CATEGORY 4 - COMPUTERS

Note 1: Computers, related equipment and "software" performing telecommunications or "local area network" functions must also be evaluated against the performance characteristics of Category 5, Part 1 (Telecommunications).

Note 2: Control units that directly interconnect the buses or channels of central processing units, "main storage" or disk controllers are not regarded as telecommunications equipment described in Category 5, Part 1 (Telecommunications).

N.B: For the control status of "software" specially designed for packet switching, see ECCN 5D001. (Telecommunications).

Note 3: Computers, related equipment and "software" performing cryptographic, cryptanalytic, certifiable multi-level security or certifiable user isolation functions, or that limit electromagnetic compatibility (EMC), must also be evaluated against the performance characteristics in Category 5, Part 2 ("Information Security").

A. SYSTEMS, EQUIPMENT AND COMPONENTS

4A001 Electronic computers and related equipment, and "electronic assemblies" and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT, NP

Control(s)	Country Chart
NS applies to entire entry	NS Column 2
MT applies to items in	MT Column 1
4A001.a when the parameters in 4A101 are met or exceeded	
AT applies to entire entry	AT Column 1

NP applies, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions for 4A001.a.2.

License Exceptions

LVS: $5000 for 4A001.a; N/A for MT and 4A001.b
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Computers and related equipment in number; "electronic assemblies" and components in $ value
Related Controls: See also 4A101 and 4A994. Equipment designed or rated for transient ionizing radiation is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: For the purposes of integrated circuits in 4A001.a.2, 5×10^3 Gy(Si) = 5×10^5 Rads (Si); 5×10^6 Gy (Si)/s = 5×10^8 Rads (Si)/s.
Items:

a. Specially designed to have either of the following characteristics:

a.1. Rated for operation at an ambient temperature below 228 K (-45°C) or above 358 K (85°C);

Note: 4A001.a.1. does not apply to computers specially designed for civil automobile or railway train applications.

a.2. Radiation hardened to exceed any of the following specifications:

a.2.a. A total dose of 5×10^3 Gy (Si);

a.2.b. A dose rate upset of 5×10^6 Gy (Si)/s; *or*

a.2.c. Single Event Upset of 1×10^{-7} Error/bit/day;

b. Having characteristics or performing functions exceeding the limits in Category 5, Part 2 ("Information Security").

4A003 "Digital computers", "electronic assemblies", and related equipment therefor, as follows, and specially designed components therefor.

License Requirements

Reason for Control: NS, CC, AT, NP

Control(s)	Country Chart
NS applies to 4A003.b and .c	NS Column 1
NS applies to 4A003.a, .e, and .g	NS Column 2
CC applies to "digital computers" for computerized finger-print equipment	CC Column 1
AT applies to entire entry (refer to 4A994 for controls on "digital computers" with a APP $\geq$ 0.00001 but $\leq$ to 0.75 WT)	AT Column 1

NP applies, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

Note 1: For all destinations, except those countries in Country Group E:1 of Supplement No. 1 to part 740 of the EAR, no license is required (NLR) for computers with an "Adjusted Peak Performance" ("APP") not exceeding 0.75 Weighted TeraFLOPS (WT) and for "electronic assemblies" described in 4A003.c that are not capable of exceeding an "Adjusted Peak Performance" ("APP") exceeding 0.75 Weighted TeraFLOPS (WT) in aggregation, except certain transfers as set forth in §746.3 (Iraq).

Note 2: Special Post Shipment Verification reporting and recordkeeping requirements for exports of computers to destinations in Computer Tier 3 may be found in §743.2 of the EAR.

License Exceptions

LVS: $5000; N/A for 4A003.b and .c.
GBS: Yes, for 4A003.e, and .g and specially designed components therefor, exported separately or as part of a system.
APP: Yes, for computers controlled by 4A003.a or .b, and "electronic assemblies" controlled by 4A003.c, to the exclusion of other technical parameters, with the exception of 4A003.e (equipment performing analog-to-digital conversions exceeding the limits of 3A001.a.5.a). See §740.7 of the EAR.
CIV: Yes, for 4A003.e, and .g.

List of Items Controlled

Unit: Computers and related equipment in number; "electronic assemblies" and components in $ value
Related Controls: See also 4A994 and 4A980
Related Definitions: N/A

Items:

Note 1: *4A003 includes the following:*

a. Vector processors;

b. Array processors;

c. Digital signal processors;

d. Logic processors;

e. Equipment designed for "image enhancement";

f. Equipment designed for "signal processing".

