

COTS Database (1/6)

| No.    | ID number | Part's Type               | Function  | Radiation Tolerance |                 |                           |                         |                  |                          |                 |                | Temperature Range (Catalogue base) |                                      | Environment Test                 |                      |                     |                   |                   |      |
|--------|-----------|---------------------------|---|---------------------|-----------------|---------------------------|-------------------------|------------------|--------------------------|-----------------|----------------|------------------------------------|--------------------------------------|----------------------------------|----------------------|---------------------|-------------------|-------------------|------|
|        |           |                           |   | TID Tolerance       |                 | SEU Tolerance             |                         |                  |                          | Operating Range | Storage Range  | Stabilization Bake                 | High temperature Operating Life Test | Temperature & Humidity Bias Test | Pressure Cooker Test | Temperature Cycling | Temperature shock |                   |      |
|        |           |                           |   | Gamma-ray TIO       | Proton TID      | Heavy-Ion SEU/SET         |                         | Proton SEU/SET   |                          |                 |                |                                    |                                      |                                  |                      |                     |                   | Heavy-Ion SEL/SEB |      |
|        |           |                           |   | Gy(Si)              |                 | Threshold LET             | Saturated Cross Section | Threshold Energy | Saturation Cross Section |                 |                | Saturated Cross Section            | Rejected/Tested                      |                                  |                      |                     |                   |                   |      |
|        |           | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>                                     | MeV                 | cm <sup>2</sup> | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>         |                  |                          | °C              | °C             |                                    |                                      |                                  |                      |                     |                   |                   |      |
| (CPU)  |           |                           |   |                     |                 |                           |                         |                  |                          |                 |                |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 1      | 11101     | CPU                       | 32bit(Internal Bus:128bit), DRAM:2MB                | >200                | -               | <1.44                     | >2.25E-03(d)            | -                | -                        | 59.8            | Function error | 0 ~ +70                            | -60 ~ +150                           | 0/22                             | 0/22                 | 0/22                | 0/22              | 0/22              | -    |
| 2      | 11112     | CPU                       | 32bit   | 150                 | -               | <1.5                      | >2.0E-06(d)             | -                | -                        | 5.5             | >1.0E-06(d)    | -20 ~ +75                          | -55 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 3      | 11113     | CPU                       | 32bit with FPU                                      | 200                 | -               | <1.5                      | >4.0E-06(d)             | -                | -                        | 5.5             | >1.0E-06(d)    | -20 ~ +75                          | -55 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 4      | 11114     | CPU                       | 32bit   | 200                 | -               | <2.9                      | >1.0E-06(d)             | -                | -                        | >61.8           | <1.0E-06(d)    | -40 ~ +110                         | -65 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 5      | 11225     | CPU                       | 32bit   | 150                 | <240            | ~2                        | ~1.0E-06(b)             | <20              | >3E-13(b)                | 5.5             | 4.9E-06(d)     | -40 ~ +110                         | -65 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 6      | 11401     | CPU                       | 32bit   | 200                 | <400            | 1.5                       | 5E-08(b)                | <9.7             | 1E-013(b)                | 1.5             | 4.9E-07(d)     | -40 ~ +85                          | -65 ~ +150                           | 0/45                             | 0/32                 | 0/22                | 0/22              | 0/22              | 0/22 |
| 7      | 21101     | CPU                       | 32bit, RISC, 100MHz                                 | 170                 | -               | 3.5                       | 9.24E-03(d)             | -                | -                        | >60             | <1.0E-05(d)    | -40 ~ +110                         | -55 ~ +150                           | 0/5                              | 0/7                  | -                   | -                 | 0/7               | -    |
| 8      | 41315     | CPU                       | 64bit   | >300                | -               | 3                         | 2.0E-03(d)              | -                | -                        | 19.8            | 9.8E-05(d)     | -30 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 9      | 41320     | CPU                       | 64bit   | >300                | -               | 3                         | 1.7E-07(b)              | -                | -                        | 14              | 6.6E-07(d)     | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 10     | 51201     | CPU                       | MPU   | <200                | 307             | 4.3                       | 1.0E-05(b)              | 0.12             | 1.5E-13(b)               | 26.2            | 4.56E-04(d)    | -40 ~ +85                          | -55 ~ +125                           | 0/22                             | 0/22                 | 0/22                | 0/22              | 0/22              | 0/22 |
| 11     | 51301     | CPU                       | 16bit CPU, Flash Memory :256kB, RAM : 8kB           | 123                 | -               | 0.64                      | 7.9E-08(b)              | 0.5              | 4.0E-14(b)               | 1.85            | 6.7E-03(d)     | -40 ~ +85                          | -55 ~ +125                           | 0/45                             | 0/76                 | 0/76                | 0/22              | 0/45              | 0/22 |
| 12     | 51308     | CPU                       | 32bit, 40MHz,3.3V, Flash Memory : 512kB, RAM : 32kB | 200                 | -               | 2.9                       | 2.0E-04(d)              | 16.3             | 1.59E-16(b)              | 5               | 6.80E-04(d)    | -40 ~ +85                          | -55 ~ +125                           | 0/45                             | 0/76                 | 0/45                | 0/22              | 0/45              | 0/15 |
| 13     | 61204     | CPU                       | 16bit   | 300                 | -               | 7.5                       | 7.0E-03(d)              | -                | -                        | 26.2            | >2.5E-05(d)    | -40 ~ +85                          | -55 ~ +125                           | 0/3                              | 0/12                 | 0/6                 | 0/5               | 0/6               | -    |
| 14     | U1001     | CPU                       | 32bit   | >300                | -               | 9                         | 1.0E-04(d)              | -                | -                        | 34              | Latch-up       | -                                  | -                                    | -                                | -                    | -                   | -                 | -                 | -    |
| (DSP)  |           |                           |   |                     |                 |                           |                         |                  |                          |                 |                |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 15     | 41101     | DSP                       | 32bit   | 100                 | -               | 3                         | 1.1E-02(d)              | -                | -                        | 14              | 2.5E-05(d)     | 0 ~ +85                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 16     | 51306     | DSP                       | 32bit IRISC   | 752                 | -               | 3                         | 2.1E-09(b)              | 0.6              | 8.50E-14                 | >26             | <9.32E-0(d)    | -40 ~ +85                          | -55 ~ +125                           | -                                | 0/15                 | 0/15                | -                 | -                 | 0/15 |
| 17     | U1002     | DSP                       |   |                     | -               | 6                         | 2.3E-01(d)              | -                | -                        | 14              | Latch-up       | -                                  | -                                    | -                                | -                    | -                   | -                 | -                 | -    |
| (SRAM) |           |                           |   |                     |                 |                           |                         |                  |                          |                 |                |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 18     | 11103     | SRAM                      | 4Mbit(512K × 8bit)                                  | 150                 | -               | 1.44                      | 2.44E-08(b)             | -                | -                        | >82.2           | <1.0E-06(d)    | 0 ~ +70                            | -65 ~ +150                           | 0/32                             | 0/32                 | 0/32                | 0/32              | 0/32              | -    |
| 19     | 11107     | SRAM                      | 4Mbit(256K × 16bit)                                 | 100                 | -               | >5.5                      | <1.0E-06(d)             | -                | -                        | 5.5             | >1.0E-06(d)    | -40 ~ +85                          | -55 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 20     | 11207     | SRAM                      | 4Mbit(256k word × 16bit)                            | 160                 | -               | >2.9                      | <1.0E-06(d)             | -                | -                        | 5.5             | 3.7E-06(d)     | 0 ~ +70                            | -55 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 21     | 11209     | SRAM                      | 4Mbit(256k word × 16bit)                            | 400                 | >200            | 2                         | 3.0E-07(b)              | <20              | 1.0E-13(b)               | >61.8           | <1.0E-05(d)    | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 22     | 11210     | SRAM                      | 1Mbit(128k word × 8bit)                             | 500                 | >200            | <1.5                      | 1.4E-09(b)              | <20              | 1.0E-13(b)               | >61.8           | <4.0E-06(d)    | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 23     | 11211     | SRAM                      | 4Mbit(256kword × 16bit)                             | 800                 | >200            | 2                         | 1.0E-06(b)              | <20              | 1.0E-13(b)               | >61.8           | <1.0E-05(d)    | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 24     | 11212     | SRAM                      | 1M(128k word × 8bit)                                | 800                 | >200            | <1.5                      | 1.0E-09(b)              | <20              | 1.0E-13(b)               | >61.8           | <1.0E-05(d)    | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 25     | 11213     | SRAM                      | 1M(128k word × 8bit)                                | 400                 | >110            | <1.5                      | >3.0E-09(b)             | <20              | >4.0E-14(b)              | 1.5             | >1.0E-06(d)    | -25 ~ +85                          | -55 ~ +125                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 26     | 11214     | SRAM                      | 1M(128k word × 8bit)                                | 250                 | >200            | <1.5                      | >3.0E-10(b)             | <20              | 1.0E-13(b)               | 2.9             | >1.0E-06(d)    | -25 ~ +85                          | -55 ~ +125                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 27     | 11215     | SRAM                      | 4M(256k word × 16bit)                               | 500                 | >200            | 2                         | 1.2E-07(b)              | <20              | 7.0E-14(b)               | >61.8           | <1.0E-05(d)    | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 28     | 11216     | SRAM                      | 1M(128k word × 8bit)                                | 250                 | >200            | 2                         | 1.2E-07(b)              | <20              | 7.0E-14(b)               | >61.8           | <1.0E-05(d)    | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 29     | 11322     | SRAM                      | 4M(512k × 8bit)                                     | -                   | -               | 32                        | 4.0E-11(b)              | >51              | <2.4E-16(b)              | >61.8           | <1.0E-06(d)    | -55 ~ +125                         | -65 ~ +150                           | -                                | -                    | -                   | -                 | -                 | -    |
