

ASIC Design Starts

by Major Market Applications

March 2023

Study No. SC106-23

© Copyright Semico Research, 2023. 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	3
List of Figures	6
Executive Overview	8
Introduction	9
Methodology	10
Key End-Use Applications	10
Design Starts Definition	12
Changes in the SoC Design Methodology	12
Definitions of SoC.....	15
Key Assumptions for ASIC Design Starts.....	17
Internet of Things Market Evolution	19
Artificial Intelligence	19
ASIC Design Start Forecasts	21
ASIC Design Starts Market Information	22
Current Economic Conditions	26
Computer and Peripheral	29
Desktop Personal Computers	29
Notebook Computers	30
Tablet PCs.....	32
Network Servers Under \$5K	34
Network Servers \$5K–\$15K	36
Network Servers Over \$15K.....	37
Workstations \$5K–\$15K.....	39
Workstations Over \$15K.....	41
Solid-State Drives.....	42
Communications	45
Central Office Switches.....	45
PBX Switches.....	46
High-End Routers	48
Mid-Range Routers	49
High-End Hubs	51
Mid-Range Hubs.....	52
Low-End Hubs	54
High-End Network Switches	55
Mid-Range Network Switches	57
Low-End Network Switches	58
ATM Switches.....	60
Low-End Smartphones.....	61

Mid-Range Smartphones	63
High-End Smartphones	65
Cable Modems	67
DSL Modems	68
4G / LTE Picocell Base Stations	70
4G / LTE Femtocell CPE	71
5G Infrastructure	73
Consumer	76
Internet of Things.....	76
Handheld Game Consoles.....	77
HDTVs.....	79
Set-Top Boxes	81
Streaming Media Devices	82
Digital Still Cameras	84
Digital Video Cameras.....	86
Wearable Medical Devices	87
Drones and Controllers.....	89
Augmented Reality / Virtual Reality (AR / VR).....	91
Satellite Radio	93
GPS	95
Smart Watches.....	97
Fitness	99
Smart Speakers	101
Industrial	104
Robotic Control Systems.....	104
High-End ATE.....	105
Mid-Range ATE.....	107
Low-End ATE	108
Smart Grid.....	110
Industrial Internet of Things (IIoT).....	112
Automotive	115
Automotive GPS Systems.....	115
Commercial Vehicles.....	116
High-End Passenger Cars	118
Mid-Range Passenger Cars	119
Low-End Passenger Cars	121
Advanced Driver Assistance Systems (ADAS)	122
Summary	125

List of Tables

Table 1. Total ASIC Design Starts by Device Type	22
Table 2. Total ASIC Unit Shipments by Device Type (Millions)	23
Table 3. Total Identified ASIC Design Starts by Application.....	24
Table 4. Total Identified ASIC Unit Shipments by Application (Millions).....	25
Table 5. Desktop ASIC Design Starts	30
Table 6. Desktop ASIC Unit Shipments (Millions)	30
Table 7. Notebook ASIC Design Starts	31
Table 8. Notebook ASIC Unit Shipments (Millions)	32
Table 9. Tablet PC ASIC Design Starts	33
Table 10. Tablet PC ASIC Unit Shipments (Millions)	34
Table 11. Network Servers Under \$5K ASIC Design Starts.....	35
Table 12. Network Servers Under \$5K ASIC Unit Shipments (Millions).....	36
Table 13. Network Servers \$5K–\$15K ASIC Design Starts	37
Table 14. Network Servers \$5K–\$15K ASIC Unit Shipments (Millions).....	37
Table 15. Network Servers Over \$15K ASIC Design Starts.....	38
Table 16. Network Servers Over \$15K ASIC Unit Shipments (Millions).....	39
Table 17. Workstations \$5K–\$15K ASIC Design Starts.....	40
Table 18. Workstations \$5K–\$15K ASIC Unit Shipments (Millions).....	40
Table 19. Workstations Over \$15K ASIC Design Starts	41
Table 20. Workstations Over \$15K ASIC Unit Shipments (Millions)	42
Table 21. Solid-State Drive ASIC Design Starts	43
Table 22. Solid-State Drive ASIC Unit Shipments (Millions).....	44
Table 23. Central Office Switch ASIC Design Starts	46
Table 24. Central Office Switch ASIC Unit Shipments (Millions).....	46
Table 25. PBX Switch ASIC Design Starts	47
Table 26. PBX Switch ASIC Unit Shipments (Millions).....	48
Table 27. High-End Router ASIC Design Starts.....	49
Table 28. High-End Router ASIC Unit Shipments (Millions of Units)	49
Table 29. Mid-Range Router ASIC Design Starts.....	50
Table 30. Mid-Range Router ASIC Unit Shipments (Millions)	51
Table 31. High-End Hub ASIC Design Starts	52
Table 32. High-End Hub ASIC Unit Shipments (Millions)	52
Table 33. Mid-Range Hub ASIC Design Starts	53
Table 34. Mid-Range Hub ASIC Unit Shipments (Millions)	54
Table 35. Low-End Hub ASIC Design Starts.....	55
Table 36. Low-End Hub ASIC Unit Shipments (Millions).....	55
Table 37. High-End Switch ASIC Design Starts	56
Table 38. High-End Switch ASIC Unit Shipments (Millions)	57
Table 39. Mid-Range Switch ASIC Design Starts	58
Table 40. Mid-Range Switch ASIC Unit Shipments (Millions)	58
Table 41. Low-End Switch ASIC Design Starts.....	59
Table 42. Low-End Switch ASIC Unit Shipments (Millions).....	60
Table 43. ATM Switch ASIC Design Starts	61
Table 44. ATM Switch ASICs by Type (Millions)	61
Table 45. Low-End Smartphone ASIC Design Starts	63
Table 46. Low-End Smartphone ASIC Unit Shipments (Millions).....	63
Table 47. Mid-Range Smartphone Design Starts	64
Table 48. Mid-Range Smartphone ASICs by Type (Millions).....	65
Table 49. High-End Smartphone ASIC Design Starts.....	66