Note 2: *The control status of the "digital computers" and related equipment described in 4A003 is determined by the control status of other equipment or systems provided:*

a. The "digital computers" or related equipment are essential for the operation of the other equipment or systems;

b. The "digital computers" or related equipment are not a "principal element" of the other equipment or systems; and

N.B. 1: *The control status of "signal processing" or "image enhancement" equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the "principal element" criterion.*

N.B. 2: For the control status of "digital computers" or related equipment for telecommunications equipment, see Category 5, Part 1 (Telecommunications).

c. *The "technology" for the "digital computers" and related equipment is determined by 4E.*

a. Designed or modified for "fault tolerance";

Note: *For the purposes of 4A003.a., "digital computers" and related equipment are not considered to be designed or modified for "fault tolerance" if they utilize any of the following:*

1. Error detection or correction algorithms in "main storage";

2. *The interconnection of two "digital computers" so that, if the active central processing unit fails, an idling but mirroring central processing unit can continue the system's functioning;*

3. *The interconnection of two central processing units by data channels or by use of shared storage to permit one central processing unit to perform other work until the second central processing unit fails, at which time the first central processing unit takes over in order to continue the system's functioning; or*

4. *The synchronization of two central processing units by "software" so that one central processing unit recognizes when the other central processing unit fails and recovers tasks from the failing unit.*

b. "Digital computers" having an "Adjusted Peak Performance" ("APP") exceeding 0.75 weighted TeraFLOPS (WT);

c. "Electronic assemblies" specially designed or modified to be capable of enhancing performance by aggregation of processors so that the "APP" of the aggregation exceeds the limit in 4A003.b.;

Note 1: *4A003.c applies only to "electronic assemblies" and programmable interconnections not exceeding the limit in 4A003.b. when shipped as unintegrated "electronic assemblies". It does not apply to "electronic assemblies" inherently*

limited by nature of their design for use as related equipment controlled by 4A003.e.

    Note 2: *4A003.c does not control "electronic assemblies" specially designed for a product or family of products whose maximum configuration does not exceed the limit of 4A003.b.*

d. [RESERVED]

e. Equipment performing analog-to-digital conversions exceeding the limits in 3A001.a.5;

f. [RESERVED]

g. Equipment specially designed to provide external interconnection of "digital computers" or associated equipment that allows communications at data rates exceeding 1.25 Gbyte/s.

    Note: *4A003.g does not control internal interconnection equipment (e.g., backplanes, buses) passive interconnection equipment, "network access controllers" or "communication channel controllers".*

4A004 Computers, as follows (see List of Items Controlled) and specially designed related equipment, "electronic assemblies" and components therefor.

License Requirements

    Reason for Control: NS, AT

Control(s)	Country Chart
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

License Exceptions

    LVS: $5000

GBS: N/A
CIV: N/A

List of Items Controlled

    Unit: Computers and related equipment in number; "electronic assemblies" and components in $ value
    Related Controls: N/A
    Related Definitions: N/A
    Items:

a. "Systolic array computers";

b. "Neural computers";

c. "Optical computers".

4A101 Analog computers, "digital computers" or digital differential analyzers, other than those controlled by 4A001 designed or modified for use in "missiles", having any of the following (see List of Items Controlled).

License Requirements

    Reason for Control: MT, AT

Control(s)	Country Chart
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

    LVS: N/A
    GBS: N/A
    CIV: N/A

List of Items Controlled

    Unit: Equipment in number
    Related Controls: N/A
    Related Definitions: N/A

Items:

a. Rated for continuous operation at temperatures from below 228 K (-45° C) to above 328 K (+55°C); *or*

b. Designed as ruggedized or 'radiation hardened'.

●**Note:** 'Radiation hardened' means that the component or equipment is designed or rated to withstand radiation levels which meet or exceed a total irradiation dose of 5×10^5 rads (Si).

4A102 "Hybrid computers" specially designed for modelling, simulation or design integration of "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

4A980 Computers for fingerprint equipment, n.e.s.

License Requirements

Reason for Control: CC, AT

Control(s)	Country Chart
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

License Exceptions

    LVS: N/A
    GBS: N/A
    CIV: N/A

List of Items Controlled

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

●*Note*: 4A980 does not control equipment limited to one finger and designed for user authentication or access control.

4A994 Computers, "electronic assemblies", and related equipment not controlled by 4A001 or 4A003, and specially designed components therefor.

