Product Change Notification (PCN)

PCN no.: **PCN-092 rev.1.2**		Date: **2015-07-03**
Device affected: **nRF51822-QFAA** **nRF51822-CEAA** **nRF51822-QFAB**		Device version / Build Code: G00, G10, G20, G30 D00, D10, D20, D30 B00, B20
Data sheet references: **See Appendix 1**	Agreement reference: **N/A**	Customers reference: **N/A**

Impact: Does the change affect **product**:

1.	Form	☒ No	☐ Yes – describe:
2.	Fit	☒ No	☐ Yes – describe:
3.	Function	☐ No	☒ Yes – describe: See description below
4.	Quality or Reliability	☒ No	☐ Yes – describe:
Classification of change		☐ Minor	☒ Major

Impact: Does the change affect **container**:

5.	Form	☒ No	☐ Yes – describe:
6.	Fit	☐ No	☒ Yes – describe: New reel MOQ for nRF51822-CEAA variant
7.	Function	☒ No	☐ Yes – describe:
8.	Quality or Reliability	☒ No	☐ Yes – describe:
Classification of change		☒ Minor	☐ Major

Description of change:

New revision of the ICs, with the following key improvements/changes:

1. *Radio and CPU concurrency*

   Support for running the CPU concurrently with the Radio. Key benefits include reduced application latency and increased CPU availability for application level code. New versions of the SoftDevices include APIs to enable/disable this feature. Refer to the SoftDevice documentation for more information.

2. *Improved power efficiency*

   300 uA reduction in active current for CPU executing code from flash.

   Improved buck DC/DC regulator. The new DC/DC only supplies the Radio. Optimizations include automatic management (application software only needs to enable/disable the feature) and improved power efficiency. Refer to the Product Specification and Reference Manual for more information.

3. *Improved start-up time for Power on Reset (POR) module*

   Optimized POR module to provide faster start-up time across the whole supply range (1.8 to 3.6 V).

4. *Fixes of anomalies*

   The new IC revision includes a number of fixes of anomalies reported in nRF51822-PAN v2.4. For an updated list of anomalies refer to the new nRF51822-PAN v3.0.

5. *New container options for the CSP package variants*

   - nRF51822-CEAA-R (Reel) MOQ changed from 3000 to 7000
   - New 7" reel option: nRF51822-CEAA-R7 with a MOQ of 1500

   Refer to the Product Specification version 3.1 for more information.

All new features and changes in electrical specifications for the new revision are documented in the nRF51822 Product Specification version 3.1 and the nRF51 Reference Manual version 3.0.
Appendix 1 lists all changes with reference to these documents.

Reason for change:

New features, bug fixes, and improvements of performance and power efficiency.

Consequences of change:

1. *Hardware*

   None. New revisions are drop-in compatible with the current revisions.

2. *Teleregulatory and Bluetooth certification*

   Reference designs nRF51822-DF (QFN) and nRF51822-CEAA-DF (CSP) pass all telecommunications regulatory bodies' requirements with the stated product changes with no discernible performance change. A reassessment of design performance due to applicable telecommunications regulatory requirements is required for any product not identical to the referenced designs.

   Bluetooth QDIDs are valid for the new device versions *). Bluetooth RF PHY conformance reassessment is recommended for all designs not identical to the referenced designs.

3. *Software*

   None. New revisions are software compatible with the current revisions including software workarounds for fixed anomalies.

   To verify this , Nordic has carried out compatibility testing with the following software revisions:

   - S110 v5.2.1, v6.2.1, and v7.1
   - S120 v1.0.1
   - nRF51 SDK v6.1 and v7.0

   Note that the SDK v7.0 is compatible *only* with the new nRF51-DK and not the nRF51822-DK or nRF51822–EK.

