Application Note
CMX7143_FI-x Configuration Guide

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1 Introduction

This document is intended to identify and illustrate the associated routing through the CMX7143 when using the 4FSK, GMSK and FFSK Function Images™. In addition references to the C-BUS accessible registers will also be shown to provide easier understanding and control of the device.

Specific to Function Image™ 7143FI-1, 7143FI-2 and 7143FI-3, this Configuration Guide covers Function Images™:

- 7143FI-1.0.4.0
- 7143FI-2.1.2.0
- 7143FI-3.0.3.0

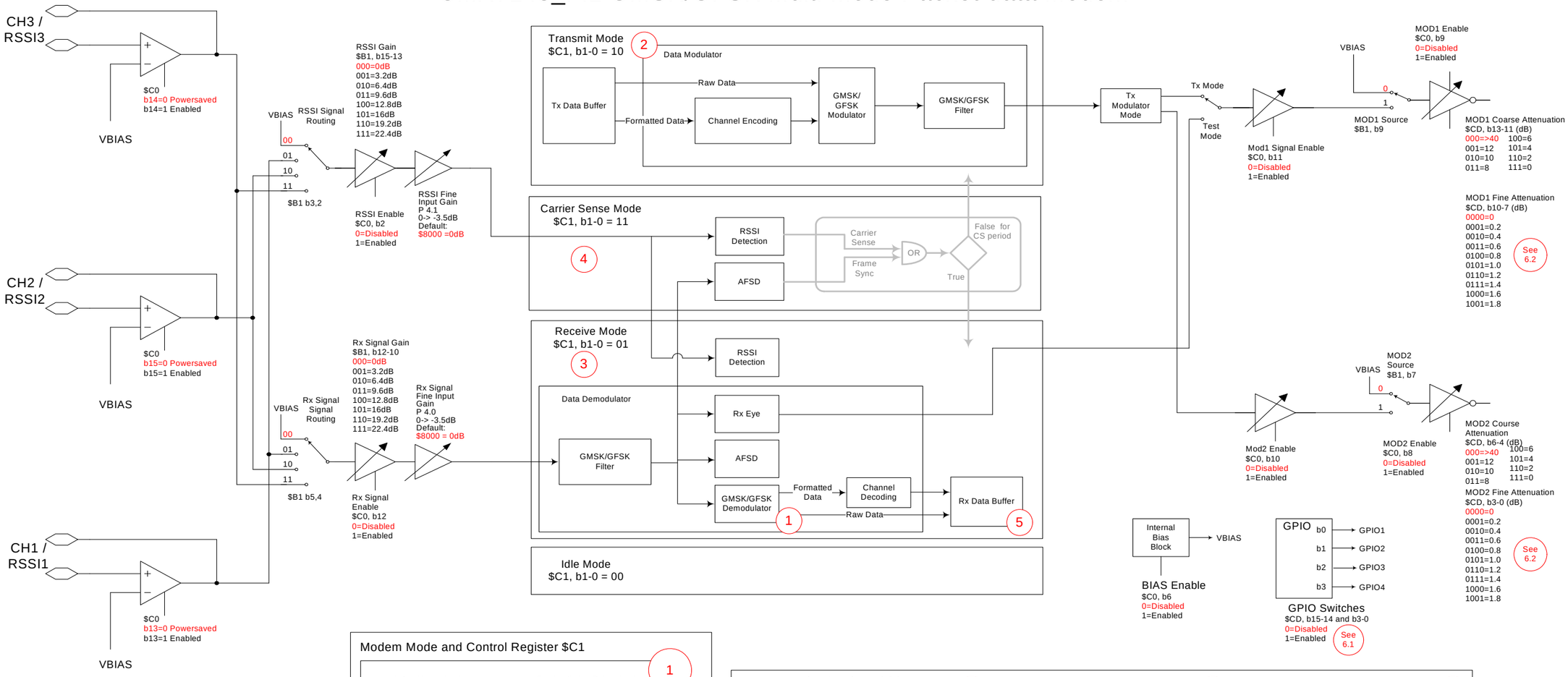
This Configuration Guide is not intended to cover all of the hardware, functions or possible set-up modes. It is a virtual representation of the device and is provided for illustrative purposes to simplify and aid product development.

Default settings are given in red and control paths are shown in blue. The Configuration Guide is best printed on an A3 colour printer.