License Requirements

Reason for Control: AT

Control(s)	Country Chart
AT applies to entire entry	AT Column 1

License Exceptions

    LVS: N/A
    GBS: N/A
    CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: *"Two dimensional vector rate"* is the number vectors generated per second that have 10 pixel poly line vectors, clip tested, randomly oriented, with either integer or floating point X-Y coordinate values (whichever produces the maximum rate) (see paragraph (g) of this ECCN).
●*Items*:

Note 1: *The control status of the "digital computers" and related equipment described in 4A994 is determined by the control status of other*

equipment or systems provided:

a. The "digital computers" or related equipment are essential for the operation of the other equipment or systems;

b. The "digital computers" or related equipment are not a "principal element" of the other equipment or systems; and

N.B. 1: The control status of "signal processing" or "image enhancement" equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the "principal element" criterion.

N.B. 2: For the control status of "digital computers" or related equipment for telecommunications equipment, see Category 5, Part 1 (Telecommunications).

c. The "technology" for the "digital computers" and related equipment is determined by 4E.

a. Electronic computers and related equipment, and "electronic assemblies" and specially designed components therefor, rated for operation at an ambient temperature above 343 K (70˚C);

b. "Digital computers", including equipment of "signal processing" or image enhancement", having an "Adjusted Peak Performance" ("APP") equal to or greater than 0.0128 Weighted TeraFLOPS (WT);

c. "Electronic assemblies" that are specially designed or modified to enhance performance by aggregation of processors, as follows:

c.1. Designed to be capable of aggregation in configurations of 16 or more processors;

c.2. [RESERVED];

Note 1: 4A994.c applies only to "electronic assemblies" and programmable interconnections with a "APP" not exceeding the limits in 4A994.b, when shipped as unintegrated "electronic assemblies". It does not apply to "electronic assemblies" inherently limited by nature of their design for use as related equipment controlled by 4A994.k.

Note 2: 4A994.c does not control any "electronic assembly" specially designed for a product or family of products whose maximum configuration does not exceed the limits of 4A994.b.

d. [RESERVED];

e. [RESERVED];

f. Equipment for "signal processing" or "image enhancement" having an "Adjusted Peak Performance" ("APP") equal to or greater than [0.0128] Weighted TeraFLOPS WT];

g. [RESERVED];

h. [RESERVED];

i. Equipment containing "terminal interface equipment" exceeding the limits in 5A991;

j. Equipment specially designed to provide external interconnection of "digital computers" or associated equipment that allows communications at data rates exceeding 80 Mbyte/s.

Note: 4A994.j does not control internal interconnection equipment (e.g., backplanes, buses) passive interconnection equipment, "network access controllers" or "communication channel controllers".

k. "Hybrid computers" and "electronic assemblies" and specially designed components therefor containing analog-to-digital converters having all of the following characteristics:

k.1.   32 channels or more; and

k.2.   A resolution of 14 bit (plus sign bit) or more with a conversion rate of 200,000 conversions/s or more.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

4B994 Equipment for the "development" and "production" of magnetic and optical storage equipment.

License Requirements

Reason for Control: AT

Control(s)   *Country Chart*

AT applies to entire entry   AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: This entry does not control general-purpose sputtering equipment.
Related Definition: N/A
Items:

a.   Equipment specially designed for the application of magnetic coating to controlled non-flexible (rigid) magnetic or magneto-optical media;

b.   "Stored program controlled" equipment specially designed for monitoring, grading, exercising or testing controlled rigid magnetic media;

c.   Equipment specially designed for the "production" or alignment of heads or head/disk assemblies for controlled rigid magnetic and magneto-optical storage, and electro-mechanical or optical components therefor.

C. MATERIALS

4C994 Materials specially formulated for and required for the fabrication of head/disk assemblies for controlled magnetic and magneto-optical hard disk drives.

License Requirements

Reason for Control: AT

Control(s)   *Country Chart*

AT applies to entire entry   AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

Note: The control status of "software" for the "development", "production", or "use" of equipment described in other Categories is dealt

with in the appropriate Category. The control status of "software" for equipment described in this Category is dealt with herein.

4D001 Specified "software", see List of Items Controlled.

License Requirements

Reason for Control: NS, CC, AT, NP

Control(s)   *Country Chart*

NS applies to   NS Column 1
entire entry

CC applies to "software"   CC Column 1
for computerized
finger-print equipment
controlled by 4A003 for
CC reasons

AT applies to entire entry   AT Column 1

NP applies, unless a License Exception is available.   See §742.3(b) of the EAR for information on applicable licensing review policies.

