SEMICO Research Corporation

- Data
- Analysis
- Knowledge

ASIC Design Starts for 2016

by Key End Market Applications

March 2016

Study No. SC106-16

© Copyright Semico Research, 2016. All rights reserved.

Reproduction in whole or part is prohibited without the express written permission of Semico.

The contents of this report represent the interpretation and analysis of statistics and information that is generally available to the public or released by responsible agencies or individuals, but is not guaranteed as to its accuracy or completeness.

Table of Contents

Table of Contents **1**
List of Tables **4**
List of Figures **7**
Executive Overview **9**
Introduction **10**
Methodology **11**
Key End-Use Applications 12
Design Starts Definition 14
Changes in the SoC Design Methodology 14
Definitions of SoC 17
Key Assumptions for ASIC Design Starts 18
Internet of Things Market Evolution 20
ASIC Design Start Forecasts **21**
ASIC Design Starts Market Information **22**
Current Economic Conditions **27**
Computer and Peripheral **30**
Desktop Personal Computers 30
Notebook Computers 32
Tablet PCs 34
Color Laser Printers 35
Commercial Color Copiers 37
Personal Copiers 40
Multifunction Machines 42
Handheld POS Machines 44
Stationary POS 46
Color Inkjet Printers 48
NAS Appliance Servers 50
Caching Appliance Servers 52
Webhosting Appliance Servers 53
All-In-One Network Appliance Servers 55
Small Business Application Servers 57
Network Servers Under $5K 59
Network Servers $5K – $15K 61
Network Servers Over $15K 63
Workstations Under $5K 64
Workstations $5 – $15K 66
Workstations Over $15K 68
Fax Machines 70
Solid State Drives 72
Communications **74**
Central Office Switches 74
PBX Switches 76

© 2016 Semico Research Corp. All Rights Reserved

High-End Routers 77
Mid-Range Routers 79
Low-End Routers 81
High-End Hubs 83
Mid-Range Hubs 85
Low-End Hubs 86
High-End Network Switches 88
Mid-Range Network Switches 90
Low-End Network Switches 91
ATM Switches 93
Basic Cell Phones 95
Low End Smart Phones 97
High-End Smartphones 99
Cellular Base Stations 101
Cable Modems 103
DSL Modems 105
4G / LTE Picocell Base Stations 107
4G / LTE Femtocell CPE 109
Internet of Things 111
Consumer 114
Handheld Game Consoles 114
HDTVs 116
Set Top Boxes 118
VoIP PBX 120
Digital Still Cameras 122
Digital Video Cameras 124
Wearable Medical Devices 126
DVD Recorders 127
DVD Players 129
Video Game Consoles 131
E-readers 133
Digital Photo Frames 135
Portable Multimedia Players 137
Satellite Radio 139
GPS 141
Smart Watches 143
Fitness 145
Industrial 148
Robotic Control Systems 148
High-End ATE 150
Mid-Range ATE 152
Low-End ATE 154
Machine Tools 155
Smart Grid 157

© 2016 Semico Research Corp. All Rights Reserved

Automotive..... 160
Automotive Add-on Systems: Entertainment..... 160
Automotive GPS Systems..... 162
Commercial Vehicles..... 164
Vans / Minivans..... 166
High-End Passenger Cars..... 167
Mid-Range Passenger Cars..... 169
Low-End Passenger Cars..... 170
Summary..... 172

