ABSTRACT
This document is an overview of the CRC implementation for the CC430, CC1100, CC1100E, CC1101, 
CC1110, CC1111, CC1150, CC2500, CC2510, CC2511, and CC2550. See Section 4 for links to the data 
sheets and user’s guides.

Contents
1 Abbreviations ........................................................................................................... 1
2 CRC Implementation .................................................................................................. 2
3 Code Example ........................................................................................................... 3
4 References ................................................................................................................ 3

List of Figures
1 Normal Mode CRC .................................................................................................... 2
2 CC2400 CRC ............................................................................................................ 2

Trademarks
All trademarks are the property of their respective owners.

1 Abbreviations

CRC Cyclic redundancy check
MSB Most significant bit
2 CRC Implementation

CC2500, CC2510, CC2511, and CC2550 all support two CRC implementations:

- Normal mode CRC
- CC2400 CRC (only for backwards compatibility)

Bit 3 (CC2400_EN) in the PKTCTRL0 register is used to select which mode to use.

CC430, CC1100, CC1100E, CC1101, CC1110, CC1111, and CC1150 only support the normal mode CRC, and hence bit 3 in the PKTCTRL0 register is not used on these devices.

In the normal mode (PKTCTRL0.CC2400_EN = 0), the CRC polynomial is CRC16 \( (x^{16} + x^{15} + x^2 + 1) \) with the CRC register reset to all ones. Figure 1 shows the shift register implementation. Note that the data input is at \( x^{16} \).

![Figure 1. Normal Mode CRC](image)

For backward compatibility, the CC2400 CRC implementation is also supported (PKTCTRL0.CC2400_EN = 1). Figure 2 shows the shift register implementation. The data input is at \( x^0 \). When PKTCTRL0.CC2400_EN = 1, PKTCTRL0.WHITE_DATA and PKTCTRL1.CRC_AUTOFLUSH must be 0.

![Figure 2. CC2400 CRC](image)

CRC is calculated over all bytes transmitted after the sync word. The CRC16 checksum is automatically transmitted after the last data byte. MSB is transmitted first.

See the device-specific data sheets for detailed use of the CRC functionality.
#define CRC16_POLY 0x8005

UINT16 culCalcCRC(BYTE crcData, UINT16 crcReg) {
    UINT8 i;
    for (i = 0; i < 8; i++) {
        if (((crcReg & 0x8000) >> 8) ^ (crcData & 0x80))
            crcReg = (crcReg << 1) ^ CRC16_POLY;
        else
            crcReg = (crcReg << 1);
        crcData <<= 1;
    }
    return crcReg;
} // culCalcCRC

// Example of Usage
#define CRC_INIT 0xFFFF
UINT8 txBuffer = {0, 1, 2, 3, 4, 5};
UINT16 checksum;
UINT8 i;

checksum = CRC_INIT; // Init value for CRC calculation
for (i = 0; i < sizeof(txBuffer); i++)
    checksum = culCalcCRC(txBuffer[i], checksum);

4 References
1. CC430 User’s Guide
2. CC1100 Single-Chip Low Cost Low Power RF-Transceiver
3. CC1100E Low-Power Sub-GHz RF Transceiver (470-510 MHz & 950-960 MHz)
4. CC1101 Single-Chip Low Cost Low Power RF-Transceiver
5. CC1110Fx/CC1111Fx Low-Power Sub-1 GHz RF System-on-Chip (SoC) with MCU, Memory, Transceiver, and USB Controller
6. CC1150 Single Chip Low Cost Low Power RF-Transmitter
7. CC2500 Single-Chip Low Cost Low Power RF-Transceiver
8. CC2510Fx/CC2511Fx Low-Power SoC (System-on-Chip) with MCU, Memory, 2.4 GHz RF Transceiver, and USB Controller
9. CC2550 Low-Cost Low-Power 2.4 GHz RF Transmitter
# Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<table>
<thead>
<tr>
<th>Changes from October 27, 2009 to September 27, 2018</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Formatting and editorial changes throughout document</td>
<td>1</td>
</tr>
</tbody>
</table>

---

Copyright © 2006–2018, Texas Instruments Incorporated
IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI's Terms of Sale or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2022, Texas Instruments Incorporated