

SMF2 WW/CN

STI6200-D101(RoHS)

Specification

Rev. 0.3 (2020.7.22)

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Revision History

Revision	Date	Modified descriptions
0.1	2020. 1. 30	Preliminary version.
0.2	2020.4.30	Chapter structure changed
0.3	2020.7.22	Antenna Information added

Chapter 1. Application Outline and Scope

SMF2 is an internet multi-stream interactive decoder. Mainly for Epson projector user entertainment usage. The main system CPU is a quad-core ARM Cortex-A53 CPU to improve decoder performance. An ARM G31 MP2 GPU handles all OpenGL ES 3.2 Vulkan 1.0 and OpenCL 2.0 graphic programs.

The decoder supports multiple video/audio formats decoding such as MPEG-2 AVC/H.264 HEVC/H.265/MP3/AAC/RM/FLAC/Ogg/Dolby Digital / programmable with 7.1/5.1 down-mixing a Wi-Fi and Bluetooth module embedded.

It supports globe WLAN standard and connects to internet to provide rich multi-media streaming experience. A remote control that meets ATV criteria and be able to connect decoder and control menu and programs selections.

Displays up to 4K though HDMI 2.1. Android TV is build-in ATV standard launcher. The most popular entertainment apps (Amazon/Mango TV) which are pre-loaded allows to free upgrade. Detail description related to hardware/software/mechanical/quality are found in following chapters.

Chapter 2. Hardware Specifications

2.1 Wi-Fi / Bluetooth / Antenna Specifications

2.1.1 Wi-Fi (2.4G RF Specification)

Conditions : VBAT=3.3V ; VDDIO=3.3V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11b/g/n & Wi-Fi compliant
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4GHz ISM Band)
Number of Channels	2.4GHz : Ch1 ~ Ch13
Modulation	802.11b : DQPSK、DBPSK、CCK 802.11 g/n : OFDM /64-QAM、16-QAM、QPSK、BPSK

Conditions : VBAT=3.3V ; VDDIO=3.3V ; Temp:25°C

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Output Power , tolerance ± 1.5 dB					
The transmit EVM quality & spectrum mask are compliant with IEEE 802.11 standard					
802.11b	1Mbps	2Mbps	5.5Mbps	11Mbps	
	17.5	17.5	17.5	17.5	
802.11g	6 、 9Mbps	12 、 18Mbps	24Mbps	36Mbps	48Mbps
	17.5	17.5	17	17	16.5
	54Mbps				
	16.5				
802.11n 20MHz	MCS0~2	MCS3	MCS4	MCS5	MCS6
	17.5	16.5	16.5	16	16
	MCS7				
	15.5				

Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.

Sensitivity, tolerance ± 2 dB				
CCK modulation PER $\leq 8\%$ 、OFDM modulation PER $\leq 10\%$				
802.11b	Data Rate	Spec.(dBm)		
	1Mbps	-96		
	2Mbps	-93		
	5.5Mbps	-91		
	11Mbps	-88		
802.11g SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-92	24Mbps	-84
	9Mbps	-91	36Mbps	-81
	12Mbps	-90	48Mbps	-78
	18Mbps	-87	54Mbps	-76
802.11g MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-95	24Mbps	-87
	9Mbps	-94	36Mbps	-84
	12Mbps	-93	48Mbps	-81
	18Mbps	-90	54Mbps	-78
802.11n_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-91	MCS4	-80
	MCS1	-89	MCS4	-78
	MCS2	-87	MCS6	-76
	MCS3	-85	MCS7	-74
802.11n_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-93	MCS5	-80
	MCS1	-92	MCS6	-78
	MCS2	-90	MCS7	-76
	MCS3	-87	MCS8	-92
	MCS4	-83	MCS15	-73
Maximum Input Level	802.11b : -10 dBm			
	802.11g/n : -20 dBm			

2.1.2 Wi-Fi (5G RF Specification)

Conditions : VBAT=3.3V ; VDDIO=3.3V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac & Wi-Fi compliant
Frequency Range	5.15~5.35GHz 、 5.47~5.725GHz 、 5.725~5.85GHz (5GHz UNII Band)
Number of Channels	5.15~5.35GHz : Ch36 ~ Ch64 5.47~5.725GHz : Ch100 ~ Ch140 5.725~5.85GHz : Ch149 ~ Ch165
Modulation	802.11a : OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK 802.11n : OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK 802.11ac : OFDM /256-QAM 、 OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK

