

CMOS SILOCON GATE ARRAY

The KG10000 Series is consists of silicon gate CMOS arrays whose interconnection are initially unspecified, therefore custom LSI is processed with only one mask step (a customized metal mask) according to customer specification.

Master chip consists of basic cell, i.e. 2 input NAND gate equivalently which is placed at regular intervals along the row and column of the chip, also consist of I/O pads which are compatible of CMOS or TTL.

SAMSUNG gate array design activity is performed on the computer aided design system which includes such capabilities as schematic or netlist entry, logic simulation, internal layout, automatic place and route and a design rule check.

FEATURES

- High performance oxide isolated silicon gate CMOS technology
- Advanced single metal mask programmable array
- Typical gate propagation delays of 2.8nsec (famous: 2)
- Maximum Toggling Frequency: 40MHz
- High density 3.5 micron geometries
- TTL and CMOS I/O compatibility
- Wide power supply voltage range: 3V to 7V
- Numerous package options
- Fully integrated CAD software support

BENEFITS

- Fast turnaround time
- Reduce component counts and space
- Low power dissipation
- Better design secrecy
- Improving the system reliability
- Low development cost
- Easier design approach

KG10000 FAMILY OF GATE ARRAY

| Device | Gate Count | Pad Count | Gate Speed |
|---------|------------|-----------|------------|
| KG10200 | 210 | 28 | 2.8 nsec |
| KG10400 | 400 | 40 | 2.8 nsec |
| KG10600 | 600 | 48 | 2.8 nsec |
| KG10800 | 840 | 56 | 2.8 nsec |
| KG11200 | 1184 | 66 | 2.8 nsec |

ABSOLUTE MAXIMUM RATINGS

| Characteristic | Symbol | Value | Unit |
|-----------------------|-----------|----------------------------------|------|
| DC Supply Voltage | V_{DD} | +3.0 to +7.0 | V |
| DC Input Voltage | V_I | $V_{SS} - 0.3$ to $V_{DD} + 0.3$ | V |
| Supply Current | I_{DD} | 25 | mA |
| Power Dissipation | P_d | 175 | mW |
| Operating Temperature | T_{opr} | -40 to +85 | °C |
| Storage Temperature | T_{stg} | -55 to +125 | °C |

RECOMMENDED OPERATING CONDITIONS

| Characteristic | Symbol | Value | Unit |
|-----------------------|-----------|--|------|
| DC Supply Voltage | V_{DD} | +3.0 to +7.0 | V |
| Operating Temperature | T_{opr} | Military -55 to +125 Industrial -40 to +85 Commercial 0 to +70 | °C |

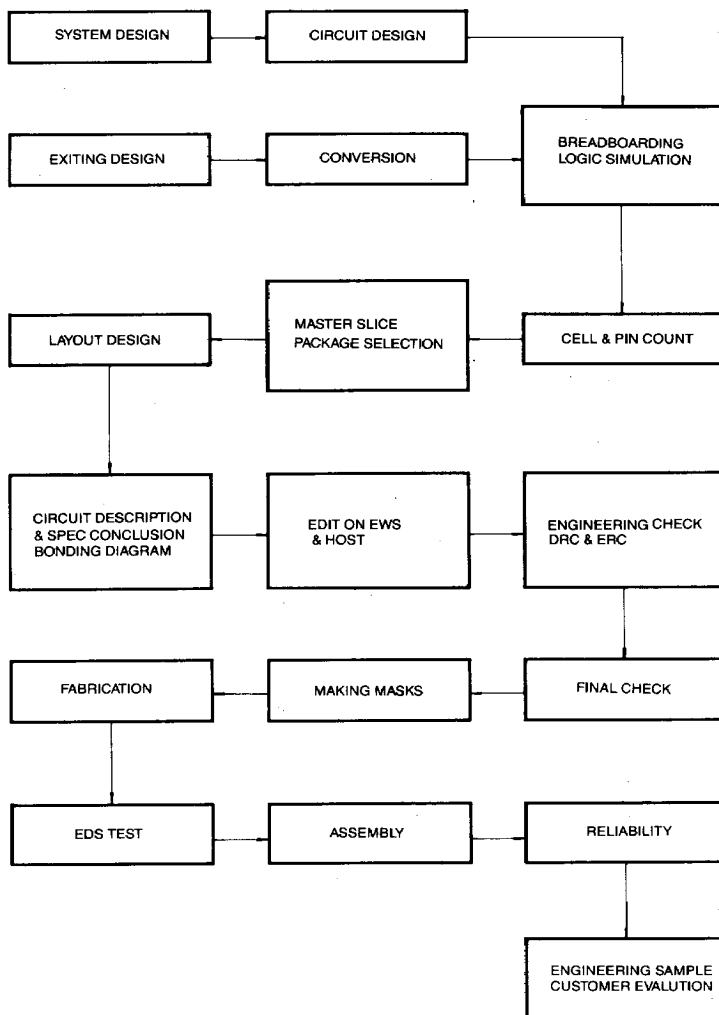
DC CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V_{DD} = 5V \pm 5\%$)

