

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



**Samsung Electronics Co., Ltd.**

**5G NR Digital BBU  
CDU50**

**July 2022**



Entire contents © 2022 EJL 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 full 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 EJL Wireless Research LLC deems reliable. EJL Wireless Research disclaims all warranties as to the accuracy, completeness or adequacy of such information. EJL Wireless Research LLC shall bear 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 their intended results. The opinions expressed herein are subject to change without notice.

# TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	7
Active/Passive Component Summary .....	7
<b>Important Note:</b> .....	7
CHAPTER 1: SAMSUNG 5G CDU .....	8
Overview of Baseband Unit.....	8
CHAPTER 2: MECHANICAL ANALYSIS.....	14
Chassis Frame (SHELF) .....	15
Chassis Frame Back Cover.....	20
Air Filter Unit .....	23
DC Power Busbar Unit.....	26
CHAPTER 3: FAN UNIT .....	33
Individual Fan Unit .....	42
CHAPTER 4: POWER/SIGNAL BACKPLANE DISTRIBUTION PCB (UCDB).....	46
CHAPTER 5: GMA1-A1A MANAGEMENT CARD .....	50
Plastic Shield .....	54
Front Panel.....	56
GMA1-A1A PCB .....	58
GMA1-A1A PCB Top Active Component Analysis .....	59
GMA1-A1A PCB Top Passive Component Analysis .....	63
GMA1-A1A PCB Bottom Active Component Analysis .....	65
GMA1-A1A PCB Bottom Passive Component Analysis .....	65
CHAPTER 6: GCB1-C1A CHANNEL MODEM PCB .....	74
GCB1-C1A Plastic Shield.....	78
Front Panel.....	80
GCB1-C1A PCB .....	82
GCB1-C1A PCB Top Active Component Analysis .....	83
GCB1-C1A PCB Top Passive Component Analysis.....	87
GCB1-C1A PCB Bottom Active Component Analysis .....	89
GCB1-C1A PCB Bottom Passive Component Analysis.....	89
CHAPTER 7: GMA1-A1A IC HEAT SINKS .....	98
CHAPTER 8: GCB1-C1A IC HEAT SINKS.....	106
APPENDIX A COMPONENT ANALYSIS.....	127
APPENDIX B COMPONENTS BY SYSTEM AREA.....	129
APPENDIX C ACTIVE COMPONENTS BY SUPPLIER .....	130
APPENDIX D PASSIVE COMPONENTS BY SUPPLIER .....	131

## TABLES

Table 1: Environmental Data .....	8
Table 2: DC Power Supply Requirements .....	8
Table 3: Power Consumption .....	8
Table 4: FANM-C4N Bill of Materials .....	41
Table 5: Fan Unit Controller PCB Top, Bill of Materials .....	41
Table 6: Fan Unit Controller PCB Bottom, Bill of Materials .....	41
Table 7: Fan Unit DC Connector Pinout .....	45
Table 8: UCDB PCB, Top Bill of Materials.....	49
Table 9: UCDB PCB, Bottom Bill of Materials.....	49
Table 10: GMA1-A1A Interface Port Functions.....	51
Table 11: GMA1-A1A PCB Top Active Bill of Materials.....	70
Table 12: GMA1-A1A PCB Top Active Bill of Materials (cont.) .....	71
Table 13: GMA1-A1A PCB Top Passive Only Bill of Materials .....	72
Table 14: GMA1-A1A PCB Bottom Passive Only Bill of Materials .....	73
Table 15: GCB1-C1A Interface Port Functions.....	75
Table 16: GCB1-C1A PCB Top Active Bill of Materials.....	94
Table 17: GCB1-C1A PCB Top Active Bill of Materials (cont.) .....	95
Table 18: GCB1-C1A PCB Top Passive Only Bill of Materials.....	96
Table 19: GCB1-C1A PCB Bottom Passive Only Bill of Materials.....	97
Table 20: CDU50 System Unit PCBs by Component Type .....	129
Table 21: CDU50 System Unit PCBs by Active Component Vendor.....	130
Table 22: CDU50 System Unit PCBs by Passive/Connector/Other Component Vendor .....	131