© 2016 Semico Research Corp. All Rights Reserved

List of Tables

Table 1. Total Worldwide ASIC Design Starts 23
Table 2. Total Worldwide ASIC Unit Shipments (Millions) 24
Table 3. Total Worldwide Identified ASIC Design Starts (Millions) 25
Table 4. Total Worldwide Identified ASIC Unit Shipments (Millions) 26
Table 5. Desktop ASIC Design Starts 31
Table 6. Desktop ASIC Unit Shipments (Millions) 31
Table 7. Notebook ASIC Design Starts 33
Table 8. Notebook ASIC Unit Shipments (Millions) 33
Table 9. Tablet PC ASIC Design Starts 35
Table 10. Tablet PC ASIC Unit Shipments (Millions) 35
Table 11. Color Laser Printer ASIC Design Starts 36
Table 12. Color Laser Printer ASIC Unit Shipments (Millions) 37
Table 13. Commercial Color Copier ASIC Design Starts 38
Table 14. Commercial Color Copier ASIC Unit Shipments (Millions) 39
Table 15. Personal Copier ASIC Design Starts 41
Table 16. Personal Copier ASIC Unit Shipments (Millions) 41
Table 17. Multifunction Machine ASIC Design Starts 43
Table 18. Multifunction Machine ASIC Unit Shipments (Millions) 43
Table 19. Handheld POS ASIC Design Starts 45
Table 20. Handheld POS ASIC Unit Shipments (Millions) 45
Table 21. Stationary POS ASIC Design Starts 47
Table 22. Stationary POS ASIC Unit Shipments (Millions) 47
Table 23. Color Inkjet Printer ASIC Design Starts 49
Table 24. Color Inkjet Printer ASIC Unit Shipments (Millions) 49
Table 25. NAS Appliance Server ASIC Design Starts 51
Table 26. NAS Appliance Server ASIC Unit Shipments (Millions) 51
Table 27. Caching Appliance Server ASIC Design Starts 52
Table 28. Caching Appliance Server ASIC Unit Shipments (Millions) 53
Table 29. Webhosting Appliance Server ASIC Design Starts 54
Table 30. Webhosting Appliance Server ASIC Unit Shipments (Millions) 55
Table 31. All-In-One Network Appliance Server ASIC Design Starts 56
Table 32. All-In-One Network Appliance Server ASIC Unit Shipments (Millions) 57
Table 33. Small Business Application Server ASIC Design Starts 58
Table 34. Small Business Application Server ASIC Unit Shipments (Millions) 59
Table 35. Network Server Under $5K ASIC Design Starts 60
Table 36. Network Server Under $5K ASIC Unit Shipments (Millions) 61
Table 37. Network Servers $5K – $15K ASIC Design Starts 62
Table 38. Network Servers $5K – $15K ASIC Unit Shipments (Millions) 62
Table 39. Network Servers Over $15K ASIC Design Starts 63
Table 40. Network Servers Over $15K ASIC Unit Shipments (Millions) 64
Table 41. Workstations Under $5K ASIC Design Starts 65
Table 42. Workstations Under $5K ASIC Unit Shipments (Millions) 66
Table 43. Workstations $5K – $15K ASIC Design Starts 67
Table 44. Workstations $5K – $15K ASIC Unit Shipments (Millions) 67
Table 45. Workstations Over $15K ASIC Design Starts 68
Table 46. Workstations Over $15K ASIC Unit Shipments (Millions) 69
Table 47. Fax Machine ASIC Design Starts 71
Table 48. Fax Machine ASIC Unit Shipments (Millions) 71
Table 49. Solid State Drive ASIC Design Starts 73
Table 50. Solid State Drive ASIC Unit Shipments (Millions) 73
Table 51. Central Office Switch ASIC Design Starts 75
Table 52. Central Office Switch ASIC Unit Shipments (Millions) 75