| Characteristic | Symbol | Test Conditions | Min | Typ | Max | Unit |
|------------------------------|----------|---------------------------|------|-----|------|---------------|
| Operating Voltage | V_{DD} | | 4.5 | 5 | 5.5 | V |
| Input Leakage Current | I_{IN} | $V_I = 0V$ or V_{DD} | -10 | | +10 | μA |
| Input High Voltage | V_{IH} | | 3.5 | | | V |
| Input Low Voltage | V_{IL} | | | | 1.5 | V |
| Output High Voltage | V_{OH} | $ I_o \leq 1\mu\text{A}$ | 4.95 | | | V |
| Output Low Voltage | V_{OL} | $ I_o \leq 1\mu\text{A}$ | | | 0.05 | V |
| Output High Current (Source) | I_{OH} | $V_O = 4.6V$ | 5.5 | 13 | | mA |
| | | $V_O = 2.5V$ | 10 | 26 | | mA |
| Output Low Current (Sink) | I_{OL} | $V_O = 0.4V$ | 4.5 | 7 | | mA |
| | | $V_O = 2.5V$ | 24 | 33 | | mA |

PACKAGE DESCRIPTION

| Package Type | | KG10200 | KG10400 | KG10600 | KG10800 | KG11200 |
|--------------|--------|---------|---------|---------|---------|---------|
| DIP | 8 DIP | ○ | × | × | × | × |
| | 16 DIP | ○ | × | × | × | × |
| | 18 DIP | ○ | ○ | × | × | × |
| | 20 DIP | ○ | ○ | ○ | × | × |
| | 22 DIP | ○ | ○ | ○ | × | × |
| | 24 DIP | ○ | ○ | ○ | ○ | ○ |
| | 28 SIP | ○ | ○ | ○ | ○ | ○ |
| | 40 DIP | × | ○ | ○ | ○ | ○ |
| 42 DIP | × | × | ○ | ○ | × | |
| SOP | 16 SOP | ○ | × | × | × | × |
| | 20 SOP | ○ | ○ | × | × | × |
| | 24 SOP | ○ | ○ | ○ | × | × |
| | 28 SOP | ○ | ○ | ○ | ○ | ○ |
| | 40 SOP | × | ○ | ○ | ○ | × |
| FQP | 48 FQP | × | ○ | ○ | ○ | × |
| | 60 FQP | × | ○ | ○ | ○ | × |
| SSD | 28 SSD | ○ | ○ | ○ | ○ | ○ |
| | 30 SSD | ○ | ○ | ○ | ○ | × |
| | 40 SSD | × | ○ | ○ | × | × |

