CATEGORY 6 - SENSORS AND LASERS

A. SYSTEMS, EQUIPMENT AND COMPONENTS

6A001 Acoustics.

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

License Exceptions

LVS: $3000; N/A for 6A001.a.2.a.1, a.2.a.2, a.2.a.5, a.2.b; processing equipment controlled by 6A001.a.2.c, and specially designed for real time application with towed acoustic hydrophone arrays; a.2.e.1, a.2.e.2; and bottom or bay cable systems controlled by 6A001.a.2.f and having processing equipment specially designed for real time application with bottom or bay cable systems
GBS: Yes for 6A001.a.1.b.4
CIV: Yes for 6A001.a.1.b.4

List of Items Controlled

Unit: $ value
Related Controls: See also 6A991
Related Definitions: N/A
Items:

a. Marine acoustic systems, equipment and specially designed components therefor, as follows:

a.1. Active (transmitting or transmitting-and-receiving) systems, equipment and specially designed components therefor, as follows:

Note: 6A001.a.1 does not control:

a. Depth sounders operating vertically below the apparatus, not including a scanning function exceeding ± 20°, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding;

b. Acoustic beacons, as follows:

1. Acoustic emergency beacons;

2. Pingers specially designed for relocating or returning to an underwater position.

a.1.a. Wide-swath bathymetric survey systems designed for sea bed topographic mapping, having all of the following:

a.1.a.1. Being designed to take measurements at an angle exceeding 20° from the vertical;

a.1.a.2. Being designed to measure depths exceeding 600 m below the water surface; *and*

a.1.a.3. Being designed to provide any of the following:

a.1.a.3.a. Incorporation of multiple beams any of which is less than 1.9°; *or*

a.1.a.3.b. Data accuracies of better than 0.3% of water depth across the swath averaged over the individual measurements within the swath;

a.1.b. Object detection or location

systems having any of the following:

a.1.b.1. A transmitting frequency below 10 Khz;

a.1.b.2. Sound pressure level exceeding 224 Db (reference 1 µPa at 1 m) for equipment with an operating frequency in the band from 10 Khz to 24 Khz inclusive;

a.1.b.3. Sound pressure level exceeding 235 Db (reference 1 µPa at 1 m) for equipment with an operating frequency in the band between 24 Khz and 30 Khz;

a.1.b.4. Forming beams of less than 1° on any axis and having an operating frequency of less than 100 Khz;

a.1.b.5. Designed to operate with an unambiguous display range exceeding 5,120 m; *or*

a.1.b.6. Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers with any of the following:

a.1.b.6.a. Dynamic compensation for pressure; *or*

a.1.b.6.b. Incorporating other than lead zirconate titanate as the transduction element;

a.1.c. Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination, having any of the following:

Notes: 1. The control status of acoustic projectors, including transducers, specially designed for other equipment is determined by the control status of the other equipment.

2. 6A001.a.1.c does not control electronic sources that direct the sound vertically only, or mechanical (e.g., air gun or vapor-shock gun) or chemical (e.g., explosive) sources.

a.1.c.1. An instantaneous radiated acoustic power density exceeding 0.01 $mW/mm^2/Hz$ for devices operating at frequencies below 10 Khz;

a.1.c.2. A continuously radiated acoustic power density exceeding 0.001 $Mw/mm^2/Hz$ for devices operating at frequencies below 10 Khz; *or*

Technical Note: Acoustic power density is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation.

or

a.1.c.3. Side-lobe suppression exceeding 22 Db;

a.1.d. Acoustic systems, equipment and specially designed components for determining the position of surface vessels or underwater vehicles designed to operate at a range exceeding 1,000 m with a positioning accuracy of less than 10 m rms (root mean square) when measured at a range of 1,000 m;

Note: 6A001.a.1.d includes:

a. Equipment using coherent "signal processing" between two or more beacons and the hydrophone unit carried by the surface vessel or underwater vehicle;

b. Equipment capable of automatically correcting speed-of-sound propagation errors for calculation of a point.

or

a.2. Passive (receiving, whether or not related in normal application to separate active

equipment) systems, equipment and specially designed components therefor, as follows:

a.2.a. Hydrophones having any of the following characteristics:

Note: The control status of hydrophones specially designed for other equipment is determined by the control status of the other equipment.

a.2.a.1. Incorporating continuous flexible sensors or assemblies of discrete sensor elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm;

a.2.a.2. Having any of the following sensing elements:

a.2.a.2.a. Optical fibers;

a.2.a.2.b. Piezoelectric polymers; *or*

a.2.a.2.c. Flexible piezoelectric ceramic materials;

a.2.a.3. A hydrophone sensitivity better than -180 Db at any depth with no acceleration compensation;

a.2.a.4. When designed to operate at depths exceeding 35 m with acceleration compensation; *or*

a.2.a.5. Designed for operation at depths exceeding 1,000 m;

Technical Note: Hydrophone sensitivity is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic field with an rms pressure of 1 µPa. For example, a hydrophone of -160 Db (reference 1 V per µPa) would yield an output voltage of 10^{-8} V in such a field, while one of -180 Db sensitivity would yield only 10^{-9} V output. Thus, -160 Db is better than -180 Db.

