Qualcomm Technologies, Inc.

QSPR for CSR8811

Setup Guide

80-YA723-2 Rev. A

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Revision history

Revision	Date	Description
A	August 2016	Initial release

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1 **Purpose**

This document describes how to perform Bluetooth CSR8811 XTAL calibration and RF tests using the Qualcomm® Sequence Profiling Resource (QSPR) and factory test mode (FTM) commands by Qualcomm Radio Control Toolkit (QRCT).

FCC NOTICE: This kit is designed to allow:

(1) Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and

(2) Software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of the FCC's rules, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of the FCC's rules.

2 **Prerequisites**

Obtain the BTDiag ipk file from QCA_Networking_2016-SPF-3-0_CSU1 and QDART files from CreatePoint at
https://createpoint.qti.qualcomm.com/tools/#suite/0b0100398103fd8c/0b0100398211b99a

The latest version of QDART is 1.0.40.3 for SPF-3.0.CSU1.

3 **BTDiag**

After installing the BTDiag ipk file, the BTDiag program is located in the /usr/sbin directory. Enter the following command to listen to connections on port 2390.

```
root@OpenWrt:/# cd usr/sbin/
root@OpenWrt:/usr/sbin# ./Btdiag UDT=yes PORT=2390 IOType=SERIAL BT-
DEVICE=/dev/ttyQHS0 BT-BAUDRATE=115200 QDARTIOType=ethernet
```

The device node for high speed UART is ttyQHS0 in the SPF-3.0 release. BTDiag sets crystal as 26MHz, baud rate as 115200, and transport interface as H4. BTDiag is successful for initial CSR8811 and waits for the QDART connection as observed from the "Listening to sock at : 4Waiting for incoming connections..." message in Figure 1.

Figure 1 Listening for QDART connection

4 QDART – QSPR

QSPR for QDART provides the following two trees under **C:\Qualcomm\WCN\ProdTests\Test Trees\BT\CSR8811**.

- CSR8811_BT_XTAL_FTrim_Calibration.xtt—Responsible for XTAL calibration to get trimming cap value.
- CSR8811_BT_Non-Signaling.xtt—Responsible for RF non-signaling test about BR/EDR/LE Tx and Rx.

4.1 CSR8811_BT_XTAL_FTrim_Calibration.xtt

To perform XTAL calibration to get trimming cap value:

1. Configure the IP address and listening port of the DUT.

    The default IP address is 192.168.1.1. The default listening port is 2390, which is the same as the BTDiag setting.
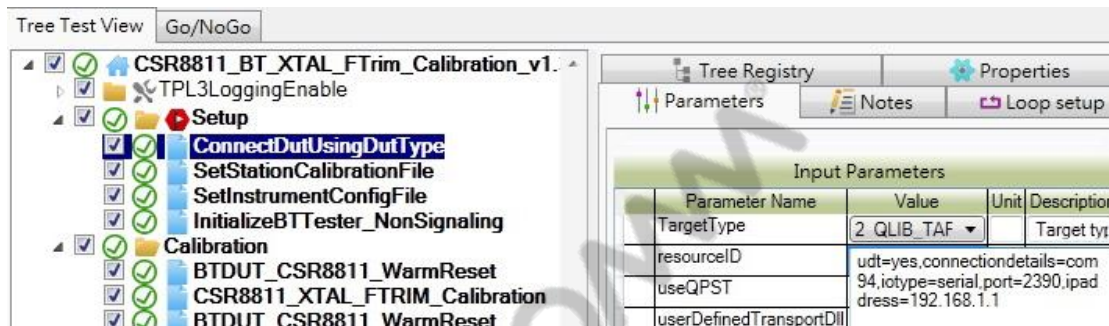

Figure 2 Test tree for ConnectDutUsingDutType

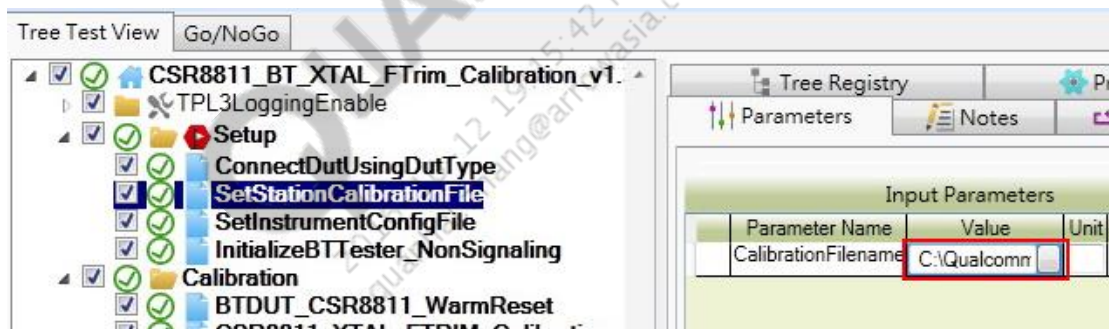2. Modify the SetStationCalibrationFile as shown in Figure 3.