| 30     | 11323     | SRAM                      | 4M(512K × 8bit)                                     | -                   | -               | 2.9                       | 6.0E-07(b)              | <10              | 1.0E-13(b)               | >61.8           | <1.0E-03(d)    | -55 ~ +125                         | -65 ~ +150                           | -                                | -                    | -                   | -                 | -                 | -    |
| 31     | 11402     | FIFO                      | 1024 × 18bit / 2048 × 9bit                          | >990                | -               | 1.5                       | ~1.0E-02(d)             | >70              | <5.4E-24(b)              | 14.2            | 2.9E-06(d)     | 0 ~ +70                            | -55 ~ +125                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 32     | 11503     | SRAM                      | 8M(512K × 16bit)                                    | 600                 | -               | ~10                       | 2E-06(b)                | <20              | ~3.0E-14(b)              | 26.6            | 2.29E-05(d)    | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 33     | 11602     | SRAM                      | 4Mbit(256k × 16bit)                                 | >1000               | -               | 2                         | 1E-07(b)                | <15              | 1E-13(b)                 | 7.97            | >1E-04(d)      | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | 0/3               | 0/3               | 0/3  |
| 34     | 11701     | SRAM                      | 16Mbit(1M X 16bit)                                  | 200                 | -               | 10                        | 3.0E-8(b)               | <15              | 2.00E-17                 | >81.3           | <9.0E-05(d)    | -40 ~ +85                          | -65 ~ +150                           | 0/5                              | 0/11                 | 0/11                | -                 | 0/5               | 0/5  |
| 35     | 11801     | SRAM                      | 4Mbit(256k × 16bit)                                 | >1000               | -               | 3                         | 1.3E-07(b)              | <20              | ~1.0E-14(b)              | ~26             | <1.0E-06(d)    | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/11                 | -                   | -                 | 0/5               | 0/5  |
| 36     | 21105     | SRAM                      | 4M(256k word × 16bit)                               | >361                | -               | 2                         | 3.39E-07(b)             | -                | -                        | >59.9           | <1.0E-06(d)    | -10 ~ +85                          | -65 ~ +150                           | 0/5                              | 0/7                  | -                   | -                 | 0/7               | -    |
| 37     | 21206     | SRAM                      | 144kbit(16kword × 9bit) FIFO                        | 50                  | -               | 5.4                       | 5.0E-08(b)              | -                | -                        | >37.4           | <1.0E-06(d)    | 0 ~ +70                            | -55 ~ +125                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 38     | 21207     | SRAM                      | 128k(8kword × 16bit) FIFO                           | >220                | -               | 4                         | 4.0E-08(b)              | -                | -                        | >37.4           | <1.0E-06(d)    | 0 ~ +70                            | -55 ~ +125                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 39     | 41312     | DPSRAM                    | 1Mbit(64kword × 8bit)                               | >300                | -               | 5                         | 1.4E-07(b)              | -                | -                        | >34             | <2.0E-07(d)    | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 40     | 41313     | FIFO                      | 16kword × 9bit                                      | >300                | -               | 5                         | 1.6E-07(b)              | -                | -                        | 14              | 9.0E-08(d)     | -40 ~ +85                          | -55 ~ +125                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 41     | 41314     | SRAM                      | 4Mbit(512kword × 8bit)                              | >300                | -               | -                         | -                       | -                | -                        | 3               | 2.4E-03(d)     | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 42     | 51319     | SRAM                      | 1MB × 16bit   | 1000                | -               | <5.5                      | 1.0E-09(b)              | ~10              | 2.0E-16(b)               | 14.2            | Latch-up       | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/15                 | 0/15                | -                 | 0/15              | 0/15 |
| 43     | 61102     | SRAM                      | 4Mbit(4bitx1M)                                      | 20                  | -               | 2.1                       | 5.0E-08(b)              | -                | -                        | >82.2           | <1.0E-06(d)    | -10 ~ +85                          | -55 ~ +125                           | 0/3                              | 0/12                 | 0/6                 | 0/5               | 0/6               | -    |
| 44     | 61201     | SRAM                      | 4Mbit   | 100                 | -               | 1.44                      | 1.0E-06(b)              | -                | -                        | >36.8           | <1.0E-06(d)    | -20 ~ +70                          | -55 ~ +125                           | 0/3                              | 0/12                 | 0/6                 | 1/5               | 0/6               | -    |
| 45     | U1003     | SRAM                      | 4Mbit   |                     | -               | 2.8                       | 2.1E-08(b)              | -                | -                        | >14.3           | -              | -                                  | -                                    | -                                | -                    | -                   | -                 | -                 | -    |

COTS Database (2/6)

| No.            | ID number | Part's Type               | Function                               | Radiation Tolerance |                 |                           |                         |                  |                          |                 |                         | Temperature Range (Catalogue base) |                                      | Environment Test                 |                      |                     |                   |                   |      |
|----------------|-----------|---------------------------|--|---------------------|-----------------|---------------------------|-------------------------|------------------|--------------------------|-----------------|-------------------------|------------------------------------|--------------------------------------|----------------------------------|----------------------|---------------------|-------------------|-------------------|------|
|                |           |                           |  | TID Tolerance       |                 | SEU Tolerance             |                         |                  |                          | Operating Range | Storage Range           | Stabilization Bake                 | High temperature Operating Life Test | Temperature & Humidity Bias Test | Pressure Cooker Test | Temperature Cycling | Temperature shock |                   |      |
|                |           |                           |  | Gamma-ray TIO       | Proton TID      | Heavy-Ion SEU/SET         |                         | Proton SEU/SET   |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   | Heavy-Ion SEL/SEB |      |
|                |           |                           |  | Gy(Si)              |                 | Threshold LET             | Saturated Cross Section | Threshold Energy | Saturation Cross Section |                 | Saturated Cross Section | °C                                 | °C                                   | Rejected/Tested                  |                      |                     |                   |                   |      |
|                |           | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>                        | MeV                 | cm <sup>2</sup> | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| (SOI-SRAM)     |           |                           |  |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 46             | 21107     | SOI-SRAM                  | 256Kbit(32Kword × 8bit)                | >1000               | -               | 57.5                      | 1.0E-12(b)              | -                | -                        | >161            | <1.0E-06(d)             | -40 ~ +125                         | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 47             | 21108     | SOI-SRAM                  | 256Kbit(32Kword × 8bit)                | 570                 | -               | 2.6                       | 1.4E-08(b)              | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 48             | 21109     | SOI-SRAM                  | 128Kbit(8Kword × 16bit)                | 220                 | -               | 4                         | 2.2E-08(b)              | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 49             | 21201     | SOI-SRAM                  | 128k(8kword×16bit)                     | 370                 | -               | 10                        | 3.0E-08(b)              | -                | -                        | >99.8           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 50             | 21301     | SOI-SRAM                  | 256Kbit(32Kword × 8bit)                | 380                 | -               | 4                         | 1.4E-08(b)              | -                | -                        | >82.4           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 51             | 21307     | SOI-SRAM                  | 256Kbit(32Kword × 8bit)                | 580                 | -               | 7.7                       | 1.0E-08(b)              | -                | -                        | >82.4           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 52             | 21308     | SOI-SRAM                  | 128Kbit(8Kword × 16bit)                | >1000               | -               | 7                         | 1.3E-08(b)              | -                | -                        | >68.9           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 53             | 21309     | SOI-SRAM                  | 128Kbit(8Kword × 16bit)                | >1000               | -               | 13                        | 8.5E-11(b)              | -                | -                        | >119.4          | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 54             | 21501     | SOI-SRAM                  | 128Kbit(8Kword × 16bit)                | 510                 | -               | 2.5                       | 1.0E-08(b)              | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 55             | 21502     | SOI-SRAM                  | 128Kbit(8Kword × 16bit)                | 780                 | -               | 6                         | 2.0E-08(b)              | -                | -                        | >104            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| (DRAM)         |           |                           |  |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 56             | 11202     | DRAM                      | 256Mbit(16Mword × 4bit × 4bank)        | 1100                | >200            | 5                         | 1.3E-08(b)              | <20              | 2.5E-16                  | 61.8            | >1.0E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 57             | 11217     | DRAM                      | 128M(8M word × 4bit × 4bank)           | 1100                | >200            | 5                         | 1.0E-07(b)              | <20              | 3.0E-16(b)               | 61.8            | >1.0E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 58             | 11218     | DRAM                      | 256Mbit(16M word × 4bit × 4bank)       | 600                 | >200            | 14.2                      | 2.3E-08(b)              | <20              | 2.0E-18(b)               | >61.8           | <1.0E-05(d)             | 0 ~ +70                            | -55 ~ +125                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 59             | 11219     | DRAM                      | 128M(8M word × 4bit × 4bank)           | 600                 | >200            | 5                         | 1.0E-07(b)              | <20              | 5.0E-16(b)               | >61.8           | <5.0E-06(d)             | 0 ~ +70                            | -55 ~ +125                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 60             | 11220     | DRAM                      | 256M(16M word × 4bit × 4bank)          | 1800                | >200            | 14.2                      | 1.0E-07(b)              | <20              | 2.2E-15(b)               | 61.8            | >1.0E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 61             | 11221     | DRAM                      | 128M(8M word × 4bit × 4bank)           | 1400                | >200            | <1.5                      | >2.6E-11(b)             | <20              | 10E-15(b)                | >61.8           | <1.0E-05(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 62             | 11222     | DRAM                      | 256Mbit(16M word × 4bit × 4bank)       | 600                 | >200            | 5                         | 1.0E-07(b)              | <20              | 8.0E-17(b)               | >61.8           | <1.0E-05(d)             | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 63             | 11223     | DRAM                      | 128Mbit(8M word × 4bit × 4bank)        | 600                 | >200            | 5                         | 1.0E-07(b)              | <20              | 7.0E-17(b)               | >61.8           | <1.0E-05(d)             | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 64             | 11224     | DRAM                      | 256Mbit(16Mword × 4bit × 4bank)        | >500                | -               | <1.5                      | 1.6E-09(b)              | -                | -                        | >63             | <1.0E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 65             | 11502     | DRAM                      | 512M bit ( 32M X 16 bit )              | 200                 | -               | 15                        | 1.0E-08(b)              | <20              | 3.7E-10(b)               | >81.4           | <9.4E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/3                              | 3/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 66             | 11504     | SDRAM                     | 256M(32M × 8bit)                       | 1000                | -               | 15                        | 5.0E-10(b)              | <20              | 1.0E-10(d)               | >81.4           | <4.6E-06(d)             | 0 ~ +70                            | -55 ~ +125                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 67             | 11505     | SDRAM                     | 512M(64M × 8bit)                       | 200                 | -               | 15                        | 5.0E-10(b)              | <20              | 8.0E-11(d)               | >81.4           | <2.1E-05(d)             | 0 ~ +70                            | -55 ~ +125                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 68             | 11601     | DRAM                      | 256Mbit(4M × 4bank × 16bit)            | 200                 | -               | 6                         | 3.0E-09(b)              | <31              | 1E-16(b)                 | ≥81.4           | <6.0E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/5                              | 5/5                  | 0/5                 | -                 | 0/5               | 0/5  |
| 69             | 11702     | SDRAM                     | 128Mbit(8M X 16bit)                    | 300                 | -               | 3                         | 1.0E-8(b)               | <15              | 1.0E-16(b)               | >81.3           | <9.0E-05(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/5                              | 0/11                 | 0/11                | -                 | 0/5               | 0/5  |
| 70             | 21102     | DRAM                      | 64Mbit, SDRAM                          | 1000                | -               | 3.2                       | 2.65E-08(b)             | -                | -                        | >60             | <1.0E-05(d)             | 0 ~ +70                            | -55 ~ +150                           | 0/5                              | 0/7                  | -                   | -                 | 0/7               | -    |
| 71             | 21204     | DRAM                      | 256Mbit(4Mword × 4bank × 16bit) SDRAM  | >220                | -               | 3.1                       | 1.2E-09(b)              | -                | -                        | 26.7            | 4.80E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 72             | 21401     | DRAM                      | 64Mbit(1Mword × 4bank × 16bit)         | >263                | -               | 3                         | 5.0E-09(b)              | -                | -                        | >58             | <1.0E-06(d)             | 0 ~ +70                            | -55 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 73             | 41316     | SDRAM                     | 128Mbit(16Mword × 8bit)                | >300                | -               | 3                         | -                       | -                | -                        | 14              | 8.4E-08(d)              | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 74             | U1004     | SDRAM                     | 64Mbit                                 | -                   | -               | 3.8                       | 1.5E-08(b)              | -                | -                        | >37             | -                       | -                                  | -                                    | -                                | -                    | -                   | -                 | -                 | -    |
| (PROM)         |           |                           |  |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 75             | 11201     | PROM                      | 256kbit(32k word X 8bit)               | >500                | -               | >63                       | <1E-06(d)               | -                | -                        | >63             | <1.0E-06(d)             | 0 ~ +70                            | -55 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 76             | 21205     | PROM                      | 1M(128Kword × 8bit)EEPROM              | 38                  | -               | 7                         | 6.7E-07(d)              | -                | -                        | >37.7           | <1.0E-06(d)             | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| (EEPROM)       |           |                           |  |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 77             | 11104     | EEPROM                    | 16Mbit_FLASH                           | >200                | -               | <3.36                     | >1.0E-06(d)             | -                | -                        | >59.8           | <1.0E-06(d)             | 0 ~ +70                            | -65 ~ +125                           | 0/32                             | 0/32                 | 0/32                | 0/32              | 0/32              | -    |
| 78             | 11208     | PROM                      | 1Mbit(128k word × 8bit)                | 166                 | -               | >5.5                      | <1E-06(d)               | -                | -                        | 14.2            | Hard error              | 0 ~ +70                            | -55 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 79             | 11321     | EEPROM                    | 1.6Mbit                                | 100                 | -               | >61.8                     | <9.2E-12(b)             | >51              | <9.2E-15(b)              | >61.8           | <1.0E-06(d)             | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 80             | 61103     | EEPROM                    | 64Mbit(8bitx8M)                        | 850                 | -               | >82.8                     | <1.0E-06(b)             | -                | -                        | 11.4            | 1.5E-05(d)              | 0 ~ +70                            | -55 ~ +125                           | 0/3                              | 0/12                 | 0/6                 | 0/5               | 0/6               | -    |
| (Flash Memory) |           |                           |  |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 81             | 11314     | FLASH                     | 32Mbit(4Mword × 8bit / 2Mword × 16bit) | 200                 | 200             | >2.9                      | <3.0E-14(b)             | >51              | <1E-09(d)                | 5.5             | Function error          | -40 ~ +85                          | -55 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 82             | 11315     | FLASH                     | 32M(4Mword × 8bit / 2Mword × 16bit)    | >280                | >300            | >61.8                     | <3.0E-14(b)             | >51              | <1E-09(d)                | 14.2            | Hard error              | -40 ~ +85                          | -55 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 83             | 11506     | FLASH                     | 128M(16M × 8bit / 8M × 16bit)          | <200                | -               | 7.9                       | -                       | >70              | <4.6E-17(d)              | >26.6           | <1.0E-05(d)             | -40 ~ +85                          | -55 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 84             | 51305     | FLASH                     | 2Mbit                                  | 107                 | -               | 9.53                      | 4.0E-07(b)              | -                | -                        | >26             | <9.95E-07(d)            | -40 ~ +85                          | -55 ~ +125                           | 0/55                             | 0/105                | 0/55                | 0/55              | 0/105             | -    |

COTS Database (3/6)

| No.          | ID number | Part's Type               | Function                  | Radiation Tolerance |                 |                           |                         |                  |                          |                 |                         | Temperature Range (Catalogue base) |                                      | Environment Test                 |                      |                     |                   |                   |      |
|--------------|-----------|---------------------------|---------------------------|---------------------|-----------------|---------------------------|-------------------------|------------------|--------------------------|-----------------|-------------------------|------------------------------------|--------------------------------------|----------------------------------|----------------------|---------------------|-------------------|-------------------|------|
