

Table 6. Alternate function AF8 to AF15

See Table 5 for AF0 to AF7.

Port		AF8	AF9	AF10	AF11	AF12	AF13	AF14	AF15
		LPUART1	-	-	-	COMP1/ COMP2/TIM1	DEBUG	TIM2/TIM16/ TIM17/LPTIM2	EVENTOUT
Port A	PA0	-	-	-	-	COMP1_OUT	DEBUG_PWR_RE GLP1S	TIM2_ETR	CM4_EVENTOUT
	PA1	LPUART1_RTS	-	-	-	-	DEBUG_PWR_RE GLP2S	-	
	PA2	LPUART1_TX	-	-	-	COMP2_OUT	DEBUG_PWR_LD ORDY	-	
	PA3	LPUART1_RX	-	-	-	-	-	-	
	PA4	-	-	-	-	-	DEBUG_SUBGHZ SPI_NSSOUT	LPTIM2_OUT	
	PA5	-	-	-	-	-	DEBUG_SUBGHZ SPI_SCKOUT	LPTIM2_ETR	
	PA6	LPUART1_CTS	-	-	-	TIM1_BKIN	DEBUG_SUBGHZ SPI_MISOOUT	TIM16_CH1	
	PA7	-	-	-	-	COMP2_OUT	DEBUG_SUBGHZ SPI_MOSIOUT	TIM17_CH1	
	PA8	-	-	-	-	-	-	LPTIM2_OUT	
	PA9	-	-	-	-	-	-	-	
	PA10	-	-	-	-	-	DEBUG_RF_HSE3 2RDY	TIM17_BKIN	
	PA11	-	-	-	-	TIM1_BKIN2	DEBUG_RF_NRE SET	-	
	PA12	-	-	-	-	-	-	-	
	PA13	IR_OUT	-	-	-	-	-	-	
	PA14	-	-	-	-	-	-	-	
	PA15	-	-	-	-	-	-	-	
Port B	PB1	LPUART1_ RTS_DE	-	-	-	-	-	LPTIM2_IN1	CM4_EVENTOUT
	PB2	-	-	-	-	-	DEBUG_RF_SMP SRDY	-	
	PB3	-	-	-	-	-	DEBUG_RF_DTB1	-	
	PB4	-	-	-	-	-	DEBUG_RF_LDO RDY	TIM17_BKIN	
	PB5	-	-	-	-	COMP2_OUT	-	TIM16_BKIN	
	PB6	-	-	-	-	-	-	TIM16_CH1N	
	PB7	-	-	-	-	-	-	TIM17_CH1N	
	PB8	-	-	-	-	-	-	TIM16_CH1	
	PB9	IR_OUT	-	-	-	-	-	TIM17_CH1	
	PB10	LPUART1_RX	-	-	-	COMP1_OUT	-	-	
	PB11	LPUART1_TX	-	-	-	COMP2_OUT	-	-	
	PB12	LPUART1_RTS	-	-	-	-	-	-	
	PB13	LPUART1_CTS	-	-	-	-	-	-	
	PB14	-	-	-	-	-	-	-	
	PB15	-	-	-	-	-	-	-	



Port		AF8	AF9	AF10	AF11	AF12	AF13	AF14	AF15
		LPUART1	-	-	-	COMP1/ COMP2/TIM1	DEBUG	TIM2/TIM16/ TIM17/LPTIM2	EVENTOUT
Port C	PC0	LPUART1_RX	-	-	-	-	-	LPTIM2_IN1	CM4_EVENTOUT
	PC1	LPUART1_TX	-	-	-	-	-	-	
	PC2	-	-	-	-	-	-	-	
	PC6	-	-	-	-	-	-	-	
	PC13	-	-	-	-	-	-	-	
Port H	PH3	-	-	-	-	-	-	-	

5 Electrical characteristics

5.1 Operating conditions

Table 7. STM32WL5MOC operating conditions

Parameter	Min.	Typ.	Max.	Unit
V _{DD}	1.71	3.3	3.6	V
Operating ambient temperature range	-40	-	85	°C
Storage temperature range	-40	-	125	°C

5.2 Power consumption

Refer to Multiprotocol LPWAN dual core 32-bit Arm® Cortex®- M4/M0+ LoRa® (G)FSK, (G)MSK, BPSK (DS13293) for more details.

