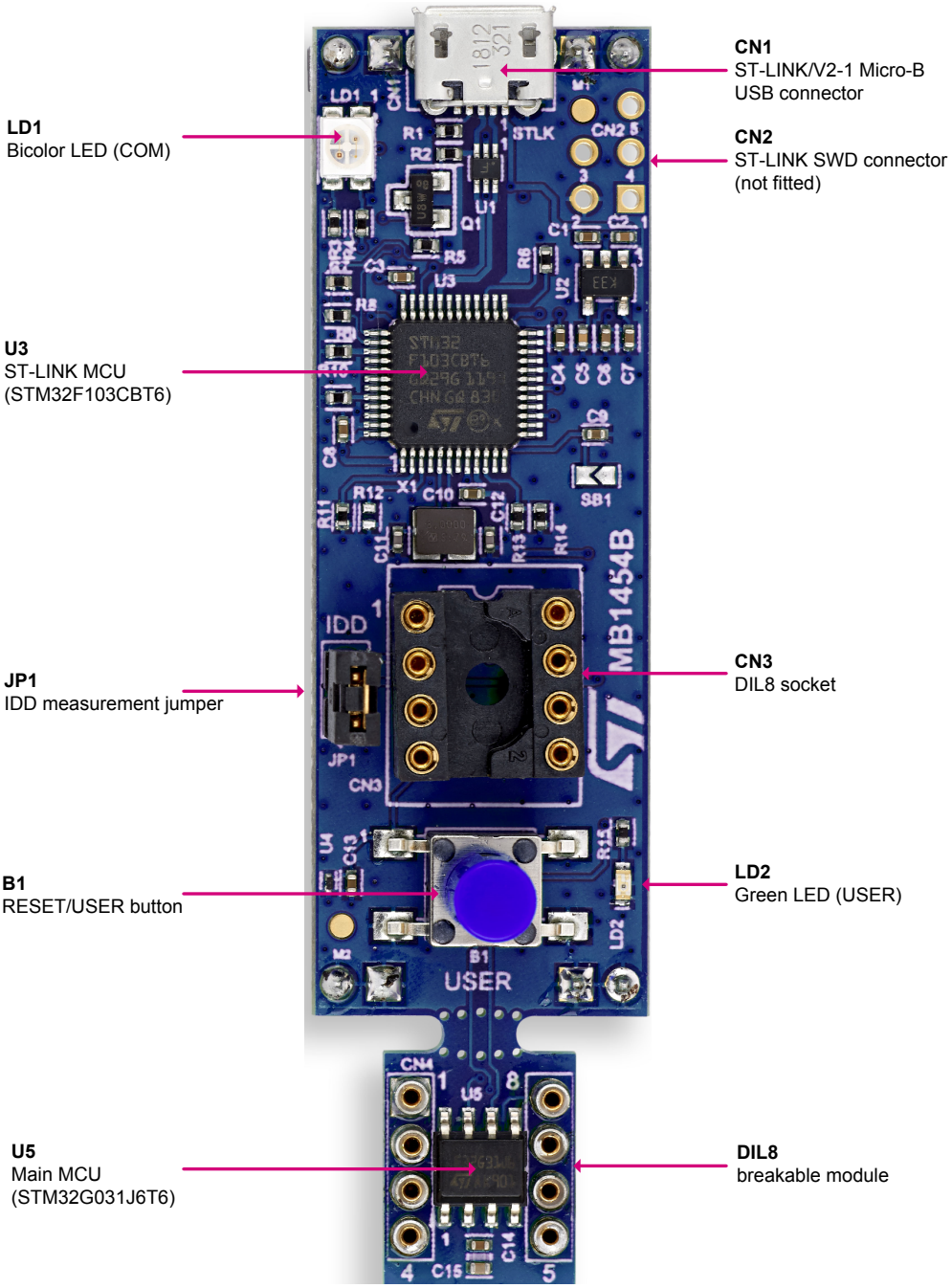
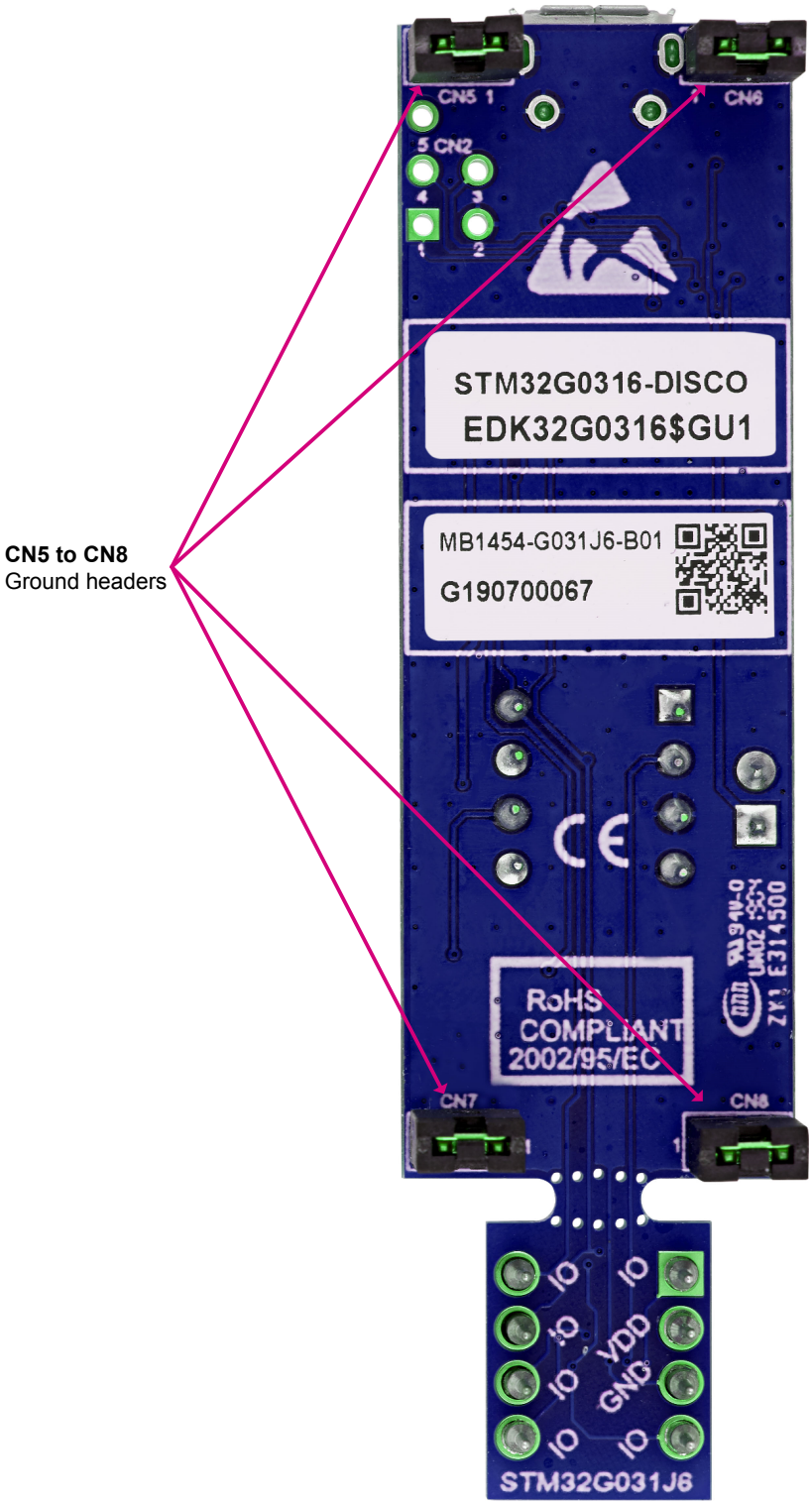