|              |           |                           |                           | TID Tolerance       |                 | SEU Tolerance             |                         |                  |                          | Operating Range | Storage Range           | Stabilization Bake                 | High temperature Operating Life Test | Temperature & Humidity Bias Test | Pressure Cooker Test | Temperature Cycling | Temperature shock |                   |      |
|              |           |                           |                           | Gamma-ray TIO       | Proton TID      | Heavy-Ion SEU/SET         |                         | Proton SEU/SET   |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   | Heavy-Ion SEL/SEB |      |
|              |           |                           |                           | Gy(Si)              |                 | Threshold LET             | Saturated Cross Section | Threshold Energy | Saturation Cross Section |                 | Saturated Cross Section | °C                                 | °C                                   | Rejected/Tested                  |                      |                     |                   |                   |      |
|              |           | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>           | MeV                 | cm <sup>2</sup> | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| (Gate Array) |           |                           |                           |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 85           | 11102     | FPGA                      | 32kgates                  | 800                 | -               | -                         | -                       | -                | -                        | -               | -                       | -40 ~ +125                         | -55 ~ +150                           | -                                | -                    | -                   | -                 | -                 | 0/3  |
| 86           | 11301     | FPGA                      | SRAM type                 | 600                 | >250            | ≤1.5                      | >6.3E-06(d)             | <50              | >1E-9(d)                 | 14.2            | >1.0E-06(d)             | -40 ~ +100                         | -65 ~ +150                           | 0/6                              | 0/6                  | 0/6                 | 0/11              | 1/11              | 0/11 |
| 87           | 11302     | FPGA                      | EEPROM type               | 150                 | 300             | ≤1.5                      | >8.9E-05(d)             | <50              | >3E-10(d)                | 14.2            | >1.0E-06(d)             | -55 ~ +125                         | -65 ~ +150                           | 0/6                              | 0/6                  | 0/6                 | 0/11              | 1/11              | 0/11 |
| 88           | 11317     | FPGA                      | SRAM type                 | 140                 | 100             | ≤1.5                      | >1.8E-06(d)             | <50              | >1E-9(d)                 | 1.5             | 1.4E-05(d)              | 0 ~ +85                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 89           | 11318     | FPGA                      | FLASH type                | 300                 | 300             | <1.5                      | -                       | >51              | <5.0E-10(d)              | 14.2            | 8.2E-05(d)              | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 90           | 11319     | FPGA                      | SRAM type                 | 500                 | >300            | ≤1.5                      | >3.0E-06(d)             | >51              | <1E-09(d)                | 14.2            | 9.51E-03(d)             | -65 ~ +135                         | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 91           | 11320     | FPGA                      | EEPROM type               | 150                 | >300            | ≤2.9                      | >8.1E-06(d)             | >51              | <1E-09(d)                | 2.9             | 2.55E-06(d)             | 0 ~ +70                            | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 92           | 11407     | FPGA                      | EEPROM type               | >300                | -               | 2.9                       | ~1.0E-04(d)             | >70              | <2.9E-10                 | 98.3            | 1.5E-06(d)              | 0 ~ +70                            | -65 ~ +150                           | 0/3                              | 0/3                  | 1/3                 | -                 | 0/3               | 0/3  |
| 93           | 11501     | FPGA                      | anti fuse type            | 250                 | -               | >11.7                     | <1E-06(d)               | >70              | <2.0E-11                 | 11.7            | 1.0E-06(d)              | 0 ~ +70                            | -65 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 94           | 11507     | FPGA                      | SRAM type                 | 800                 | -               | ≤1.0                      | >1.8E-06(d)             | <20              | >1.4E-11(d)              | 26.6            | 4.6E-06(d)              | 0 ~ +70                            | -65 ~ +150                           | 0/3                              | 0/3                  | 0/4                 | -                 | 0/3               | 0/3  |
| 95           | 21103     | Gate Array                | 32kgates FPGA             | 309                 | -               | 17                        | 9.69E-04(d)             | -                | -                        | >66             | <1.0E-06(d)             | 0 ~ +70                            | -40 ~ +125                           | 0/5                              | 0/7                  | -                   | -                 | 0/7               | -    |
| 96           | 51309     | FPGA                      | 108kgates                 | 400                 | -               | 10.8                      | 6.67E-10(b)             | >50              | -                        | >61.8           | <8.13E-07(d)            | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/15                 | 0/15                | -                 | 0/15              | 0/15 |
| 97           | 61101     | Gate Array                | 700kgates                 | 350                 | -               | >20.2                     | -                       | -                | -                        | 20.2            | <6.4E-06(d)             | -40 ~ +85                          | -55 ~ +125                           | -                                | -                    | -                   | -                 | -                 | -    |
| 98           | U1005     | Gate Array                | 400kgates                 | -                   | -               | >48                       | -                       | -                | -                        | 48              | Latch-up                | -                                  | -                                    | -                                | -                    | -                   | -                 | -                 | -    |
| (Digital IC) |           |                           |                           |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 99           | 11108     | Digital IC                | LVDS Driver               | >300                | -               | >37.9                     | <1E-06(d)               | -                | -                        | 14.2            | >1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 100          | 11109     | Digital IC                | LVDS Receiver             | >280                | -               | >37.9                     | <1E-06(d)               | -                | -                        | 14.2            | >1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 101          | 11303     | Digital IC                | 16bit Bus Transceiver     | 100                 | -               | -                         | -                       | -                | -                        | >61.8           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 102          | 11304     | Digital IC                | 16bit Bus Transceiver     | >300                | -               | -                         | -                       | -                | -                        | >61.8           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 11/11             | 0/11              | 0/11 |
| 103          | 11305     | Digital IC                | 16bit Bus Receiver        | >300                | -               | -                         | -                       | -                | -                        | >61.8           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 104          | 11306     | Digital IC                | Schmidt Trigger Inverter  | <380                | -               | -                         | -                       | -                | -                        | >61.8           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 105          | 11307     | Digital IC                | Inverter                  | <380                | -               | -                         | -                       | -                | -                        | >61.8           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 106          | 11316     | Digital IC                | 16bit Bus Transceiver     | 100                 | -               | -                         | -                       | -                | -                        | >61.8           | <1.0E-06(d)             | -40 ~ +85                          | -60 ~ +150                           | 0/11                             | 0/6                  | 0/6                 | 0/11              | 0/11              | 0/11 |
| 107          | 21104     | Digital-IC                | 16bit Bus Transceiver     | 223                 | -               | >119                      | <1.0E-06(b)             | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/5                              | 0/7                  | -                   | -                 | 0/7               | -    |
| 108          | 21106     | Digital-IC                | EIA422 Line Driver        | 113                 | -               | >119                      | <1.0E-06(d)             | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/5                              | 0/7                  | -                   | -                 | 0/7               | -    |
| 109          | 21306     | Digital-IC                | 8bit Bus Transceiver      | 208                 | -               | >163                      | <1.0E-07(d)             | -                | -                        | >163.8          | <1.0E-07(d)             | -55 ~ +125                         | -65 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 110          | 21402     | Digital-IC                | Line Driver/Receiver      | >247                | -               | 3.8                       | 1.0E-05(ch)             | -                | -                        | >73             | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/3                  | 0/3                 | 0/3               | 0/3               | -    |
| 111          | 21403     | Digital-IC                | Line Driver               | >225                | -               | >73                       | <1.0E-07(d)             | -                | -                        | >73             | <1.0E-07(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/3                  | 0/3                 | 0/3               | 0/3               | -    |
| 112          | 21404     | Digital-IC                | Line Receiver             | >225                | -               | 16                        | 5.5E-06(ch)             | -                | -                        | >73             | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/3                  | 0/3                 | 0/3               | 0/3               | -    |
| 113          | 21405     | Digital-IC                | EIA422 Line Receiver, 4ch | >242                | -               | 15                        | 3.0E-05(ch)             | -                | -                        | >78             | <1.0E-06(d)             | -55 ~ +125                         | -65 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 114          | 21406     | Digital-IC                | 16bit Bus Transceiver     | >247                | -               | >89                       | <1.0E-07(ch)            | -                | -                        | >89             | <1.0E-07(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/3                  | 0/3                 | 0/3               | 0/3               | -    |
