DTM mode testing guide

Introduction

This document is a translated version of DTM 模式测试操作手册 from PhyPlus. As PRBMD0x module is cored with PhyPlus chip, this document could also be a reference for PRBMD0x user. If there is any difference between this version and DTM 模式测试操作手册 , please refers to DTM 模式测试操作手册 .

1. Firmware programming

1.1.Connect the DUT (PRBMD0x) and the computer through the UART serial port, open the PhyPlusKit software, select the serial port to be connected as shown in Figure 1, and select the baud rate (115200 for the PHY6202/6212/6222 baud rate, UXTDWU for the PHY6252 baud rate), Click connect;

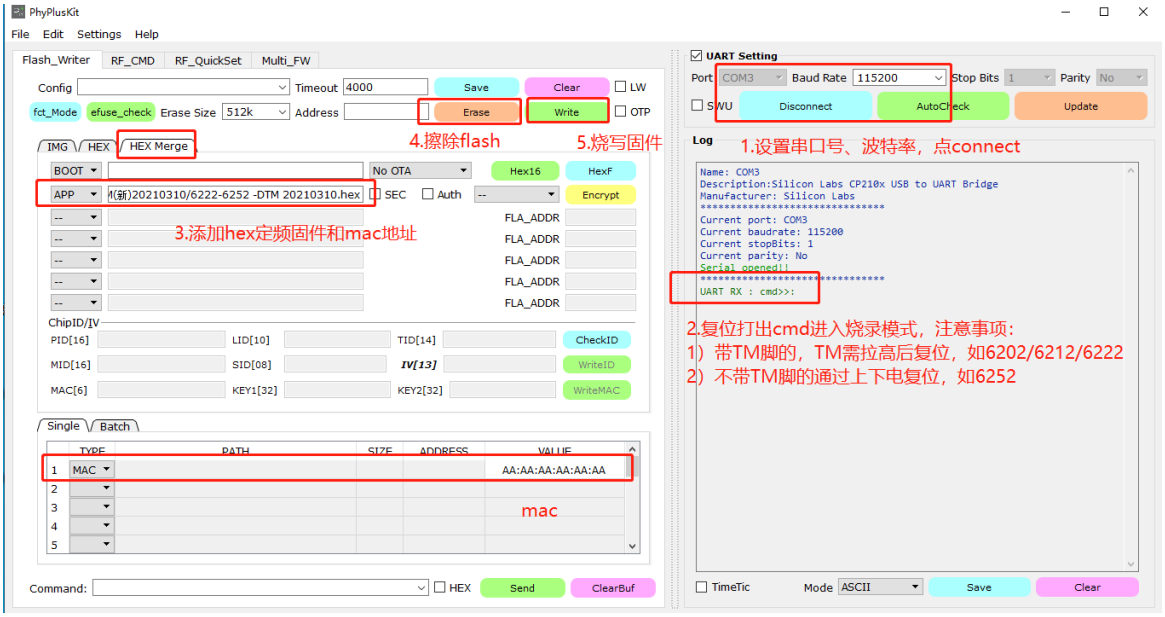


Figure 1

1.2.Set the DUT TM pin to high and press the reset key to display the green UART RX marked as 2 in Figure 1, cmd>>:Models without TM pins and reset pins (not PRBMD00 or PRBMD02), after setting the baud rate, click connect and enter the scanning state, directly reset the green UART by turning the power on and off the power line RX: cmd>> : , as shown in Figure 3;