# EXHIBITS

Exhibit 1: Samsung 5G NR CDU Solution Example.....	9
Exhibit 2: CDU50 Hardware Architecture Block Diagram.....	10
Exhibit 3: CDU50, Front View .....	11
Exhibit 4: CDU50, Back View .....	11
Exhibit 5: CDU50, Top View .....	12
Exhibit 6: CDU50, Bottom View .....	12
Exhibit 7: CDU50, Left Side View .....	13
Exhibit 8: CDU50, Right Side View .....	13
Exhibit 9: Chassis/SHELF Identification Label.....	15
Exhibit 10: CDU50 Chassis, Front View .....	16
Exhibit 11: CDU50 Chassis, Front View with Slot Assignments.....	16
Exhibit 12: CDU50 Chassis, Back View.....	17
Exhibit 13: CDU50 Chassis, Back View without Cover .....	17
Exhibit 14: CDU50 Chassis, Back View without Cover and UCDB .....	17
Exhibit 15: CDU50 Chassis, Top View .....	18
Exhibit 16: CDU50 Chassis, Bottom View .....	18
Exhibit 17: CDU50 Chassis, Right Side View .....	19
Exhibit 18: CDU50 Chassis, Left Side View .....	19
Exhibit 19: CDU50 Chassis Frame Back Cover, External View .....	20
Exhibit 20: CDU50 Chassis Frame Back Cover, Internal View.....	21
Exhibit 21: CDU50 Chassis Frame Back Cover, Internal Offset View .....	21
Exhibit 22: CDU50 Chassis Frame Back Cover, Top Screw Locations.....	21
Exhibit 23: CDU50 Chassis Frame Back Cover, Right Side Screw Locations.....	22
Exhibit 24: CDU50 Chassis Frame Back Cover, Left Side Screw Locations.....	22
Exhibit 25: Air Filter Faceplate, External View (Left) and Internal View (Right).....	23
Exhibit 26: Air Filter Faceplate, Left Side View (Left) and Right Side View (Right).....	24
Exhibit 27: Air Filter, Top View .....	24
Exhibit 28: Air Filter, Left Side View .....	25
Exhibit 29: Air Filter, Right Side View .....	25
Exhibit 30: DC Power Busbar Top View .....	26
Exhibit 31: DC Power Busbar Label .....	27
Exhibit 32: DC Power Busbar Bottom View .....	27
Exhibit 33: DC Power Busbar Left View .....	28
Exhibit 34: DC Power Busbar Right View .....	28
Exhibit 35: DC Power Busbar Faceplate External View (Left) and Internal View (Right) .....	29
Exhibit 36: DC Power Busbar Faceplate Left Side View (Left) and Right Side View (Right) .....	29
Exhibit 37: DC Power Busbar 2-Blade Terminal Block Connector, Front View .....	30
Exhibit 38: DC Power Busbar 2-Blade Terminal Block Connector Left Side View (Left) and Right Side View (Right) .....	30
Exhibit 39: DC Power Busbar Plastic Adapter Guide Plate, Internal View (Left) and External View (Right) .....	31
Exhibit 40: DC Power Busbar Plastic Adapter Guide Plate, Left Side View (Left) and Right Side View (Right) .....	31
Exhibit 41: DC Power Busbar Plastic Adapter Guide Plate Mounting Locations .....	32
Exhibit 42: Fan Unit FANM-C4N Product Label.....	33
Exhibit 43: Fan Unit Front View (Left) and Back View (Right).....	34
Exhibit 44: Fan Unit Top View.....	35
Exhibit 45: Fan Unit Bottom View.....	35
Exhibit 46: Fan Unit Left Side View.....	36
Exhibit 47: Fan Unit Right Side View.....	36
Exhibit 48: Fan Unit Faceplate, Internal View .....	37
Exhibit 49: PCB Top View (Left) and Bottom View (Right) .....	38
Exhibit 50: PCB Top Component Diagram.....	39
Exhibit 51: PCB Bottom Component Diagram.....	40
Exhibit 52: Fan Unit Label Marking .....	42
Exhibit 53: Fan Unit Left Side Screw Locations.....	43
Exhibit 54: Fan Unit Right Side Screw Locations.....	43
Exhibit 55: Fan Unit DC Power Connector, (External (Left) and Internal (Right) Views .....	44
Exhibit 56: UCDB Top/Internal View .....	46
Exhibit 57: UCDB Bottom/External View.....	46
Exhibit 58: UCDB Side View .....	47
Exhibit 59: UCDB PCB Top Component Diagram.....	47
Exhibit 60: UCDB PCB Bottom Component Diagram.....	48

