

## 1040. Computers

### Note 1:

Computers, related equipment or "software" performing telecommunications or "local area network" functions must also be evaluated against the performance characteristics of Category 1050 (Telecommunications).

### N.B.:

- Control units which directly interconnect the buses or channels of central processing units, "main storage" or disk controllers are not regarded as telecommunications equipment described in Category 1050 (Telecommunications).
- For the embargo status of "software" which provides routing or switching of "datagram" or "fast select" packets (i.e. packet by packet route selection) or of "software" specially designed for packet switching, see Category 1054 (Telecommunications).

### Note 2:

Computers, related equipment or "software" performing cryptographic, cryptanalytic, certifiable multi-level security or certifiable user isolation functions, or which limit electromagnetic compatibility (EMC), must also be evaluated against the performance characteristics in Category 1151 ("Information Security").

## 1041. Equipment, Assemblies and Components

- Electronic computers and related equipment, as follows, and "assemblies" and specially designed components therefor:
  - Specially designed to have either of the following characteristics:
    - Rated for operation at an ambient temperature below 228 K (-45°C) or above 358 K (85°C);  
**Note:**  
1041.1.a.1. does not apply to computers specially designed for civil automobile or railway train applications.
    - Radiation hardened to exceed any of the following specifications:
      - Total Dose  $5 \times 10^5$  Rads (Si)
      - Dose Rate Upset  $5 \times 10^8$  Rads (Si)/sec; **or**
      - Single Event Upset  $1 \times 10^{-7}$  Error/bit/day;  
(For equipment designed or rated for transient ionising radiation, see the Munitions List.)
  - Having characteristics or performing functions exceeding the limits in Category 1150 ("Information Security");
- "Hybrid computers", as follows, and "assemblies" and specially designed components therefor:
  - Containing "digital computers" embargoed by 1041.3.;
  - Containing analogue-to-digital converters having both of the following characteristics:
    - 32 channels or more; **and**
    - A resolution of 14 bits (plus sign bit) or more with a conversion rate of 200,000 conversions/s or more;
- "Digital computers", "assemblies", and related equipment therefor, as follows, and specially designed components therefor:

### Notes:

- 1041.3. includes vector processors, array processors, digital signal processors, logic processors, and equipment for "image enhancement" or "signal processing".
- The embargo status of the "digital computers" or related equipment described in 1041.3 is governed by the embargo status of other equipment or systems provided:
  - The "digital computers" or related equipment are essential for the operation of the other equipment or systems;
  - The "digital computers" or related equipment are not a "principal element" of the other equipment or systems; **and**

### N.B.:

- The embargo 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 embargo status of the other equipment even if it exceeds the "principal element" criterion.
- For the embargo status of "digital computers" or related equipment for telecommunications equipment, see Category 5 (Telecommunications).

- The technology for the "digital computers" and related equipment is governed by 1045.

- Designed or modified for "fault tolerance";

### Note:

For the purposes of 1041.3.a., "digital computers" and related equipment are not considered to be designed or modified for "fault tolerance" if they use:

- Error detection or correction algorithms in "main storage";
  - 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;
  - 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**
  - The synchronisation of two central processing units by "software" so that one central processing unit recognises when the other central processing unit fails and recovers tasks from the failing unit.
- "Digital computers" having a "CTP" exceeding 260 Mtops;
  - "Assemblies" specially designed or modified to be capable of enhancing performance by aggregation of "computing elements" ("CEs") so that the "CTP" of the aggregation exceeds the limit in 1041.3.b.

### Notes:

- 1041.3.c. applies only to "assemblies" and programmable interconnections not exceeding the limit in 1041.3.b. when shipped as unintegrated "assemblies". It does not apply to "assemblies" inherently limited by nature of their design for use as related equipment embargoed by 1041.3.d., e. or f.
  - 1041.3.c. does not embargo "assemblies" specially designed for a product or family of products whose maximum configuration does not exceed the limit of 1041.3.b.
- Graphics accelerators or graphics coprocessors exceeding a "three dimensional (3 -D) vector rate" of 1,600,000;
  - Equipment performing analogue-to-digital conversions exceeding the limits in 1031.1.a.5.;
  - Equipment containing "terminal interface equipment" exceeding the limits in 1051.b.3.;
- Note:**  
For the purposes of 1041.3.f. "terminal interface equipment" includes "local area network" interfaces, modems and other communications interfaces. "Local area network" interfaces are evaluated as "network access controllers".
- Equipment specially designed to provide for the external interconnection of "digital computers" or associated equipment which allows communications at data rates exceeding 80 Mbyte/s.

### Notes:

- 1041.3.g. does not embargo internal interconnection equipment (e.g. backplanes, buses) or passive interconnection equipment
  - Governments may permit the export of equipment embargoed by 1041.3.g. provided it is exported for use in interconnecting peripheral equipment to "digital computers" not embargoed by 1041.3.b.
- Computers, as follows, and specially designed related equipment, "assemblies" and components therefor:
    - "Systolic array computers";
    - "Neural computers";
    - "Optical computers";

## 1042. Test, Inspection and Production Equipment

None

## 1043. Materials

None