© 2016 Semico Research Corp. All Rights Reserved

Table 53. PBX Switch ASIC Design Starts....76
Table 54. PBX Switch ASIC Unit Shipments (Millions)....77
Table 55. High-End Router ASIC Design Starts....78
Table 56. High-End Router ASIC Unit Shipments (Millions of Units)....79
Table 57. Mid-Range Router ASIC Design Starts....80
Table 58. Mid-Range Router ASIC Unit Shipments (Millions)....80
Table 59. Low-End Router ASIC Design Starts....82
Table 60. Low-End Router ASIC Unit Shipments (Millions)....82
Table 61. High-End Hub ASIC Design Starts....84
Table 62. High-End Hub ASIC Unit Shipments (Millions)....84
Table 63. Mid-Range Hub ASIC Design Starts....85
Table 64. Mid-Range Hub ASIC Unit Shipments (Millions)....86
Table 65. Low-End Hub ASIC Design Starts....87
Table 66. Low-End Hub ASIC Unit Shipments (Millions)....87
Table 67. High-End Switch ASIC Design Starts....89
Table 68. High-End Switch ASIC Unit Shipments (Millions)....89
Table 69. Mid-Range Switch ASIC Design Starts....90
Table 70. Mid-Range Switch ASIC Unit Shipments (Millions)....91
Table 71. Low-End Switch ASIC Design Starts....92
Table 72. Low-End Switch ASIC Unit Shipments (Millions)....92
Table 73. ATM Switch ASIC Design Starts....94
Table 74. ATM Switch ASICs by Type (Millions)....94
Table 75. Basic Cell Phone ASIC Design Starts....96
Table 76. Basic Cell Phone ASIC Unit Shipments (Millions)....96
Table 77. Low End Smartphone Design Starts....98
Table 78. Low End Smartphone ASICs by Type (Millions)....98
Table 79. High-End Smartphone ASIC Design Starts....100
Table 80. High-End Cell Phone ASIC Unit Shipments (Millions)....100
Table 81. Cellular Base Station ASIC Design Starts....102
Table 82. Cellular Base Station ASIC Unit Shipments (Millions)....103
Table 83. Cable Modem ASIC Design Starts....104
Table 84. Cable Modem ASIC Unit Shipments (Millions)....105
Table 85. DSL Modem Market ASIC Design Starts....106
Table 86. DSL Modem ASIC Unit Shipments (Millions)....107
Table 87. 4G / LTE Picocell Base Station ASIC Design Starts....108
Table 88. 4G / LTE Picocell Base Station ASIC Unit Shipments (Millions)....109
Table 89. 4G / LTE Femtocell CPE ASIC Design Starts....110
Table 90. 4G / LTE Femtocell CPE ASIC Unit Shipments (Millions)....111
Table 91. Internet of Things ASIC Design Starts....112
Table 92. Internet of Things ASIC Unit Shipments (Millions)....113
Table 93. Handheld Game Console ASIC Design Starts....115
Table 94. Handheld Game Console ASIC Unit Shipments (Millions)....115
Table 95. HDTV ASIC Design Starts....117
Table 96. HDTV ASIC Unit Shipments (Millions)....117
Table 97. Set Top Box ASIC Design Starts....119
Table 98. Set Top Box ASIC Unit Shipments (Millions)....119
Table 99. VoIP PBX ASIC Design Starts....121
Table 100. VoIP PBX ASIC Unit Shipments (Millions)....121
Table 101. Digital Still Camera ASIC Design Starts....123
Table 102. Digital Still Camera ASIC Unit Shipments (Millions)....123
Table 103. Digital Video Camera ASIC Design Starts....125
Table 104. Digital Video Camera ASIC Unit Shipments (Millions)....125
Table 105. Wearable Medical Device ASIC Design Starts....127
Table 106. Wearable Medical Device ASIC Unit Shipments (Millions)....127
Table 107. DVD Recorder ASIC Design Starts....128