The power consumption is identical to the STM32WL55xx. Refer to Multiprotocol LPWAN dual core 32-bit Arm® Cortex®- M4/M0+ LoRa® (G)FSK, (G)MSK, BPSK (DS13293) for all power consumption figures, except for tables *Sub-GHz radio power consumption* and *Sub-GHz radio power consumption in transmit mode*, that you can find below. This power consumption modification takes into account the presence of a 32MHz TCXO inside the module.

Table 8. Sub-GHz radio power consumption

Symbol	Mode	Conditions		Min	Typ	Max	Unit
I _{DD}	Deep-Sleep mode (Sleep with cold start)	All blocks off		-	50	-	nA
	Sleep mode (with warm start)	Configuration retained		-	140	-	
		Configuration retained + RC64k		-	810	-	
	Sleep, LDO mode	LDO, band-gap, RC 13 MHz on	HSE32 off	-	414	-	μA
			HSE32 on	-	564	-	
	Sleep, SMPS mode	Band-gap, RC 13 MHz on, SMPS 40 mA max	HSE32 off	-	700	-	
			HSE32 on	-	950	-	
	Standby mode (RC 13 MHz on)	RC 13 MHz on, HSE32 off		-	0.7	-	mA
	Standby mode (HSE32)	SMPS mode	40 mA max settings	-	2.55	-	
		LDO mode		-	2.49	-	
	Synthesizer mode	SMPS mode used with 40 mA drive capability		-	4.16	-	
		LDO mode		-	5.55	-	
	Receive mode, SMPS mode used	SMPS 40 mA max	FSK 4.8 Kbit/s	-	5.97	-	mA
			LoRa 125 kHz	-	6.32	-	
			Rx boosted, FSK 4.8 Kbit/s	-	6.62	-	
			RX boosted, LoRa 125 kHz	-	6.96	-	
	Receive mode, LDO mode used		FSK 4.8 Kbit/s		-	9.68	-
LoRa 125 kHz			-	10.4	-		
Rx boosted			FSK 4.8 Kbit/s		-	11.02	-
			LoRa 125 kHz		-	11.72	-

1. Cold start is equivalent to device at POR or when the device wakes up from Sleep mode with all blocks off.
2. Only Sub-GHz radio power consumption
3. Warm start only happens when the device wakes up from Sleep mode with its configuration retained
4. System in Stop 0 mode range 2

Table 9. Sub-GHz radio power consumption and effective transmitted output power in [868 to 915]MHz band

Symbol	Frequency band (MHz)	PA match (conditions)	Programmed power output	Measured power output			
				Typ (LDD)	Unit	Typ	Unit
<	868 to 915	Low power	+10 dBm, $V_{DDRF} = 3.3\text{ V}$	20	mA	9.2	dBm
			+10 dBm, $V_{DDRF} = 1.8\text{ V}$	35		9.1	
			+15 dBm, $V_{DDRF} = 3.3\text{ V}$	29		13.7	
			+15 dBm, $V_{DDRF} = 1.8\text{ V}$	52		13.4	
		High power	+22 dBm, $V_{DDRF} = 3.3\text{ V}$	111		20.3	
			+22 dBm, $V_{DDRF} = 1.8\text{ V}$	80		16	
			+20 dBm, $V_{DDRF} = 3.3\text{ V}$	103		18.6	
			+20 dBm, $V_{DDRF} = 1.8\text{ V}$	80		16	

1. These power outputs correspond to the settings programmed in the device. Depending on the board, up to 2 dB less than the setting are expected.