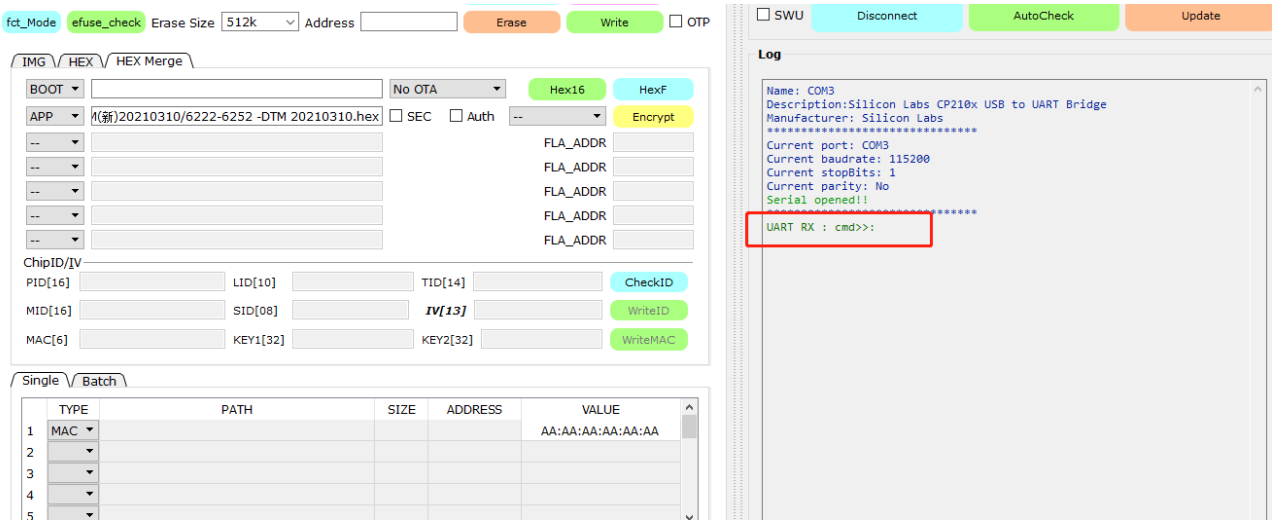


Figure 2

1.3.Enter the Flash_Write interface as shown in Figure 1, click the HEX Merge option, double-click the app bar, select the software to be burned, and enter the MAC address to be burned;

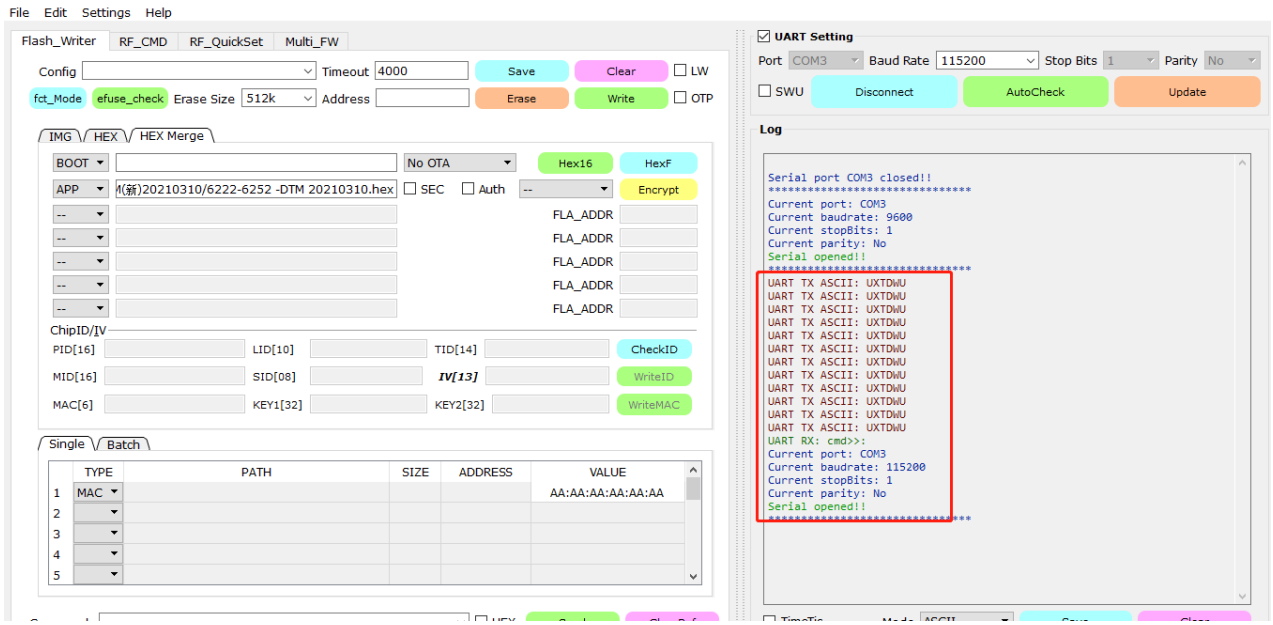


Figure 3

1.4. Click Erase, wait until the right interface displays green Erase successfully! Click the Write button, and wait until the right interface displays green Write registers successfully! Software programming is complete, as shown in Figure 4.