2 History

Version	Changes	Date
1.0	New Issue	8-1-09
2.0	Correction to illustrations, $CD Fine Gain Descriptions Corrected	13-1-09
3.0	Addition of SoftBit Rx mode (FI-2.x). Images split into 3 separate illustrations	12-3-09
4.0	Further correction to Mod1 $CD Fine Gain Description	2-6-09
5.0	Addition of Mod Fine Gain and additions to $C1 (FI-2)	24-11-09

CMX7143_FI1 GMSK/GFSK Multi-mode Packet-data Modem



Modem Mode and Control Register $C1

1

Levels tracking behaviour
$C1, b15-14
00 = Locked: no tracking
01 = Track levels on, slow response
10 = Track levels on, fast response
11 = Auto-tracking response dynamically selected.

Symbol timing PLL behaviour
$C1, b13-12
00 = Locked: no tracking
01 = Narrow PLL
10 = Medium PLL
11 = Auto-PLL bandwidth dynamically selected

Programming Register $C8

6.0	6.1	6.2
Burst Data Configuration $C8, Block 0 P0.0 - P0.10	Burst Tx Sequence + GPIO Configuration $C8, Block 1 P1.0 – P1.13	Gain and Offset Setup $C8, Block 4 P4.0 – P4.10

5

Tx Bytewise Formatted Data Transmit

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
$B5	TxData0	TxData_Byte 0							Trans Count		Block Spec/Fair (Note 1)					
$B6	TxData1	TxData_Byte 1							TxData_Byte 2							
$B7	TxData2	TxData_Byte 3							TxData_Byte 4							
$CA	TxData3	TxData_Byte 5							TxData_Byte 6							
$CB	TxData4	TxData_Byte 7							TxData_Byte 8							
$C2	TxData5	TxData_Byte 9							TxData_Byte 10							
$C7	TxData6	TxData_Byte 11							TxData_Byte 12							

Tx Bytewise Raw Data Transmit

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
$B5	TxData0	TxData_Byte 0							Trans Count							
$B6	TxData1	TxData_Byte 1							1	Byte Counter						
$B7	TxData2	TxData_Byte 3							TxData_Byte 4							
$CA	TxData3	TxData_Byte 5							TxData_Byte 6							
$CB	TxData4	TxData_Byte 7							TxData_Byte 8							
$C2	TxData5	TxData_Byte 9							TxData_Byte 10							
$C7	TxData6	TxData_Byte 11							TxData_Byte 12							

Tx Bitwise Raw Data Transmit

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
$B5	TxData0	b0	b1	b2	b3	b4	b5	b6	b7	Trans. Count	0	Bit Counter				
$B6	TxData1	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19	b20	b21	b22	b23
$B7	TxData2	b24	b25	b26	b27	b28	b29	b30	b31								

Rx Bytewise Formatted Data Receive

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
$B8	RxData0	RxData_Byte 0							Trans Count	CRC		Block Spec/Fair (Note 1)				
$B9	RxData1	RxData_Byte 1							RxData_Byte 2							
$BA	RxData2	RxData_Byte 3							RxData_Byte 4							
$BB	RxData3	RxData_Byte 5							RxData_Byte 6							
$C5	RxData4	RxData_Byte 7							RxData_Byte 8							
$C9	RxData5	RxData_Byte 9							RxData_Byte 10							
$CC	RxData6	RxData_Byte 11							RxData_Byte 12							

Rx Bytewise Raw Data Receive

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
$B8	RxData0	RxData_Byte 0							Trans Count							
$B9	RxData1	RxData_Byte 1							1	Byte Counter						
$BA	RxData2	RxData_Byte 3							RxData_Byte 4							
$BB	RxData3	RxData_Byte 5							RxData_Byte 6							
$C5	RxData4	RxData_Byte 7							RxData_Byte 8							
$C9	RxData5	RxData_Byte 9							RxData_Byte 10							
$CC	RxData6	RxData_Byte 11							RxData_Byte 12							

Rx Bitwise Raw Data Receive

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
$B8	RxData0	b0	b1	b2	b3	b4	b5	b6	b7	Trans. Count	0	Bit Counter				
$B9	RxData1	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19	b20	b21	b22	b23
$BA	RxData2	b24	b25	b26	b27	b28	b29	b30	b31								

