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## **Application Note : Telink 8267 EMI Test Guide**

AN-17011600-E2

Ver 1.1.0

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2017/7/6

### **Brief:**

This document is the EMI test guide for 8267-based DUT board.



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For further information on the technology, product and business term, please contact Telink Semiconductor Company ([www.telink-semi.com](http://www.telink-semi.com)).

For sales or technical support, please send email to the address of:

[telinkcnsales@telink-semi.com](mailto:telinkcnsales@telink-semi.com)

[telinkcnsupport@telink-semi.com](mailto:telinkcnsupport@telink-semi.com)

**Revision History**

Version	Major Changes	Date	Author
1.0.0	Initial release	2017/1	C.K.X., L.X., Cynthia
1.1.0	Updated section 1 Overview: updated test item "RSSI", "Cmd" and "Preamble length".	2017/7	C.K.X., Cynthia

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## 1 Overview

EMI test for Telink 8267-based DUT board is implemented by operating specific SRAM or flash address.

- 1) The default EMI test parameters after power on without any configuration are shown as below:

- ✧ mode=1, BLE 1M mode
- ✧ power=0, 7dBm Tx power
- ✧ channel=2, 2402MHz frequency point
- ✧ cmd=1, carry mode

By default, after EMI test is started, the DUT will send carrier at 2402MHz frequency with 7dBm Tx power in BLE 1M mode.

- 2) As shown in Table 1, user can modify EMI test parameters by writing either specific SRAM address or specific flash address with specific value.

- ✧ Configure parameter via Flash:

By writing flash address 0x3f007~0x3f00a with specific value, user can switch EMI test mode, Tx power level, frequency point and working mode correspondingly.

When the DUT is configured as BLE mode, user can set preamble length in byte by writing flash address 0x3f00b.

It's needed to power cycle the DUT, so that EMI test will be started automatically and the new parameters configured via flash will take effect.

Note that before writing new value, user should erase the corresponding flash sector first.

The internal load capacitance value and calibration parameters "Tp0" and "Tp1" will be automatically written into DUT flash 0x77000, 0x77040 and 0x77041 after calibration by Telink jig. It's highly recommended not to adjust the Cap\_value, Tp0 and Tp1 manually.

✧ Configure parameter via SRAM:

By writing SRAM address 0x808007~0x80800a with specific value, and writing SRAM address 0x808006 with 1, user can switch EMI test mode, Tx power level, frequency point and working mode correspondingly, and start EMI test.

When the DUT is configured as BLE mode, user can set preamble length in byte by writing SRAM address 0x80800b.

When the DUT is configured as RX mode, SRAM address 0x80800c~0x80800f serves to store the 4-byte number of received packets, while 0x808004 serves to store the RSSI value.

Note that parameters configured via SRAM addresses are not non-volatile, i.e. the parameters will be cleared to their default values after power cycle.

Table 1 SRAM/Flash address specified for 8267 EMI test

SRAM address	Flash address	Function definition for EMI test
0x808004		<b>RSSI (Read only):</b> Store RSSI (Received Signal Strength Indication) value in RX mode.
0x808006		<b>Run</b> 0: default; 1: start EMI test.
0x808007	0x3f007	<b>Cmd: select EMI test mode.</b> 1: emi_carrier_only, select carry mode. 2: emi_carrier_data, select CD mode. 3: emi_rx_test, select RX mode. 4: emi_tx_test (PRBS9), select TX mode and send 37-byte PRBS9 data. PRBS9 is pseudorandom binary sequence. 5: emi_tx_test (0x55), select TX mode and

SRAM address	Flash address	Function definition for EMI test
		<p>send 37-byte data which are all 0x55.</p> <p>6: emi_tx_test (0xff), select TX mode and send 37-byte data which are all 0xff.</p>
0x808008	0x3f008	<p><b>Power: Select Tx power level.</b></p> <p>0: 7dBm  1: 5dBm  2: -0.6dBm  3: -4.3dBm  4: -9.5dBm  5: -13.6dBm  6: -18.8dBm  7: -23.3dBm  8: -27.5dBm  9: -30dBm  10: -37dBm  11: Disable PA</p>
0x808009	0x3f009	<p><b>Channel: Select frequency point.</b></p> <p>Frequency = (2400+ channel) MHz  <math>0 \leq \text{channel} \leq 100</math></p>
0x80800a	0x3f00a	<p><b>Mode: Select working mode.</b></p> <p>0: ble_2M, select BLE 2M mode.  1: ble_1M, select BLE 1M mode.  2: zigbee, select ZigBee mode.</p>
0x80800b	0x3f00b	<p><b>[4:0] Preamble length</b></p> <p>Set preamble byte number in BLE mode.  Default length: 11 bytes</p>
0x80800c~0x80800f		<p><b>RX_packet_num (Read only):</b></p> <p>Store the 4-byte number of received packets  In RX mode.</p>
	0x77000	<p>0x81_Cap_value  Internal load capacitance value.  <math>0\text{xbf} &lt; \text{cap} &lt; 0\text{xe0}</math></p>

