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GPS Tracking Solutions

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AVL-300 CDMA

Automatic Vehicle Tracking Device

USER MANUAL

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0. Revision history

Revision	Date	Author	Description of change
1.00	2014-09-01	York Zhu	Initial
1.01	2015-09-10	York Zhu	Update the related information about Introduction

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1. Introduction

The GV300VC is a compact GPS tracker designed for a wide variety of vehicle tracking applications. It has multiple I/O interfaces that can be used for monitoring or controlling external devices. Its built-in GPS receiver has superior sensitivity and fast time to first fix. Its dual band CDMA2000-1x allows the GV300VC's location to be monitored in real time or periodically tracked by a backend server and mobile devices. Its built-in 3-axis accelerometer allows driving behaviour monitoring, motion detection and extended battery life through sophisticated power management algorithms. System integration is straightforward as complete documentation is provided for the full featured @Track protocol. The @Track protocol supports a wide variety of reports including emergency, geo-fence boundary crossings, driving behaviour, low battery and scheduled GPS position.

1.1. Reference

Table 1: AVL-300 CDMA Protocol Reference

SN	Document name	Remark
[1]	AVL-300 CDMA @Track Air Interface Protocol	The air protocol interface between AVL-300 CDMA and backend server.

1.2 Terms and Abbreviations

Table 2: Terms and Abbreviations

Abbreviation	Description
AGND	Analog Ground
AIN	Analog Input
DIN	Digital Input
DOUT	Digital Output
GND	Ground
RXD	Receive Data
TXD	Transmit Data
NC	No Connection

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2. Product Overview

2.1. Check Parts List

Before starting, check whether all the following items have been included with your AVL-300 CDMA. If anything is missing, please contact your supplier.

Figure 1: Appearance of AVL-300 CDMA

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2.2. Parts List

Table 3: Parts List

Name	Picture
AVL-300 CDMA Locator	80*49*26 mm
User Cable	
GPS Antenna (Optional)	
DATA_CABLE_M (Optional)	

2.3. Interface Definition

The AVL-300 CDMA has a 16 PIN interface connector. It contains the connections for power, I/O, RS232, microphone, speaker, etc. The sequence and definition of the 16PIN connector are shown in following figure:

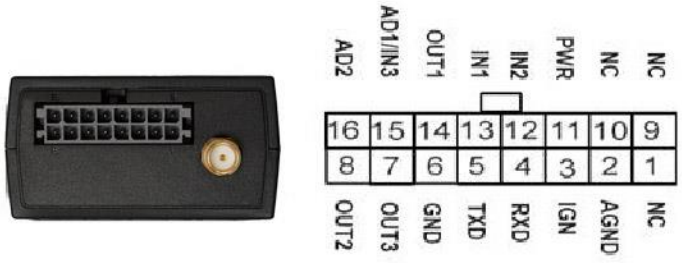

Figure 2: The 16 PIN connector on the AVL-300 CDMA

Table 4: Description of 16 PIN Connections

Index	Description	Comment
1	NC	Leave it floating
2	AGND	Analog ground
3	IGN	Ignition input, positive trigger
4	RXD	UART RXD, RS232
5	TXD	UART TXD, RS232
6	GND	Power and digital ground
7	OUT3	Open drain, 150 mA max
8	OUT2	Open drain, 150 mA max
9	NC	Leave it floating
10	NC	
11	PWR	External DC power input, 8-32V
12	IN2	Digital input, negative trigger
13	IN1	Digital input, negative trigger
14	OUT1	Open drain, 150 mA max ,with latch circuit
15	AD1/IN3	Multifunction input, analog or digital input 0-16V
16	AD2	Analog input 0.3-16v

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2.4. AVL-300 CDMA User Cable Color

Table 5: AVL-300 CDMA User Cable Color Definition

Definition	Color	PIN No	Cable	PIN No	Color	Definition
OUT2	Yellow	8		16	Brown/White	AD2
OUT3	Brown	7		15	Green	AD1/IN3
GND	Black	6		14	Blue	OUT1
TXD	White/Black	5		13	Orange	IN1
RXD	Green or Pink	4		12	Orange/Black	IN2
IGN	White	3		11	Red	PWR
AGND	Gray/Black	2		10	Purple/White	N/C
N/C	Gray	1		9	Purple	N/C

