



Product Change Notification (PCN)

PCN no.: PCN-083 rev. 1.1		Date: 2013-08-14
Device affected:		Device version / Build Code:
nRF51822-QFAA		CA, C0
nRF51822-QFAB		AA, A0
nRF51822-CEAA		BA, B0
nRF51422-QFAA		CA, C0
nRF51422-CEAA		A0
Data sheet references: See Appendix 1	Agreement reference: N/A	Customers reference: N/A

Description of change: <p>Additional calibration of radio deviation for the BLE_1MBIT mode in Nordics production flow. Calibration parameters are written to the FICR to be used as override parameters for default deviation.</p> <p>Impact: Does the change affect product:</p> <table style="width: 100%;"> <tr> <td>1. Form</td> <td><input checked="" type="checkbox"/> No</td> <td><input type="checkbox"/> Yes – describe:</td> </tr> <tr> <td>2. Fit</td> <td><input checked="" type="checkbox"/> No</td> <td><input type="checkbox"/> Yes – describe:</td> </tr> <tr> <td>3. Function</td> <td><input type="checkbox"/> No</td> <td><input checked="" type="checkbox"/> Yes – describe: See below</td> </tr> <tr> <td>4. Quality or Reliability</td> <td><input checked="" type="checkbox"/> No</td> <td><input type="checkbox"/> Yes – describe:</td> </tr> <tr> <td>Classification of change</td> <td><input checked="" type="checkbox"/> Minor</td> <td><input type="checkbox"/> Major</td> </tr> </table>		1. Form	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes – describe:	2. Fit	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes – describe:	3. Function	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes – describe: See below	4. Quality or Reliability	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes – describe:	Classification of change	<input checked="" type="checkbox"/> Minor	<input type="checkbox"/> Major
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4. Quality or Reliability	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes – describe:														
Classification of change	<input checked="" type="checkbox"/> Minor	<input type="checkbox"/> Major														
Reason for change: <p>Increase production yield and improve deviation performance of the radio in BLE_1MBIT mode</p>																
Consequences of change: <p>To ensure correct radio operation in the BLE_1MBIT (Bluetooth low energy) mode, override parameters have to be copied from FICR into the RADIO OVERRIDE registers before enabling RADIO first time. Failing to do will mean that some devices will not meet Bluetooth low energy requirements on deviation.</p> <p>The change has <i>no consequences</i> for customers using nRF51822 in combination with Nordic's S110 Bluetooth low energy softdevice version 5.0.0 or later, or any future softdevice from Nordic, as this is handled automatically by the softdevice.</p> <p>Customers using the BLE_1MBIT radio mode in combination with their own protocol stack need to update the stack to handle copying of FICR override parameters to RADIO. Appendix 1 provides a description on FICR and RADIO override features. The text in Appendix 1 will be included the next version of the nRF51 Series Reference Manual (v2.0). Affected customers are advised to implement and verify this software change as soon as possible. For question or clarifications please contact Nordic technical support.</p> <p>This change <i>only</i> affects the BLE_1MBIT radio mode, the other radio modes are unaffected by this change.</p>																
Verification: <p>New test and calibration procedure will be approved and qualified under standard Nordic Semiconductor ASA Q/A procedures.</p>																
Marking/Shipping labels: <p>There will be no build code incremented because of these changes:</p>																
Change active from (date): nRF51822-QFAA: September 1 st 2013 nRF51822-QFAB: September 1 st 2013 nRF51822-CEAA: September 1 st 2013 nRF51422-QFAA: September 1 st 2013 nRF51422-CEAA: September 1 st 2013	Change active from (lot no/date code): Available on request, please contact Nordic Semiconductor ASA															

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Last time order (date): (optional)		Final shipment date: (optional)	
N/A		N/A	
Attachments:	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes – Appendix 1	
Authorization for Nordic Semiconductor			
Product Manager	Date: 2013-08-14	Sign:	
Quality Director	Date: 2013-08-14	Sign:	

Appendix 1

The following sections will be integrated into the next revision of the nRF51 Series Reference Manual. The chapter headings correspond to chapters in the nRF51 Series Reference manual where the description belongs.