| 115          | 41301     | DAC                       | 16bit                     | >300                | -               | 10                        | 2.0E-04(d)              | -                | -                        | >53             | <1.5E-05(d)             | -40 ~ +85                          | -60 ~ +100                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 116          | 41302     | ADC                       | 12bit                     | >300                | -               | 3                         | 2.0E-05(d)              | -                | -                        | >34             | <9.3E-07(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 117          | 41317     | IEEE1394 I/F              |                           | >300                | -               | 3                         | 1.0E-04(d)              | -                | -                        | 19.8            | 2.8E-06(d)              | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 118          | 41322     | PCI I/F                   |                           | >300                | -               | 3                         | 1.0E-07(d)              | -                | -                        | 14              | 5.1E-05(d)              | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 119          | 41323     | EDAC                      |                           | >300                | -               | 81.4                      | 5.0E-07(d)              | -                | -                        | >81.4           | <5.0E-07(d)             | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 120          | 41324     | Buffer                    |                           | >300                | -               | 81.4                      | 1.0E-06(d)              | -                | -                        | >81.4           | <6.0E-07(d)             | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 121          | 51310     | Digital-IC                | CAN Driver                | <50                 | -               | 34.7                      | 4.39E-12(b)             | -                | -                        | >61.8           | <6.99E-07(d)            | -40 ~ +110                         | -40 ~ +150                           | -                                | 0/15                 | -                   | 0/30              | 0/15              | 0/15 |
| 122          | 51313     | Timer                     |                           | 400                 | -               | 1.45                      | 2.1E-06(d)              | ~10              | 1.92E-14(d)              | >61.8           | <6.80E-07(d)            | -40 ~ +85                          | -55 ~ +125                           | 0/25                             | 0/15                 | 0/15                | 0/25              | 0/15              | 0/15 |
| 123          | 51315     | Latch                     |                           | <50                 | -               | >61.8                     | <4.59E-07(d)            | -                | -                        | >61.8           | <4.59E-07(d)            | -40 ~ +85                          | -65 ~ +150                           | 0/22                             | 0/22                 | 0/22                | 0/22              | 0/45              | 0/15 |
| 124          | 51317     | NAND Gate                 |                           | 100                 | -               | >61.8                     | <6.80E-07(d)            | -                | -                        | >61.8           | <6.80E-07(d)            | -40 ~ +85                          | -55 ~ +125                           | 0/30                             | 0/30                 | 0/30                | 0/22              | 0/22              | 0/15 |
| 125          | 51322     | Inverter                  |                           | 100                 | -               | >61.8                     | <4.59E-07(d)            | -                | -                        | >61.8           | <4.59E-07(d)            | -40 ~ +85                          | -65 ~ +150                           | 0/22                             | 0/15                 | 0/22                | 0/22              | 0/15              | 0/15 |
| 126          | 51323     | Buffer                    |                           | 50                  | -               | >61.8                     | <8.06E-07(d)            | -                | -                        | >61.8           | <8.06E-07(d)            | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/15                 | 0/15                | -                 | 0/15              | 0/15 |

COTS Database (4/6)

| No.                | ID number | Part's Type               | Function                    | Radiation Tolerance |                 |                           |                         |                  |                          |                 |                         | Temperature Range (Catalogue base) |                                      | Environment Test                 |                      |                     |                   |                   |      |
|--------------------|-----------|---------------------------|-----------------------------|---------------------|-----------------|---------------------------|-------------------------|------------------|--------------------------|-----------------|-------------------------|------------------------------------|--------------------------------------|----------------------------------|----------------------|---------------------|-------------------|-------------------|------|
|                    |           |                           |                             | TID Tolerance       |                 | SEU Tolerance             |                         |                  |                          | Operating Range | Storage Range           | Stabilization Bake                 | High temperature Operating Life Test | Temperature & Humidity Bias Test | Pressure Cooker Test | Temperature Cycling | Temperature shock |                   |      |
|                    |           |                           |                             | Gamma-ray TIO       | Proton TID      | Heavy-Ion SEU/SET         |                         | Proton SEU/SET   |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   | Heavy-Ion SEL/SEB |      |
|                    |           |                           |                             | Gy(Si)              |                 | Threshold LET             | Saturated Cross Section | Threshold Energy | Saturation Cross Section |                 | Saturated Cross Section | °C                                 | °C                                   | Rejected/Tested                  |                      |                     |                   |                   |      |
|                    |           | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>             | MeV                 | cm <sup>2</sup> | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| (Digital IC - SOI) |           |                           |                             |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 127                | 21110     | Digital-IC(SOI)           | Shift Register              | 500                 | -               | 3                         | 3.3E-08(b)              | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 128                | 21111     | Digital-IC(SOI)           | Half Bridge MOS Gate Driver | 83                  | -               | 14.5                      | 6.1E-05(d)              | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 129                | 21202     | Digital-IC(SOI)           | Shift Register              | >1000               | -               | 8.2                       | 3.0E-06(d)              | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 130                | 21208     | Digital-IC(SOI)           | Shift Register              | >1000               | -               | 8                         | 1.5E-06(d)              | -                | -                        | >119            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 131                | 21310     | Digital-IC(SOI)           | Shift Register              | 540                 | -               | 2                         | 1.0E-05(d)              | -                | -                        | >119.4          | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 132                | 21311     | Digital-IC(SOI)           | Shift Register              | 380                 | -               | 15                        | 1.2E-05(d)              | -                | -                        | >119.4          | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 133                | 21503     | Digital-IC(SOI)           | Shift Register              | >1000               | -               | 25                        | 2.0E-05(d)              | -                | -                        | >120            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| 134                | 21504     | Digital-IC(SOI)           | Shift Register              | >1000               | -               | 10                        | 2.0E-05(d)              | -                | -                        | >104            | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | -                   | -                 | 0/3               | 0/3  |
| (Analog IC)        |           |                           |                             |                     |                 |                           |                         |                  |                          |                 |                         |                                    |                                      |                                  |                      |                     |                   |                   |      |
| 135                | 11110     | Analog-IC                 | 3.3VRegulator               | >300                | -               | -                         | -                       | -                | -                        | 14.2            | >1.0E-06(d)             | -40 ~ +125                         | -65 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 136                | 11111     | Analog-IC                 | Driver                      | 50                  | -               | -                         | -                       | -                | -                        | >14.2           | <1.0E-06(d)             | -25 ~ +85                          | -40 ~ +125                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 137                | 11204     | Analog-IC                 | 8bit ADC                    | 130                 | -               | 5.5                       | >2.5E-06(d)             | -                | -                        | 14.2            | >1.0E-06(d)             | -40 ~ +85                          | -55 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 138                | 11205     | Analog-IC                 | 8bit ADC                    | 50                  | -               | 1.5                       | >2.8E-06(d)             | -                | -                        | 5.5             | >1.0E-06(d)             | -40 ~ +85                          | -55 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 139                | 11206     | Analog-IC                 | 8bit ADC                    | 50                  | -               | 5.5                       | >9.6E-07(d)             | -                | -                        | 14.2            | 8.2E-07(d)              | -40 ~ +85                          | -65 ~ +150                           | 0/11                             | 0/11                 | 0/11                | 0/11              | 0/11              | 0/11 |
| 140                | 11403     | Analog-IC                 | CAN Driver                  | 1000                | -               | -                         | -                       | -                | -                        | >98.3           | <1.0E-06(d)             | -40 ~ +125                         | -55 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 141                | 11404     | Analog-IC                 | CAN Driver                  | <190                | -               | -                         | -                       | -                | -                        | >98.3           | <1.0E-06(d)             | -40 ~ +125                         | -55 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 142                | 11405     | Analog-IC                 | Amplifier                   | <330                | -               | -                         | -                       | -                | -                        | >98.3           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 3/3  |