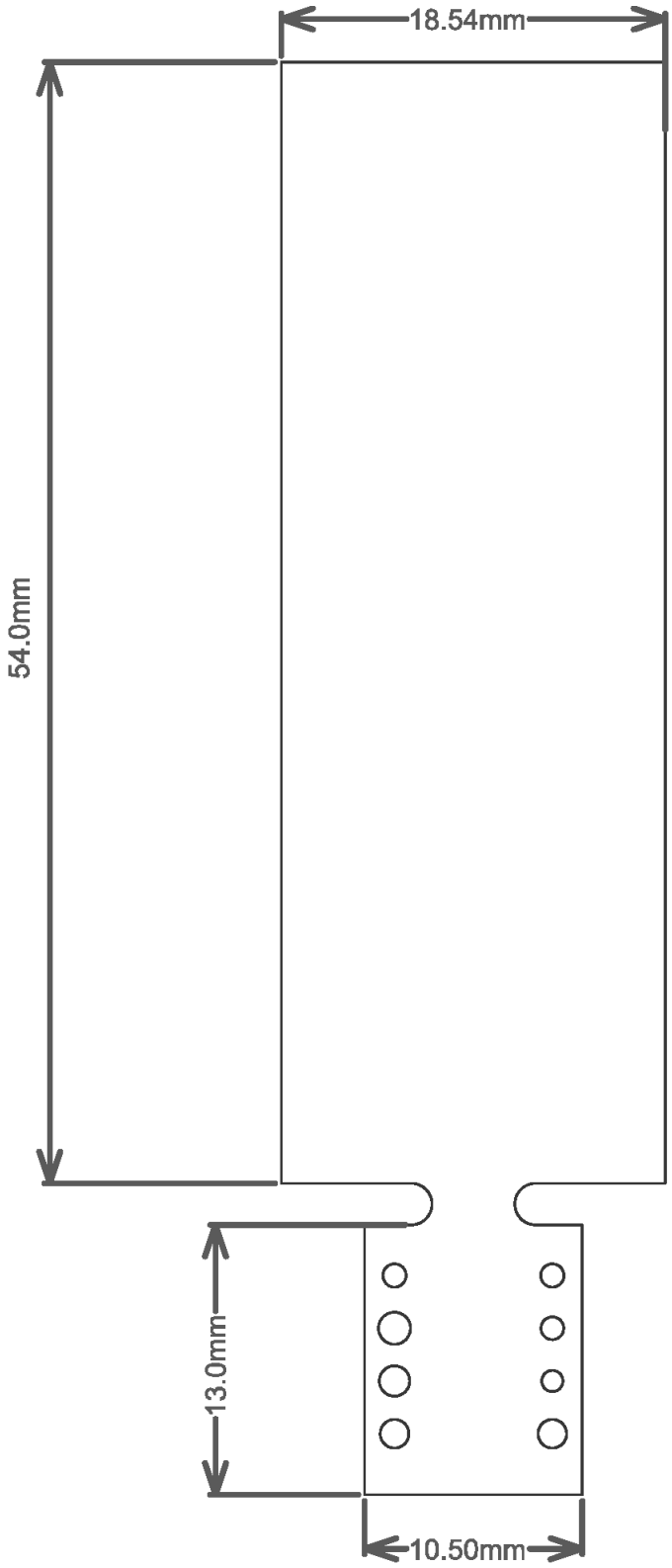