Figure 3 Test tree for SetStationCalibrationFile

In this sample calibration file to set the station, the value is specified as C:\Qualcomm\WCN\ProdTests\StationCal for the CalibrationFilename parameter.

Figure 4 List of sample calibration files

Back up and modify the QTA_CalDataFile_Sample.xml first about path frequencies at 2402, 2440 and 2480 as shown in Figure 5.

```
<Path>
  <PathName>BTPath</PathName>
  <PathID>0</PathID>
  <AdditionalLoss>0</AdditionalLoss>
  <Cal_Date>7/18/2013 12:57 PM</Cal_Date>
  <TesterID>PC NAME</TesterID>
  <CalCable_PathName>CAL_CABLE</CalCable_PathName>
  <UseCalCable>false</UseCalCable>
  <DataList>
    <Data>
      <Frequency>2402</Frequency>
      <Value>2.19</Value>
      <Delta>0</Delta>
    </Data>
    <Data>
      <Frequency>2441</Frequency>
      <Value>2</Value>
      <Delta>0</Delta>
    </Data>
    <Data>
      <Frequency>2480</Frequency>
      <Value>2</Value>
      <Delta>0</Delta>
    </Data>
  </DataList>
</Path>
```
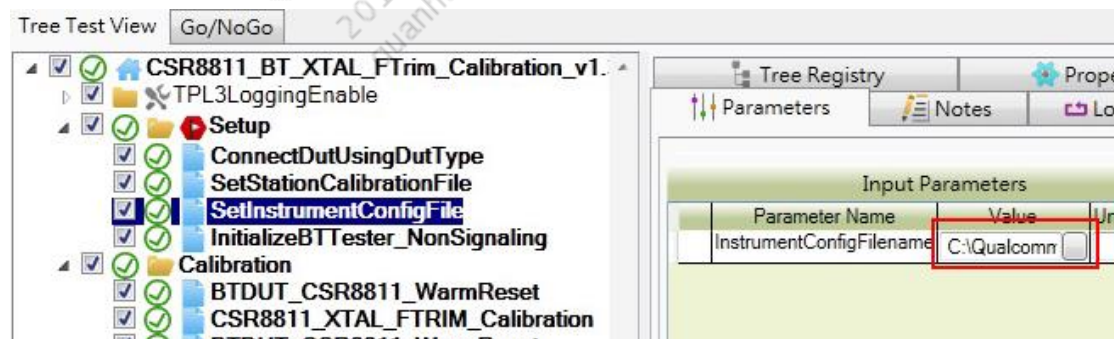
Figure 5 Modify path frequency values

3. Modify the SetInstrumentConfigFile as shown in Figure 6.

Figure 6 Test tree for SetInstrumentConfigFile

In this sample configuration file to set instrument, the value is specified as C:\Qualcomm\WCN\ProdTests\ConfigFiles\Sample for the InstrumentConfigFilename parameter.

Figure 7 List of sample configuration files to set instrument

In this example, the name of the instrument is Litepoint IQxel. In this case, modify IP address of IQxel first as shown in Figure 8. The default IP address is 192.168.100.254.