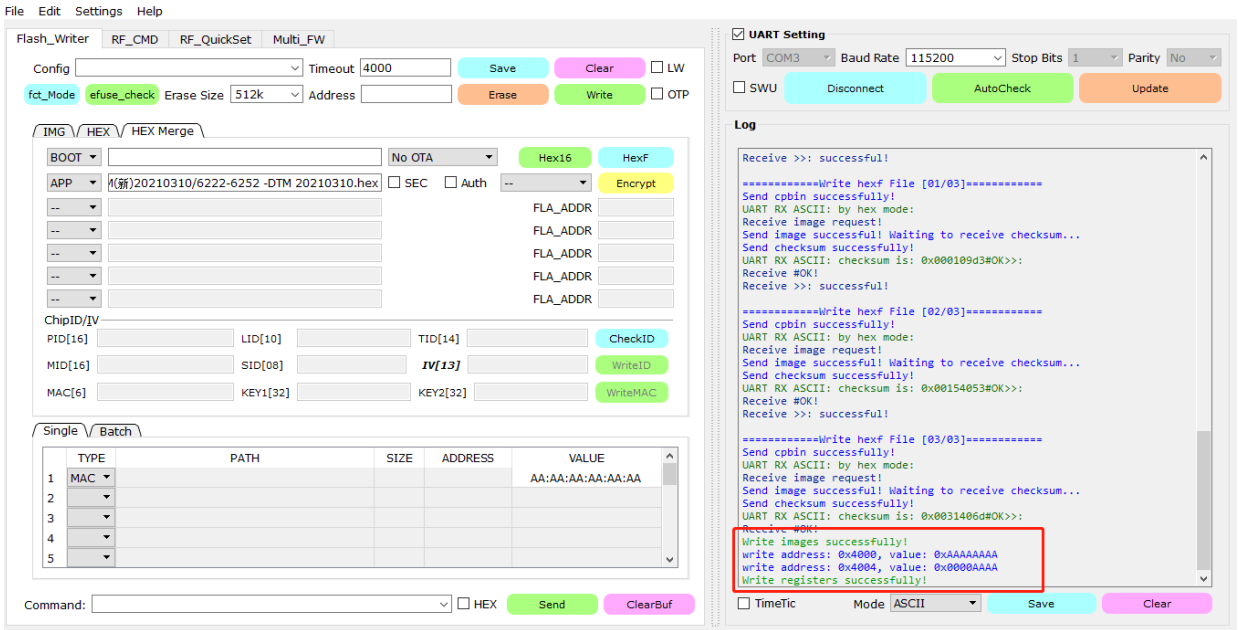


Figure 4

2. DTM mode testing

2.1. Tx_burst_test

2.1.1.Test equipement:ROHDE&SCHWARZ FSQ

2.1.2.Connect DUT to computer, pull TM pin low (if available), and reset the DUT. LOG should display the following in Figure 5, which means that DTM is in fixed frequency testing mode, RF portis connected to ROHDE&SCHWARZ FSQ.

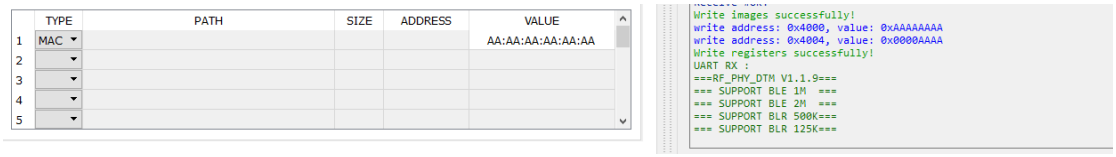


Figure 5

2.1.3.Click RF_QuickSet as shown as indication 1 in figure 6

2.1.4.Select Tx_BURST_TEST option in the Mode pull down menu as indication 2, it send out BLE package at fixed period and frequency. The Tx frequency can be adjusted; length (TX_Packet_Length default value is 25 Bytes); PKT default value is 0 (send out data packate format: 0->prbs9，1->11110000，2->10101010，3->prbs15), FREQ_OFF (frequency offset) default value is 0; Tx_Power default value is 0; TX_TPCAL is not ticked by default (core chip will auto calibrate)