Figure 4. **Bottom layout**



6.2 Mechanical drawing

Figure 5. **Board mechanical drawing (in millimeter)**



6.3 Embedded ST-LINK/V2-1

The ST-LINK/V2-1 programming and debugging tool is integrated in the STM32G0316-DISCO board.

The embedded ST-LINK/V2-1 supports only the SWD for STM32 devices.

For detailed information about the debugging and programming features of ST-LINK/V2-1, refer to the *ST-LINK/V2 in-circuit debugger/programmer for STM8 and STM32* user manual (UM1075) and *Overview of ST-LINK derivatives* technical note (TN1235).

Features supported by the ST-LINK/V2-1:

- USB software re-enumeration
- Mass storage interface on USB
- USB power management request for more than 100 mA power on USB

Known limitation:

- Activating the readout protection on the STM32 target prevents the target application from running afterwards. The target readout protection must be kept disabled on ST-LINK/V2-1 boards.

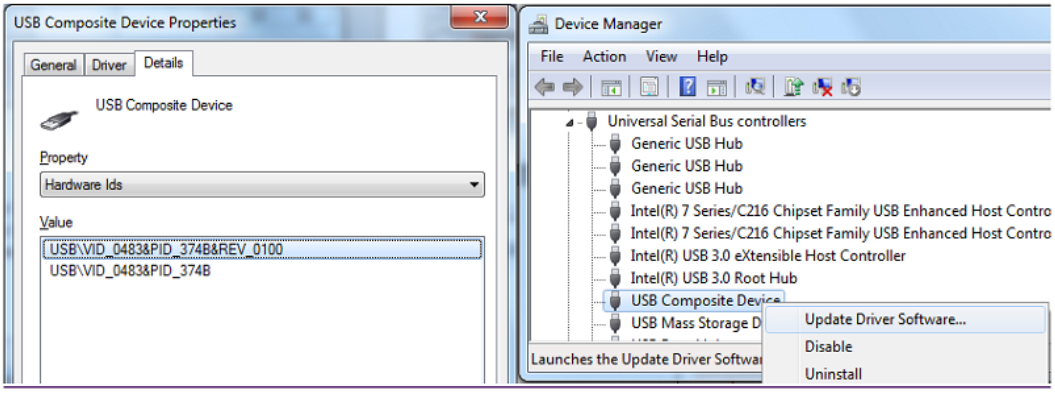
6.3.1 Drivers

The ST-LINK/V2-1 requires a dedicated USB driver, which, for Windows 7®, Windows 8® and Windows 10®, is found at *www.st.com*.