| 143                | 11406     | Analog-IC                 | Amplifier                   | <300                | -               | -                         | -                       | -                | -                        | >98.3           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | 0/3                              | 0/3                  | 0/3                 | -                 | 0/3               | 0/3  |
| 144                | 21303     | Analog-IC                 | Linear IC                   | 141                 | -               | 5.8                       | 8.5E-04(d)              | -                | -                        | >84.4           | <1.0E-06(d)             | -25 ~ +85                          | -65 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 145                | 21304     | Analog-IC                 | Linear IC                   | >267                | -               | 2.7                       | 2.0E-04(d)              | -                | -                        | >68.9           | <1.0E-06(d)             | -55 ~ +125                         | -65 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 146                | 21305     | Analog-IC                 | Regulator                   | >266                | -               | 2.7                       | 1.0E-03(d)              | -                | -                        | >84.4           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/3                  | -                   | -                 | 0/3               | -    |
| 147                | 41102     | MMIC                      | Low Noise Amplifier         | >300                | -               | -                         | -                       | -                | -                        | >63             | <7.5E-07(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 148                | 41103     | MMIC                      | Converter                   | >300                | -               | -                         | -                       | -                | -                        | >63             | <9.3E-07(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 149                | 41104     | MMIC                      | Synthesizer                 | >300                | -               | 34                        | 8.7E-05(d)              | -                | -                        | >63             | <7.3E-05(d)             | -40 ~ +85                          | -55 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 150                | 41201     | Analog-IC                 | Pos. Adjustable Regulator   | 200                 | -               | -                         | -                       | -                | -                        | -               | -                       | -55 ~ +150                         | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 151                | 41202     | Analog-IC                 | Neg. Adjustable Regulator   | 300                 | -               | -                         | -                       | -                | -                        | -               | -                       | -55 ~ +150                         | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 152                | 41203     | Analog-IC                 | 16bit ADC                   | 400                 | -               | 5.9                       | 1.3E-05(d)              | -                | -                        | >53             | <7.1E-07(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 153                | 41303     | MMIC                      | Receiver IF                 | >300                | -               | -                         | -                       | -                | -                        | >62.9           | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 154                | 41304     | MMIC                      | Low Noise Amplifier         | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <8.5E-07(d)             | -30 ~ +85                          | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 155                | 41305     | MMIC                      | Mixer                       | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <9.9E-07(d)             | -40 ~ +85                          | -40 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 156                | 41306     | MMIC                      | Switch                      | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <9.4E-07(d)             | -40 ~ +85                          | -40 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 157                | 41307     | MMIC                      | Up Converter                | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <9.0E-07(d)             | -30 ~ +80                          | -30 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 158                | 41308     | MMIC                      | Modulator                   | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <9.5E-07(d)             | -40 ~ +85                          | -40 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 159                | 41309     | MMIC                      | Transciever                 | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <9.6E-07(d)             | -40 ~ +85                          | -40 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 160                | 41310     | MMIC                      | Driver Amplifier            | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <9.1E-07(d)             | -40 ~ +85                          | -40 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 161                | 41311     | Analog-IC                 | Power Amplifier             | >700                | -               | -                         | -                       | -                | -                        | >62.9           | <9.7E-07(d)             | -40 ~ +85                          | -40 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 162                | 41318     | Analog-IC                 | LVDS Driver                 | >300                | -               | 59.7                      | 5.0E-08(d)              | -                | -                        | >81.4           | <1.0E-07(d)             | -55 ~ +125                         | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 163                | 41319     | Analog-IC                 | LVDS Receiver               | >300                | -               | 59.7                      | 2.3E-07(d)              | -                | -                        | >81.4           | <1.0E-07(d)             | -55 ~ +125                         | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 164                | 41321     | Analog-IC                 | PLL                         | >300                | -               | 1.45                      | 1.0E-04(d)              | -                | -                        | 34              | 4.1E-07(d)              | 0 ~ +70                            | -65 ~ +150                           | -                                | 0/5                  | -                   | -                 | 0/4               | -    |
| 165                | 41801     | GaN-FET                   | 10W                         | -                   | >1.5k           | >34                       | <1.0E-07(d)             | >70              | <2.0E-09                 | >34             | <1.0E-07(d)             | -                                  | -65 ~ +175                           | -                                | -                    | -                   | -                 | -                 | -    |
| 166                | 41802     | GaN-FET                   | 100W                        | >12.5k              | >1.5k           | >14                       | <1.8E-08(d)             | >70              | <2.0E-09                 | >14             | <1.8E-08(d)             | -                                  | -65 ~ +175                           | -                                | -                    | -                   | -                 | -                 | -    |
| 167                | 51202     | Analog-IC                 | Multiplexer                 | <100                | -               | >82.1                     | <1.0E-06(d)             | -                | -                        | 37.5            | 1.0E-06(d)              | -40 ~ +85                          | -65 ~ +150                           | 0/22                             | 0/22                 | 0/22                | 0/22              | 0/9               | 0/22 |
| 168                | 51203     | Analog-IC                 | Relay Driver                | 400                 | -               | >82.1                     | <1.0E-06(d)             | -                | -                        | >82.1           | <1.0E-06(d)             | -40 ~ +110                         | -55 ~ +150                           | 0/22                             | 0/22                 | 0/22                | 0/22              | 0/9               | 0/25 |
| 169                | 51206     | Analog-IC                 | Amplifier                   | 151                 | -               | -                         | -                       | -                | -                        | -               | -                       | -40 ~ +85                          | -55 ~ +125                           | 0/20                             | 0/20                 | 0/20                | -                 | 0/20              | 0/20 |
| 170                | 51302     | Analog-IC                 | Octal Line Driver           | <60                 | -               | >37.4                     | <8.77E-07(d)            | -                | -                        | >37.4           | <8.77E-07(d)            | -55 ~ +125                         | -55 ~ +125                           | -                                | 0/240                | -                   | 0/242             | 0/76              | -    |

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| No.             | ID number | Part's Type                | Function   | Radiation Tolerance |                 |                           |                         |                  |                          |                   |                         | Temperature Range (Catalogue base) |               | Environment Test   |                                      |                                  |                      |                     |                   |
|-----------------|-----------|----------------------------|--|---------------------|-----------------|---------------------------|-------------------------|------------------|--------------------------|-------------------|-------------------------|------------------------------------|---------------|--------------------|--------------------------------------|----------------------------------|----------------------|---------------------|-------------------|
|                 |           |                            |  | TID Tolerance       |                 |                           |                         | SEU Tolerance    |                          |                   |                         | Operating Range                    | Storage Range | Stabilization Bake | High temperature Operating Life Test | Temperature & Humidity Bias Test | Pressure Cooker Test | Temperature Cycling | Temperature shock |
|                 |           |                            |  | Gamma-ray TIO       | Proton TID      | Heavy-Ion SEU/SET         |                         | Proton SEU/SET   |                          | Heavy-Ion SEL/SEB |                         |                                    |               |                    |                                      |                                  |                      |                     |                   |
|                 |           |                            |  | Gy(Si)              |                 | Threshold LET             | Saturated Cross Section | Threshold Energy | Saturation Cross Section |                   | Saturated Cross Section | °C                                 | °C            | Rejected/Tested    |                                      |                                  |                      |                     |                   |