DEVELOPMENT FLOW CHART



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EQUIVALENT CELL COUNTS OF LS TTL

| TTL Part No. | Count | TTL Part No. | Count | TTL Part No. | Count | TTL Part No. | Count |
|--------------|-------|--------------|-------|--------------|-------|--------------|-------|
| 7400 | 4 | 7470 | 16 | 74152 | 24 | 74253 | 40 |
| 7401 | 4 | 7471 | 15 | 74153 | 27 | 74257 | 36 |
| 7402 | 4 | 7472 | 14 | 74154 | 33 | 74258 | 34 |
| 7403 | 4 | 7473 | 20 | 74155 | 21 | 74259 | 48 |
| 7404 | 4 | 7474 | 15 | 74156 | 21 | 74260 | 6 |
| 7405 | 4 | 7475 | 14 | 74157 | 22 | 74261 | 58 |
| 7406 | 3 | 7476 | 20 | 74158 | 23 | 74265 | 7 |
| 7407 | 6 | 7477 | 14 | 74159 | 18 | 74266 | 10 |
| 7408 | 6 | 7478 | 20 | 74160 | 68 | 74273 | 50 |
| 7409 | 6 | 7480 | 17 | 74161 | 68 | 74274 | 70 |
| 7410 | 6 | 7481 | 80 | 74162 | 68 | 74275 | 70 |
| 7411 | 8 | 7482 | 27 | 74163 | 68 | 74276 | 40 |
| 7412 | 6 | 7483 | 57 | 74164 | 43 | 74278 | 34 |
| 7413 | 14 | 7484 | 80 | 74165 | 85 | 74279 | 10 |
| 7414 | 30 | 7485 | 73 | 74166 | 62 | 74280 | 24 |
| 7415 | 8 | 7486 | 12 | 74167 | 52 | 74281 | 170 |
| 7416 | 3 | 7487 | 19 | 74168 | 80 | 74283 | 59 |
| 7417 | 6 | 7489 | 320 | 74169 | 80 | 74284 | 58 |
| 7420 | 6 | 7490 | 40 | 74170 | 116 | 74285 | 58 |
| 7421 | 5 | 7491 | 43 | 74172 | 205 | 74289 | 280 |
| 7422 | 4 | 7492 | 41 | 74173 | 56 | 74290 | 48 |
| 7423 | 6 | 7493 | 41 | 74174 | 37 | 74293 | 45 |
| 7425 | 6 | 7494 | 42 | 74175 | 25 | 74295 | 57 |
| 7426 | 4 | 7495 | 42 | 74176 | 42 | 74298 | 32 |
| 7427 | 6 | 7496 | 44 | 74177 | 41 | 74299 | 188 |
| 7428 | 4 | 7497 | 120 | 74178 | 56 | 74323 | 188 |
| 7430 | 6 | 7498 | 33 | 74179 | 56 | 74348 | 64 |
| 7432 | 4 | 7499 | 46 | 74180 | 20 | 74351 | 124 |
| 7433 | 4 | 74100 | 18 | 74181 | 100 | 74352 | 26 |
| 7437 | 4 | 74102 | 14 | 74182 | 30 | 74353 | 39 |
| 7438 | 4 | 74103 | 20 | 74183 | 16 | 74362 | 44 |
| 7440 | 4 | 74106 | 20 | 74184 | 100 | 74363 | 28 |
| 7442 | 29 | 74107 | 20 | 74185 | 100 | 74364 | 48 |
| 7443 | 29 | 74108 | 20 | 74190 | 80 | 74365 | 37 |
| 7444 | 29 | 74109 | 21 | 74191 | 76 | 74366 | 40 |
| 7445 | 29 | 74110 | 14 | 74192 | 62 | 74367 | 37 |
| 7446 | 45 | 74111 | 20 | 74193 | 58 | 74368 | 40 |
| 7447 | 45 | 74116 | 26 | 74194 | 70 | 74373 | 58 |
| 7448 | 45 | 74120 | 15 | 74195 | 46 | 74374 | 74 |
| 7449 | 45 | 74135 | 24 | 74196 | 42 | 74375 | 16 |
| 7450 | 6 | 74136 | 12 | 74197 | 41 | 74376 | 40 |
| 7451 | 5 | 74138 | 23 | 74198 | 92 | 74377 | 48 |
| 7452 | 8 | 74139 | 20 | 74199 | 85 | 74378 | 34 |
| 7453 | 7 | 74141 | 16 | 74225 | 450 | 74379 | 24 |
| 7454 | 7 | 74142 | 90 | 74226 | 116 | 74381 | 150 |
| 7455 | 6 | 74143 | 45 | 74245 | 83 | 74386 | 12 |
| 7460 | 6 | 74144 | 98 | 74246 | 51 | 74390 | 86 |
| 7461 | 6 | 74145 | 24 | 74247 | 51 | 74393 | 80 |
| 7462 | 9 | 74147 | 35 | 74248 | 51 | 74395 | 50 |
| 7464 | 8 | 74148 | 35 | 74249 | 51 | 74398 | 22 |
| 7465 | 8 | 74150 | 60 | 74251 | 37 | 74399 | 22 |
| | | 74151 | 24 | | | 74670 | 144 |

