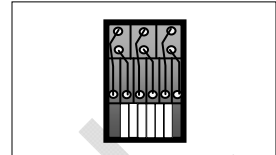


Earl J. Lum  
+1-650-430-2221  
[elum@ejlwireless.com](mailto:elum@ejlwireless.com)



**Nokia Siemens Networks FLEXI W-CDMA Base Station  
Digital BBU Module  
Model 082849A.103 FSMB Core**

December 2009



Entire contents © 2009 EJM Wireless Research LLC. All Rights Reserved. Reproduction of this publication in any form without prior written permission is strictly forbidden and will be prosecuted to the fully extent of US and International laws. The transfer of this publication in either paper or electronic form to unlicensed third parties is strictly forbidden. The information contained herein has been obtained from sources EJM Wireless Research LLC deems reliable. EJM Wireless Research LLC disclaims all warranties as to the accuracy, completeness or adequacy of such information. EJM Wireless Research LLC shall have no liability for errors, omissions or inadequacies in the information contained herein or for the interpretation thereof. The reader assumes sole responsibility for the selection of these materials to achieve its intended results. The opinions expressed herein are subject to change without notice.

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	6
Active/Passive Component Summary .....	6
Important Note: .....	6
CHAPTER 1: FLEXI W-CDMA NODEB SYSTEM .....	7
1.1 Overview of Nokia Siemens Networks Flexi NodeB Platform .....	7
CHAPTER 2: MECHANICAL ANALYSIS.....	11
2.1 Exterior Mechanical Analysis.....	11
CHAPTER 3: DIGITAL BASEBAND SUBSYSTEM (RRU) .....	30
3.1 RRU Sector BBU System.....	31
3.2 Area A: FPGA/Microprocessor Section .....	32
3.3 Area B: DSPs/ASICs for Chip Rate/Symbol Rate Processing Section .....	34
3.4 Area C: SRAM Memory Section .....	36
3.5 Area D: FPGA/Microprocessor Support Section .....	38
3.6 1/8 Brick 75W DC-DC Converter Module .....	41
3.7 22W DC-DC Converter Module .....	41
3.8 55W DC-DC Converter Module .....	42
CHAPTER 4: DIGITAL BASEBAND SUBSYSTEM (MAIN NODEB) .....	43
4.1 NodeB BBU System.....	44
4.2 Area E: Ethernet Transport Section .....	45
4.3 Area F: RRU Interface Section .....	47
4.4 Area G: FPGA/ASIC/Microprocessor Support Section .....	50
4.5 Area H: Ethernet Transport Support Section .....	52
CHAPTER 5: POWER ENTRY MODULE.....	54
CHAPTER 6: COOLING FAN UNIT .....	63
APPENDIX A - PASSIVE CASE SIZE ANALYSIS.....	65
APPENDIX B - ACTIVE COMPONENT MARKET SHARE ANALYSIS .....	68

## TABLES

Table 1: Area A Bill of Materials .....	33
Table 2: Area B Bill of Materials .....	35
Table 3: Area C Bill of Materials .....	37
Table 4: Area D Bill of Materials .....	40
Table 5: Area E Bill of Materials .....	46
Table 6: Area F Bill of Materials .....	48
Table 7: Area F Bill of Materials (con't) .....	49
Table 8: Area G Bill of Materials .....	51
Table 9: Area H Bill of Materials .....	53
Table 10: Flexi NodeB Power Entry Module Top Section Bill of Materials .....	59
Table 11: Flexi NodeB Power Entry Module Bottom Section Bill of Materials .....	61
Table 12: Passive Component Case Size Distribution by System Subsection .....	66
Table 13: Active/Passive Component Distribution by System Subsection .....	67
Table 14: Active Semiconductor Vendor Distribution by System Subsection .....	69