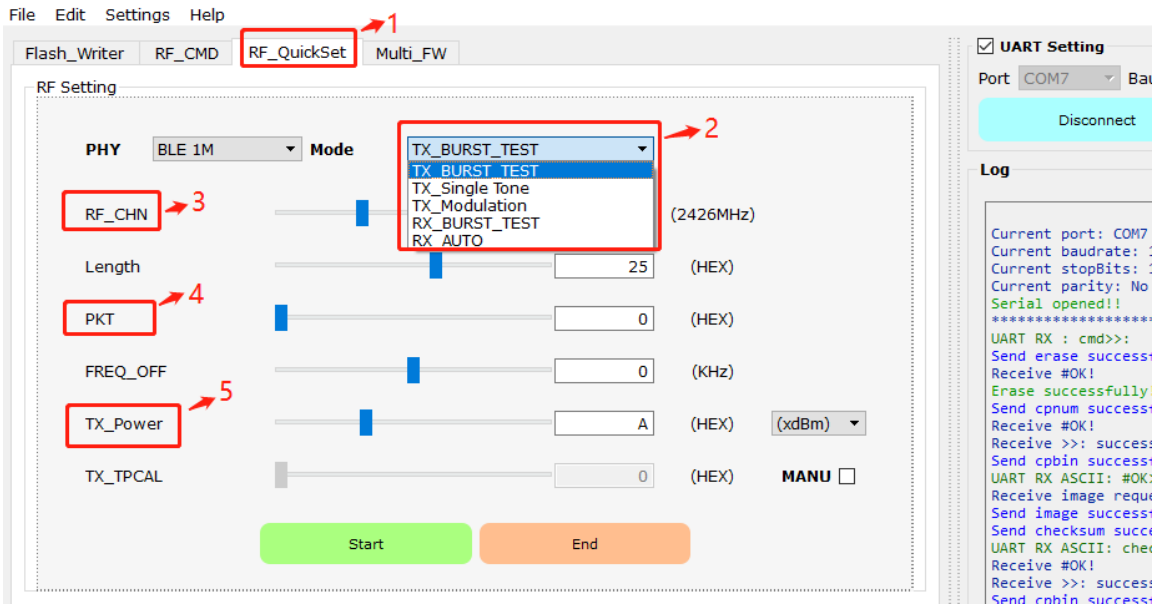


Figure 5

2.1.5. FREQ on the instrument end is adjusted to the same as RF_CHN of the software, SPAN is adjusted to 0HZ, and RBW is adjusted to 1M, SWEEP TIME is adjusted to 8ms;

2.1.6. Click the Start button on the software PhyPlusKit, send the sequence command, and observe whether the instrument has packet loss;

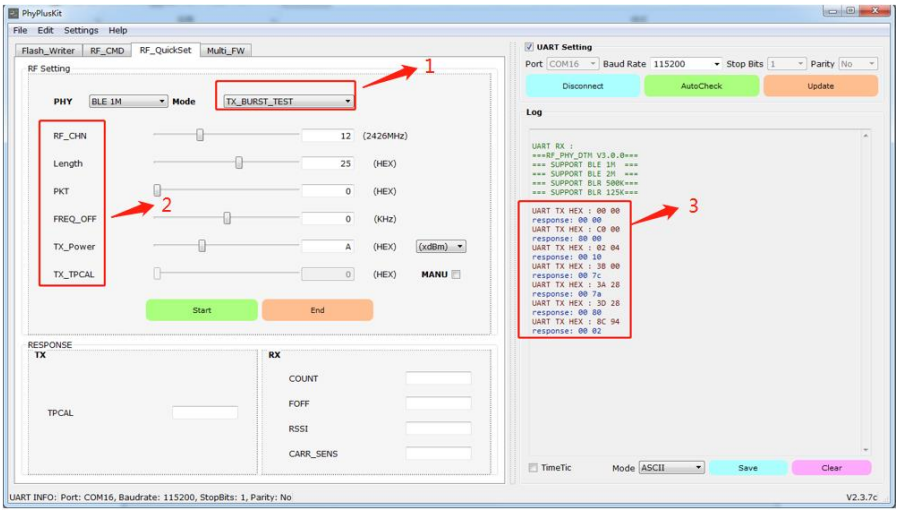
2.1.7. To set up the instrument, click on the VSA-DIGITAL STANDARD-PHYPLUS-BLETIMING_1M-ENTER-TRIG-IFPOWER(-5dBm)-TRIGGEROFFSET(80us);