© 2016 Semico Research Corp. All Rights Reserved

Table 108. DVD Recorder ASIC Unit Shipments (Millions) 129
Table 109. DVD Player ASIC Design Starts 130
Table 110. DVD Player ASIC Unit Shipments (Millions) 131
Table 111. Video Game Console ASIC Design Starts 132
Table 112. Video Game Console ASIC Unit Shipments (Millions) 133
Table 113. E-reader ASIC Design Starts 134
Table 114. E-reader ASIC Unit Shipments (Millions) 135
Table 115. Digital Photo Frame ASIC Design Starts 136
Table 116. Digital Photo Frame ASIC Unit Shipments (Millions) 137
Table 117. Portable Multimedia Player ASIC Design Starts 138
Table 118. Portable Multimedia Player ASIC Unit Shipments (Millions) 139
Table 119. Satellite Radio ASIC Design Starts 140
Table 120. Satellite Radio ASIC Unit Shipments (Millions) 141
Table 121. GPS ASIC Design Starts 142
Table 122. GPS ASIC Unit Shipments (Millions) 143
Table 123. Smart Watch ASIC Design Starts 144
Table 124. Smart Watch ASIC Unit Shipments (Millions) 145
Table 125. Fitness ASIC Design Starts 146
Table 126. Fitness ASIC Unit Shipments (Millions) 147
Table 127. Robotic Control System ASIC Design Starts 149
Table 128. Robotic Control System ASIC Unit Shipments (Millions) 149
Table 129. High-End ATE ASIC Design Starts 151
Table 130. High-End ATE ASIC Unit Shipments (Millions) 151
Table 131. Mid-Range ATE ASIC Design Starts 152
Table 132. Mid-Range ATE ASIC Unit Shipments (Millions) 153
Table 133. Low-End ATE ASIC Design Starts 154
Table 134. Low-End ATE ASIC Unit Shipments (Millions) 155
Table 135. Machine Tool ASIC Design Starts 156
Table 136. Machine Tool ASIC Unit Shipments (Millions) 157
Table 137. Smart Grid ASIC Design Starts 158
Table 138. Smart Grid ASIC Unit Shipments (Millions) 159
Table 139. Automotive Entertainment System ASIC Design Starts 161
Table 140. Automotive Entertainment System ASIC Unit Shipments (Millions) 161
Table 141. Automotive GPS ASIC Design Starts 163
Table 142. Automotive GPS ASIC Unit Shipments (Millions) 164
Table 143. Commercial Vehicle ASIC Design Starts 165
Table 144. Commercial Vehicle ASIC Unit Shipments (Millions) 165
Table 145. Van / Minivan ASIC Design Starts 166
Table 146. Van / Minivan ASIC Unit Shipments (Millions) 167
Table 147. High-End Passenger Car ASIC Design Starts 168
Table 148. High-End Passenger Car ASIC Unit Shipments (Millions) 168
Table 149. Mid-Range Passenger Car ASIC Design Starts 169
Table 150. Mid-Range Passenger Car ASIC Unit Shipments (Millions) 170
Table 151. Low-End Passenger Car ASIC Design Starts 171
Table 152. Low-End Passenger Car ASIC Unit Shipments (Millions) 171