Table 50. High-End Smartphone ASIC Unit Shipments (Millions).....	67
Table 51. Cable Modem ASIC Design Starts.....	68
Table 52. Cable Modem ASIC Unit Shipments (Millions).....	68
Table 53. DSL Modem Market ASIC Design Starts.....	69
Table 54. DSL Modem ASIC Unit Shipments (Millions).....	70
Table 55. 4G / LTE Picocell Base Station ASIC Design Starts.....	71
Table 56. 4G / LTE Picocell Base Station ASIC Unit Shipments (Millions).....	71
Table 57. 4G / LTE Femtocell CPE ASIC Design Starts.....	72
Table 58. 4G / LTE Femtocell CPE ASIC Unit Shipments (Millions).....	73
Table 59. 5G Infrastructure ASIC Design Starts.....	74
Table 60. 5G Infrastructure ASIC Unit Shipments (Millions).....	75
Table 61. Internet of Things ASIC Design Starts.....	77
Table 62. Internet of Things ASIC Unit Shipments (Millions).....	77
Table 63. Handheld Game Console ASIC Design Starts.....	78
Table 64. Handheld Game Console ASIC Unit Shipments (Millions).....	79
Table 65. HDTV ASIC Design Starts.....	80
Table 66. HDTV ASIC Unit Shipments (Millions).....	81
Table 67. Set-Top Box ASIC Design Starts.....	82
Table 68. Set-Top Box ASIC Unit Shipments (Millions).....	82
Table 69. Streaming Media Devices ASIC Design Starts.....	83
Table 70. Streaming Media Devices ASIC Unit Shipments (Millions).....	84
Table 71. Digital Still Camera ASIC Design Starts.....	85
Table 72. Digital Still Camera ASIC Unit Shipments (Millions).....	86
Table 73. Digital Video Camera ASIC Design Starts.....	87
Table 74. Digital Video Camera ASIC Unit Shipments (Millions).....	87
Table 75. Wearable Medical Device ASIC Design Starts.....	88
Table 76. Wearable Medical Device ASIC Unit Shipments (Millions).....	89
Table 77. Drones and Controller ASIC Design Starts.....	90
Table 78. Drones and Controller ASIC Unit Shipments (Millions).....	91
Table 79. Augmented Reality / Virtual Reality ASIC Design Starts.....	92
Table 80. Augmented Reality / Virtual Reality ASIC Unit Shipments (Millions).....	93
Table 81. Satellite Radio ASIC Design Starts.....	94
Table 82. Satellite Radio ASIC Unit Shipments (Millions).....	95
Table 83. GPS ASIC Design Starts.....	96
Table 84. GPS ASIC Unit Shipments (Millions).....	97
Table 85. Smart Watch ASIC Design Starts.....	98
Table 86. Smart Watch ASIC Unit Shipments (Millions).....	99
Table 87. Fitness ASIC Design Starts.....	100
Table 88. Fitness ASIC Unit Shipments (Millions).....	101
Table 89. Smart Speakers ASIC Design Starts.....	102
Table 90. Smart Speakers ASIC Unit Shipments (Millions).....	103
Table 91. Robotic Control System ASIC Design Starts.....	105
Table 92. Robotic Control System ASIC Unit Shipments (Millions).....	105
Table 93. High-End ATE ASIC Design Starts.....	106
Table 94. High-End ATE ASIC Unit Shipments (Millions).....	107
Table 95. Mid-Range ATE ASIC Design Starts.....	108
Table 96. Mid-Range ATE ASIC Unit Shipments (Millions).....	108
Table 97. Low-End ATE ASIC Design Starts.....	109
Table 98. Low-End ATE ASIC Unit Shipments (Millions).....	110
Table 99. Smart Grid ASIC Design Starts.....	111
Table 100. Smart Grid ASIC Unit Shipments (Millions).....	112
Table 101. Industrial Internet of Things ASIC Design Starts.....	113

