



Intended use and major functionalities

The Keep Truckin LBB-3.5CA is primarily an ELD (Electronic Logging Device). It connects to a light-duty truck OBD-II port, a heavy-duty truck diagnostic interface, or a dedicated telematics device interface, in order to log driving hours for driver hours-of-operation rules. It collects data from the vehicle such as engine RPM, road speed, VIN, etc. It synchronizes that data with a companion app running on an iOS or Android companion via Bluetooth at the 2.4 GHz unlicensed frequency band. The companion app uses the companion device connectivity to upload most data to our cloud platform rather than our on-device LTE connection. Our LTE connection is primarily used for some low-priority data and occasional video upload, triggered by on-device sensors. WiFi will be used to enable 802.11 b/g/n hot spot functionality (confined to the 2.4 GHz band). The product will bridge the WiFi connection to LTE in order to provide Internet connection services to connected companion device.

Bundled accessories

The product is shipped with a vehicle-specific cable for connecting to OBD-II, 6-pin diagnostic, 9-pin diagnostic, or telematics port, as appropriate.

Typical operating environment

This product is always used in a motor vehicle - typically a heavy-duty truck or bus.

Operational conditions and extremes

LBB-3.5CA is designed to operate in temperatures ranging from -20 to +115 degrees C, with input voltages ranging from 12V DC to 24V DC.

Product dimensions

111.4mm long by 97.8mm wide by 26mm tall.

External interfaces

- 1x USB Type A
- 1x 15-pin connector for power, ground, and vehicle communications interfaces

RF functions

- LTE with 3G fall-back
- 2.4 GHz Bluetooth v4.2
- 2.4 GHz 802.11n WiFi

WiFi channel plan

WiFi will be configured to use only 802.11n as an Access Point, with 20 MHz wide channels.

We do not configure WiFi channel parameters with our device firmware. We simply load a version of the WiFi module firmware which does not support manual channel control (there is a different version of firmware that enables specific channel and power control for test and certification purposes). Exact channel and power configuration for the firmware comes from a US and Canada-specific calibration file provided by LSR (brcmfmac43430-sdio-fcc.txt). Here is the detail from that calibration file:

Channel	Tx Power
1	14
2	14
3	14
4	14
5	14
6	14
7	14
8	14
9	14
10	13
11	12
12	Unused
13	Unused
14	Unused

potential SW/FW control of RF parameters

In order to change RF parameters, the firmware and calibration files would need to be changed in the Linux file system on the device. This is not exposed to users (no UI is

exposed to users other than two LEDs), and is protected by an unshared root password as well as difficulties of physical access (no way to access shell without custom wiring

RF Band	Transmit Band (Tx)	Receive Band (Rx)	Maximum Output Power
LTE B2	1850 to 1910 MHz	1930 to 1990 MHz	23 dBm ($\pm$ 2dBm) Class 3bis
LTE B4	1710 to 1755 MHz	2110 to 2155 MHz	+23 dBm ($\pm$ 2dBm) Class 3bis
LTE B5	824 to 849 MHz	869 to 894 MHz	23 dBm ($\pm$ 2dBm) Class 3bis
LTE B13	777 to 787 MHz	746 to 756 MHz	23 dBm ($\pm$ 2dBm) Class 3bis
LTE B17	704 to 716 MHz	734 to 746 MHz	23 dBm ($\pm$ 2dBm) Class 3bis
UMTS B2	1850 to 1910 MHz	1930 to 1990 MHz	23 dBm ($\pm$ 2dBm) Class 3bis
UMTS B5	824 to 849 MHz	869 to 894 MHz	23 dBm ($\pm$ 2dBm) Class 3bis

as well as root credentials).

possible simultaneous transmission configurations

Bluetooth and WiFi are provided by a single module with one RF path. The module cannot transmit WiFi and Bluetooth at the same time as a result.

LTE is separate from BT/WiFi, and there is no control mechanism to prevent LTE from transmitting at the same time as BT or Wifi. Thus, the following combinations are possible:

LTE/3G + WiFi

LTE/3G + Bluetooth

information about all used antennas

All antennas are internal, and the properties are as follow:

Technology	Tx/Rx	Avg Gain	Max Gain	Frequency	Type
GNSS	Rx only	-2.5 dBi @ zenith	3 dBi	1575.42 +/- 1.023 MHz	Active Ceramic Patch with Front-End SAW Filter
BT/WiFi	Tx/Rx	-1.0 dBi	1.5 dBi	2.4 - 2.48 GHz	Ceramic SMD
LTE Main	Tx/Rx		4.4 dBi	704 - 894 MHz 1710-2155 MHz	FPC over plastic form
LTE Diversity	Tx/Rx		3.7 dBi	704 - 894 MHz 1710-2155 MHz	FPC over plastic form

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Details about integrated pre-certified modules

FCC ID: N7NHL7588 / IC: 2417C-HL7588 - Sierra Wireless HL7588 LTE module

FCC ID: TFB-1003 / IC: 5969A-1003 - LSR Sterling-LWB BT/WiFi module

RF exposure related information

The product is designed to be semi-permanently mounted on top of a vehicle dashboard. It should always be considerably further from users than 20cm. Typical usage would have 1 meter of separation between the user and the product.

Documentation of test HWSW

A special WiFi firmware which enabled test modes was used for testing WiFi along with the WL Linux utility.

For Bluetooth, the module was placed into test mode, and the module was subsequently controlled via a test box connected via Bluetooth.

Factory Tune-Up procedure

Cellular:

- No tune up procedure/steps are taken during time of manufacture/device configuration. These settings remain unchanged.