Modem Mode and Control Register $C1

2

Tx Modem and CS Modem Control
$C1, b7-4
0000 = Idle
0001 = Reserved
0010 = Tx Raw Data Only
0011 = Tx PRBS
0100 = Tx Preamble, Sync1, Raw Data
0101 = Tx Preamble, Sync2, Raw Data
0110 = Test – Deviation
0111 = Reset / Abort
1000 = Test – Preamble
1001 = Reserved
1010 = Tx Preamble, Sync1, Formatted Data
1011 = Tx Preamble, Sync2, Formatted Data

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Rx Modem Control
$C1, b11-8
0000 = Idle
0001 = Reserved
0010 = Rx search for Sync1 or 2, then Rx Raw Data
0011 = Rx eye
0100 = Rx search for Sync1, then Rx Raw Data
0101 = Rx search for Sync2, then Rx Raw Data
0110 = Reserved
0111 = Reset / Abort
1000 = Reserved
1001 = Rx search for Sync1 and 2, then Rx Formatted Data
1010 = Rx search for Sync1, then Rx Formatted Data
1011 = Rx search for Sync2, then Rx Formatted Data

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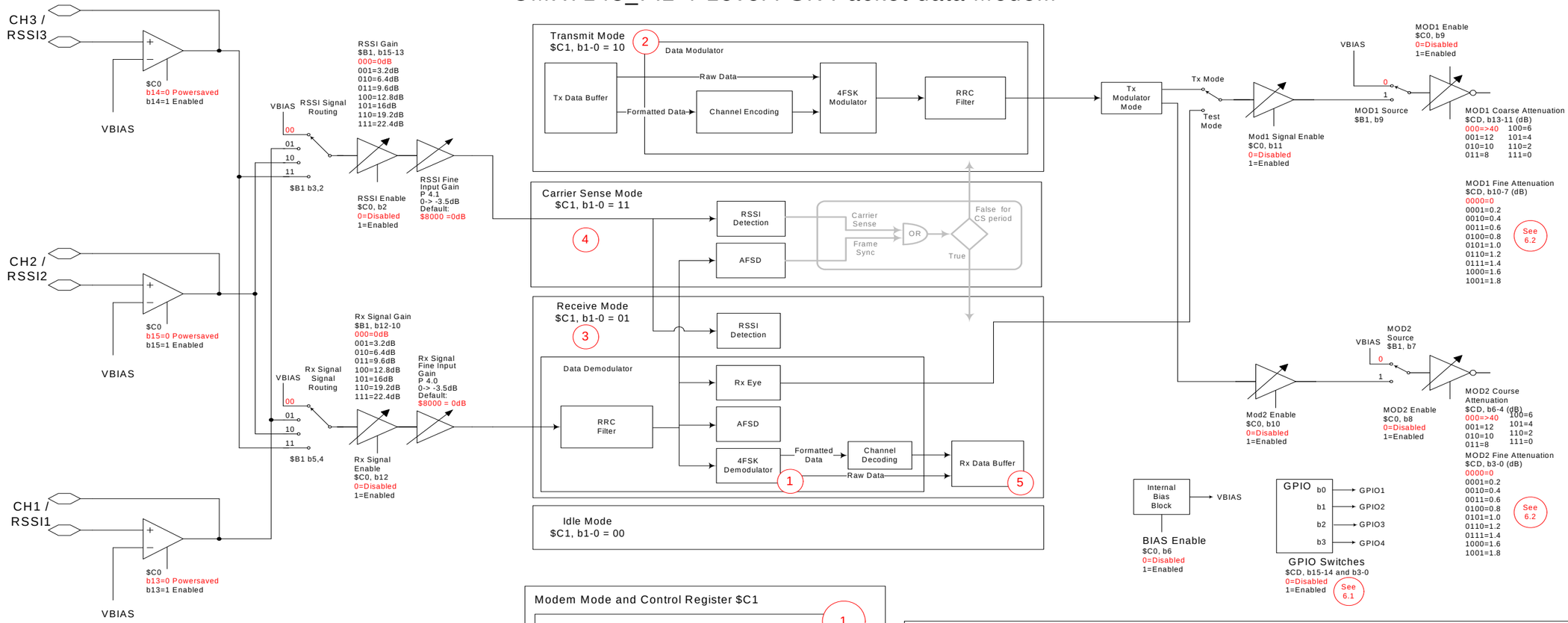
CS Modem Control
$C1, b7-4
0000 = Idle
0001 = Reserved
0010 = Tx Raw Data Only
0011 = Tx PRBS
0100 = Tx Preamble, Sync1, Raw Data
0101 = Tx Preamble, Sync2, Raw Data
0110 = Test – Deviation
0111 = Reset / Abort
1000 = Test – Preamble
1001 = Reserved
1010 = Tx Preamble, Sync1, Formatted Data
1011 = Tx Preamble, Sync2, Formatted Data

