

## LSD4RF0436-10D0

### 2.4GHz Wireless Module

LSD4RF0436-10D0 wireless module is a wireless module designed on the basis of TI RF integrated chip CC2510. It is a high-performance 1mW IOT wireless transceiver. With the adoption of PCB antenna, the module is compact and small in terms of overall design and can be widely used for short distance IOT wireless communications in various applications. It is characterized by small volume, low power consumption, long transmission distance, strong anti-interference capacity, low cost, etc.

#### Product Features

- **Working frequency range**
  - Working frequency range 2402~2480MHz
- **Multiple ways of modulation**
  - The ways of modulation including 2-FSK are adopted to increase the capacity of data anti-burst interference and random interference
- **Power supply**
  - 2.0~3.6V (recommended to use 3.3V)
  - I / O interface control level: 0~ VCC
- **High link budget**
  - High receiving sensitivity:  $-95 \pm 1\text{dBm}$  (@10KBaud)
  - Transmit power: Max.  $95.08\text{dB}\mu\text{V / m}$
- **Super long transmission distance**
  - Excellent transmission performance, reliable transmission distance is greater than 15m
- **Rapid channel switching**
  - < 90uS channel switching time, especially suitable for FM communication system
- **Convenient for programming**
  - On-chip integrated 51 internal core, very convenient for software programming

#### Applicable Situations

- Industrial remote sensing, telemetry communication
- Home wireless security alarm system
- Personnel positioning system in mine
- Consumer electronic wireless applications, wireless mouse keyboard, etc.

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### Revision Histories

<b>Revision</b>	<b>Date</b>	<b>Author</b>	<b>Change Description</b>
Rev01	June 14, 2019	You Xuecheng	Initial Revision

## 1. Specification Parameter

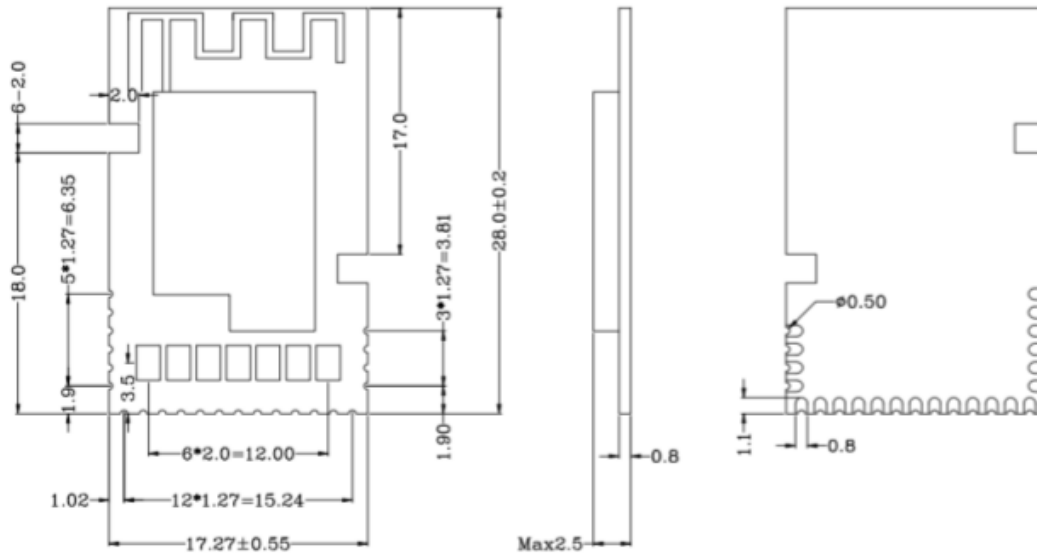
Form 1-1 Module Working Parameter<sup>1</sup>

Major Parameter	Performance <sup>1</sup>			Remarks
	Min. Value	Typical Value	Max. Value	
Working Voltage (V)	2.0	3.3	3.6	
Working Temperature (°C)	-40	-	85	
Initial Frequency Deviation (KHz)	-40	-	+40	
Working Frequency Range (MHZ)	2402		2480	The customer can customize the working frequency
Transmit power (dBμV /m)		95.08		The customer can customize the transmit power
Receiving sensitivity (dBm)	-	-95	-	FSK modulation, PER <1%; Deviation:38KHz, Data rate: 10KBaud
Communication rate kBaud	1.2	-	500	2-FSK can be customized by the user
Ways of modulation	2-FSK			The programming may be customized by the user
Type of interface	Stamp hole			
Overall dimensions (mm)	(Refer to Drawing 2-1 for more information)			-
Dimension accuracy	Grade GB / T 1804-C			In conformity with the requirements of dimensional tolerance Grade C