Figure 8 Modify the IP address of instrument

4. Configure the trimming setting, which includes the customized channel, number of averages, and initial start value.

In the following example, if trimming cap value of most boards is approximately 22, modify start value as 22 to reduce test time as shown in Figure 9.
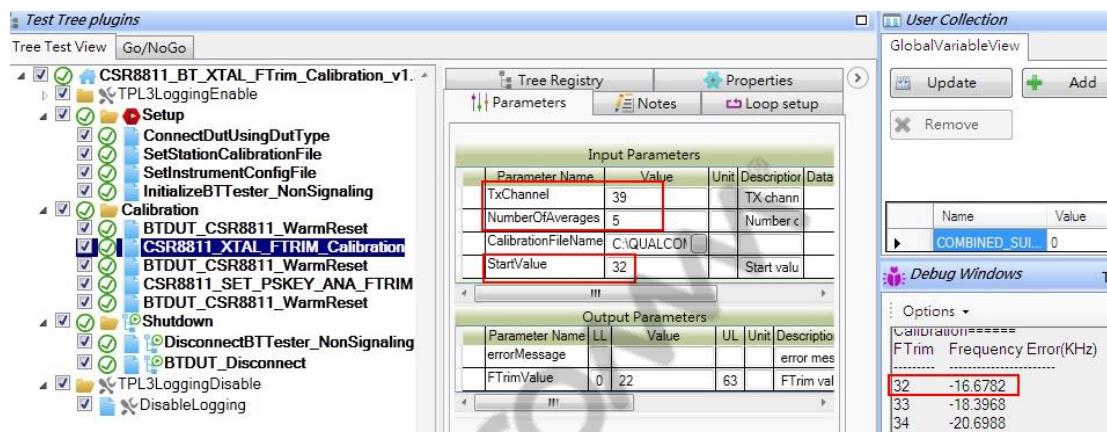

Figure 9 Configure trimming settings

5. Run QSPR. The PASSED message appears if QSPR is successful as shown in Figure 10.

The process of trimming cap value is in Debug Windows. In this example being discussed here, the final trimming cap value is 22(0x16) for the DK07 board.

The initial frequency error is -0.4596 KHz at 2440 MHz (channel 39) by DH1 package with PRBS9 data sequence.

Bluetooth specification for BR/EDR is ± 75KHz. The final trimming cap value is saved in the **C:\Qualcomm\WCN\ProdTests\refDesigns\boardData\bt_xtal.txt**.
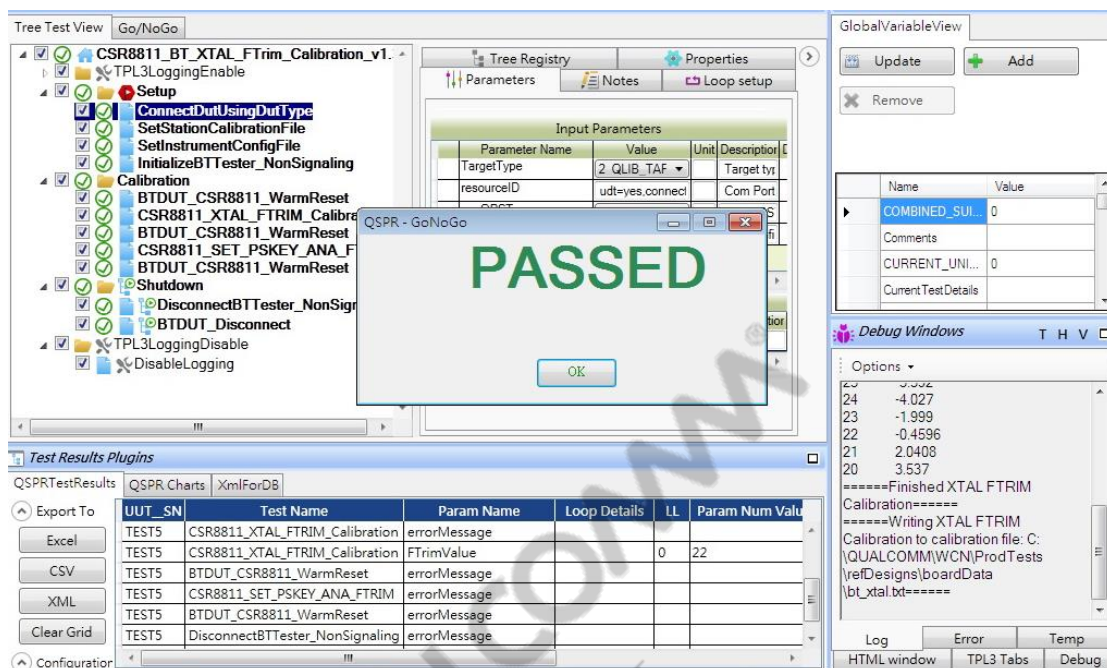
Figure 10 QSPR Passed message

NOTE: The range of trimming cap value is from 0 to 63 (0x0 to 0x3F).

NOTE: Operator must open the bt_xtal.txt file and check the trimming cap value. Send the setmac command from the console or Ethernet by using a Telnet session to save BD_ADDR and trimming cap value in the flash of IPQ40xx and IPQ80xx chipsets manually. For more information about the setmac command usage, refer to *CSR8811 BD_ADDR and Trimming Cap Value Application Note* (80-YA723-1 Rev. B).