CMX7143_FI2 4-Level FSK Packet-data Modem



Modem Mode and Control Register $C1

1

Levels tracking behaviour
$C1, b15-14
00 = Locked: no tracking
01 = Track levels on, slow response
10 = Track levels on, fast response
11 = Auto-tracking response dynamically selected.

Symbol timing PLL behaviour
$C1, b13-12
00 = Locked: no tracking
01 = Narrow PLL
10 = Medium PLL
11 = Auto-PLL bandwidth dynamically selected

Programming Register $C8

6.0	6.1	6.2
Burst Data Configuration $C8, Block 0 P0.0 - P0.10	Burst Tx Sequence + GPIO Configuration $C8, Block 1 P1.0 – P1.13	Gain and Offset Setup $C8, Block 4 P4.0 – P4.10

Tx/Rx Data Registers

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Tx Bytewise Formatted Data Transmit

	bit 15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
$B5	TxData0	TxData_Byte 0
$B6	TxData1	TxData_Byte 1
$B7	TxData2	TxData_Byte 3
$CA	TxData3	TxData_Byte 5
$CB	TxData4	TxData_Byte 7
$C2	TxData5	TxData_Byte 9
$C7	TxData6	TxData_Byte 11

Trans Count | Block Specifier (Note 1) | TxData_Byte 2 | TxData_Byte 4 | TxData_Byte 6 | TxData_Byte 8 | TxData_Byte 10 | TxData_Byte 12

Tx Bytewise Raw Data Transmit

	bit 15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
$B5	TxData0	TxData_Byte 0
$B6	TxData1	TxData_Byte 1
$B7	TxData2	TxData_Byte 3
$CA	TxData3	TxData_Byte 5
$CB	TxData4	TxData_Byte 7
$C2	TxData5	TxData_Byte 9
$C7	TxData6	TxData_Byte 11

Trans Count | 1 | Byte Counter | TxData_Byte 2 | TxData_Byte 4 | TxData_Byte 6 | TxData_Byte 8 | TxData_Byte 10 | TxData_Byte 12

Tx Bitwise Raw Data Transmit

	bit 15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
$B5	TxData0	b0 b1 b2 b3 b4 b5 b6 b7
$B6	TxData1	b8 b9 b10 b11 b12 b13 b14 b15
$B7	TxData2	b16 b17 b18 b19 b20 b21 b22 b23

Trans Count | 0 | Bit Counter

	bit 31 30 29 28 27 26 25 24
$B5	b0 b1 b2 b3 b4 b5 b6 b7
$B6	b8 b9 b10 b11 b12 b13 b14 b15
$B7	b24 b25 b26 b27 b28 b29 b30 b31

Rx Bitwise Raw Data Receive

	bit 15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
$B8	RxData0	b0 b1 b2 b3 b4 b5 b6 b7
$B9	RxData1	b8 b9 b10 b11 b12 b13 b14 b15
$BA	RxData2	b16 b17 b18 b19 b20 b21 b22 b23

Trans Count | 0 | Bit Counter

	bit 31 30 29 28 27 26 25 24
$B8	b0 b1 b2 b3 b4 b5 b6 b7
$B9	b8 b9 b10 b11 b12 b13 b14 b15
$BA	b24 b25 b26 b27 b28 b29 b30 b31

Rx Bytewise Formatted Data Receive

	bit 15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
$B8	RxData0	RxData_Byte 0
$B9	RxData1	RxData_Byte 1
$BA	RxData2	RxData_Byte 3
$BB	RxData3	RxData_Byte 5
$C5	RxData4	RxData_Byte 7
$C9	RxData5	RxData_Byte 9
$CC	RxData6	RxData_Byte 11