Output Power , tolerance ± 1.5 dB					
The transmit EVM quality & spectrum mask are compliant with IEEE 802.11 standard					
802.11a	Frequency (MHz)	6~9Mbps	12~18Mbps	24Mbps	36Mbps
	5150~5350	16.5	16.5	16	16
	5470~5720	16.5	16.5	16	16
	5725~5845	16.5	16.5	16	16
	Frequency (MHz)	48Mbps	54Mbps		
	5150~5350	15.5	15.5		
	5470~5720	15.5	15.5		
	5725~5845	15.5	15.5		

802.11n 20MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16	16	15.5	15.5
	5470~5720	16	16	15.5	15.5
	5725~5845	16	16	15.5	15.5
	Frequency (MHz)	MCS6	MCS7		
	5150~5350	14.5	14.5		
	5470~5720	14.5	14.5		
	5725~5845	14.5	14.5		

802.11n 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16	16	15.5	15.5
	5470~5720	16	16	15.5	15.5
	5725~5845	16	16	15.5	15.5
	Frequency (MHz)	MCS6	MCS7		
	5150~5350	14.5	14.5		
	5470~5720	14.5	14.5		
	5725~5845	14.5	14.5		

802.11ac 20MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16	16	15.5	15.5
	5470~5720	16	16	15.5	15.5
	5725~5845	16	16	15.5	15.5
	Frequency (MHz)	MCS6	MCS7	MCS8	
	5150~5350	14.5	14.5	12	
	5470~5720	14.5	14.5	12	
	5725~5845	14.5	14.5	12	

802.11ac 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16	16	15.5	15.5
	5470~5720	16	16	15.5	15.5
	5725~5845	16	16	15.5	15.5
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	14.5	14.5	12	10
	5470~5720	14.5	14.5	12	10
	5725~5845	14.5	14.5	12	10

802.11ac 80MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15	15	14	14
	5470~5720	15	15	14	14
	5725~5845	15	15	14	14
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	13	13	12	10
	5470~5720	13	13	12	10
	5725~5845	13	13	12	10

Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.

<p style="text-align: center;">Sensitivity, tolerance ± 1.5 dB</p> <p style="text-align: center;">CCK modulation PER $\leq 8\%$、OFDM modulation PER $\leq 10\%$</p>				
802.11a SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-91	24Mbps	-83
	9Mbps	-90	36Mbps	-80
	12Mbps	-88	48Mbps	-76
	18Mbps	-86	54Mbps	-74
802.11a MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-92	24Mbps	-86
	9Mbps	-91	36Mbps	-83
	12Mbps	-90	48Mbps	-78
	18Mbps	-89	54Mbps	-77

802.11n_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS4	-79
	MCS1	-88	MCS5	-76
	MCS2	-86	MCS6	-73
	MCS3	-83	MCS7	-72
802.11n_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-92	MCS5	-78
	MCS1	-91	MCS6	-76
	MCS2	-89	MCS7	-75
	MCS3	-86	MCS8	-89
	MCS4	-82	MCS15	-70

802.11n_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-88	MCS4	-77
	MCS1	-86	MCS5	-72
	MCS2	-83	MCS6	-70
	MCS3	-80	MCS7	-69
802.11n_40MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-88	MCS5	-75
	MCS1	-88	MCS6	-73
	MCS2	-86	MCS7	-72
	MCS3	-83	MCS8	-86
	MCS4	-79	MCS15	-67

		Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
802.11ac_20MHz SISO	MCS0	-90		MCS5	-75
	MCS1	-88		MCS6	-73
	MCS2	-86		MCS7	-70
	MCS3	-83		MCS8	-67
	MCS4	-79			
802.11ac_20MHz MIMO	Data Rate		Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0,NSS=1	-92		MCS6,NSS=1	-76
	MCS1,NSS=1	-91		MCS7,NSS=1	-75
	MCS2,NSS=1	-88		MCS8,NSS=1	-72
	MCS3,NSS=1	-85		MCS0,NSS=2	-88
	MCS4,NSS=1	-82		MCS8,NSS=2	-65
	MCS5,NSS=1	-77			

		Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
802.11ac_40MHz SISO	MCS0	-88		MCS5	-72
	MCS1	-86		MCS6	-70
	MCS2	-83		MCS7	-69
	MCS3	-80		MCS8	-65
	MCS4	-76		MCS9	-63
802.11ac_40MHz MIMO	Data Rate		Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0,NSS=1	-90		MCS6,NSS=1	-73
	MCS1,NSS=1	-88		MCS7,NSS=1	-72
	MCS2,NSS=1	-86		MCS8,NSS=1	-68
	MCS3,NSS=1	-82		MCS9,NSS=1	-66
	MCS4,NSS=1	-79		MCS0,NSS=2	-86
	MCS5,NSS=1	-77		MCS9,NSS=2	-60

	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
802.11ac_80MHz SISO	MCS0	-85	MCS5	-68
	MCS1	-82	MCS6	-67
	MCS2	-79	MCS7	-65
	MCS3	-76	MCS8	-62
	MCS4	-73	MCS9	-60
	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
802.11ac_80MHz MIMO	MCS0,NSS=1	-87	MCS6,NSS=1	-70
	MCS1,NSS=1	-85	MCS7,NSS=1	-68
	MCS2,NSS=1	-82	MCS8,NSS=1	-66
	MCS3,NSS=1	-79	MCS9,NSS=1	-63
	MCS4,NSS=1	-76	MCS0,NSS=2	-83
	MCS5,NSS=1	-71	MCS9,NSS=2	-58
Maximum Input Level	802.11a/n/ac : -30 dBm			

2.1.3 Bluetooth Specification

Conditions : VBAT=3.3V ; VDDIO=3.3V ; Temp:25°C

Feature	Description
<i>General Specification</i>	
Bluetooth Standard	GFSK、DQPSK、8DPSK、LE(1Mbps)、2LE(2Mbps)
Host Interface	UART
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	79 channels for classic、40 channels for BLE
Modulation	FHSS, GFSK, DPSK, DQPSK

<i>RF Specification</i>			
	Min.	Typical.	Max.
Output Power*		7	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-86 dBm	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-88 dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-84 dBm	
Sensitivity @ BER=0.01% for LE (1Mbps)		-89 dBm	
Sensitivity @ BER=0.01% for 2LE (2Mbps)		TBD	

Maximum Input Level	GFSK (1Mbps):-20dBm
	π/4-DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

Note* : The Bluetooth BDR output power is able to be configured by firmware (hcd file).

2.2 Antenna Information

This module has been approved to operate with the antenna types listed below, with the maximum permissible gain indicated.

Antenna Type	Model Number	Connector	Gain(dBi)		
			2.4G	5G	BT
HONGBO	290-40488	I-Pex	2.34	5.29	-
HONGBO	290-40488	I-Pex	2.74	4.50	2.74