Exhibit 61: GMA1-A1A Interface Port Identification.....	50
Exhibit 62: GMA1-A1A PCB, Top View .....	52
Exhibit 63: GMA1-A1A PCB, Bottom View.....	52
Exhibit 64: GMA1-A1A PCB, Bottom View with Plastic Shield Removed.....	53
Exhibit 65: GMA1-A1A Plastic Shield, External View.....	54
Exhibit 66: GMA1-A1A Plastic Shield, Internal View .....	55
Exhibit 67: GMA1-A1A Front Panel, External View .....	56
Exhibit 68: GMA1-A1A Front Panel, Internal View.....	56
Exhibit 69: GMA1-A1A Front Panel, Top View.....	57
Exhibit 70: GMA1-A1A Front Panel, Bottom View .....	57
Exhibit 71: GMA1-A1A PCB Assembly QR Code Label.....	58
Exhibit 72: GMA1-A1A Functional Block Diagram .....	59
Exhibit 73: GMA1-A1A PCB Top Active Component Diagram .....	66
Exhibit 74: GMA1-A1A PCB Top Passive Only Component Diagram .....	67
Exhibit 75: GMA1-A1A PCB Bottom Active Only Component Diagram.....	68
Exhibit 76: GMA1-A1A PCB Bottom Passive Only Component Diagram .....	69
Exhibit 77: GCB1-C1A Interface Port Identification .....	74
Exhibit 78: GCB1-C1A PCB, Top View .....	76
Exhibit 79: GCB1-C1A PCB, Bottom View .....	76
Exhibit 80: GCB1-C1A PCB, Bottom View with Plastic Shield Removed .....	77
Exhibit 81: GCB1-C1A Plastic Shield, External View .....	78
Exhibit 82: GCB1-C1A Plastic Shield, Internal View .....	79
Exhibit 83: GCB1-C1A Front Panel, External View.....	80
Exhibit 84: GCB1-C1A Front Panel, Internal View .....	80
Exhibit 85: GCB1-C1A Front Panel, Top View.....	81
Exhibit 86: GCB1-C1A Front Panel, Bottom View .....	81
Exhibit 87: GCB1-C1A PCB Assembly QR Code Label .....	82
Exhibit 88: GCB1-C1A Functional Block Diagram.....	83
Exhibit 89: GCB1-C1A PCB Top Active Component Diagram .....	90
Exhibit 90: GCB1-C1A PCB Top Passive Only Component Diagram .....	91
Exhibit 91: GCB1-C1A PCB Bottom Active Only Component Diagram .....	92
Exhibit 92: GCB1-C1A PCB Bottom Passive Only Component Diagram .....	93
Exhibit 93: GMA-1 IC Heat Sink (Left) and Heat Sink Frame (Right) Locations .....	98
Exhibit 94: IC Heat Sink Type 1, External (Left) and Internal (Right) Views.....	99
Exhibit 95: IC Heat Sink Type 1, Horizontal Side View .....	100
Exhibit 96: IC Heat Sink Type 1, Vertical Side View .....	100
Exhibit 97: IC Heat Sink Frame Type 1, External View (-90°).....	101
Exhibit 98: IC Heat Sink Frame Type 1, Internal View (-90°) .....	102
Exhibit 99: IC Heat Sink Frame Type 1 Marking .....	102
Exhibit 100: IC Heat Sink Type 2, External (Left) and Internal (Right) Views .....	103
Exhibit 101: IC Heat Sink Type 2, Horizontal Side View .....	104