Trans Count | 0/1 | Block Specifier (Note 1) | RxData_Byte 2 | RxData_Byte 4 | RxData_Byte 6 | RxData_Byte 8 | RxData_Byte 10 | RxData_Byte 12

Rx Bytewise Raw Data Receive

	bit 15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
$B8	RxData0	RxData_Byte 0
$B9	RxData1	RxData_Byte 1
$BA	RxData2	RxData_Byte 3
$BB	RxData3	RxData_Byte 5
$C5	RxData4	RxData_Byte 7
$C9	RxData5	RxData_Byte 9
$CC	RxData6	RxData_Byte 11

Trans Count | 1 | Byte Counter | RxData_Byte 2 | RxData_Byte 4 | RxData_Byte 6 | RxData_Byte 8 | RxData_Byte 10 | RxData_Byte 12

Rx Soft Decision Raw Data Receive

	bit 15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
$B8	RxData0	RxData_Bit 0	RxData_Bit 1
$B9	RxData1	RxData_Bit 2	RxData_Bit 3	RxData_Bit 4	RxData_Bit 5
$BA	RxData2	RxData_Bit 6	RxData_Bit 7	RxData_Bit 8	RxData_Bit 9
$BB	RxData3	RxData_Bit 10	RxData_Bit 11	RxData_Bit 12	RxData_Bit 13
$C5	RxData4	RxData_Bit 14	RxData_Bit 15	RxData_Bit 16	RxData_Bit 17
$C9	RxData5	RxData_Bit 18	RxData_Bit 19	RxData_Bit 20	RxData_Bit 21
$CC	RxData6	RxData_Bit 22	RxData_Bit 23	RxData_Bit 24	RxData_Bit 25

Trans Count | 0 | Bit Counter

Note: Programming Register $C8, P4.1, SoftBitsOut bit = 1

Modem Mode and Control Register $C1

Tx Modem and CS Modem Control
$C1, b7-4
0000 = Idle
0001 = Reserved
0010 = Tx Raw Data Only
0011 = Tx PRBS
0100 = Tx Preamble, Sync1, Raw Data
0101 = Tx Preamble, Sync2, Raw Data
0110 = Test – Deviation
0111 = Reset / Abort
1000 = Test – Preamble
1001 = Reserved
1010 = Tx Preamble, Sync1, Formatted Data
1011 = Tx Preamble, Sync2, Formatted Data
1100 = Tx Formatted Data Only