<sup>1</sup> The above testing conditions are as follows: temperature: 25°C, center frequency: 2433MHz and working voltage: 3.3V

## 2. Dimensional Drawing and Interface Description

### 2.1 Module Dimensional Drawing



Drawing 2-1 Dimensional Drawing for LSD4RF0436-10D0 PCBA (Unit: mm)

### 2.2 Real Module Drawing



Drawing 2-2 Real Module Drawing for LSD4RF0436-10D0

### 2.3 Interface Description

The following figure shows the serial number of the pins of the module and describes the corresponding pins:

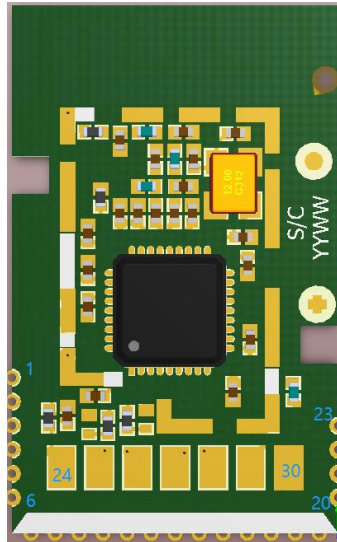


Table 2-1 Functional Description of Pins of LSD4RF-10D0 Module

Module Pin	Name	Function	Remarks
1	VDD	Power supply	
2	D_CLK	Programmed	
3	D_DATA	Programmed	
4	RST	Reset	
5	GND	Ground	
6	GND	Ground	
7	GND	Ground	
8	P1_5	GPIO	
9	P1_4	GPIO	
10	P1_3	GPIO	
11	P1_2	GPIO	
12	GND	Ground	
13	GND	Ground	
14	GND	Ground	
15	GND	Ground	
16	RX	UART RX	
17	TX	UART TX	
18	GND	Ground	
19	GND	Ground	

20	GND	Ground	
21	GND	Ground	
22	GND	Ground	
23	VDD	Power supply	
24	RST	Reset	
25	P1_3	GPIO	
26	P1_2	GPIO	
27	RX	RX	
28	TX	TX	
29	VDD	Power supply	
30	GND	Ground	

### 2.4 PCB antenna instructions

The module has an on-board PCB antenna. During the layout of the board, please make sure the area right below the antenna is completely clear, as shown in the following figure. The red part is the user's backplane area or the copper-clad area, the grey part is the clear area of the antenna of the user's backplane, and the boundary point of the clear area is the upper edge of the shielding cover. Make sure there is no any metal in 360 degrees around the antenna; otherwise, the radiation efficiency of the antenna will be affected, and the communication distance will be greatly affected.

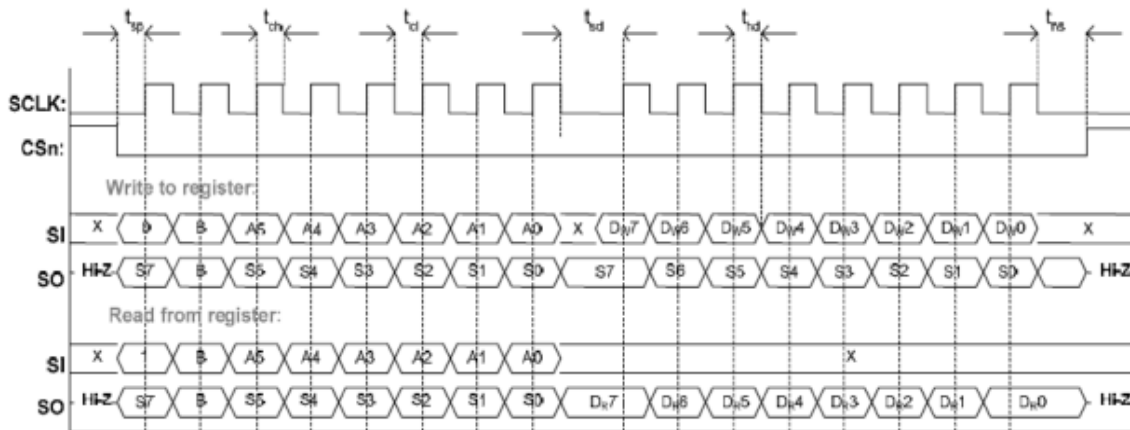


Drawing 2-3 Description of Clear Area of Antenna

### 3. Basic Operation

The module is installed on the user's product. Since the module is equipped with MCU, it can be

directly operated via the built-in MCU control register and the transceiver buffer, which can complete the receiving function of wireless data. The read-write operation timing sequence of the module register is shown in the drawing. For more operation information, please refer to the latest data manual CC2510.