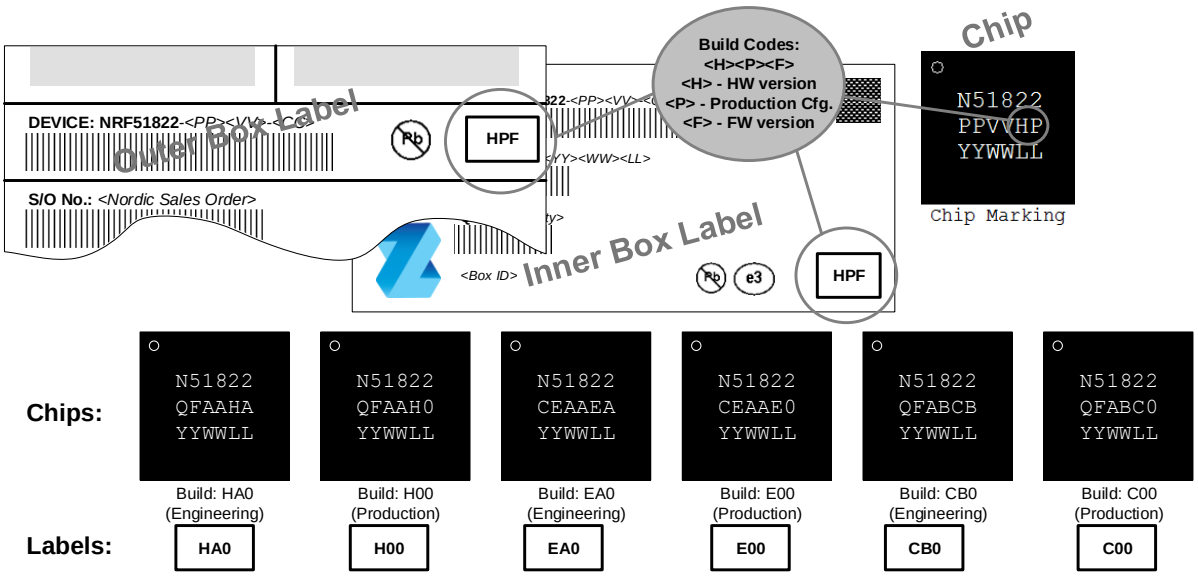
*) For more information on migrating to the new revisions refer to the white paper nWP-021 "*Migrating from the 2nd to the 3rd revision of nRF51822*", v.1.0.

Verification of change:

New revisions are approved and qualified under standard Nordic Semiconductor ASA QA procedures.

Marking/Shipping labels:

The new versions will be marked with new build codes as follows:



Change active from:

nRF51822-QFAA (6x6mm QFN, 256kB Flash)			
Build code	**Wafer / assembly**	**Samples / reports**	**Active from**
H00	TSMC Fab10 / AMKOR ATP	Now	2015-02-01
Second source build codes:			
H10	TSMC Fab10 / ASE ChungLi	Now	2015-09-01
H20	TSMC Fab3 / AMKOR ATP	To be announced	Samples + 90 days
H30	TSMC Fab 3 / ASE ChungLi	To be announced	Samples + 90 days

nRF51822-CEAA (3.5x3.8mm CSP, 256kB Flash)			
Build code	**Wafer / assembly**	**Samples / reports**	**Active from**
E00	TSMC Fab10 / Deca Technologies	Now	2015-02-01
Second source build codes:			
E10	TSMC Fab10 / ASE ChungLi	Now	2015-09-01
E20	TSMC Fab3 / Deca Technologies	To be announced	Samples + 90 days
E30	TSMC Fab 3 / ASE ChungLi	To be announced	Samples + 90 days

nRF51822-QFAB (6x6mm QFN, 128kB Flash)			
Build code	**Wafer / assembly**	**Samples / reports**	**Active from**
C00	TSMC Fab10 / ASE ChungLi	Now	2015-02-01
Second source build codes:			
C10	TSMC Fab10 / Amkor ATP	October 2015	Samples + 60 days
C20	TSMC Fab3 / ASE ChungLi	To be announced	Samples + 90 days
C30	TSMC Fab3 / Amkor ATP	To be announced	Samples + 90 days

Note that the above 'active from' dates refer to the earliest date Nordic will fulfill orders with the new revisions instead of the current revisions. Depending on stock level of current revision the actual 'active from' date may be later.