Table 10. Sigfox RF output power (T = 25 °C, $V_{DD} = 3.3\text{ V}$)

Parameter	Condition	Min	Typ	Max	Unit
Frequency range	-	863	-	928	MHz
RF output power	RC1	12	12.3	-	dBm
	RC2	18	18.2	-	
	RC3	11.7	11.9	-	
	RC4	18.3	18.4	-	
	RC5	11.1	11.2	-	
	RC6	12.3	12.4	-	
	RC7	12.3	12.5	-	
Modulation techniques	Sigfox				-

Table 11. Sigfox receiver sensitivity (T = 25 °C, $V_{DD} = 3.3\text{ V}$)

Zone	Frequency	Sensitivity (0.6 kbps)	Unit
RC1	869.525	-124.3	dBm
RC2	905.2	-122.2	
RC3	922.2	-123.9	
RC4	922.3	-122.4	
RC5	922.3	-125.2	
RC6	866.3	-124.4	
RC7	869.1	-124.5	

5.3 32 MHz TCXO clock characteristics

The embedded 32 MHz TCXO clock has the following characteristics:

Table 12. STM32WL5M TCXO characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Fnom	Output frequency		-	32	-	MHz
Ftol	Frequency accuracy	Initial	-2.0	-	+2.0	ppm
		Over temperature [-40:+85]	-1.0	-	+1.0	
		Aging over 10 years	-10	-	+10	

6 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

6.1 Device marking

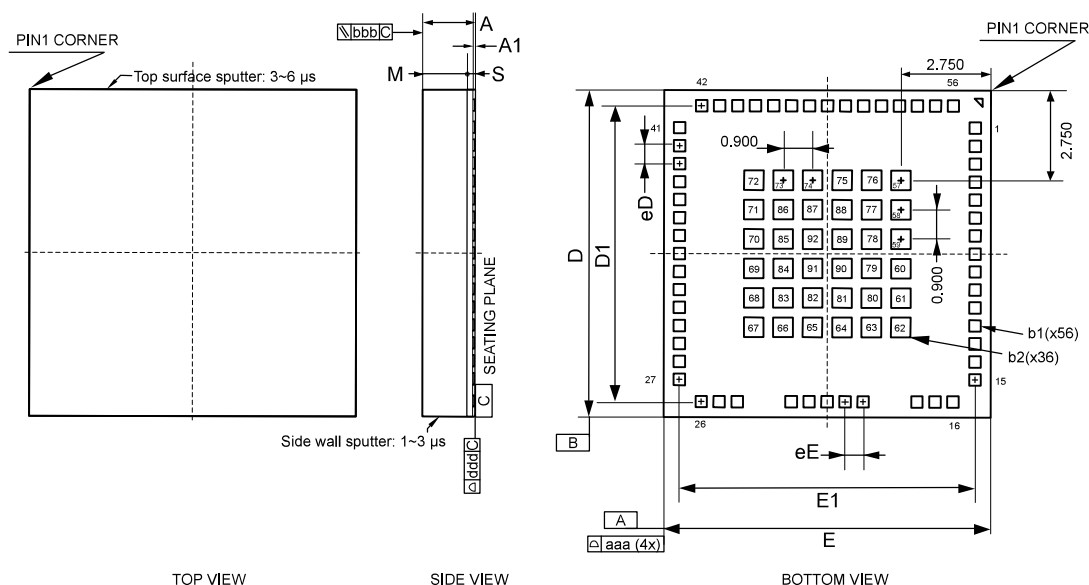
Refer to the technical note "Reference device marking schematics for STM32 microcontrollers and microprocessors" (TN1433) available on www.st.com, for the location of pin 1 / ball A1 as well as the location and orientation of the marking areas versus pin 1 / ball A1.

Parts marked as "ES", "E" or accompanied by an engineering sample notification letter, are not yet qualified and therefore not approved for use in production. ST is not responsible for any consequences resulting from such use. In no event will ST be liable for the customer using any of these engineering samples in production. ST's Quality department must be contacted prior to any decision to use these engineering samples to run a qualification activity.