Drawing 3-1 SPI Timing Sequence

## 4. Frequently Asked Questions

### 4.1 The communications cannot be made if the module is at close range

- To verify whether the sending and receiving configurations are matching and the communications cannot be made if the configurations are different.
- The voltage is abnormal; and the transmission will be abnormal if the voltage is too low.
- The battery is low; and the transmission will be abnormal if the voltage is lowered due to the low volume battery.
- The RF signal does not reach the antenna or  $\pi$  circuit soldering occurs error if antenna welding is abnormal.

### 4.2 Module communication distance is not enough

- The power transmitted is small due to bad antenna impedance matching.
- Objects such as metal around the antenna or the metal inside the module may cause serious signal attenuation.
- Any other interference signals in the test environment may cause the module to communicate close.



- Insufficient power supply will make the module's transmit power abnormal.
- Harsh test environment will make signal attenuation greater.
- When the module communicates with other end after passing through the wall, the wall will have a great impact on signal attenuation. The signal will be attenuated greatly when most of signals are passing through the wall.
- If the module is too close to the ground, resulting in poor communication due to being absorbed and reflected.

## **5. Notation of Annexes**

1. Recommended to use DC stabilized power supply to power for the module. The power ripple coefficient should be as close as possible and the module needs to be reliably grounded. Please be noted that the positive and negative poles of power supply shall be correctly connected. The module may be permanently damaged if connected reversely.
2. Prohibited to have any metal objects around the module antenna. Otherwise, the communication distance may be seriously affected.