Factory Information Configuration Registers (FICR)

Override parameters

The FICR may contain override parameters set during device calibration in Nordic production, which need to replace default settings in the RADIO. If there are override parameters and for which RADIO mode, will vary between nRF51 devices. Read the OVERRIDDEN register to determine if the FICR contains override parameters for the radio mode you are going to use. If the FICR contains override parameters, they must be copied to the Radio OVERRIDE registers before enabling the radio in that mode.

Registers

Register	Offset	Description
OVERRIDEEN	0x0AC	Overridden enable
BLE_1MBIT[0]	0x0EC	RADIO.OVERRIDE[0] values for BLE_1MBIT mode
BLE_1MBIT[1]	0x0F0	RADIO.OVERRIDE[1] values for BLE_1MBIT mode
BLE_1MBIT[2]	0x0F4	RADIO.OVERRIDE[2] values for BLE_1MBIT mode
BLE_1MBIT[3]	0x0F8	RADIO.OVERRIDE[3] values for BLE_1MBIT mode
BLE_1MBIT[4]	0x0FC	RADIO.OVERRIDE[4] values for BLE_1MBIT mode

OVERRIDEN

Bit number	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
ID (Field ID)	-----D-----

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Value after erase					
I	R	Field	Value ID	Value	Description
D	R	BLE_1MBIT		0	Override values for BLE_1MBIT mode is available in FICR. BLE_1MBIT[n] (n=0..4)
				1	No override values for BLE_1MBIT mode available in FICR

BLE_1MBIT[n] (n=0..4)

Bit number	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1																												
ID (Field ID)	A A																												
Value after erase			- -																										
I	R	Field	Value ID	Description																									
A	R			Override values for BLE_1MBIT mode																									

2.4 GHz radio (RADIO)

Override registers

Registers OVERRIDE[n] (n=0...4) must be configured for a given radio mode if override parameters have been written to the FICR during Nordic production calibration. It is not possible to partially override these parameters, meaning all five registers must either be used or left untouched.

Using the Override registers

Before enabling the radio, check if the FICR contains override parameters for the selected radio mode by reading FICR:OVERRIDEN register. If the FICR contains override parameters for this mode, they have to be copied into the RADIO.OVERRIDE[n] (n=0...4) registers before the radio is enabled. See FICR section for further details.

Override can be disabled by setting the value of OVERRIDE[4].OREN to 0. Override can be re-enabled by setting the value of OVERRIDE[4].OREN to 1.

Configuration of the OVERRIDE registers, including OVERRIDE[4].OREN, must occur before the radio is enabled using the RXEN or TXEN task. The registers must not be overwritten while the radio is enabled, that is, from RADIO.RXEN or RADIO.TXEN until the RADIO.DISABLED event.

Registers

Register	Offset	Description
OVERRIDE[0]	0x724	Override0 - Radio configuration parameters
OVERRIDE[1]	0x728	Override1 - Radio configuration parameters
OVERRIDE[2]	0x72C	Override2 - Radio configuration parameters
OVERRIDE[3]	0x730	Override3 - Radio configuration parameters
OVERRIDE[4]	0x734	Override4 - Radio configuration parameters

OVERRIDE[n] (n=0..3)

Bit number	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1																												
ID (Field ID)	B A																												
Value after erase			0 0																										
I	R	Field	Value ID	Description																									

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D	W	d	
A	R		Radio override (Content to be copied from FICR)

OVERVERRIDE[4]

Bit number		31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
ID (Field ID)		B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Value after erase		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	D	R	W	Field	Value ID	Value	Description																									
A		R	W				Radio override (Content to be copied from FICR)																									
B		R	W	OREN			Override control																									
						0	Disable use of OVERVERRIDE[n] (n=0...4) registers																									
						1	Enable use of OVERVERRIDE[n] (n=0...4) registers																									