In case the STM32G0316-DISCO board is connected to the PC before the driver is installed, some STM32G0316-DISCO interfaces may be declared as *"Unknown"* in the PC device manager. In this case, the user must install the dedicated driver files, and update the driver of the connected device from the device manager as shown in Figure 6.

Note: Prefer using the USB Composite Device handle for a full recovery.

Figure 6. USB composite device



6.3.2 ST-LINK/V2-1 firmware upgrade

The ST-LINK/V2-1 embeds a firmware upgrade mechanism for in-situ upgrade through the USB port. As the firmware may evolve during the lifetime of the ST-LINK/V2-1 product (for example new functionalities, bug fixes, support for new microcontroller families), it is recommended to visit the *www.st.com* website before starting to use the STM32G0316-DISCO board and periodically, to stay up-to-date with the latest firmware version.

6.4 Power supply

The STM32G0316-DISCO Discovery kit is designed to be powered using the ST-LINK/V2-1 USB connector CN1.

6.5 Board functions

6.5.1 LEDs

LD1 ST-LINK COM LED

The bicolor LED LD1 (green, red) provides information about ST-LINK communication status. LD1 default color is red. LD1 turns to green to indicate that communication is in progress between the PC and the ST-LINK, with the following setup:

- Blinking red: the first USB enumeration with the PC is taking place
- Red LED ON: when the initialization between the PC and ST-LINK is complete
- Blinking red or green: during programming and debugging with target
- Orange ON: communication failure

LD2 USER

This green LED is connected to the GPIO PA12 of the STM32G031J6 microcontroller. To light this LED, a high-logic state “1” must be written in the corresponding GPIO.

6.5.2 Push-button

B1 RESET/USER

This push-button is connected to NRST (PF2-NRST) and is used to reset the STM32G0 microcontroller or to generate a user event.

6.5.3 Current consumption measurement (IDD)

Jumper JP1, labeled IDD, is used to measure the STM32G0 microcontroller consumption by removing the jumper and by connecting an ammeter.

- JP1 ON: STM32G0 is powered by 3V3 voltage (default)
- JP1 OFF: an ammeter must be connected to measure the STM32G0 current. If there is no ammeter, the STM32G0 is not powered.

6.5.4 Solder bridge

The solder bridge SB1 is located on the top layer of the STM32G0316-DISCO. Its configuration appears in Table 5.

Table 5. Solder bridge configuration

Solder bridge control	Solder bridge (SB)	State(1)	Description(1)
ST-LINK reset	SB1	ON	ST-LINK in RESET state
		OFF	**ST-LINK in normal operation**

1. *The default SB state is in bold.*

7 Board connectors

7.1 DIL8 socket CN3

An STM32 device mounted on a DIL8 module can be programmed or debugged by plugging it to the socket CN3. The DIL8 socket pinout is detailed in Table 6.

Table 6. DIL8 socket pinout

Connector	Pin number	Pin name	Function
CN3	1	NC	Not connected
	2	VDD	Power supply
	3	GND	Ground
	4	NRST/USER	RESET or USER button
	5	NC	Not connected
	6	LED	User LED
	7	SWDIO	Serial wire debug I/O
	8	SWCLK	Serial wire clock

8 STM32G0 I/O assignment

The STM32G031J6 pin-out can be directly transposed to the DIL8 module pin-out, as shown in Table 7.

Table 7. STM32G0 I/O assignment

Pin number	Pin name	Description
1	PB7/PB8/PB9/PC14	Not used
2	VDD	Power supply
3	VSS	Ground
4	PA0/PA1/PA2/PF2	RESET or USER button
5	PA8/PA11/PB1	Not used
6	PA12	User LED
7	PA13	Serial wire debug I/O
8	PA14/PB5/PB6	Serial wire clock

Appendix A Federal Communications Commission (FCC) and Industry Canada (IC) Compliance Statements

A.1 FCC Compliance Statement

Part 15.19

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.

Part 15.21

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment.

Part 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Responsible party (in the USA)

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A.2 IC Compliance Statement

This device complies with FCC and Industry Canada RF radiation exposure limits set forth for general population for mobile application (uncontrolled exposure). This device must not be collocated or operating in conjunction with any other antenna or transmitter.

Compliance Statement

Notice: This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Industry Canada ICES-003 Compliance Label: CAN ICES-3 (A)/NMB-3(A).

Déclaration de conformité

Avis: Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Étiquette de conformité à la NMB-003 d'Industrie Canada: CAN ICES-3 (A)/NMB-3(A).

Revision history

Table 8. **Document revision history**

Date	Revision	Changes
3-Jul-2019	1	Initial release.

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