License Exceptions

   CIV: N/A
   TSR: Yes, except for "software" for the "development" or "production" of commodities with an "Adjusted Peak Performance" ("APP") exceeding 0.1 WT.
   APP: Yes to specific countries (see §740.7 of the EAR for eligibility criteria)

List of Items Controlled

   Unit: $ value
   Related Controls: N/A

Related Definitions: N/A
Items:

a. "Software" specially designed or modified for the "development", "production" or "use" of equipment or "software" controlled by 4A001 to 4A004, or 4D (except 4D980, 4D993 or 4D994).

b. "Software", other than that controlled by 4D001.a, specially designed or modified for the "development" or "production" of:

   b.1. "Digital computers" having an "Adjusted Peak Performance" ("APP") exceeding 0.04 Weighted TeraFLOPS (WT); or

   b.2. "Electronic assemblies" specially designed or modified for enhancing performance by aggregation of processors so that the "APP" of the aggregation exceeds the limit in 4D001.b.1.

4D002   "Software" specially designed or modified to support "technology" controlled by 4E (except 4E980, 4E992, and 4E993).

License Requirements

   Reason for Control: NS, AT, NP

Control(s)   *Country Chart*

NS applies to entire entry   NS Column 1

AT applies to entire entry   AT Column 1

NP applies, unless a License Exception is available.   See §742.3(b) of the EAR for information on applicable licensing review policies.

License Exceptions

   CIV: N/A
   TSR: Yes, except N/A for "software"

specifically designed or modified to support "technology" for computers requiring a license.

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

4D003 Specific "software", as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: Yes, except 4D003.c

List of Items Controlled

Unit: $ value
Related Controls: See also 4D993.
Related Definitions: N/A
Items:

a.   Operating system "software", "software" development tools and compilers specially designed for "multi-data-stream processing" equipment, in "source code";

b. [RESERVED]

c. "Software" having characteristics or performing functions exceeding the limits in Category 5, Part 2 ("Information Security");

4D980 "Software" specially designed for the "development", "production", or "use" of items controlled by 4A980.

License Requirements

Reason for Control: CC, AT

Control(s)	Country Chart
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

●**4D993 "Program" proof and validation "software", "software" allowing the automatic generation of "source codes", and operating system "software" not controlled by 4D003 that are specially designed for real time processing equipment (see List of Items Controlled).**

License Requirements

Reason for Control: AT		*Reason for Control*: AT	
Control(s)	*Country Chart*	*Control(s)*	*Country Chart*
AT applies to entire entry	AT Column 1	AT applies to entire entry	AT Column 1

License Exceptions

    CIV: N/A
    TSR: N/A

List of Items Controlled

    Unit: $ value
    Related Controls: N/A
    Related Definitions: "Global interrupt latency time" is the time taken by the computer system to recognize an interrupt due to the event, service the interrupt and perform a context switch to an alternate memory-resident task waiting on the interrupt.
    Items:

a. "Program" proof and validation "software" using mathematical and analytical techniques and designed or modified for "programs" having more than 500,000 "source code" instructions;

●b. "Software" allowing the automatic generation of "source codes" from data acquired on line from external sensors described in the Commerce Control List; *or*

●c. Operating system "software" specially designed for "real time processing" equipment that guarantees a "global interrupt latency time" of less than 20 microseconds.

4D994 "Software" other than that controlled in 4D001 specially designed or modified for the "development", "production", or "use" of equipment controlled by 4A101, 4A994, 4B994, and materials controlled by 4C994.

License Requirements

License Exceptions

    CIV: N/A
    TSR: N/A

List of Items Controlled

    Unit: $ value
    Related Controls: N/A
    Related Definitions: N/A
    Items:

The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

4E001 Specified "technology", see List of Items Controlled.

License Requirements

Reason for Control: NS, MT, CC, AT, NP

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to "technology" for items controlled by 4A001.a and 4A101 for MT reasons	MT Column 1
CC applies to "technology" for computerized fingerprint equipment controlled by 4A003 for CC reasons	CC Column 1

AT applies to entire entry   AT Column 1

NP applies, unless a License Exception is available.   See §742.3(b) of the EAR for information on applicable licensing review policies.

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: N/A
TSR: Yes, except for "technology" for the "development" or "production" of commodities with an "Adjusted Peak Performance" ("APP") exceeding 0.1 WT.
APP: Yes to specific countries (see §740.7 of the EAR for eligibility criteria).

List of Items Controlled

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items:

a.   "Technology" according to the General Technology Note, for the "development", "production", or "use" of equipment or "software" controlled by 4A (except 4A980 or 4A994) or 4D (except 4D980, 4D993, 4D994).

b.   "Technology", other than that controlled by 4E001.a, specially designed or modified for the "development" or "production" of:

b.1. "Digital computers" having an "Adjusted Peak Performance" ("APP") exceeding 0.04 Weighted TeraFLOPS (WT); or

b.2.   "Electronic assemblies" specially designed or modified for enhancing performance by aggregation of processors so that the "APP" of

the aggregation exceeds the limit in 4E001.b.1.