|                 |           | MeV/(mg/cm <sup>2</sup> )  | cm <sup>2</sup>  | MeV                 | cm <sup>2</sup> | MeV/(mg/cm <sup>2</sup> ) | cm <sup>2</sup>         |                  |                          |                   |                         |                                    |               |                    |                                      |                                  |                      |                     |                   |
| 171             | 51307     | Analog-IC                  | Regulator  | <100                | -               | -                         | -                       | -                | -                        | -                 | -                       | -40 ~ +150                         | -55 ~ +150    | 0/77               | 0/77                                 | 0/77                             | -                    | 0/40                | -                 |
| 172             | 51311     | Analog-IC                  | Current Limiter  | 50                  | -               | -                         | -                       | -                | -                        | -                 | -                       | -40 ~ +85                          | -65 ~ +150    | -                  | 0/15                                 | 0/15                             | -                    | 0/15                | 0/15              |
| 173             | 51312     | Analog-IC                  | 2.5V Regulator   | 100                 | -               | -                         | -                       | -                | -                        | -                 | -                       | -30 ~ +85                          | -55 ~ +150    | -                  | 0/15                                 | 0/15                             | -                    | 0/15                | 0/15              |
| 174             | 51316     | Analog-IC                  | Amplifier  | 100                 | -               | -                         | -                       | -                | -                        | -                 | -                       | -30 ~ +85                          | -55 ~ +125    | 0/20               | 0/20                                 | 0/20                             | -                    | 0/15                | 0/15              |
| 175             | 51318     | Analog-IC                  | Shunt Regulator  | 500                 | -               | -                         | -                       | -                | -                        | -                 | -                       | -40 ~ +85                          | -55 ~ +125    | -                  | 0/15                                 | 0/15                             | -                    | 0/15                | 0/15              |
| 176             | 51501     | Analog-IC                  | Differential Amplifier                                       | <100                | -               | -                         | -                       | -                | -                        | -                 | -                       | -55 ~ +125                         | -65 ~ +150    | -                  | 0/15                                 | 0/15                             | -                    | 0/15                | 0/15              |
| 177             | 61202     | Analog-IC                  | Converter  | 300                 | -               | -                         | -                       | -                | -                        | -                 | -                       | -40 ~ +85                          | -65 ~ +150    | 1/3                | 0/12                                 | 0/6                              | 0/5                  | 0/6                 | -                 |
| (Optical Parts) |           |                            |  |                     |                 |                           |                         |                  |                          |                   |                         |                                    |               |                    |                                      |                                  |                      |                     |                   |
| 178             | 11203     | CCD                        |  | -                   | <100            | -                         | -                       | -                | -                        | -                 | -                       | -10 ~ +60                          | -30 ~ +80     | 0/11               | 0/11                                 | 0/11                             | 0/11                 | 0/11                | 0/11              |
| 179             | 11308     | Photo Coupler              |  | >300                | 100             | -                         | -                       | -                | -                        | -                 | -                       | -55 ~ +100                         | -55 ~ +125    | 0/11               | 0/6                                  | 0/6                              | 0/11                 | 0/11                | 0/11              |
| 180             | 31102     | Diode                      | Super Luminescent Diode                                      | 2720                | 584             | -                         | -                       | >20              | <1.0E-11(d)              | >82.1             | <1.0E-06(d)             | -45 ~ +85                          | -54 ~ +85     | 0/8                | 0/24                                 | -                                | -                    | 0/8                 | -                 |
| 181             | 31103     | Diode                      | Avalanche Photo Diode  | 400                 | 64              | >62.9                     | <1.0E-06(d)             | >20              | <1.0E-11(d)              | >62.9             | <1.0E-06(d)             | -40 ~ +85                          | -55 ~ +125    | 0/100              | 0/10                                 | -                                | -                    | 0/100               | -                 |
| 182             | 51205     | Photo Coupler              |  | 100                 | >500            | -                         | -                       | -                | -                        | -                 | -                       | -55 ~ +100                         | -55 ~ +125    | -                  | 0/25                                 | 0/25                             | -                    | 0/25                | -                 |
| 183             | 61203     | CCD                        |  | 100                 | 300             | -                         | -                       | -                | -                        | -                 | -                       | -25 ~ +60                          | -40 ~ +100    | 2/3                | 0/12                                 | -                                | -                    | -                   | -                 |
| 184             | U1006     | CCD                        |  | >300                | -               | -                         | -                       | -                | -                        | -                 | -                       | -                                  | -             | -                  | -                                    | -                                | -                    | -                   | -                 |
| (Others - SOI)  |           |                            |  |                     |                 |                           |                         |                  |                          |                   |                         |                                    |               |                    |                                      |                                  |                      |                     |                   |
| 185             | 21203     | SOI (Others)               | 10bit A/D Converter  | >1000               | -               | 15                        | 1.3E-07(d)              | -                | -                        | >82.4             | <1.0E-06(d)             | -40 ~ +85                          | -65 ~ +150    | 0/3                | 0/3                                  | -                                | -                    | 0/3                 | 0/3               |
| (Others)        |           |                            |  |                     |                 |                           |                         |                  |                          |                   |                         |                                    |               |                    |                                      |                                  |                      |                     |                   |
| 186             | 11105     | Transistor Array           | 8ch  | 300                 | -               | -                         | -                       | -                | -                        | -                 | -                       | -20 ~ +75                          | -55 ~ +125    | -                  | 0/11                                 | 0/11                             | 0/11                 | -                   | 0/22              |
| 187             | 11106     | Crystal Oscillator         | 16MHz  | 400                 | -               | -                         | -                       | -                | -                        | -                 | -                       | -20 ~ +70                          | -55 ~ +125    | -                  | 0/11                                 | 0/11                             | 0/11                 | -                   | 0/22              |
| 188             | 11309     | Thermistor                 |  | >7800               | -               | -                         | -                       | -                | -                        | -                 | -                       | <+200                              | -             | 0/11               | 0/6                                  | 0/6                              | 0/11                 | 0/11                | 0/11              |
| 189             | 11310     | Thermistor                 |  | >7700               | -               | -                         | -                       | -                | -                        | -                 | -                       | -40 ~ +85                          | -40 ~ +85     | 0/11               | 0/6                                  | 0/6                              | 0/11                 | 0/11                | 0/11              |
| 190             | 11311     | Heater                     |  | >7800               | -               | -                         | -                       | -                | -                        | -                 | -                       | <+110                              | -             | 11/11              | 6/6                                  | 6/6                              | -                    | 11/11               | 7/11              |
| 191             | 11312     | Heater                     |  | >7800               | -               | -                         | -                       | -                | -                        | -                 | -                       | -                                  | -             | 11/11              | 6/6                                  | 6/6                              | -                    | 11/11               | 11/11             |
| 192             | 11313     | Heater                     |  | >7700               | -               | -                         | -                       | -                | -                        | -                 | -                       | -                                  | -             | 0/11               | 0/6                                  | 0/6                              | -                    | 0/11                | 0/11              |
| 193             | 11703     | RF-MEMS                    | Metal-type   | >1000               | >1000           | -                         | -                       | -                | -                        | -                 | -                       | -                                  | -             | -                  | -                                    | -                                | -                    | -                   | -                 |
| 194             | 11704     | RF-MEMS                    | Dielectric-type  | >1000               | >1000           | -                         | -                       | -                | -                        | -                 | -                       | -                                  | -             | -                  | -                                    | -                                | -                    | -                   | -                 |