SRAM address	Flash address	Function definition for EMI test
	0x77040	Tp0. BLE 1M: 0x13<Tp0<0x27; BLE 2M: 0x36<Tp0<0x4a.
	0x77041	Tp1. BLE 1M: 0x0f<Tp1<0x23; BLE 2M: 0x2f<Tp1<0x43.

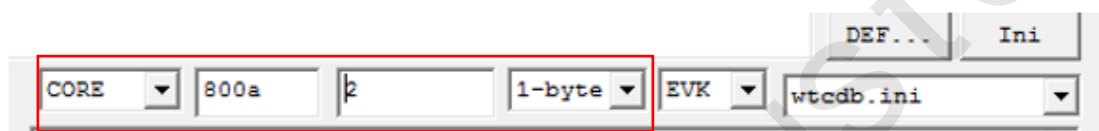


## 2 Configuration Example

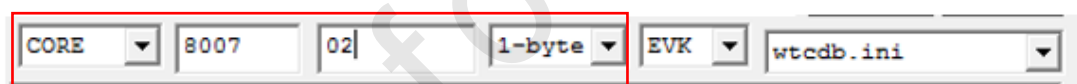
Telink WtcdB tool can be used to configure DUT parameters for EMI test by writing specific SRAM or flash addresses.

**Configuration example:** Set DUT as ZigBee mode, 2402MHz frequency point, 7dBm output power, and Carrier+Data (CD) mode.

- ✧ On WtcdB window, successively select “CORE”, select “1-byte”, input “800a”, input “2”, and then click the “Enter” key. This step writes DUT RAM “0x800a” with “0x02”, and serves to set DUT as ZigBee mode.

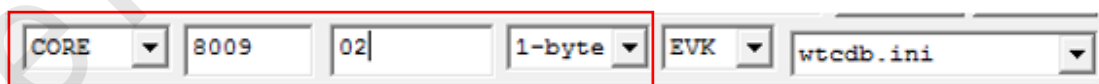


- ✧ On WtcdB window, successively select “CORE”, select “1-byte”, input “8007”, input “2”, and then click the “Enter” key. This step writes DUT RAM “0x8007” with “0x02”, and serves to set DUT as CD mode.



- ✧ On WtcdB window, successively select “CORE”, select “1-byte”, input “8009”, input “2”, and then click the “Enter” key. This step writes DUT RAM “0x8009” with “0x02”, and serves to set frequency point of DUT as 2402MHz.

Since frequency point is 2402MHz by default, this step can be skipped.



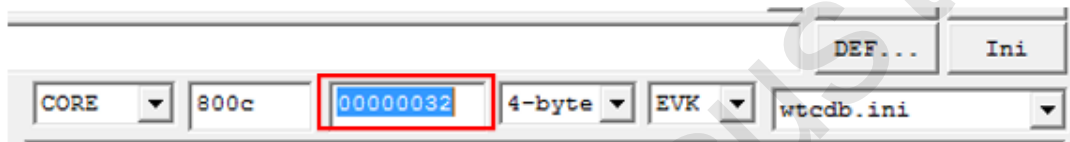
- ✧ On WtcdB window, successively select “CORE”, select “1-byte”, input “8008”, input “0”, and then click the “Enter” key. This step writes DUT RAM “0x8008” with “0x00”, and serves to set DUT Tx power as 7dBm.

Since the Tx power is 7dBm by default, this step can be skipped.

- ✧ On WtcdB window, successively select “CORE”, select “1-byte”, input “8006”, input “1”, and then click the “Enter” key. This step writes DUT RAM “0x8006” with “0x01”, and then DUT starts transmitting CD data packets at 2402MHz point and 7dBm power in ZigBee mode.

#### Read the number of received packets in RX mode:

- ✧ On WtcdB window, successively select “CORE”, select “4-byte”, input “800c”, and then click the “Tab” key. This step reads 4-byte data (i.e. the number of packets received by DUT) from RAM 0x800c~0x800f.



For each read of DUT RAM 0x800c~0x800f, the new data is accumulated based on the previous data; user can clear the data of RAM 0x800c~0x800f via WtcdB: successively select “CORE”, select “1-byte”, input “8006”, input “1”, and then click the “Enter” key.