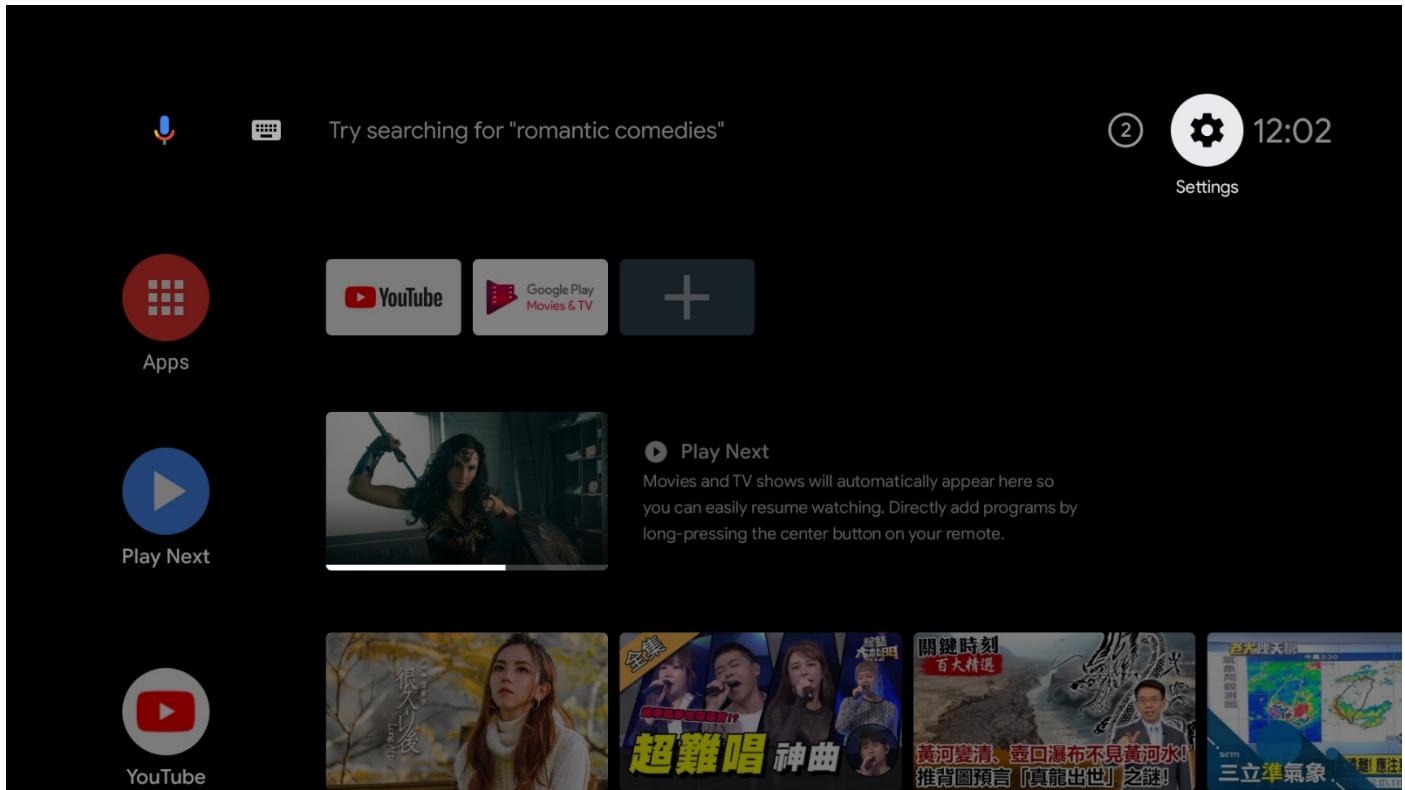
2.3 Global Compliance

Country	Authorization
Europe	CE
USA	FCC
Candan	IC
Japan	VCCI
	JRF
	JRF
	JRF
	JRF
	JPA
Aus/New Zealand	RCM
Taiwan	NCC
Brazil(2 years)	ANATEL
Mexico (1 year)	IFETEL
India	WPC
	Safety +EMC
China	SRRC (End product)
Korea	KC
Argentina	ENACOM
Indonesia	SDPPI (End Product)
Chile	SUBTEL

Others including: Singapore / Thailand / Malaysia / Philippines / UAE / Israel / Vietnam / South Africa