8. Change the PKT marked as 4 in the PhyplusKit software in Figure 6 to 0, 1 and 2, respectively. Observe the waveform and record the value of FSK_Meas_Dev
9. Drag the RF_CHN of the software label 3 in Figure 6 to 2440MHZ and 2480MHZ, and change the frequency of the instrument at the same time, and repeat the above steps 4-8;

2.2. Tx_Single_Tone

2.2.1.Test instrument: ROHDE&SCHWARZ FSQ

2.2.2.Connect the DUT to the computer with UART, pull down the TM (ignore this step for models without TM pins), and reset the DUT, the log as shown in Figure 4 will be returned, which means that the DTM fixed frequency test mode is entered, and the RF port is connected to the ROHDE&SCHWARZ FSQ of the instrument , select the Tx_Single_Tone option of the software PhyPlusKit Mode, other options are default values, transmit a single tone signal, reset the DUT, and click Start



2.2.3.On the instrument side, adjust FREQ to the same as RF_CHN of the software, adjust SPAN to 5M, and RBW to 50k, click MKR-PEAK-CENTER=MKR_FREQ, select the peak point of the waveform, adjust the waveform to the center of the screen, then click AMPT, rotate Turn the knob, the difference between the peak point and the REFERENCE LEVEL is about 10dB, read the transmit power value and frequency deviation at this time, and record it.

2.2.4.Change the software Tx_Power to MAX and EXTRA respectively, and perform step 2;

2.2.5.Adjust the RF_CHN on the software to 2426M, 2440M and 2480M respectively, and perform steps 2-4 above

2.3. Tx_Modulation

2.3.1.Test instrument: ROHDE&SCHWARZ FSQ

2.3.2. Connect the DUT to the computer via UART, and pull the TM low (for models without TM pins, ignore this step), and reset the DUT, it will return to the log as shown in Figure 4 below, which means that the DTM fixed frequency test mode is entered, and the RF port is connected to the ROHDE&SCHWARZ FSQ of the instrument;

2.3.3.Select Tx_Single_Tone of software PhyPlusKit Mode, other options are default values, click Start, adjust FREQ to the same as RF_CHN of the software, SPAN to 5M, RBW to 50k, click MKR-PEAK CENTER=MKR_FREQ, Select the peak point of the waveform, adjust the waveform to the middle of the screen, then click AMPT, rotate the knob, until the peak point is about 10dB away from the REFERENCE LEVEL, click the End of the software PhyPlusKit, change the test Mode to Tx_Modulation, click Start, and transmit a continuous modulation signal , click on VSA-DIGITAL_STANDARD-PHYPLUS-BLE1M, observe the eye diagram, read the FSK_Meas_Dev value, and record it.

2.3.4. Adjust the RF_CHN on the software to 2426M, 2440M and 2480M respectively, and perform the above step 2.

2.4. Rx_Burst_Test

2.4.1.Test instrument: ROHDE&SCHWARZ SMJ 100A

2.4.2. Connect the DUT to the computer with UART, pull down the TM (for models without TM pins, ignore this step), and reset the DUT, the log as shown in Figure 4 will be returned, which means that the DTM fixed frequency test mode is entered, and the RF port is connected to the instrument ROHDE&SCHWARZ SMJ 100A connect;

2.4.3. Open the Matlab software, execute the main_siggen.m program, and click LOCAL on the instrument side to enter the local operable state;

2.4.4. Select the Rx_Burst_Test option of the software PhyPlusKit Mode, other options are default values, enter the RX demodulation mode, and count the total number of received packets;

2.4.5. Adjust RF_CHN on software to 2426M

2.4.6. FREQ on the instrument side is consistent with RF_CHN, click Start of PhyPlusKit software, click End after 5s, observe the COUNT value, count the total number of received packets, FOFF is the frequency offset estimate value of RX_PHY (khz), RSSI is the received signal strength estimate value, CARR_SENS is the signal quality estimate

2.4.7.Change the size of the RF_CHN value on the software side to 2440 and 2480 respectively, and repeat step 6.