For the second source build codes, Nordic will update this PCN when the exact schedule of production samples and qualification report are available.

Nordic may on a limited basis support earlier ramp-up on the new revisions. Please contact Nordic sales for more information.

Last time order:

2015-12-31

Final shipment date:

2016-06-30

Attachments: ☐ No ☒ Yes – describe: Appendix 1

Technical contact at Nordic Semiconductor:

www.nordicsemi.com, "Support"

Commercial contact at Nordic Semiconductor:

www.nordicsemi.com, "Contact Us"

Authorization for Nordic Semiconductor

Product Manager	Date:	2015-07-03	Sign:	
Quality Director	Date:	2015-07-03	Sign:	

Please note that all last time buy orders are non-cancellable and non-returnable.

Revision History

Revision	Date	Author	Comment
1.0	2014-10-28	T. Bonnerud	Initial Release
1.1	2015-04-31	T. Bonnerud	Updated build codes for nRF51822-QFAB
1.2	2015-07-03	D. Angco T. Bonnerud	Updated Active From dates for nRF51822-QFAA H10, nRF51822-CEAA E10 & nRF51822-QFAB C10. Added Last time order and final shipment date.

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Appendix 1

Product change summary

This is a summary of the changes implemented in the relevant product documentation:

Module	nRF51 Series Reference Manual v3.0 chapter	nRF51822 PS v3.1 chapter	Part changed/added	Comment
RAM	5.1.4	3.2.2	RAM organization	The RAM is divided into multiple RAM AHB slaves. Added description on how to organize usages of the RAM to take advantages of multiple RAM AHB slaves.
Power	12.1.1	3.4.1	Power Supply	Changed how the DC/DC and Regulators are organized. The DC/DC converter is only controlling the radio voltage.
	12.1.3	3.4.1.2	DC/DC Converter setup	Improved the DC/DC solution: ▪ Simplified how the DC/DC is controlled and operates. ▪ Removed the complexity around how it is controlled. ▪ Removed the startup time issue.
	12.1.7	3.4.2.2	System ON mode	Improved description around Low Power and Constant Latency
	12.1.12	--	Power-on reset	The Power-on reset module has been improved on the startup time for the whole VDD range (1.8 to 3.6 V). No change in the descriptive text but it's seen on the numbers specified for the Power-on reset module below. Both in chapter 7 Operation condition and section 8.2 Power Management.
Timer	--	4.2	Timer/ Counter	Added description about 1 MHz mode.
Radio	17.1.3	--	Maximum packet length	*Correction of documentation error. No change in actual performance between current revision and new revisions.* The combined length of S0, LENGTH, S1, and PAYLOAD is changed from "**cannot exceed 255 bytes**" to "**cannot exceed 254 bytes**".
	29.6		UART	New section "Suspending the UART"
	33		Software Interrupts	New chapter
Operating Condition	--	7	Table 20	Parameter t_{R_VDD} is specified under new conditions to reflect the improved POR module. Old parameter description: *Supply rise time (0V to 1.8 V)* New parameter description: *Supply rise time (0 V to VDD)* Symbol: t_{R_VDD} | Old value: 60 @ 0 – 1.8V | New value: 100 @ 0V – VDD | Units: ms
System	--	8	Electrical specification	Changes in the electrical specification
	--	8.1.2	Table 22	Symbol: $I_{X16M.1M}$ | Old value: *New par.* | New value: 250 | Units: µA
	--	8.1.3	Table 23	Symbol: $I_{X32M.1M}$ | Old value: *New par.* | New value: 300 | Units: µA