Chapter 3. Software Specifications

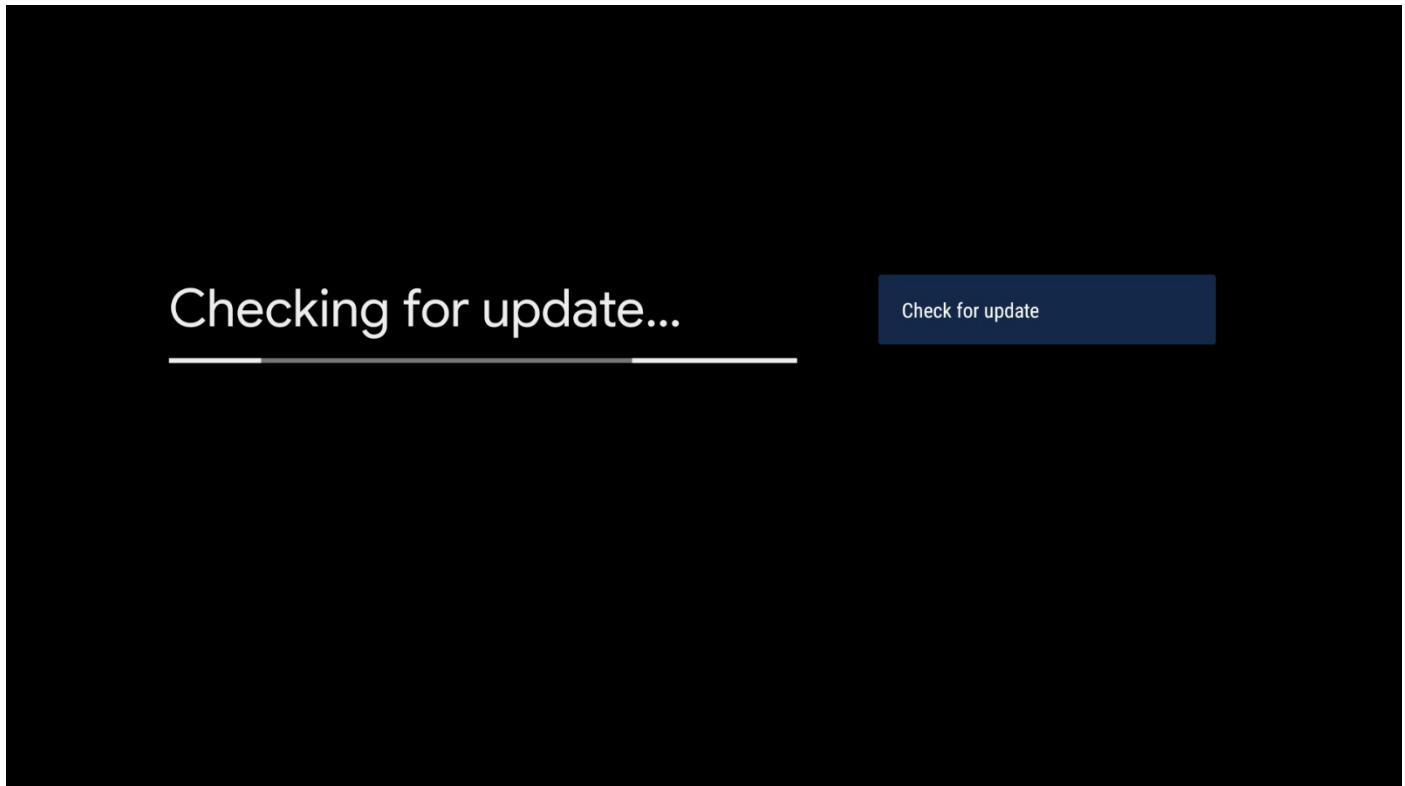
3.1 Launcher



3.2 OTA function

SMF2 is able to upgrade the FW by OTA method.

Please refer to the OTAProcess (file name) to confirm the OTA process and manage process.



Chapter 4. Statement

FCC

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this 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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This module is certified pursuant to two Part 15 rules sections(15.407, 15.247).

Label of the end product:

The host product must be labeled in a visible area with the following " Contains FCC ID: BKMAE-STI6200 ".

The end product shall bear the following 15.19 statement: 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.

This module is restricted to integration into hosts for indoor use only.

OEM integrator has be limited the operation channels in channel 1-11 for 2.4GHz band.

The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations

The information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, , versus with multiple, simultaneously transmitting modules or other transmitters in a host can be found at KDB Publication 996369 D04

The user manual of the end product should include

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

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

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons.

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.

This device is restricted to indoor use.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

ISED

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.

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.

The device shall automatically discontinue transmission in cases of absence of information to transmit, or operational failure.

This device is restricted to indoor use.

The transmitter module may not be co-located with any other transmitter or antenna.

Le module émetteur peut ne pas être coimplanté avec un autre émetteur ou antenne.

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.

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 20cm de distance entre la source de rayonnement et votre corps

OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the IC authorization is no longer considered valid and the IC No. cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate IC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains transmitter module IC: 1052D-STI6200".

Contient le module d'émission IC: 1052D-STI6200:

The Host Model Number (HMN) must be indicated at any location on the exterior of the end product or product packaging or product literature which shall be available with the end product or online.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

- 1) L'antenne doit être installée de telle sorte qu'une distance de 20cm est respectée entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coimplanté avec un autre émetteur ou antenne.

CAN ICES-3 (B)/NMB-3(B)

The Country Code Selection feature is disabled for products marketed in the US/Canada

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.