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3. Getting Started

3.1. Opening the Case

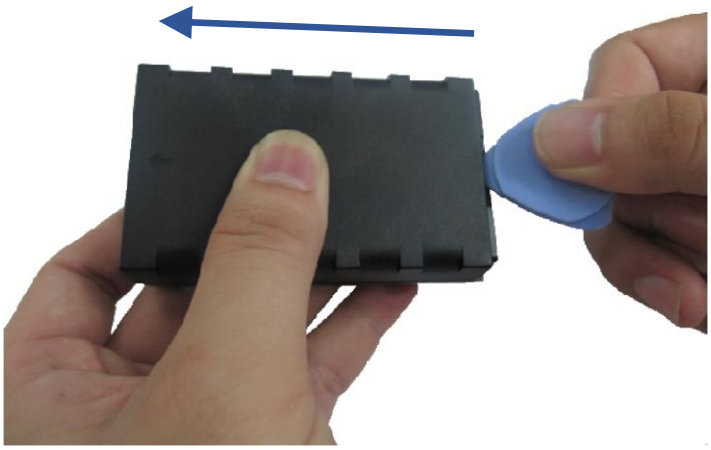

Figure 3: Opening the Case

Insert the triangular-pry-opener into the gap of the case as shown below, push the opener up until the case unsnaps.

3.2. Closing the Case

Figure 4: Closing the Case

Place the cover on the bottom in the position as shown in the following figure. Slide the cover against the direction of the arrow until it snaps.

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3.3. Installing the Internal Backup Battery

AVL-300 CDMA has an internal backup Li-ion battery.

Figure 5: Backup Battery Installation

3.4. Switch ON the Backup Battery

To use the AVL-300 CDMA backup battery, the switch must be in the ON position. The switch on the case and ON/OFF position are shown below.

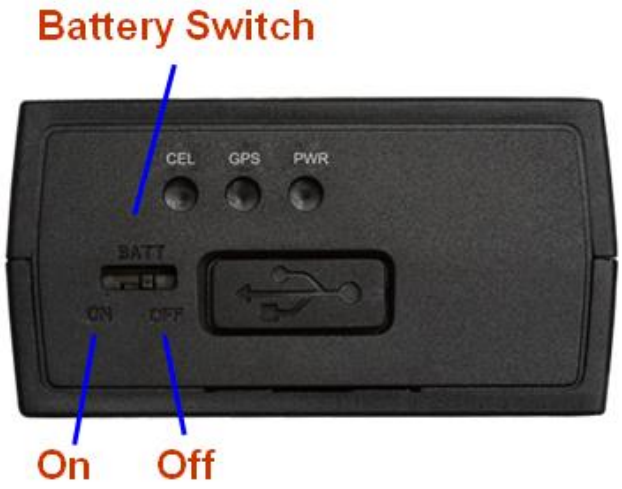

Figure 6: Switch and ON/OFF position

Note:
1-The switch must be in the “OFF” position when the AVL-300 CDMA is shipped on an aircraft.
2-When the switch is in the “OFF” position, the battery cannot be charged or discharged.

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3.5. Installing the External GPS Antenna (Optional)

There is a SMA GPS antenna connector on AVL-300 CDMA. The AVL-300 CDMA will automatically detect and use an external antenna when connected.

Figure 7: GPS Antenna of AVL-300 CDMA

3.5.1. GPS Antenna Specification

Table 6: GPS Antenna Specification

GPS antenna:	Specification
Frequency	1575.42MHz
Bandwidth	>5MHz
Beam width	>120 deg
Supply voltage	2.7V - 3.3V
Polarization	RHCP
Gain	Passive: 0dBi min Active: 15dB
Impedance	50Ω
VSWR	<2
Noise figure	<3

3.6. Power Connection

PWR (PIN12) / GND (PIN6) are the power input pins. The input voltage range for this device is from 8V to 32V. The device is designed to be installed in vehicles that operate on 12V or 24V systems without the need for external transformers.