# EXHIBITS

Exhibit 1: Generic First Generation W-CDMA Base Station Diagram .....	7
Exhibit 2: Mounted Flexi Base Station w/Single RF Module Example .....	8
Exhibit 3: Flexi 3 Sector W-CDMA Base Station Site Example .....	9
Exhibit 4: Flexi System Level Basic Block Diagram .....	10
Exhibit 5: Flexi Digital BBU Module with Side Plates Attached .....	11
Exhibit 6: Flexi Digital BBU Module with Front Cover and Side Plates Removed .....	12
Exhibit 7: Flexi Digital BBU Module Front Cover with and w/o Side Plates, Top View .....	13
Exhibit 8: Flexi Digital BBU Module Front Cover, Internal View .....	13
Exhibit 9: Flexi Digital BBU Module Front Cover with Side Plates, Side View .....	13
Exhibit 10: Flexi Digital BBU Module Side Plate Cover, External and Internal Views .....	15
Exhibit 11: Flexi Digital BBU Module Side Plate Cover Disassembled, Internal View .....	15
Exhibit 12: Flexi Digital BBU Module Rear Cover, External and Internal Views .....	16
Exhibit 13: Flexi Digital BBU Module Metal Case, Top View .....	17
Exhibit 14: Flexi Digital BBU Module Metal Case, Bottom View .....	17
Exhibit 15: Flexi Digital BBU Module Metal Case, Front/Back Views .....	17
Exhibit 16: Flexi Digital BBU Module Metal Case, Side Views .....	18
Exhibit 17: Flexi Digital BBU Module with Case Partially Removed .....	19
Exhibit 18: Flexi Digital BBU Module with Case Fully Removed .....	19
Exhibit 19: Flexi Digital BBU Module System Frame, Top External View .....	20
Exhibit 20: Flexi Digital BBU Module System Frame, Bottom External View .....	21
Exhibit 21: Flexi Digital BBU Module System, Exploded Side View .....	22
Exhibit 22: Flexi Digital BBU Module System Frame, Top Internal View with Sector C & Main NodeB PCBs	22
Exhibit 23: Flexi Digital BBU Module System Frame, Top Internal View with Sector C & Main NodeB PCBs Removed .....	23
Exhibit 24: Flexi Digital BBU Module System Frame, Internal Shield (Top View) .....	25
Exhibit 25: Flexi Digital BBU Module System Frame, Internal Shield (Bottom View Attached) .....	26
Exhibit 26: Flexi Digital BBU Module System Frame, Internal Shield (Bottom View) .....	27
Exhibit 27: Flexi Digital BBU Module System Frame, Bottom Internal View with Sector A & B PCBs .....	28
Exhibit 28: Flexi Digital BBU Module System Frame, Bottom Internal View with Sector A & B PCB Removed .....	29
Exhibit 29: RRU Sector BBU System PCB Top (Area A/B Diagram) .....	30
Exhibit 30: RRU Sector BBU System PCB Bottom (Area C/D Diagram) .....	30
Exhibit 31: RRU Sector BBU System Block Diagram .....	31
Exhibit 32: Area A Component Diagram .....	32
Exhibit 33: Area B Component Diagram .....	34
Exhibit 34: Area C Component Diagram .....	36
Exhibit 35: Area C Test Connector Component Locations .....	36
Exhibit 36: Area D Component Diagram .....	38
Exhibit 37: Area D Test Connector Component Locations .....	39
Exhibit 38: LES15A48-5VORANJ .....	41
Exhibit 39: PTH05050 .....	41
Exhibit 40: PTH 08T240 .....	42
Exhibit 41: Main NodeB BBU Subsystem PCB Top (Area E/F Diagram) .....	43
Exhibit 42: Main NodeB BBU Subsystem PCB Bottom (Area G/H Diagram) .....	43
Exhibit 43: NodeB BBU System Block Diagram .....	44
Exhibit 44: Area E Component Diagram .....	45
Exhibit 45: Area F Component Diagram .....	47
Exhibit 46: Area G Component Diagram .....	50
Exhibit 47: Area H Component Diagram .....	52
Exhibit 48: Flexi Digital Module with Power Distribution Subsystem Location .....	55
Exhibit 49: Flexi NodeB Power Entry Module (Top/Bottom Views) .....	56
Exhibit 50: Flexi NodeB Power Entry Module Component Diagram (Internal View) .....	56
Exhibit 51: Flexi NodeB Power Entry Module Component Diagram (Internal View, Top) .....	57
Exhibit 52: Flexi NodeB Power Entry Module Component Diagram (Internal View, Top Disassembled) .....	58
Exhibit 53: Flexi NodeB Power Entry Module Component Diagram (Internal View, Bottom) .....	60
Exhibit 54: RRU DC Power Cable .....	62
Exhibit 55: Flexi Digital Module Fan Unit Location Diagram .....	63
Exhibit 56: Flexi Digital Module Fan Unit Assembly, External View .....	64
Exhibit 57: Flexi Digital Module Fan Unit Assembly, Internal View .....	64
Exhibit 58: Passive Component Case Size Distribution .....	65
Exhibit 59: Identified Passive Component Market Share by Vendor .....	67
Exhibit 60: Active Semiconductor Component Share .....	68
Exhibit 61: Active Semiconductor Market Share by Vendor .....	70

Exhibit 62: IC (>8 pin) vs. Discrete Active Semiconductor Share ..... 70  
Exhibit 63: High Pin Count (64+) Active Semiconductor Market Share by Vendor ..... 71

CONFIDENTIAL