Table 102. Industrial Internet of Things ASIC Unit Shipments (Millions).....	114
Table 103. Automotive GPS ASIC Design Starts	116
Table 104. Automotive GPS ASIC Unit Shipments (Millions)	116
Table 105. Commercial Vehicle ASIC Design Starts	117
Table 106. Commercial Vehicle ASIC Unit Shipments (Millions)	118
Table 107. High-End Passenger Car ASIC Design Starts	119
Table 108. High-End Passenger Car ASIC Unit Shipments (Millions)	119
Table 109. Mid-Range Passenger Car ASIC Design Starts	120
Table 110. Mid-Range Passenger Car ASIC Unit Shipments (Millions)	121
Table 111. Low-End Passenger Car ASIC Design Starts.....	122
Table 112. Low-End Passenger Car ASIC Unit Shipments (Millions).....	122
Table 113. Advanced Driver Assistance Systems ASIC Design Starts.....	123
Table 114. Advanced Driver Assistance Systems ASIC Unit Shipments (Millions).....	124

List of Figures

Figure 1. Revised Complexity Definitions for SoCs	14
Figure 2. Revised Complexity Definitions for SoCs Including AI Features	15
Figure 3. Total ASIC Design Starts by Device Type.....	22
Figure 4. Total ASIC Unit Shipments by Device Type	23
Figure 5. Total Identified ASIC Design Starts by Application	24
Figure 6. Total Identified ASIC Unit Shipments by Application.....	25
Figure 7. Original SoC Designs Without Derivative Designs	27
Figure 8. Desktop ASIC Design Starts.....	29
Figure 9. Notebook ASIC Design Starts	31
Figure 10. Tablet PC ASIC Design Starts.....	33
Figure 11. Network Servers Under \$5K ASIC Design Starts	35
Figure 12. Network Servers \$5K–\$15K ASIC Design Starts	36
Figure 13. Network Servers Over \$15K ASIC Design Starts.....	38
Figure 14. Workstations \$5K–\$15K ASIC Design Starts	39
Figure 15. Workstations Over \$15K ASIC Design Starts.....	41
Figure 16. Solid-State Drive ASIC Design Starts	43
Figure 17. Central Office Switch ASIC Design Starts	45
Figure 18. PBX Switch ASIC Design Starts	47
Figure 19. High-End Router Market ASIC Design Starts.....	48
Figure 20. Mid-Range Router Market ASIC Design Starts.....	50
Figure 21. High-End Hub ASIC Design Starts.....	51
Figure 22. Mid-Range Hub ASIC Design Starts.....	53
Figure 23. Low-End Hub Design Starts.....	54
Figure 24. High-End Switch ASIC Design Starts.....	56
Figure 25. Mid-Range Switch Design Starts	57
Figure 26. Low-End Switch ASIC Design Starts.....	59
Figure 27. ATM Switch ASIC Design Starts.....	60
Figure 28. Low-End Smartphone ASIC Design Starts	62
Figure 29. Mid-Range Smartphone Market Design Starts	64
Figure 30. High-End Smartphone ASIC Design Starts	66
Figure 31. Cable Modem ASIC Design Starts	67
Figure 32. DSL Modem ASIC Design Starts	69
Figure 33. 4G / LTE Picocell Base Station ASIC Design Starts.....	70
Figure 34. 4G / LTE Femtocell CPE ASIC Design Starts.....	72
Figure 35. 5G Infrastructure ASIC Design Starts	74
Figure 36. Internet of Things ASIC Design Starts	76
Figure 37. Handheld Game Console ASIC Design Starts	78
Figure 38. HDTV ASIC Design Starts.....	80
Figure 39. Set-Top Box ASIC Design Starts.....	81
Figure 40. Streaming Media Devices ASIC Design Starts	83
Figure 41. Digital Still Camera ASIC Design Starts.....	85
Figure 42. Digital Video Camera ASIC Design Starts	86
Figure 43. Wearable Medical Device ASIC Design Starts	88
Figure 44. Drones and Controller ASIC Design Starts	90
Figure 45. Augmented Reality / Virtual Reality ASIC Design Starts	92
Figure 46. Satellite Radio ASIC Design Starts.....	94
Figure 47. GPS ASIC Design Starts.....	96
Figure 48. Smart Watch ASIC Design Starts.....	98
Figure 49. Fitness ASIC Design Starts.....	100

Figure 50. Smart Speakers ASIC Design Starts	102
Figure 51. Robotic Control System ASIC Design Starts	104
Figure 52. High-End ATE ASIC Design Starts	106
Figure 53. Mid-Range ATE ASIC Design Starts	107
Figure 54. Low-End ATE ASIC Design Starts	109
Figure 55. Smart Grid ASIC Design Starts.....	111
Figure 56. Industrial Internet of Things ASIC Design Starts	113
Figure 57. Automotive GPS ASIC Design Starts.....	115
Figure 58. Commercial Vehicle ASIC Design Starts	117
Figure 59. High-End Passenger Car ASIC Design Starts.....	118
Figure 60. Mid-Range Passenger Car ASIC Design Starts.....	120
Figure 61. Low-End Passenger Car ASIC Design Starts.....	121
Figure 62. Advanced Driver Assistance Systems ASIC Design Starts	123