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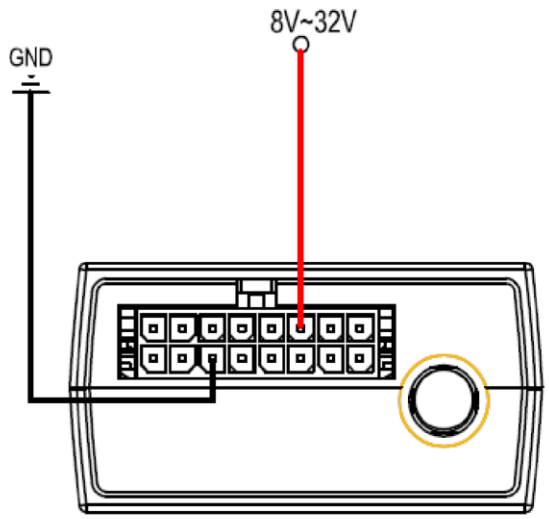

Figure 8: Typical Power Connection

3.7. Ignition Detection

Table 7: Electrical Characteristics of Ignition Detection

Logical State	Electrical State
Active	5.0V to 32V
Inactive	0V to 3V or Open

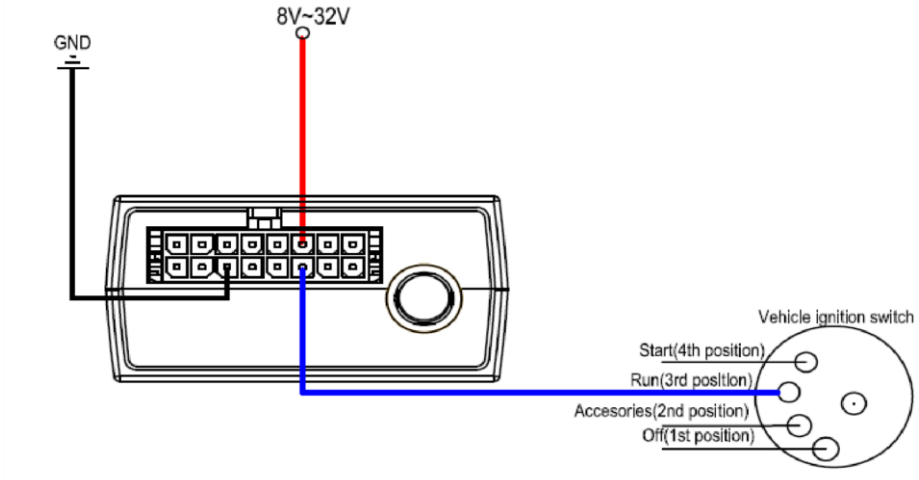

Figure 9: Typical Ignition Detection

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IGN (Pin3) is used for ignition detection. It is strongly recommended to connect this pin to ignition key "RUN" position as shown above. If you do not connect the ignition detection, not all functions of the device will be available.

An alternative to connecting to the ignition switch is to find a non-permanent power source that is only available when the vehicle is running. For example, the power source for the FM radio.

IGN signal can be configured to start transmitting information to backend server when ignition is on; and enter power saving mode when ignition is off.

3.8. Digital Inputs

There are three general purpose digital inputs on AVL-300 CDMA. They are all negative trigger.

Table 8: Electrical Characteristics of the Digital Inputs

Logical State	Electrical Characteristics
Active	0V to 0.8V
Inactive	Open

The following diagram shows the recommended connection of a digital input.