6.2 LGA92 package information (B0HB)

This LGA is a 92 lead, 10 x 10 mm, 1.608 mm pitch, lead grid array package.

Figure 17. LGA92 - Outline



1. Drawing is not to scale.

Table 13. LGA92 - Mechanical data

Symbol	millimeters			inches ⁽¹⁾		
	Min	Typ	Max	Min	Typ	Max
A	1.818±0.060			0.0716±0.0024		
A1	0.030±0.020			0.0012±0.0008		
b1 ⁽²⁾	0.350x0.350			0.0138x0.0138		
b2 ⁽³⁾	0.600x0.600			0.0236x0.0236		
D	9.900	10.000	10.100	0.3898	0.3937	0.3976
D1	9.050			0.3563		
eD	0.550			0.0216		
E	9.900	10.000	10.100	0.3898	0.3937	0.3976
E1	9.050			0.3563		
eE	0.550			0.0216		
M	1.540			0.0606		
S	0.248			0.0098		
n	92					
aaa	0.100			0.0039		
bbb	0.100			0.0039		
ddd	0.100			0.0039		

1. Values in inches are converted from mm and rounded to 4 decimal digits.
2. Peripheral pad.
3. Inner pad.

6.3 Thermal characteristics

The thermal characteristics of the STM32WL5MOC are defined below and the constant values are given in Table 14 where:

- Θ_{JA} is the junction-to-ambient thermal resistance (EIA/JESD51-2 and EIA/JESD51-6).
 Θ_{JA} represents the resistance to the heat flows from the chip to ambient air. It is an indicator of package heat dissipation capability. Lower Θ_{JA} , means better overall thermal performance and is calculated as follows:

$$\Theta_{JA} = (T_J - T_A) / P_H$$
 where:
 - T_J = junction temperature
 - T_A = ambient temperature
 - P_H = power dissipation.
- Ψ_{JT} is the junction-to-top-center thermal characterization parameter (EIA/JESD51-2 and EIA/JESD51-6).
 Ψ_{JT} is used for estimating the junction temperature by measuring T_T in an actual environment and is calculated as follows:

$$\Psi_{JT} = (T_J - T_T) / P_H$$
 where T_T = temperature at the top-center of the package.
- Θ_{JC} is the junction-to-case thermal resistance.
 Θ_{JC} represents the resistance to the heat flows from the chip to package top case. Θ_{JC} is important when external heat sink is attached on package top and is calculated as follows:

$$\Theta_{JC} = (T_J - T_C) / P_H$$
 where T_C = case temperature attached with a cold plate.
- Θ_{JB} is the junction-to-board thermal resistance (EIA/JESD51-8).
 Θ_{JB} represents the resistance to the heat flows from the chip to PCB. Θ_{JB} is used in compact thermal models for system-level thermal simulation and is calculated as follows:

$$\Theta_{JB} = (T_J - T_B) / P_H$$
 where T_B = board temperature with ring cold plate fixture applied.

Table 14. STM32WL5MOC thermal characteristics

Symbol	$T_J(^{\circ}\text{C})$	$T_T(^{\circ}\text{C})$	$\Psi_{JT}(^{\circ}\text{C/W})$	$\Theta_{JA}(^{\circ}\text{C/W})$	$\Theta_{JB}(^{\circ}\text{C/W})$	$\Theta_{JC}(^{\circ}\text{C/W})$
Value	96.79	96.70	0.20	25.96	11.49	9.59

7 Ordering information

Table 15. Ordering information

Order code	STSAFE-A110	Flash size	Temperature range	Package type	Pin count	Packing information
STM32WL5MOCH6STR	STSAFE-A110 is provisioned	256 Kbytes	Industrial temperature range, —40 to 85 °C (105 °C junction)	LGA	92	Tape and reel
STM32WL5MOCH6TR	STSAFE-A110 is not provisioned	256 Kbytes	Industrial temperature range, —40 to 85 °C (105 °C junction)	LGA	92	Tape and reel

Note: For a list of available options (such as speed and package) or for further information on any aspect of this device, contact your nearest ST sales office.