4E980 "Technology" for the "development", "production", or "use" of items controlled by 4A980.

License Requirements

Reason for Control: CC, AT

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

4E992 "Technology" other than that controlled in 4E001 for the "development", "production", or "use" of equipment controlled by 4A994 and 4B994, materials controlled by 4C994, or "software" controlled by 4D993 or 4D994.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*

AT applies to entire entry   AT Column 1

License Exceptions

    CIV: N/A
    TSR: N/A

List of Items Controlled

    Unit: N/A
    ●*Related Controls*: N/A
    Related Definitions: N/A
    Items:

The list of items controlled is contained in the ECCN heading.

4E993   **Other "Technology" for the "development" or "production" of graphics accelerators or equipment designed for "multi-data-stream processing" and "technology" "required" for the "development" or "production" of magnetic hard disk drives.**

License Requirements

    Reason for Control: AT

Control(s)   *Country Chart*

AT applies to entire entry   AT Column 1

License Exceptions

    CIV: N/A
    TSR: N/A

List of Items Controlled

    Unit: N/A
    Related Controls: N/A
    Related Definitions: N/A
    Items:

a.   "Technology" for the "development" or "production" of graphics accelerators;

b.   "Technology", for the "development" or "production" of equipment designed for "multi-data-stream processing";

c.   "Technology", "required" for the "development" or "production" of magnetic hard disk drives with a "maximum bit transfer rate" ("MBTR") exceeding 11 Mbit/s.

EAR99 **Items subject to the EAR that are *not* elsewhere specified in this CCL Category *or* in any other category in the CCL are designated by the number *EAR99*.**

TECHNICAL NOTE ON "ADJUSTED PEAK PERFORMANCE" ("APP")

APP is an adjusted peak rate at which "digital computers" perform 64-bit or larger floating point additions and multiplications.

Abbreviations used in this Technical Note

n   number of processors in the "digital computer"
i   processor number (i,....n)
t_i processor cycle time ($t_i = 1/F_i$)
F_i processor frequency
R_i peak floating point calculating rate
W_i architecture adjustment factor

    APP is expressed in Weighted TeraFLOPS (WT), in units of 1012 adjusted floating point operations per second,

Outline of "APP" calculation method

    1. For each processor i, determine the peak number of 64-bit or larger floating-point operations, FPOi, performed per cycle for each

processor in the "digital computer".

Note: In determining FPO, include only 64-bit or larger floating point additions and/or multiplications. All floating point operations must be expressed in operations per processor cycle; operations requiring multiple cycles may be expressed in fractional results per cycle. For processors not capable of performing calculations on floating-point operands of 64-bits or more the effective calculating rate R is zero.

2. Calculate the floating point rate R for each processor

$R_i = FPO_i/t_i$.

3. Calculate APP as

$APP = W_1 \times R_1 + W_2 \times R_2 + \ldots + W_n \times R_n$.

4. For "vector processors", $W_i = 0.9$. For non-"vector processors", $W_i = 0.3$.

Note 1: For processors that perform compound operations in a cycle, such as an addition and multiplication, each operation is counted.

Note 2: For a pipelined processor the effective calculating rate R is the faster of the pipelined rate, once the pipeline is full, or the non-pipelined rate.

Note 3: The calculating rate R of each contributing processor is to be calculated at its maximum value theoretically possible before the "APP" of the combination is derived. Simultaneous operations are assumed to exist when the computer manufacturer claims concurrent, parallel, or simultaneous operation or execution in a manual or brochure for the computer.

Note 4: Do not include processors that are limited to input/output and peripheral functions (e.g., disk drive, communication and video display) when calculating APP.

Note 5: APP values are not to be calculated for processor combinations (inter)connected by "Local Area Networks", Wide Area Networks, I/O shared connections/devices, I/O controllers and any communication interconnection implemented by "software".

Note 6: APP values must be calculated for (1) processor combinations containing processors specially designed to enhance performance by aggregation, operating simultaneously and sharing memory; or (2) multiple memory/processor combinations operating simultaneously utilizing specially designed hardware.

Note 7: A "vector processor" is defined as a processor with built-in instructions that perform multiple calculations on floating-point vectors (one-dimensional arrays of 64-bit or larger numbers) simultaneously, having at least 2 vector functional units and at least 8 vector registers of at least 64 elements each.