4.2 CSR8811_BT_Non-Signaling.xtt

QDART 1.0.40 supports BR/EDR Tx and Rx tests. Basic rate (BR) by DH1 and DH5 is verified by default. Also, enhanced data rate (EDR) by 2DH5 and 3DH5 is verified by default.
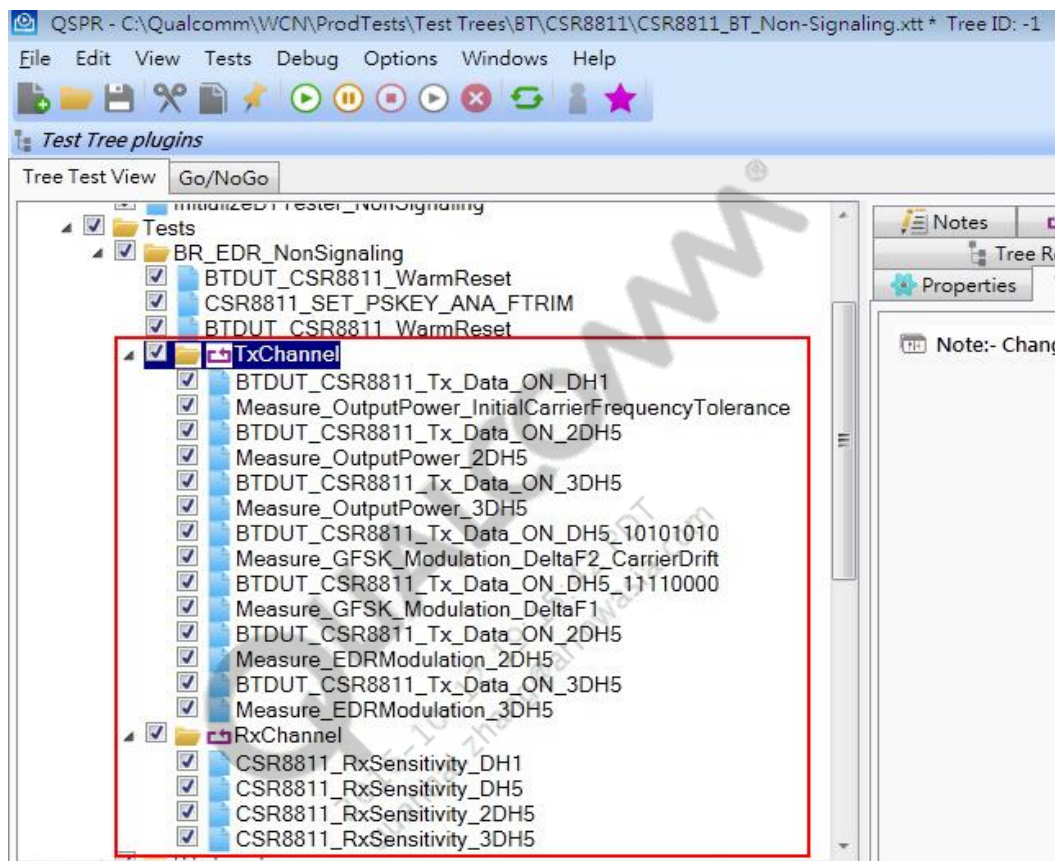