2

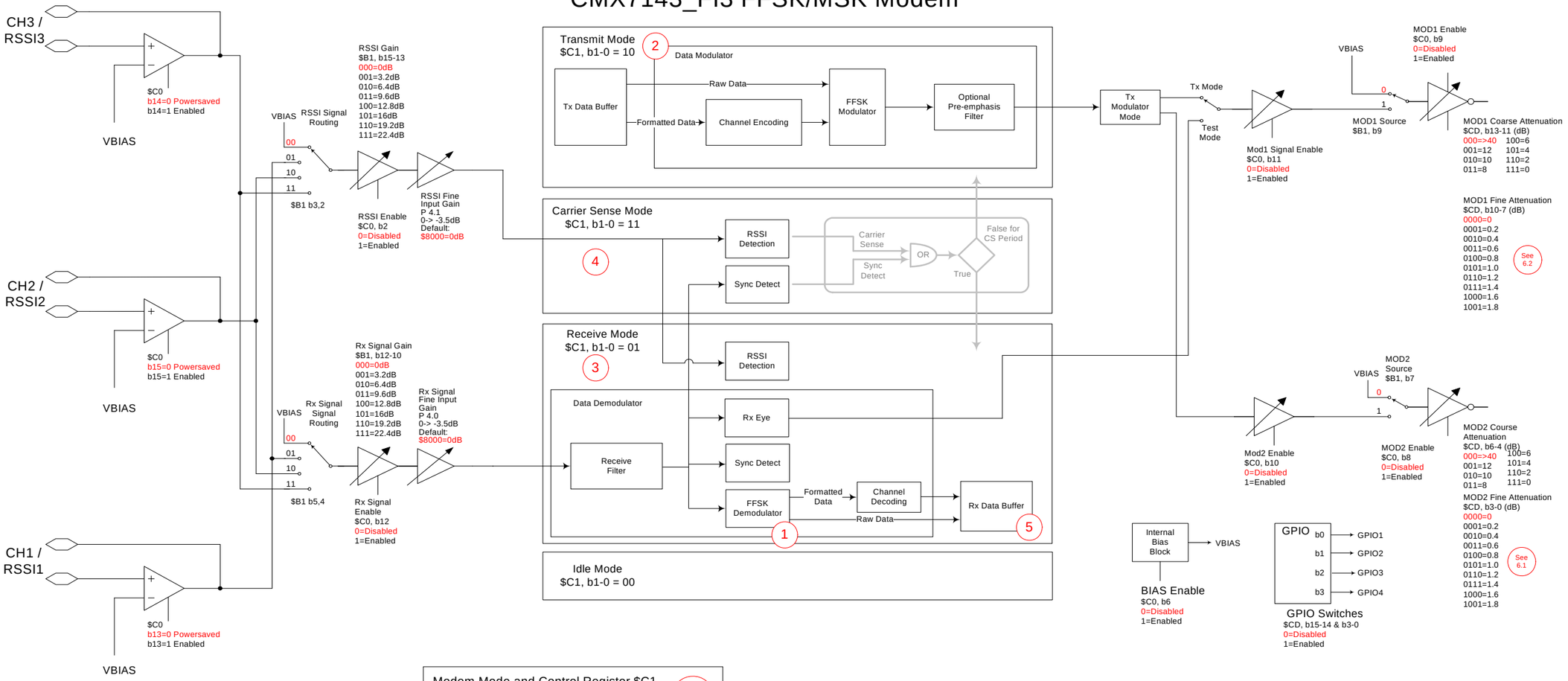
Rx Modem Control
$C1, b11-8
0000 = Idle
0001 = Reserved
0010 = Rx search for Sync1 or 2, then Rx Raw Data
0011 = Rx eye
0100 = Rx search for Sync1, then Rx Raw Data
0101 = Rx search for Sync2, then Rx Raw Data
0110 = Reserved
0111 = Reset / Abort
1000 = Reserved
1001 = Rx search for Sync1 and 2, then Rx Formatted Data
1010 = Rx search for Sync1, then Rx Formatted Data
1011 = Rx search for Sync2, then Rx Formatted Data

3

CS Modem Control
$C1, b7-4
0000 = Idle
0001 = Reserved
0010 = Tx Raw Data Only
0011 = Tx PRBS
0100 = Tx Preamble, Sync1, Raw Data
0101 = Tx Preamble, Sync2, Raw Data
0110 = Test – Deviation
0111 = Reset / Abort
1000 = Test – Preamble
1001 = Reserved
1010 = Tx Preamble, Sync1, Formatted Data
1011 = Tx Preamble, Sync2, Formatted Data
1100 = Tx Formatted Data Only

4

CMX7143_FI3 FFSK/MSK Modem



Modem Mode and Control Register $C1

1

Scrambler seed select
$C1, b15-12
0000 = $FFFF: Standard seed
0001 = Scramble seed 1 (See program block 0)
0010 = Scramble seed 2 (See program block 0)
0011 = $0000: Scrambler off

Programming Register $C8

- 6.0 Burst Data Configuration $C8, Block 0 P0.0 - P0.15
- 6.1 Burst Tx Sequence + GPIO Configuration $C8, Block 1 P1.0 – P1.13
- 6.2 Gain and Offset Setup $C8, Block 4 P4.0 – P4.10

Tx/Rx Data Registers

5

Tx Bytewise Formatted Data Transmit

	bit 15 14 13 12 11 10 9 8	7 6	5 4 3 2 1 0
$B5	TxData0 TxData_Byte 0	Trans Count	Block Specifier
$B6	TxData1 TxData_Byte 1		TxData_Byte 2
$B7	TxData2 TxData_Byte 3		TxData_Byte 4
$CA	TxData3 TxData_Byte 5		TxData_Byte 6
$CB	TxData4 TxData_Byte 7		TxData_Byte 8
$C2	TxData5 TxData_Byte 9		TxData_Byte 10
$C7	TxData6 TxData_Byte 11		TxData_Byte 12