8 Certification

8.1 CE certification

The STM32WL5MOC module has obtained CE certification.
 The module is provided with CE marking.

Figure 18. CE certification logo



8.2 FCC - ISED compliance statement

FCC Part 15 compliance statement

Changes or modifications not expressly approved by STMicroelectronics could void the user's authority to operate the equipment.

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.

FCCID: YCP-32WL5MOCH01

Product Marketing Name: STM32WL5MOCH

Model name: 32WL5MOCH6 and 32WL5MOCH6S

- Applicable FCC rules: This module has been approved under FCC part 15C 15.247 in the frequency range 902-928MHz. This modular transmitter is only FCC authorized for this specific rule part.
- Specific operational use conditions:
 - The module is limited to OEM installation ONLY.
 - If other parameters (modulation or power setting) other than the type documented in the filing, a class 2 permissive change must be filed with FCC.
 - The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install the module.
- Limited module procedures are not applicable to this application.
- RF path: Use a 50Ω PCB path to feed the connector. Refer to section 3.4.3 for path requirements.
- Radio Frequency (RF) Exposure Compliance of Radio communication: To satisfy FCC RF Exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- List of antenna types approved: Dipole antenna with max gain 2 dBi in the frequency band 902-928MHz. If other antenna with higher gain or other antennas type, other than the type documented in the filing, a class 2 permissive change must be filed with FCC.
 If the end host product is equipped with an external connector, then a unique (nonstandard) antenna connector must be used on the transmitter. Use of standard antenna jack or electrical connector is forbidden.
- End Product Labeling: The final end product must be labeled in a visible area with the following:
 - “Contains Transmitter Module FCC ID: YCP-32WL5MOCH01”

- End Product User's Manual: The user manual for end users must include the following information in a prominent location:
To satisfy FCC RF Exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Additional testing requirements:
 - If testing of the host product with this transmitter installed and operating is necessary (to verify that the host product meets all the applicable FCC rules), a test mode for this specific module is available upon request to STMicroelectronics.
 - The host product manufacturer is responsible for compliance with any other FCC rules that apply to the host not covered by the modular transmitter grant of certification (For example, Part 15 Subpart B).

ISED - Industry Canada Licence-Exempt Radio Apparatus

IC: 8976A-32WL5MOCH01

Product Marketing Name: STM32WL5MOCH

HVIN: 32WL5MOCH6 & 32WL5MOCH6S

Note: 32WL5MOCH6 & 32WL5MOCH6S models share this same user's manual because these two models belong to the same hardware family of the STM32WL5MOCH module. Refer to clause 3.5.2 for details.

This device contains licence-exempt transmitter(s)/receivers(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.
- Applicable ISED-CANADA rules: This module has been approved under RSS-247 in the frequency range 902-928MHz. This modular transmitter is only ISED authorized for this specific rule part.
 - Specific operational use conditions:
 - The module is limited to OEM installation ONLY.
 - If other parameters (modulation or power setting) other than the type documented in the filing, a class 2 permissive change must be filed with ISED-CANADA.
 - The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install the module.
 - Limited module procedures are not applicable to this application.
 - RF path: Use a 50Ω PCB path to feed the connector. Refer to section 3.4.3 for path requirements.
 - Radio Frequency (RF) Exposure Compliance of Radio communication: To satisfy ISED-Canada RF Exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be colocated or operating in conjunction with any other antenna or transmitter.
 - This radio transmitter IC: 8976A-32WL5MOCH01 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
 - List of antenna type approved: Dipole antenna with max gain 2 dBi in the frequency band 902-928MHz. If other antenna with higher gain or other antennas type, other than the type documented in the filing, a class 2 permissive change must be filed with ISED-Canada.
 - End Product Labeling: The final end product must be labeled in a visible area with the following: "Contains Transmitter Module IC: 8976A-32WL5MOCH01"
 - End Product User's Manual: The user manual for end users must include the following information in a prominent location: *To satisfy ISED-Canada RF Exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.*
 - Additional testing requirements:
 - If testing of the host product with this transmitter installed and operating is necessary (to verify that the host product meets all the applicable ISED-Canada rules), a test mode for this specific module is available upon request to STMicroelectronics.
 - The host product manufacturer is responsible for compliance with any other FCC rules that apply to the host not covered by the modular transmitter grant of certification (For example, ICES-003).