© 2016 Semico Research Corp. All Rights Reserved

List of Figures

Figure 1. Revised Complexity Definitions for SoCs 16
Figure 2. Total ASIC Design Starts 22
Figure 3. Total ASIC Units by Device Type 23
Figure 4. Total Worldwide Identified ASIC Design Starts by Application 24
Figure 5. Total Worldwide Identified ASIC Unit Volumes by Application Category 25
Figure 6. Original SoC Designs without Derivative Designs 28
Figure 7. Desktop ASIC Design Starts 30
Figure 8. Notebook ASIC Design Starts 32
Figure 9. Tablet PC ASIC Design Starts 34
Figure 10. Color Laser Printer ASIC Design Starts 36
Figure 11. Commercial Color Copier ASIC Design Starts 38
Figure 12. Personal Copier ASIC Design Starts 40
Figure 13. Multifunction Machine ASIC Design Starts 42
Figure 14. Handheld POS ASIC Design Starts 44
Figure 15. Stationary POS Market ASIC Design Starts 46
Figure 16. Color Inkjet Printer ASIC Design Starts 48
Figure 17. NAS Appliance Server ASIC Design Starts 50
Figure 18. Caching Appliance Server ASIC Design Starts 52
Figure 19. Webhosting Appliance Server ASIC Design Starts 54
Figure 20. All-In-One Network Appliance Server ASIC Design Starts 56
Figure 21. Small Business Application Server ASIC Design Starts 58
Figure 22. Network Server Under $5K ASIC Design Starts 60
Figure 23. Network Servers $5K – $15K ASIC Design Starts 61
Figure 24. Network Servers Over $15K ASIC Design Starts 63
Figure 25. Workstations Under $5K ASIC Design Starts 65
Figure 26. Workstations $5K – $15K ASIC Design Starts 66
Figure 27. Workstations Over $15K ASIC Design Starts 68
Figure 28. Fax Machine ASIC Design Starts 70
Figure 29. Solid State Drive ASIC Design Starts 72
Figure 30. Central Office Switch ASIC Design Starts 74
Figure 31. PBX Switch ASIC Design Starts 76
Figure 32. High-End Router Market ASIC Design Starts 78
Figure 33. Mid-Range Router Market ASIC Design Starts 79
Figure 34. Low-End Router Market (Units/Dollars in Millions) 81
Figure 35. High-End Hub ASIC Design Starts 83
Figure 36. Mid-Range Hub ASIC Design Starts 85
Figure 37. Low-End Hub Design Starts 86
Figure 38. High-End Switch Market ASIC Design Starts 88
Figure 39. Mid-Range Switch Design Starts 90
Figure 40. Low-End Switch ASIC Design Starts 91
Figure 41. ATM Switch ASIC Design Starts 93
Figure 42. Basic Cell Phone ASIC Design Starts 95
Figure 43. Low End Smartphone Market Design Starts 97
Figure 44. High-End Cell Phone ASIC Design Starts 99
Figure 45. Cellular Base Station Market ASIC Design Starts 102
Figure 46. Cable Modem ASIC Design Starts 104
Figure 47. DSL Modem ASIC Design Starts 106
Figure 48. 4G / LTE Picocell Base Station ASIC Design Starts 108
Figure 49. 4G / LTE Femtocell CPE ASIC Design Starts 110
Figure 50. Internet of Things ASIC Design Starts 112
Figure 51. Handheld Game Console ASIC Design Starts 114
Figure 52. HDTV ASIC Design Starts 116

© 2016 Semico Research Corp. All Rights Reserved

Figure 53. Set Top Box ASIC Design Starts 118
Figure 54. VoIP PBX ASIC Design Starts 120
Figure 55. Digital Still Camera ASIC Design Starts 122
Figure 56. Digital Video Camera ASIC Design Starts 124
Figure 57. Wearable Medical Device ASIC Design Starts 126
Figure 58. DVD Recorder ASIC Design Starts 128
Figure 59. DVD Player ASIC Design Starts 130
Figure 60. Video Game Console ASIC Design Starts 132
Figure 61. E-reader ASIC Design Starts 134
Figure 62. Digital Photo Frame ASIC Design Starts 136
Figure 63. Portable Multimedia Player ASIC Design Starts 138
Figure 64. Satellite Radio ASIC Design Starts 140
Figure 65. GPS ASIC Design Starts 142
Figure 66. Smart Watch ASIC Design Starts 144
Figure 67. Fitness ASIC Design Starts 146
Figure 68. Robotic Control System ASIC Design Starts 148
Figure 69. High-End ATE ASIC Design Starts 150
Figure 70. Mid-Range ATE ASIC Design Starts 152
Figure 71. Low-End ATE ASIC Design Starts 154
Figure 72. Machine Tool ASIC Design Starts 156
Figure 73. Smart Grid ASIC Design Starts 158
Figure 74. Automotive Entertainment System ASIC Design Starts 160
Figure 75. Automotive GPS ASIC Design Starts 163
Figure 76. Commercial Vehicle ASIC Design Starts 164
Figure 77. Van / Minivan ASIC Design Starts 166
Figure 78. High-End Passenger Car ASIC Design Starts 167
Figure 79. Mid-Range Passenger Car ASIC Design Starts 169
Figure 80. Low-End Passenger Car ASIC Design Starts 170

© 2016 Semico Research Corp. All Rights Reserved