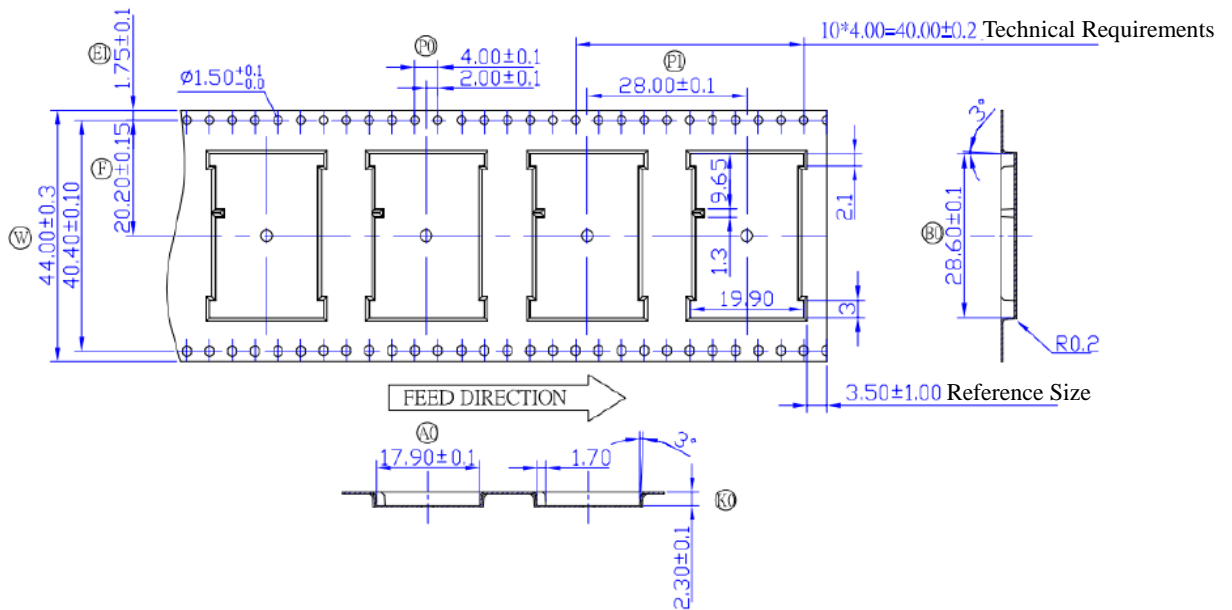
## 6. Packing

### 6.1 Ways of Packing

■ Roll

□ Foam

□ ESD bag



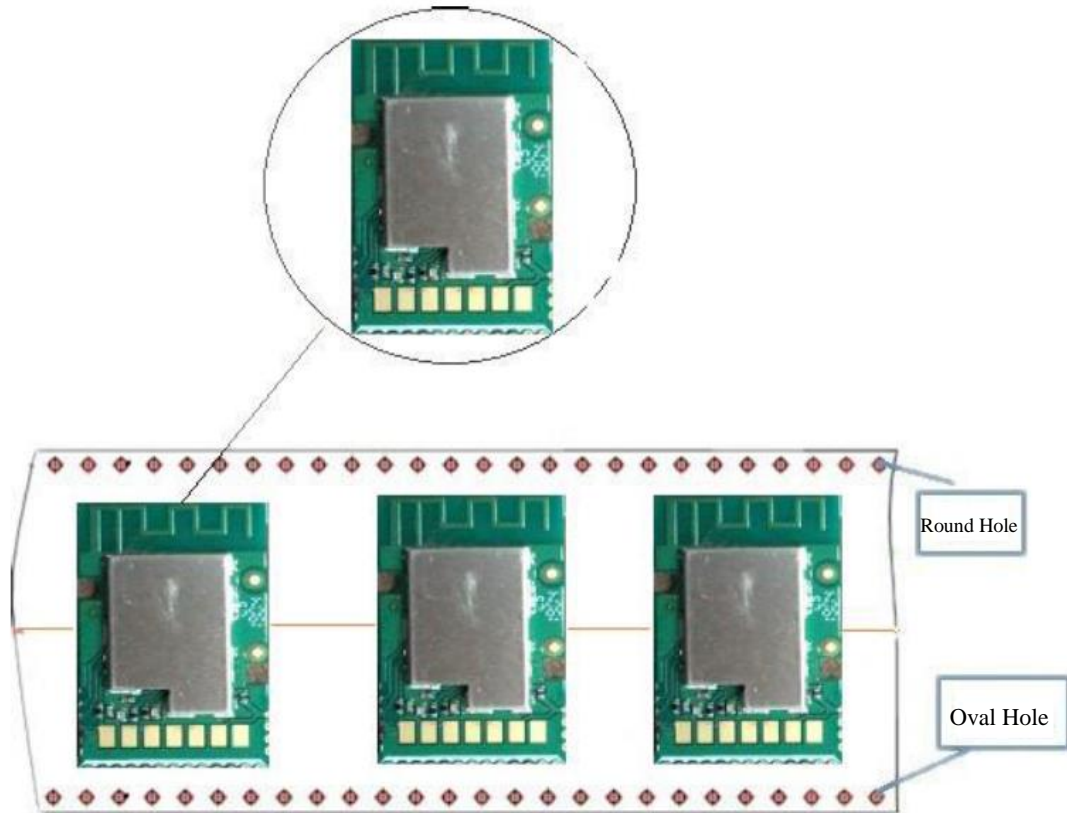
W	44.00±0.3
E1	1.75±0.1
F	20.20±0.15
P0	4.00±0.1
P1	28.00±0.1
A0	17.90±0.1
B0	28.60±0.1
K0	2.30±0.1