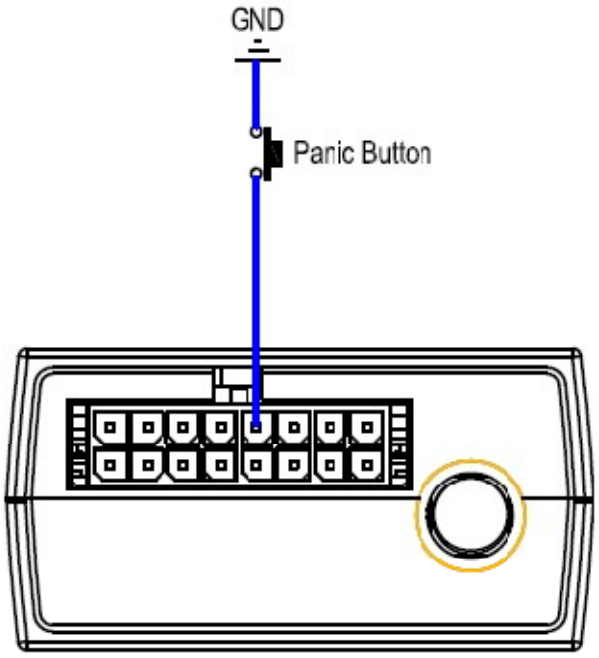

Figure 10: Typical Digital Input Connection

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3.9. Analog Inputs

There are two analog inputs on AVL-300 CDMA, the analog input voltage range is from 0 to 16V.

The following diagram shows the recommended connection.

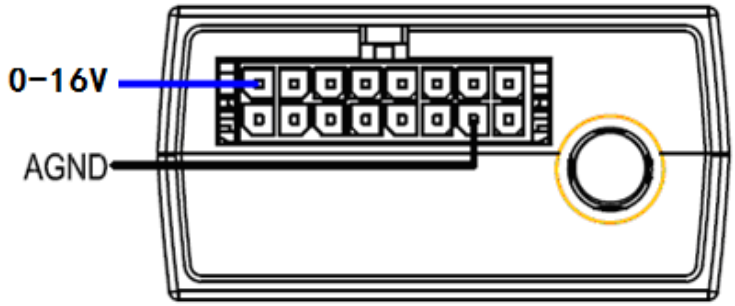

Figure 11: Typical Analog Input Connection

Note: PIN 15 is a multifunction pin: it can be configured as a digital input or an analog input.

3.10. Digital Outputs

There are three digital outputs on AVL-300 CDMA. All are of open drain type and the maximum drain current is 150 mA. Each output has the built-in over current and recovery PTC resettable fuse.

