CMT2300AW Low Voltage Transmitting Power Compensation

Summary

This document introduces the method of low voltage transmitting power compensation for CMT2300AW RFPDK.

The part numbers covered by this document are as shown below..

Table1. Part Numbers Covered by This Document

Part No.	Frequency	Modem	Function	Configuration	Package
CMT2300AW	127 - 1020MHz	(G)FSK/OOK	Transceiver	Register	QFN16

Before reading this document, it is recommended to read ***AN142-CMT2300AW Quick Start Guideline*** to learn the basic usage of CMT2300AW.

Table of Contents

1. Low Voltage Transmitting Power Compensation

Here is the register associated with the power compensation:

Table2. Register Related to Power Compensation

Register Name	Bit	R/W	Bit Name	Function Description
CUS_TX9 (0x5D)	7:5	RW	LBD_COMP_OFFSET<2:0>	At the Tx mode, the battery voltage will be reduced. The dropped value will be different in the different application. By setting this OFFSET, the chip power can be automatically compensated when the voltage is reduced.

This register is designed primarily to assist LBD power compensation. It is located in the Tx bank and open to the user.

Let's introduce the power compensation algorithm here. The power configured on the RFPDK, such as the 13dBm, is the power at the supply voltage of 3.3V, But in actual use, the power supply voltage may be reduced in different levels, especially when using the battery. Therefore, a power compensation algorithm has been designed in the chip. When the voltage is below 3.3V, the power of RFPDK configuration can still be transmitted.

The basic principle of the compensation algorithm is that CMT2300AW will automatically do the low battery detection (LBD) for one time before it goes to the Tx mode. For example, if detecting it is 2.5V, the interior knows the drop is 0.8V from 3.3V, so it will compensate the transmitting power corresponding to 0.8V.

But there is another problem. When the LBD is in progress, the TX has not yet started. The chip current is small, and the power voltage value detected by the LBD is the value before the TX starts. When the TX enters the transmitting state, especially the output power of 20 dBm, it will consume a great working current, exceeding the 80mA. Usually, the power supply or the battery has certain resistance in high current load conditions. There will be some voltage drop. This results in the chip power supply voltage at the TX being lower than the power supply voltage value detected by LBD before the TX. For example, the voltage by LBD is 2.5V, but it actually drops to 2.2V at the TX stage. If no processing, then the power supplied by the compensation algorithm still cannot reach the power to be transmitted at 3.3V. On the other hand, we do not know how much this voltage drop will be. Because of the different types of power / battery, different output power and other applications, the voltage drop due to TX will vary.

So we provide the following method that allows the user to compensate for the power loss caused by the transmitting voltage drop.

The user combines its own application scheme to test the voltage value before and during the TX. The voltage value before the TX can be considered as the voltage detected by the LBD. By that way, we know the voltage drop caused by the TX. Then the configuration register LBD_COMP_OFFSET<2:0> is used to

compensate for the D-value between the power supply voltage detected by the LBD and the actual power supply voltage during the TX. The chip will further compensate the power based on this value to achieve transmitting power at 3.3V. The compensation range is from 0 to 399mV, and options are as follows:

Table3. The Corresponding Relation between Power Compensation and Register Value

LBD_COMP_OFFSET<2:0>	Compensated Voltage Value
0	None
1	57 mV
2	114 mV
3	171 mV
4	228 mV
5	285 mV
6	342 mV
7	399 mV

For example, when the user detects that the voltage drop is 300mV, then the user is suggested to select level 5, which is the closest to 300mV. Once configured, the chip compensates for 285mV at TX each time.

2. Document Modification Record

Table4. Document Modification Record Sheet

Version	Chapter	Modification descriptions	Date
0.8	All	Initial release	2017-03-24
0.9	Summary	Add the advice to read AN142	2017-07-12

3. Contact Information

Wuxi CMOSTEK Microelectronics Co., Ltd. Shenzhen branch

Room 203, Honghai Building, Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

Zip Code： 518000

Tel： +86 - 755 - 83235017

Fax： +86 - 755 - 82761326

Sales： sales@cmostek.com

Technical support： support@cmostek.com

Website： www.cmostek.com