

# Laird Range Testing

## BL652 Development Kit

*Application Note*

*v1.0*

### 1. INTRODUCTION

Bluetooth Low Energy is designed for use within Personal Area Networks (PANs). A BLE connection is typically only meant to cover a maximum range of 30 meters and is often meant for much shorter distances.

However, BLE connections are capable of a greater range than advertised. In fact, in recent Bluetooth field testing, a Laird engineer was able to sustain communications up to almost 115 meters with the BL652 development kit and the Nexus 6.0 smartphone (running the Laird Toolkit).

This paper describes the setup, procedure, and results of the successful long-range Bluetooth testing. For this testing, we used a BL652-SA (-SA indicates an on-board antenna) mounted on a Laird DVK-BL652 development board.

### 2. TEST HARDWARE

BL652 Development Kit (DVK-BL652-SA):

- BL652-SA module:
  - Loaded with *smartBASIC* runtime engine FW v.28.6.1.2
  - With final RF matching circuit, antenna tuning values, and RF shield can; fitted at assembly (no hand-soldering)
- DVK-BL652 development board:
  - R111 OR removed (disconnected nReset line from Atmel MCU to the BL652) to be in-line with production development board
  - With jumpers in default production settings
- Running the health thermometer service – available from:  
<https://github.com/LairdCP/BL652-Applications/blob/master/Applications/htss.health.thermometer.sensor.custom.sb>

This mobile kit's connection strength was tested with the Nexus 6.0, running the Laird Toolkit (v.4.18.1.13).

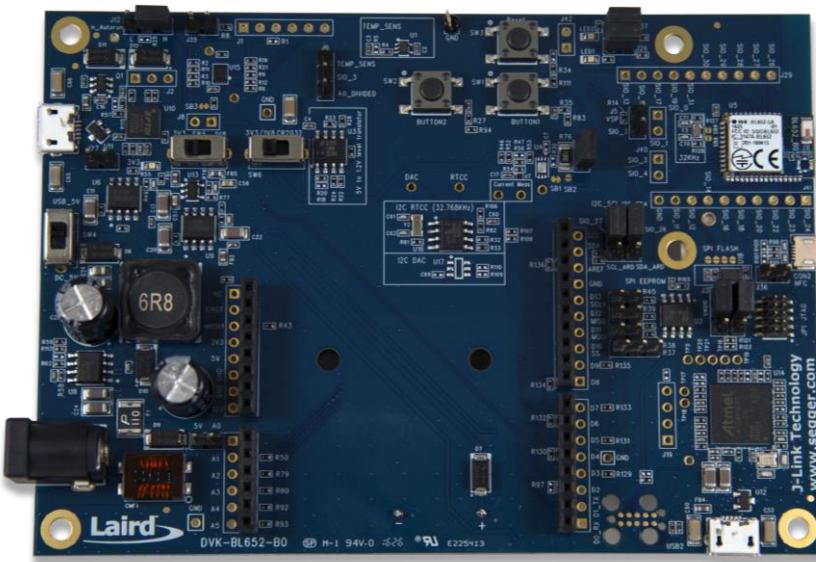
### 3. TEST PROCEDURE

The test procedure was as follows:

#### BL652 Development Kit

##### Development Board Orientation

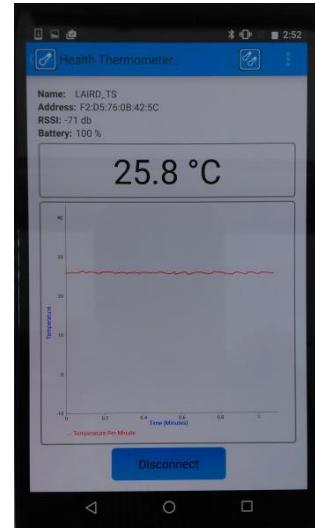
Facing the Nexus 6.0 (in the right column) as shown below:



#### Nexus 6.0

##### Nexus 6.0 Orientation

Facing the BL652 development board (in the left column) as shown below:



##### Development Board Set-up

- Connected the BL652 development board to a laptop (it remained stationary during the test).
- USB1 connector was held in the left hand; laptop in the right hand.

##### Nexus 6.0 Set-up

- Placed on a clipboard/A4 book; *not* held in hand.

##### Process

- Walked the Nexus away from the development board.
- At regular separation distances, operator of the development board placed a finger on the development board temperature sensor circuitry (shown below) to change the temperature.



- With the Nexus facing *towards* the development kit, viewed the screen to see if the temperature update came through; Nexus updates the temperature change.  
The laptop (on the development board end) should be displaying the temperature data going over BLE.

## 4. TEST RESULTS

The total distance of effective communication was 115 meters (ran out of land to go any further). This distance was accomplished only when both the development board and the Nexus device were facing each other. The range was slightly shorter when one or the other or both were facing away from the other device.



DVK-BL652-SA stationary, connected to laptop.  
Held at USB1 connector in left hand, laptop held in right hand.

Nexus 6.0 moved (walked) away.

## REVISION HISTORY

Version	Date	Notes	Approver
1.0	14 Dec 2016	Initial Release	Raj Khatri