| 195             | 21209     | Transistor                 | NPN  | >250                | -               | -                         | -                       | -                | -                        | -                 | -                       | -65 ~ +200                         | -65 ~ +200    | -                  | 0/3                                  | -                                | -                    | 0/3                 | -                 |
| 196             | 21210     | Transistor                 | PNP  | >250                | -               | -                         | -                       | -                | -                        | -                 | -                       | -65 ~ +200                         | -65 ~ +200    | -                  | 0/3                                  | -                                | -                    | 0/3                 | -                 |
| 197             | 21211     | Diode                      | Zener Diode  | >250                | -               | -                         | -                       | -                | -                        | -                 | -                       | -65 ~ +200                         | -65 ~ +200    | -                  | 0/3                                  | -                                | -                    | 0/3                 | -                 |
| 198             | 21302     | FET                        |  | 114                 | -               | -                         | -                       | -                | -                        | 26.6              | Function error          | -55 ~ +150                         | -55 ~ +150    | -                  | 0/3                                  | -                                | -                    | 0/3                 | -                 |
| 199             | 31101     | Integrated Optic Modulator |  | 2800                | 579             | >62.9                     | <1.0E-06(d)             | -                | -                        | -                 | -                       | -45 ~ +95                          | -55 ~ +95     | 0/100              | 0/7                                  | -                                | -                    | 0/100               | -                 |
| 200             | 31104     | Fiber                      |  | 27                  | 48              | -                         | -                       | -                | -                        | -                 | -                       | -55 ~ +105                         | -55 ~ +105    | -                  | -                                    | -                                | -                    | -                   | -                 |
| 201             | 31105     | FOG                        |  | 35                  | -               | -                         | -                       | -                | -                        | -                 | -                       | -35 ~ +85                          | -40 ~ +85     | -                  | -                                    | -                                | -                    | -                   | -                 |
| 202             | 31401     | FET                        |  | 30                  | -               | -                         | -                       | -                | -                        | >34               | <1.0E-06(d)             | -55 ~ +150                         | -55 ~ +150    | 0/50               | 0/5                                  | -                                | -                    | 0/5                 | -                 |
| 203             | 51204     | FET                        | Power FET  | >500                | -               | -                         | -                       | -                | -                        | 37                | 1.0E-06(d)              | 150MAX                             | -55 ~ +150    | 0/22               | 0/22                                 | 0/22                             | -                    | 0/22                | 0/22              |
| 204             | 51207     | Diode                      | Zener Diode  | >94                 | -               | -                         | -                       | -                | -                        | -                 | -                       | 150MAX                             | -55 ~ +150    | 0/22               | 0/22                                 | 0/22                             | 0/20                 | 0/22                | 0/22              |
| 205             | 51303     | IGBT                       | Power IGBT   | 1157                | -               | -                         | -                       | -                | -                        | 37.6              | Break(> 380V)           | 150MAX                             | -40 ~ +125    | -                  | 0/15                                 | 0/15                             | -                    | 0/15                | 0/15              |
| 206             | 51304     | FET                        | Power FET  | 324                 | -               | -                         | -                       | -                | -                        | 37                | 2.0E-05(d)              | 150MAX                             | -55 ~ +150    | 0/22               | 0/22                                 | 0/22                             | 0/22                 | 0/22                | 0/22              |
| 207             | 51314     | FET                        | Power FET  | 500                 | -               | -                         | -                       | -                | -                        | >61.8             | <8.85E-07(d)            | 150MAX                             | -55 ~ +150    | -                  | 0/15                                 | 0/15                             | -                    | 0/15                | 0/15              |
| 208             | 51320     | Transistor                 |  | 1000                | -               | -                         | -                       | -                | -                        | >61.8             | <6.58E-07(d)            | 150MAX                             | -55 ~ +150    | 0/30               | 0/22                                 | 0/20                             | 0/22                 | 0/50                | 0/15              |
| 209             | 51321     | Transistor                 |  | 1000                | -               | -                         | -                       | -                | -                        | >61.8             | <9.26E-07(d)            | 150MAX                             | -55 ~ +150    | 0/30               | 0/22                                 | 0/20                             | 0/22                 | 0/50                | 0/15              |
| 210             | 51502     | Hall Sensor                |  | <100                | -               | -                         | -                       | -                | -                        | -                 | -                       | -55 ~ +125                         | -55 ~ +150    | -                  | 0/15                                 | 0/15                             | -                    | 0/15                | 0/15              |
| (Technology)    |           |                            |  |                     |                 |                           |                         |                  |                          |                   |                         |                                    |               |                    |                                      |                                  |                      |                     |                   |
| 211             | T1301     | Grease Lubricant           | Lubrication technology with vacuum grease for semiconductors | >10,000             | -               | -                         | -                       | -                | -                        | -                 | -                       | -                                  | -             | -                  | -                                    | -                                | -                    | -                   | -                 |

COTS Database (6/6)

| No.                       | ID number | Part's Type                                       | Function | Radiation Tolerance       |  |                                       |                         |                  |                          | Temperature Range<br>(Catalogue base) |                         | Environment Test   |                                      |                                  |                      |                     |                   |
|---------------------------|-----------|---|----------|---------------------------|--|---------------------------------------|-------------------------|------------------|--------------------------|---------------------------------------|-------------------------|--------------------|--------------------------------------|----------------------------------|----------------------|---------------------|-------------------|
|                           |           |   |          | TID Tolerance             |  | SEU Tolerance                         |                         |                  |                          | Operating Range                       | Storage Range           | Stabilization Bake | High temperature Operating Life Test | Temperature & Humidity Bias Test | Pressure Cooker Test | Temperature Cycling | Temperature shock |
|                           |           |   |          | Gamma-ray TIO             | Proton TID                             | Heavy-Ion SEU/SET                     |                         | Proton SEU/SET   |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
|                           |           |   |          | Gy(Si)                    |  | Threshold LET                         | Saturated Cross Section | Threshold Energy | Saturation Cross Section |                                       | Saturated Cross Section | °C                 | °C                                   | Rejected/ Tested                 |                      |                     |                   |
| MeV/(mg/cm <sup>2</sup> ) |           | cm <sup>2</sup>                                   | MeV      | cm <sup>2</sup>           | MeV/(mg/cm <sup>2</sup> )              | cm <sup>2</sup>                       |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
|                           |           |   |          | Thermal & Mechanical Test |  |                                       |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
|                           |           |   |          | Performance Test          | Sine Wave Vibration Test<br>( 15Gp-0 ) | Random Vibration Test<br>( 19.7Grms ) | Thermal Vacuum Test     |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
| 212                       | T1302     | Vane-type Propellant Tank – Super Plastic Forming | Pass     | Pass                      | Pass                                   | Pass                                  |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
| 213                       | T1303     | Surface Mount Technology                          | Pass     | Pass                      | Pass                                   | Pass                                  |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
| 214                       | T1304     | Multi-chip Module                                 | Pass     | Pass                      | Pass                                   | Pass                                  |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
| 215                       | T1305     | High-density Mount Technology                     | Pass     | Pass                      | Pass                                   | Pass                                  |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
| 216                       | T1306     | Lithium Ion (Co type) Battery Cell                | Pass     | Pass                      | Pass                                   | Pass                                  |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |
| 217                       | T1307     | Power Hybrid-IC Technology                        | Pass     | Pass                      | Pass                                   | Pass                                  |                         |                  |                          |                                       |                         |                    |                                      |                                  |                      |                     |                   |

Note ) (b) : Cross section per bit, (d) : CrossSection per device, (ch) : Cross section per channel