Figure 11 Test tree of TxChannel and RxChannel

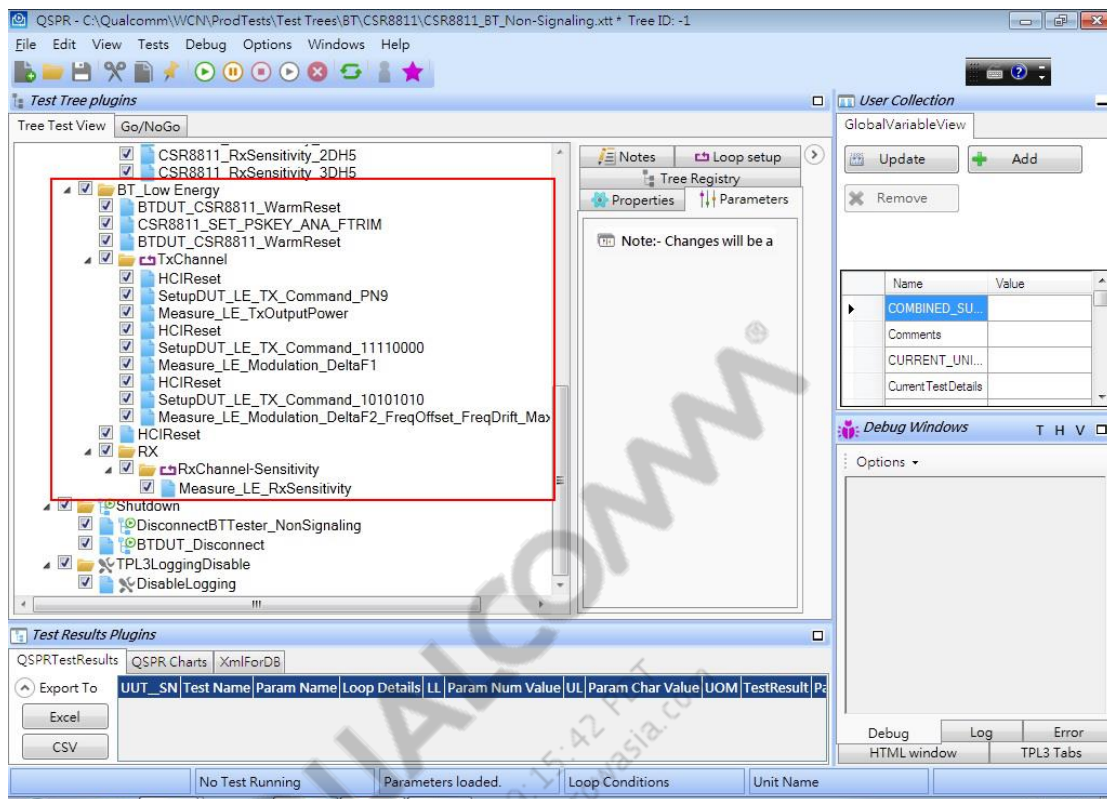**MAY CONTAIN U.S. AND INTERNATIONAL EXPORT CONTROLLED INFORMATION**

Figure 12 List of sample TxChannel and Rx files

Customized channel, power level, package type, and payload are the supported parameters for configuration as shown in Figure 13.
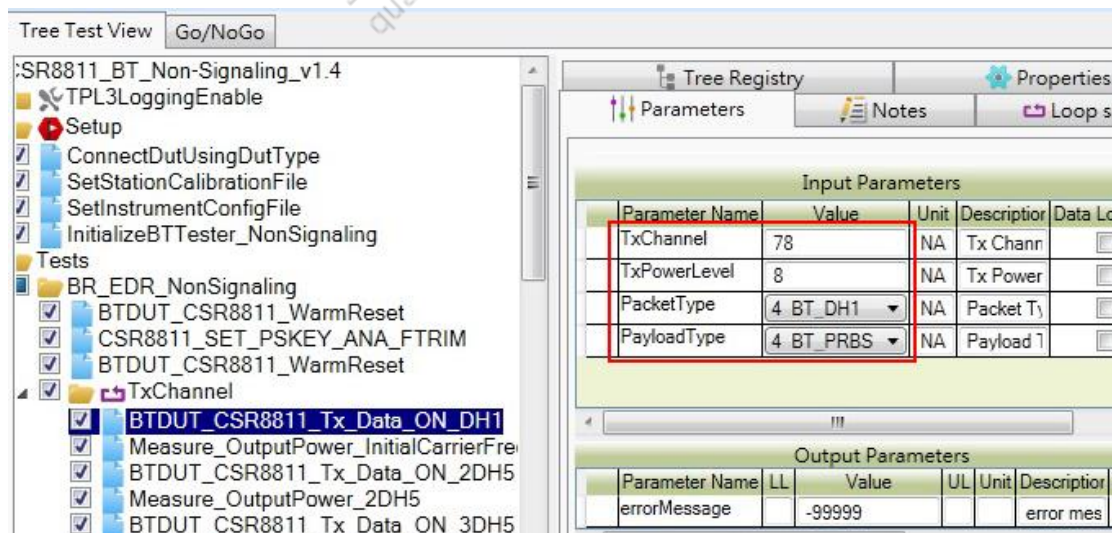

Figure 13 Parameters in a sample TxChannel file

The test reports are available at **C:\Qualcomm\QSPR\TestLog**.

NOTE: The power table in ROM of CSR8811 contains values as -20, -16, -12, -8, -4, 0, 4 and 8, in steps or increments of 4. To change TxPowerLevel parameter, make a note of the value. Search the power table for an exact match or the next lower value. For example, if the new TxPowerLevel value is 8, set it as 8. Similarly, if the new TxPowerLevel is 6, set it as 4.

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