EQUIVALENT CELL COUNTS OF C-MOS LOGIC

| Part No. | Count | Part No. | Count | Part No. | Count | Part No. | Count |
|----------|-------|----------|-------|----------|-------|----------|-------|
| 4000 | 5 | 4038 | 74 | 4153 | 32 | 4515 | 69 |
| 4001 | 4 | 4040 | 74 | 4155 | 22 | 4516 | 66 |
| 4002 | 4 | 4041 | 4 | 4157 | 24 | 4518 | 26 |
| 4006 | 108 | 4042 | 12 | 4158 | 24 | 4519 | 28 |
| 4007 | 2 | 4043 | 20 | 4160 | 64 | 4520 | 54 |
| 4008 | 32 | 4044 | 20 | 4162 | 64 | 4521 | 123 |
| 4009 | 35 | 4051 | 6 | 4163 | 64 | 4522 | 44 |
| 4010 | 5 | 4068 | 4 | 4164 | 51 | 4526 | 47 |
| 4011 | 4 | 4069 | 3 | 4166 | 84 | 4530 | 16 |
| 4012 | 4 | 4070 | 12 | 4174 | 38 | 4531 | 36 |
| 4013 | 10 | 4071 | 6 | 4175 | 25 | 4532 | 39 |
| 4014 | 43 | 4072 | 4 | 4192 | 60 | 4534 | 190 |
| 4015 | 62 | 4073 | 38 | 4193 | 56 | 4539 | 24 |
| 4017 | 45 | 4074 | 14 | 4273 | 50 | 4554 | 40 |
| 4018 | 52 | 4075 | 8 | 4373 | 58 | 4555 | 22 |
| 4019 | 12 | 4076 | 41 | 4374 | 74 | 4556 | 22 |
| 4020 | 40 | 4077 | 12 | 4375 | 14 | 4558 | 65 |
| 4021 | 43 | 4078 | 4 | 4386 | 12 | 4560 | 78 |
| 4022 | 35 | 4081 | 4 | 4501 | 6 | 4580 | 187 |
| 4024 | 44 | 4082 | 4 | 4504 | 33 | 4581 | 100 |
| 4026 | 65 | 4089 | 84 | 4505 | 271 | 4582 | 31 |
| 4027 | 20 | 4093 | 32 | 4506 | 19 | 4583 | 23 |
| 4028 | 22 | 4094 | 86 | 4508 | 24 | 4584 | 30 |
| 4029 | 68 | 4099 | 64 | 4510 | 94 | 4585 | 35 |
| 4030 | 12 | 4106 | 30 | 4511 | 136 | 4597 | 103 |
| 4032 | 68 | 4107 | 18 | 4512 | 31 | 4598 | 74 |
| 4034 | 110 | 4138 | 20 | 4514 | 69 | 4599 | 42 |
| 4035 | 48 | 4139 | 10 | | | | |

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