<table>
<tr><th>Module</th><th>nRF51 Series Reference Manual v3.0 chapter</th><th>nRF51822 PS v3.1 chapter</th><th>Part changed/added</th><th>Comment</th></tr>
<tr><td></td><td>--</td><td>8.1.4</td><td>Table 24</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$I_{RC16M,1M}$</td><td>New par.</td><td>540</td><td>µA</td></tr>
<tr><td>$t_{START,RC16M}$ (Typ.)</td><td>2,5</td><td>4,2</td><td>µs</td></tr>
<tr><td>$t_{START,RC16M}$ (Max.)</td><td>3,5</td><td>5,2</td><td>µs</td></tr>
</table>
Correction of documentation error. No change in actual performance between current revision and new revisions.
</td></tr>
<tr><td></td><td>--</td><td>8.1.6</td><td>Table 26</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$t_{START,RC32k}$ (Typ.)</td><td>100</td><td>390</td><td>µs</td></tr>
<tr><td>$t_{START,RC32k}$ (Max.)</td><td>New par.</td><td>487</td><td>µs</td></tr>
</table>
Correction of documentation error. No change in actual performance between current revision and new revisions.
</td></tr>
<tr><td></td><td>--</td><td>8.1.7</td><td>Table 27</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$t_{START,SYNT32k}$</td><td>100</td><td>406</td><td>µs</td></tr>
</table>
Correction of documentation error. No change in actual performance between current revision and new revisions.
</td></tr>
<tr><td></td><td>--</td><td>8.2</td><td>Power management</td><td>The POR module is improved so that it gives a fast startup time for the whole VDD range (1.8 to 3.6 V).</td></tr>
<tr><td></td><td>--</td><td>8.2</td><td>Table 30</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$t_{POR,\ 1µs}$ (Min, Typ)</td><td colspan="3">Removed.</td></tr>
<tr><td>$t_{POR,\ 50ms}$ (Min, Typ)</td><td colspan="3">Removed.</td></tr>
<tr><td>$t_{POR,\ 10µs}$ (Min.)</td><td>New par.</td><td>0,7</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 10µs}$ (Typ.)</td><td>New par.</td><td>2.4</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 10µs}$ (Max.)</td><td>New par.</td><td>19</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 1ms}$ (Min.)</td><td>New par.</td><td>1,7</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 1ms}$ (Typ.)</td><td>New par.</td><td>3.4</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 1ms}$ (Max.)</td><td>New par.</td><td>20</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 10ms}$ (Min.)</td><td>New par.</td><td>11</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 10ms}$ (Typ.)</td><td>New par.</td><td>12</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 10ms}$ (Max.)</td><td>New par.</td><td>28</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 100ms}$ (Min.)</td><td>New par.</td><td>68</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 100ms}$ (Typ.)</td><td>New par.</td><td>101</td><td>ms</td></tr>
<tr><td>$t_{POR,\ 100ms}$ (Max.)</td><td>New par.</td><td>115</td><td>ms</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td></td><td>Table 32</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$I_{1V2XO16,1M}$</td><td>New par.</td><td>520</td><td>µA</td></tr>
<tr><td>$I_{1V2XO32,1M}$</td><td>New par.</td><td>560</td><td>µA</td></tr>
<tr><td>$I_{1V2RC16,1M}$</td><td>New par.</td><td>630</td><td>µA</td></tr>
<tr><td>t_{XO} (Typ.)</td><td>New par.</td><td>2,3</td><td>µs</td></tr>
<tr><td>t_{XO} (Max.)</td><td>New par.</td><td>5,3</td><td>µs</td></tr>
<tr><td>I_{DCDC}</td><td colspan="3">Removed</td></tr>
<tr><td>$t_{START,DCDC}$</td><td colspan="3">Removed</td></tr>
</table>
</td></tr>
<tr><td></td><td>--</td><td>8.3</td><td>Table 33</td><td>Updated. Added row “CPU” and the column “1V7”.</td></tr>
<tr><td></td><td>--</td><td>8.4</td><td>Table 34</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$I_{CPU,FLASH}$</td><td>4,4</td><td>4,1</td><td>mA</td></tr>
</table>
</td></tr>
<tr><td></td><td>--</td><td>8.5.3</td><td>Table 37 / Figure 11</td><td>New section specifying Radio parameters when the DC/DC is enabled.</td></tr>
</table>