ISED-Industry Canada Licence-Exempt Radio Apparatus

IC: 8976A-32WL5MOCH01

Nom de marque du produit: STM32WL5MOCH

NIVM: 32WL5MOCH6 & 32WL5MOCH6S

Note: Les modèles 32WL5MOCH6 et 32WL5MOCH6S partagent ce même manuel d'utilisation car ces deux modèles appartiennent à la même famille matérielle du module STM32WL5MOCH. Reportez-vous à la clause 3.5.2 pour plus de détails.

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.
- Règles ISED-CANADA applicables: Ce module a été approuvé suivant la norme RSS-247 dans la gamme de fréquences 902-928 MHz. Cet émetteur modulaire est uniquement autorisé par ISDE pour cette partie de règle spécifique.
 - Conditions opérationnelles spécifiques d'utilisation :
 - Le module est limité à l'installation OEM UNIQUEMENT.
 - Si d'autres paramètres (modulation ou réglage de puissance) autres que ceux documentés dans le dossier, un changement permissif de classe 2 doit être déposé auprès d'ISDE-CANADA.
 - L'intégrateur OEM est responsable de s'assurer que l'utilisateur final ne dispose d'aucune instruction pour retirer ou installer le module.
 - Les procédures de module limité ne sont pas applicables à cette application.
 - Conception de la piste d'antenne : utilisez une piste PCB adaptée à 50 Ω pour alimenter le connecteur. Reportez-vous à la section 3.4.3 pour connaître les exigences en matière de conception.
 - Conformité des communications radio en matière d'exposition aux radiofréquences (RF) : Pour satisfaire aux exigences d'ISDE-Canada en matière d'exposition aux radiofréquences, une distance de séparation de 20 cm ou plus doit être maintenue entre l'antenne de cet appareil et les personnes pendant le fonctionnement. Pour assurer la conformité, il est déconseillé d'utiliser cet équipement à une distance inférieure. Cet émetteur ne doit pas être co-situé ou fonctionner conjointement avec une autre antenne ou un autre émetteur.
 - Le présent émetteur radio IC: 8976A-32WL5MOCH01 a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.
 - Liste des types d'antennes approuvés : Antenne dipôle avec gain maximum 2dBi dans la bande de fréquence 902-928MHz. Si d'autres antennes avec un gain plus élevé ou d'un autre type d'antenne, autre que le type documenté dans le dossier, un changement permissif de classe 2 doit être déposé auprès d'ISDE-Canada.
 - Étiquetage du produit final : Le produit final doit être étiqueté dans une zone visible avec les éléments suivants: « Contient IC : 8976A-32WL5MOCH01 »
 - Manuel de l'utilisateur du produit final : le manuel de l'utilisateur destiné aux utilisateurs finaux doit inclure les informations suivantes dans un endroit bien en vue: *Pour satisfaire aux exigences d'ISDE-Canada en matière d'exposition aux RF, une distance de séparation de 20 cm ou plus doit être maintenue entre l'antenne de cet appareil et les personnes pendant le fonctionnement. Pour garantir la conformité, il n'est pas recommandé d'opérer à une distance plus courte que celle-ci. Cet émetteur ne doit pas être colocalisé ou fonctionner en conjonction avec une autre antenne ou émetteur.*
 - Exigences de tests supplémentaires :
 - Si un test du produit hôte avec cet émetteur installé et opérationnel est nécessaire (pour vérifier que le produit hôte répond à toutes les règles applicables d'ISDE-Canada), un mode de test pour ce module spécifique est disponible sur demande à STMicroelectronics.
 - Le fabricant du produit hôte est responsable du respect de toutes les autres règles ISDE applicables à l'hôte non couvertes par l'octroi de certification de l'émetteur modulaire (Par exemple, ICES-003).