2.5. Rx_Auto

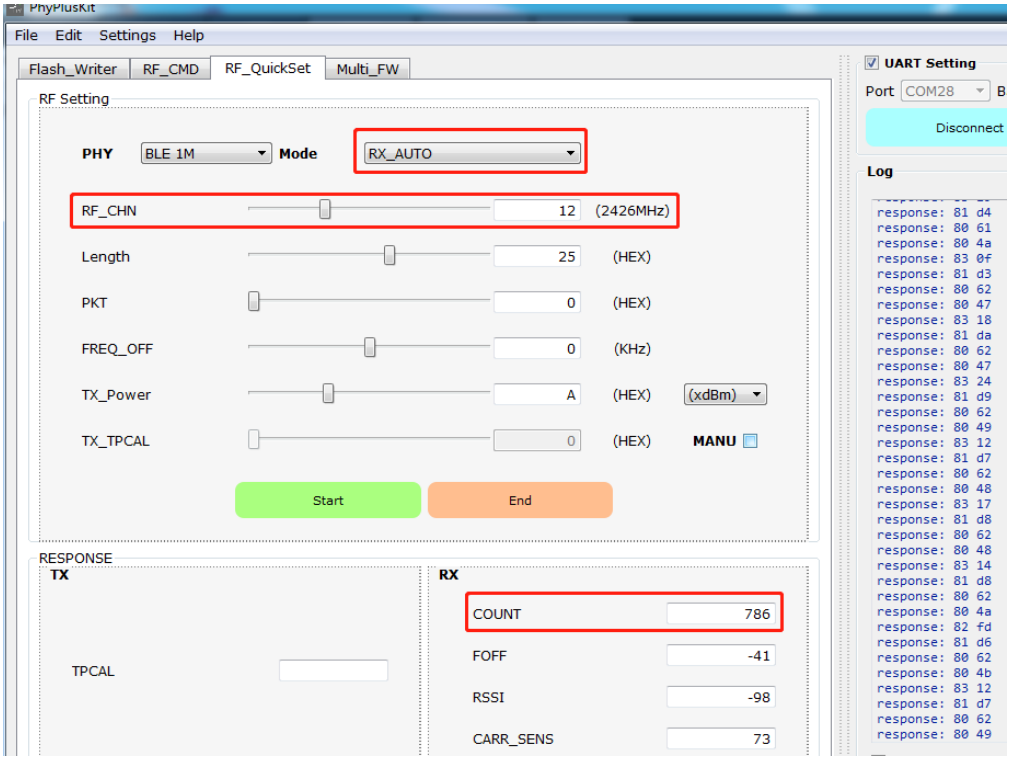
2.5.1.Test instrument: ROHDE&SCHWARZ SMJ 100A

2.5.2.Connect the DUT to the computer with UART, pull down the TM (for models without TM pins, ignore this step), and reset the DUT, the log as shown in Figure 4 will be returned, which means that the DTM fixed frequency test mode is entered, and the RF port is connected to the instrument ROHDE&SCHWARZ SMJ 100A connect;

2.5.3.Select RX_AUTO in PhyPlusKit test mode, every 1000 data packets interval, automatically count the number of received correct data packets;

2.5.4.RF_CHN adjusted to 2426M

2.5.5. Adjust the FREQ of the instrument to the same value as the RF_CHN value of the software, and the others are the default values. Click the Start button of the software PhyPlusKit to adjust the Level value on the instrument until the COUNT value is greater than and close to 700. Read the PEP value on the instrument and read it. record as the magnitude of the receive sensitivity value for this channel;



2.5.6.Change the size of the RF_CHN value on the software side to 2440 and 2480 respectively, and repeat the execution of the above 5 steps.