<table>
<tr><th>Module</th><th>nRF51 Series Reference Manual v3.0 chapter</th><th>nRF51822 PS v3.1 chapter</th><th>Part changed/added</th><th>Comment</th></tr>
<tr><td></td><td></td><td></td><td></td><td>▪ New table 37 specifying the Radio current consumption when the DC/DC is enabled.
▪ Figure 11 gives the Conversion factor (F_{DCDC}) as function of VDD for selected radio modes.</td></tr>
<tr><td></td><td>--</td><td>8.5.6</td><td>Table 40</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$t_{RXCHAIN}$ (250 k)</td><td>12</td><td>12,5</td><td>µs</td></tr>
<tr><td>$t_{RXCHAIN}$ (1 M)</td><td>2</td><td>3</td><td>µs</td></tr>
<tr><td>$t_{RXCHAIN}$ (2 M)</td><td>2,5</td><td>2</td><td>µs</td></tr>
</table>
Correction of documentation error. No change in actual performance between current revision and new revisions.</td></tr>
<tr><td></td><td></td><td>8.7</td><td>Table 43</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>t_{CTSH}</td><td>New par.</td><td>1</td><td>µs</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>8.8</td><td>Table 45</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>t_{CD}</td><td>60</td><td>97</td><td>ns</td></tr>
</table>
Correction of documentation error. No change in actual performance between current revision and new revisions.</td></tr>
<tr><td></td><td>--</td><td>8.13</td><td>Table 52</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$I_{TIMER0/1/2,1M}$</td><td>New par.</td><td>4</td><td>µA</td></tr>
</table></td></tr>
<tr><td></td><td>--</td><td>8.15</td><td>Table 54</td><td>Improved the accuracy of the temperature sensor.
Added a Note on T_{ACC} specifying that the accuracy is applicable in the range from 0ºC to +60ºC.</td></tr>
<tr><td></td><td></td><td>8.22</td><td>--</td><td>Corrected the timing specification for the NVMC module.</td></tr>
<tr><td></td><td></td><td></td><td>Table 61</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$t_{ERASEALL}$ (Typ.)</td><td colspan="3">Removed</td></tr>
<tr><td>$t_{ERASEALL}$ (Max.)</td><td>New par.</td><td>22.3</td><td>ms</td></tr>
<tr><td>$t_{PAGEERASE}$ (Typ.)</td><td colspan="3">Removed</td></tr>
<tr><td>$t_{PAGEERASEALL}$ (Max.)</td><td>New par.</td><td>22.3</td><td>ms</td></tr>
<tr><td>t_{WRITE} (Typ.)</td><td colspan="3">Removed</td></tr>
<tr><td>$t_{WRITE,FLASH}$ (Max.)</td><td>New par.</td><td>46,3</td><td>µs</td></tr>
<tr><td>$t_{WRITE,RAM,1st}$ (Max.)</td><td>New par.</td><td>39,3</td><td>µs</td></tr>
<tr><td>$t_{WRITE,RAM,2nd}$ (Max.)</td><td>New par.</td><td>22,3</td><td>µs</td></tr>
<tr><td>$t_{WRITE,RAM,3rd}$ (Max.)</td><td>New par.</td><td>46,3</td><td>µs</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td></td><td>--</td><td>8.24</td><td>Table 63</td><td>
<table>
<tr><th>Symbol</th><th>Old value</th><th>New value</th><th>Units</th></tr>
<tr><td>$t_{LPCOMPSTARTUP}$</td><td>New par.</td><td>40</td><td>µs</td></tr>
</table></td></tr>
</table>