Important security notice

The STMicroelectronics group of companies (ST) places a high value on product security, which is why the ST product(s) identified in this documentation may be certified by various security certification bodies and/or may implement our own security measures as set forth herein. However, no level of security certification and/or built-in security measures can guarantee that ST products are resistant to all forms of attacks. As such, it is the responsibility of each of ST's customers to determine if the level of security provided in an ST product meets the customer needs both in relation to the ST product alone, as well as when combined with other components and/or software for the customer end product or application. In particular, take note that:

- ST products may have been certified by one or more security certification bodies, such as Platform Security Architecture (www.psacertified.org) and/or Security Evaluation standard for IoT Platforms (www.trustcb.com). For details concerning whether the ST product(s) referenced herein have received security certification along with the level and current status of such certification, either visit the relevant certification standards website or go to the relevant product page on www.st.com for the most up to date information. As the status and/or level of security certification for an ST product can change from time to time, customers should re-check security certification status/level as needed. If an ST product is not shown to be certified under a particular security standard, customers should not assume it is certified.
- Certification bodies have the right to evaluate, grant and revoke security certification in relation to ST products. These certification bodies are therefore independently responsible for granting or revoking security certification for an ST product, and ST does not take any responsibility for mistakes, evaluations, assessments, testing, or other activity carried out by the certification body with respect to any ST product.
- Industry-based cryptographic algorithms (such as AES, DES, or MD5) and other open standard technologies which may be used in conjunction with an ST product are based on standards which were not developed by ST. ST does not take responsibility for any flaws in such cryptographic algorithms or open technologies or for any methods which have been or may be developed to bypass, decrypt or crack such algorithms or technologies.
- While robust security testing may be done, no level of certification can absolutely guarantee protections against all attacks, including, for example, against advanced attacks which have not been tested for, against new or unidentified forms of attack, or against any form of attack when using an ST product outside of its specification or intended use, or in conjunction with other components or software which are used by customer to create their end product or application. ST is not responsible for resistance against such attacks. As such, regardless of the incorporated security features and/or any information or support that may be provided by ST, each customer is solely responsible for determining if the level of attacks tested for meets their needs, both in relation to the ST product alone and when incorporated into a customer end product or application.
- All security features of ST products (inclusive of any hardware, software, documentation, and the like), including but not limited to any enhanced security features added by ST, are provided on an "AS IS" BASIS. AS SUCH, TO THE EXTENT PERMITTED BY APPLICABLE LAW, ST DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, unless the applicable written and signed contract terms specifically provide otherwise.

Revision history

Table 16. Document revision history

Date	Revision	Changes
08-Nov-2023	1	Initial release.
21-Dec-2023	2	Updated the following sections: - Section Device summary - Section 2: Description - Section 8: FCC - ISED compliance statement - Section 7: Ordering information - Section 3.4: RF antenna impact - Section 3.5.2: STSAFE supply
04-Jan-2024	3	Updated the Section 7: Ordering information and the Section Cover image
14-Feb-2024	4	Updated the following sections: - Section Features - Section 8: FCC - ISED compliance statement Added the following sections and related subsections: - Section 3.4.3: Antenna trace design
17-Oct-2024	5	Updated the following sections: - Section 3.4.3: RF path design - Section 3.4.3.3: RF track routing guidelines - Table 4. Pin description - Section 8.2: FCC - ISED compliance statement Added: - Table 10. Sigfox RF output power (T = 25 °C, V_{DD} = 3.3 V) - Table 11. Sigfox receiver sensitivity (T = 25 °C, V_{DD} = 3.3 V) - Section 8.1: CE certification

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