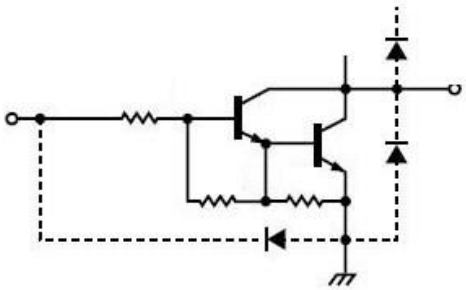

Figure 12: Digital Output Internal Drive Circuit

Table 9: Electrical Characteristics of Digital Outputs

Logical State	Electrical Characteristics
Enable	<1.5V @150mA
Disable	Open drain

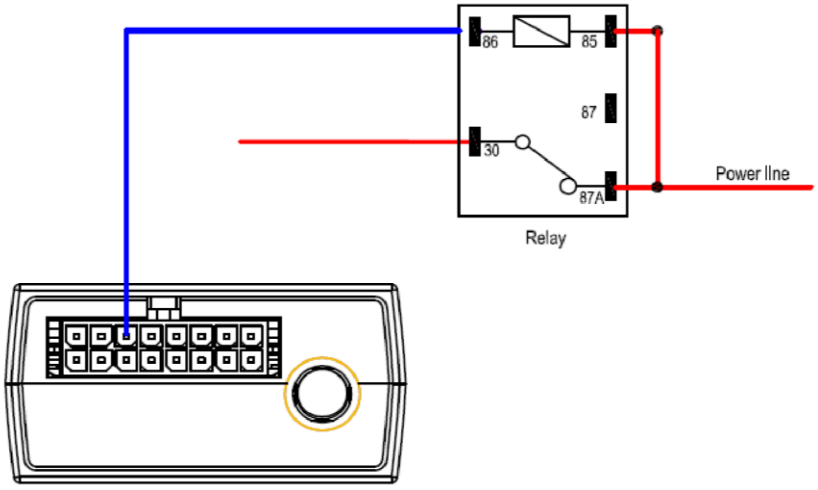

Figure 13: Typical Connection with Relay

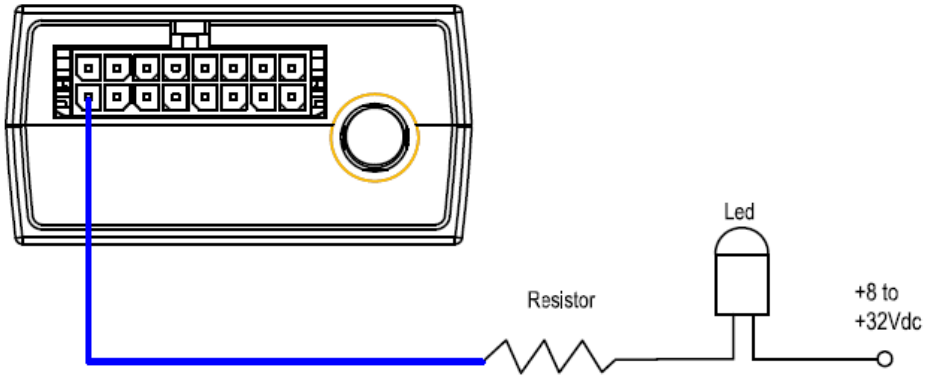

Figure 14: Typical Connection with LED

Note:

1. OUT1 will latch the output state during reset.
2. Many modern relays come with a flyback diode pre-installed internal to the relay itself. If the relay has this diode, ensure the relay polarity is properly connected. If this diode is not internal, it should be added externally. A common diode such as a 1N4004 will work in most circumstances.

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3.11. Device Status LED

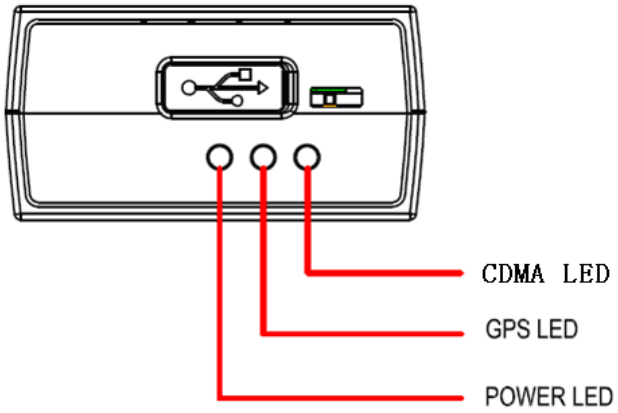

Figure 15: AVL-300 CDMA LED on the Case

Table 10: Definition of Device Status and LED

LED	Device status	LED status
CELL (note 1)	Device is searching CDMA2000 network.	Fast flashing (Note 3)
	Device has registered to CDMA2000 network.	Slow flashing (Note 4)
GPS (note 2)	GPS chip is powered off.	OFF
	GPS sends no data or data format error occurs.	Slow flashing
	GPS chip is searching GPS info.	Fast flashing
	GPS chip has gotten GPS info.	ON
PWR (note 2)	No external power and internal battery voltage is lower than 3.35V.	OFF
	No external power and internal battery voltage is below 3.5V.	Slow flashing
	External power in and internal battery is charging.	Fast flashing
	External power in and internal battery is fully charged.	ON

Note:

1. CDMA2000 LED cannot be configured.
2. GPS LED and PWR LED can be configured to turn off after a period of time using the configuration tool
3. Fast flashing： for CELL LED is about 60 ms ON/780 ms OFF; for GPS LED and PWR LED is about 100 ms ON/100 ms OFF
4. Slow flashing: for CELL LED is about 60 ms ON/1940 ms OFF; for GPS LED and PWR LED is about 600 ms ON/600 ms OFF.

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3.12. Serial Port / UART Interface

There are two lines dedicated to the Serial Port / UART interface (TXD and RXD).TXD / RXD are standard RS232 signal.