#### Technical requirements

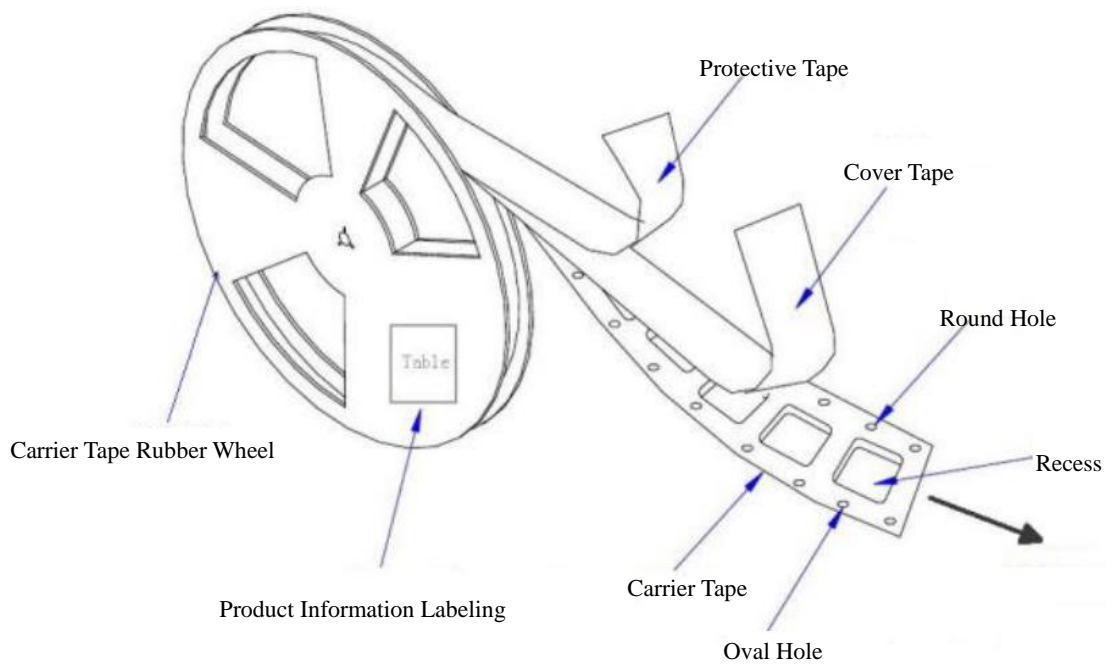
1. The accumulative error per 10 drive holes should be within±0.2;
2. The inner bending of 250MM shall not be higher than 1;
3. Loaded with the materials: black PS and thickness: 0.30±0.05;
4. Surface impedance ranges from  $10^6$  to  $10^{11}$  Ohm;
5. 23.5m per reel and packed in 13" plastic tray; the number of elements accommodated:800 Pcs;
6. A0 and B0 shall be subject to the measurement made at the place 0.3mm away from the lowest bottom inside the cavity, K0 is the inner depth and R angle unmarked is 0.3;
7. The product complies with Standard EIA-481 ;
8. Product requirements comply with "ROHS".

Drawing 6-1 Roll Dimensional Drawing

The diagram of roll wrapping module placement direction is as follows:



Drawing 6-2 Schematic Diagram of Module Placement



Drawing 6-3 Packaging Diagram

## **Regulatory Module Integration Instructions**

### **2.2 List of applicable FCC rules**

This device complies with part 15.247 of the FCC Rules.

### **2.3 Summarize the specific operational use conditions**

This module can be used in Industrial remote sensing, telemetry communication ,Home wireless security alarm system. The input voltage to the module should be nominally 2.0~3.6 V<sub>DC</sub> ,typical value 3.3VDC and the ambient temperature of the module should not exceed 85°C . This module using only one kind of antennas with maximum gain is 0.5dBi .Other antenna arrangement is not covered by this certification.

The antenna is not field replaceable. If the antenna needs to be changed, the certification should be re-applied.

### **2.4 Limited module procedures**

Not applicable

### **2.5 Trace antenna designs**

Not applicable

### **2.6 RF exposure considerations**

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. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by§.1093.

### **2.7 Antennas**

Module only contains one PCB antenna. No additional external connectors.

### **2.8 Label and compliance information**

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: “Contains Transmitter Module FCC ID: 2AOFDLSD4RF043610D0 ”,or “Contains FCC ID: 2AOFDLSD4RF043610D0 ”, Any similar wording that expresses the same meaning may be used.

## 2.9 Information on test modes and additional testing requirements

a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected.

Below are steps for TX verification:

```
RfTest();    // RF parameter configuration
STX();      //Set RF to send mode
SIDLE()     // Set RF to IDLE mode ,stop sending data
```

## 2.10 Additional testing, Part 15 subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B

criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

### **Frequency spectrum to be investigated**

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

### **Operating the host product**

When testing the host product, all the transmitters must be operating. The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.

When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.

The product under test is set into a link/association with a partnering WLAN device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content.

**FCC Statement**

Any Changes or modifications not expressly approved by the party responsible for compliance 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 attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further

The product under test is set into a link/association with a partnering WLAN device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content. **ISED RSS Warning:**

This device complies with Innovation, Science and Economic Development 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.

Le présent appareil est conforme aux CNR d'ISED 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.

IC Label Instructions:

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module IC: 25210-LSD043610D0", or "Contains IC: 25210-LSD043610D0", Any similar wording that expresses the same meaning may be used.

L'extérieur des produits finis contenant ce module doit afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut utiliser des libellés tels que: contient le module émetteur IC: 25210-LSD043610D0 "ou" contient: IC: 25210-LSD043610D0 ", tout libellé similaire exprimant le même sens peut être utilisé.