Exhibit 102: IC Heat Sink Type 2, Vertical Side View .....	104
Exhibit 103: IC Heat Sink Frame Type 2, External View (-90°).....	105
Exhibit 104: IC Heat Sink Frame Type 2, Internal View (-90°).....	105
Exhibit 105: GCB1-C1A IC Heat Sink (Left) and Heat Sink Frame (Right) Locations .....	106
Exhibit 106: IC Heat Sink Type 1, External (Left) and Internal (Right) Views .....	107
Exhibit 107: IC Heat Sink Type 1, Horizontal Side View .....	108
Exhibit 108: IC Heat Sink Type 1, Vertical Side View .....	108
Exhibit 109: IC Heat Sink Frame Type 1, External View .....	109
Exhibit 110: IC Heat Sink Frame Type 1, Internal View.....	110
Exhibit 111: IC Heat Sink Frame Type 1 Marking .....	110
Exhibit 112: IC Heat Sink Type 2, External (Left) and Internal (Right) Views .....	111
Exhibit 113: IC Heat Sink Type 2, Horizontal Side View .....	112
Exhibit 114: IC Heat Sink Type 2, Vertical Side View .....	112
Exhibit 115: IC Heat Sink Frame Type 2, External View .....	113
Exhibit 116: IC Heat Sink Frame Type 2, Internal View .....	114
Exhibit 117: IC Heat Sink Type 3, External (Left) and Internal (Right) Views .....	115
Exhibit 118: IC Heat Sink Type 3, Horizontal Side View .....	116
Exhibit 119: IC Heat Sink Type 3, Vertical Side View .....	116
Exhibit 120: IC Heat Sink Frame Type 3, External View .....	117
Exhibit 121: IC Heat Sink Frame Type 3, Internal View .....	118
Exhibit 122: IC Heat Sink Type 4, External (Left) and Internal (Right) Views .....	119
Exhibit 123: IC Heat Sink Type 4, Horizontal Side View .....	120

Exhibit 124: IC Heat Sink Type 4, Vertical Side View .....	120
Exhibit 125: IC Heat Sink Frame Type 4, External View .....	121
Exhibit 126: IC Heat Sink Frame Type 4, Internal View .....	122
Exhibit 127: IC Heat Sink Type 5, External (Left) and Internal (Right) Views .....	123
Exhibit 128: IC Heat Sink Type 5, Horizontal Side View .....	124
Exhibit 129: IC Heat Sink Type 5, Vertical Side View .....	124
Exhibit 130: IC Heat Sink Type 6, External (Left) and Internal (Right) Views .....	125
Exhibit 131: IC Heat Sink Type 6, Horizontal Side View .....	126
Exhibit 132: IC Heat Sink Type 6, Vertical Side View .....	126
Exhibit 133: Component Market Share by Type .....	127
Exhibit 134: Active Semiconductor Market Share by Vendor .....	128
Exhibit 135: Active Semiconductor Market Share by Vendor, 64+ Pin .....	128
Exhibit 136: Passive/Connector/Other Component Market Share by Vendor .....	132
Exhibit 137: Passive/Connector/Other Component Market Share by Type.....	133
Exhibit 138: Passive/Connector/Other Component Market Share by Country of Origin .....	134