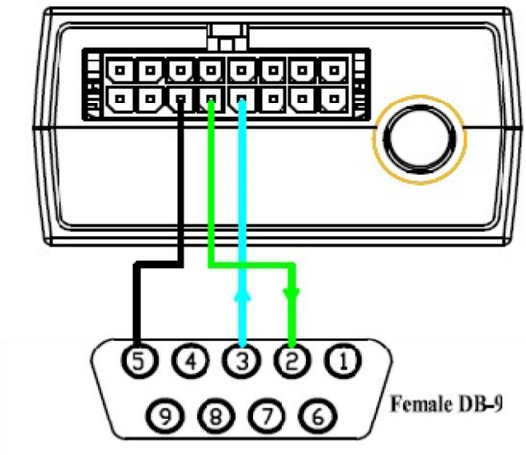

Figure 16: Typical Audio Connection

3.12.1. Connect with Garmin GPS Set

AVL-300 CDMA can communicate with Garmin GPS set. The following typical connection is using the AG100 cable.

Figure 17: AVL-300 CDMA Connection with Garmin GPS Set

Note: Some versions of AVL-300 CDMA can connect with Garmin GPS set by Garmin FMI10/FMI15 cable. Please consult manufacturer for detail information.

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3.12.2. Connect with CAN100 Device

AVL-300 CDMA can communicate with CAN100 device. Only for the serial ports of CAN100 device is RS232. The following picture shows the external interface of CAN100 device. Refer to Figure 19.

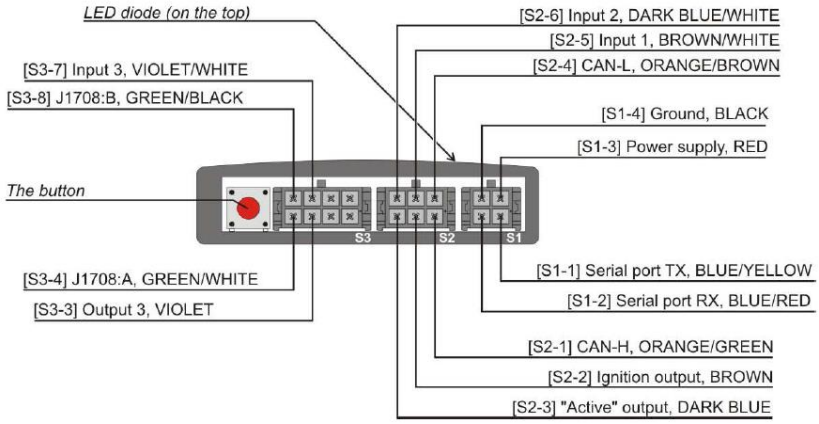

Figure 18: The External Interface of CAN100 Device

The following Table 11 shows the definition of CAN100 device's external interface.

Table 11: External Interface of CAN100 Device

Pin No.	Pin Name	Cable Color
S1-1	TX	Blue/Yellow
S1-2	RX	Blue/Red
S1-3	Power Supply	Red
S1-4	Ground	Black

The following Table 12 shows the definition of CAN100 device's external interface.

Table 12: CAN100 Device Connect with AVL-300 CDMA

AVL-300 CDMA				CAN100		
Pin No.	**Pin Name**	**Color**	**Connection**	**Pin No.**	**Pin Name**	**Color**
4	RXD	Green or Pink	←----→	S1-1	TX	Blue/Yellow
5	TXD	White/Black	←----→	S1-2	RX	Blue/Red
11	Power	Red	←----→	S1-3	Power Supply	Red
6	Ground	Black	←----→	S1-4	Ground	Black

Note: How to distinguish the CAN100 device's serial port is RS232 or TTL, Please refer to CAN100 specification

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RF Exposure Statement:

For the product, under normal use condition is at least 7.1cm away from the body of the user the user must keep at least 7.1cm distance to the product.

This device complies with Part 15 of the FCC Rules. Its 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.

Note:

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This product has been tested and found to comply with the limits for Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This product 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 product 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.

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