Tx Bytewise Raw Data Transmit

	bit 15 14 13 12 11 10 9 8	7 6	5 4 3 2 1 0
$B5	TxData0 TxData_Byte 0	Trans Count	1 Byte Counter
$B6	TxData1 TxData_Byte 1		TxData_Byte 2
$B7	TxData2 TxData_Byte 3		TxData_Byte 4
$CA	TxData3 TxData_Byte 5		TxData_Byte 6
$CB	TxData4 TxData_Byte 7		TxData_Byte 8
$C2	TxData5 TxData_Byte 9		TxData_Byte 10
$C7	TxData6 TxData_Byte 11		TxData_Byte 12

Tx Bitwise Raw Data Transmit

	bit 15 14 13 12 11 10 9 8	7 6 5	4 3 2 1 0
$B5	TxData0 b0 b1 b2 b3 b4 b5 b6 b7	Trans Count	0 Bit Counter
$B6	TxData1 b8 b9 b10 b11 b12 b13 b14 b15	b16 b17 b18	b19 b20 b21 b22 b23
$B7	TxData2 b24 b25 b26 b27 b28 b29 b30 b31		

Rx Bytewise Formatted Data Receive

	bit 15 14 13 12 11 10 9 8	7 6	5 4 3 2 1 0
$B8	RxData0 RxData_Byte 0	Trans Count	Block Specifier
$B9	RxData1 RxData_Byte 1		RxData_Byte 2
$BA	RxData2 RxData_Byte 3		RxData_Byte 4
$BB	RxData3 RxData_Byte 5		RxData_Byte 6
$C5	RxData4 RxData_Byte 7		RxData_Byte 8
$C9	RxData5 RxData_Byte 9		RxData_Byte 10
$CC	RxData6 RxData_Byte 11		RxData_Byte 12

Rx Bytewise Raw Data Receive

	bit 15 14 13 12 11 10 9 8	7 6	5 4 3 2 1 0
$B8	RxData0 RxData_Byte 0	Trans Count	1 Byte Counter
$B9	RxData1 RxData_Byte 1		RxData_Byte 2
$BA	RxData2 RxData_Byte 3		RxData_Byte 4
$BB	RxData3 RxData_Byte 5		RxData_Byte 6
$C5	RxData4 RxData_Byte 7		RxData_Byte 8
$C9	RxData5 RxData_Byte 9		RxData_Byte 10
$CC	RxData6 RxData_Byte 11		RxData_Byte 12

Rx Bitwise Raw Data Receive

	bit 15 14 13 12 11 10 9 8	7 6 5	4 3 2 1 0
$B8	RxData0 b0 b1 b2 b3 b4 b5 b6 b7	Trans Count	0 Bit Counter
$B9	RxData1 b8 b9 b10 b11 b12 b13 b14 b15	b16 b17 b18	b19 b20 b21 b22 b23
$BA	RxData2 b24 b25 b26 b27 b28 b29 b30 b31		

Modem Mode and Control Register $C1

Tx Modem and CS Modem Control
$C1, b7-4
0000 = Idle
0001 = Reserved
0010 = Tx Raw Data Only
0011 = Tx PRBS
0100 = Tx Preamble, Sync1, Raw Data
0101 = Tx Preamble, Sync2+Raw Data
0110 = Test – Deviation
0111 = Reset / Abort
1000 = Test – Preamble
1001 = Tx Preamble, Sync3 + Raw Data
1010 = Tx Preamble, Sync1, Formatted Data
1011 = Tx Preamble, Sync2, Formatted Data
1100 = Tx Preamble, Sync3, Formatted Data

2

Rx Modem Control
$C1, b11-8
0000 = Idle
0001 = Reserved
0010 = Rx search for Sync and modulation as defined by P4.1, then Rx Raw Data
0011 = Rx eye
0100 = Reserved
0101 = Reserved
0110 = Reserved
0111 = Reset / Abort
1000 = Reserved
1001 = Rx search for Sync and modulation as defined by P4.1, then Rx Formatted Data

3

CS Modem Control
$C1, b7-4
0000 = Idle
0001 = Reserved
0010 = Tx Raw Data Only
0011 = Tx PRBS
0100 = Tx Preamble, Sync1, Raw Data
0101 = Tx Preamble, Sync2, Raw Data
0110 = Test – Deviation
0111 = Reset / Abort
1000 = Test – Preamble
1001 = Tx Preamble, Sync3 + Raw Data
1010 = Tx Preamble, Sync1, Formatted Data
1011 = Tx Preamble, Sync2, Formatted Data
1100 = Tx Preamble, Sync3, Formatted Data

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