a.2.b. Towed acoustic hydrophone arrays having any of the following:

a.2.b.1. Hydrophone group spacing of less than 12.5 m;

a.2.b.2. Designed or 'able to be modified' to operate at depths exceeding 35m;

Technical Note: "Able to be modified" in 6A001.a.2.b.2 means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.

a.2.b.3. Heading sensors controlled by 6A001.a.2.d;

a.2.b.4. Longitudinally reinforced array hoses;

a.2.b.5. An assembled array of less than 40 mm in diameter;

a.2.b..6 Multiplexed hydrophone group signals designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; *or*

a.2.b..7 Hydrophone characteristics controlled by 6A001.a.2.a;

a.2.c. Processing equipment, specially designed for towed acoustic hydrophone arrays, having "user accessible programmability" and time or frequency domain processing and

correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

a.2.d. Heading sensors having all of the following:

a.2.d.1. An accuracy of better than ± 0.5°; *and*

a.2.d.2. Designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m;

a.2.e. Bottom or bay cable systems having any of the following:

a.2.e.1. Incorporating hydrophones controlled by 6A001.a.2.a; *or*

a.2.e.2. Incorporating multiplexed hydrophone group signal modules having all of the following characteristics:

a.2.e.2.a. Designed to operate at depths exceeding 35 m or having an adjustable or removal depth sensing device in order to operate at depths exceeding 35 m; *and*

a.2.e.2.b. Capable of being operationally interchanged with towed acoustic hydrophone array modules;

a.2.f. Processing equipment, specially designed for bottom or bay cable systems, having "user accessible programmability" and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

b. Correlation-velocity sonar log equipment designed to measure the horizontal speed of the equipment carrier relative to the sea bed at distances between the carrier and the sea bed exceeding 500 m.

6A002 Optical sensors.

License Requirements

Reason for Control: NS, MT, CC, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to optical detectors in 6A002.a.1, a.3, and .e that are specially designed or rated as electomagnetic (including "lasers") and ionized particle radiation resistant	MT Column 1
RS applies to 6A002.a.1, a.2, a.3 and .c	RS Column 1
CC applies to police-model infrared viewers in 6A002.c	CC Column 1
AT applies to entire entry	AT Column 1
UN applies to 6A002.a.1, a.2 a.3 and c.	Rwanda;Federal Republicof Yugoslavia (Serbia and Montenegro)
UN applies to 6A002	Federal Republic of Yugoslavia (Serbia and Montenegro).

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

License Exceptions

LVS: $3000, *except* N/A for MT and for 6A002.a.1, a.2, a.3, .c, and .e
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in $ value
Related Controls: See also 6A102, 6A202, and 6A992
Related Definitions: 1.) "Image intensifiers" defined in 6A002.a.2 and "focal plane arrays" defined in 6A002.a.3 specially designed, modified, or configured for military use and not part of civil equipment are subject to the export licensing authority of U.S. Department of State, Office of Defense Trade Controls (22 CFR part 121). 2.) "Space qualified" "monospectral imaging sensors", and "multispectral imaging sensors" defined in 6A002.b, and "space-qualified" "focal plane arrays" defined in 6A002.e, specially designed or modified for items on the U.S. Munitions List are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls (22 CFR part 121).
Items:

a. Optical detectors, as follows:

Note: 6A002.a does not control germanium or silicon photodevices.

a.1. "Space-qualified" solid-state detectors, as follows:

a.1.a. "Space-qualified" solid-state detectors, having all of the following:

a.1.a.1. A peak response in the wavelength range exceeding 10 nm but not exceeding 300 nm; *and*

a.1.a.2. A response of less than 0.1% relative to the peak response at a wavelength exceeding 400 nm;

a.1.b. "Space-qualified" solid-state detectors, having all of the following:

a.1.b.1. A peak response in the wavelength range exceeding 900 nm but not exceeding 1,200 nm; *and*

a.1.b.2. A response "time constant" of 95 ns or less;

a.1.c. "Space-qualified" solid-state detectors having a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

a.2. Image intensifier tubes and specially designed components therefor, as follows:

a.2.a. Image intensifier tubes having all of the following:

a.2.a.1. A peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm;

a.2.a.2. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of 15 µm or less; *and*

a.2.a.3. Photocathodes, as follows:

a.2.a.3.a. S-20, S-25 or multialkali photocathodes with a luminous sensitivity exceeding 240 µA/lm;

a.2.a.3.b. GaAs or GaInAs photocathodes; *or*

a.2.a.3.c. Other III-V compound semiconductor photocathodes;

Note: 6A002.a.2.a.3.c does not control compound semiconductor photocathodes with a

maximum radiant sensitivity of 10 mA/W or less.

a.2.b. Specially designed components, as follows:

a.2.b.1. Microchannel plates having a hole pitch (center-to-center spacing) of 15 µm or less;

a.2.b.2. GaAs or GaInAs photocathodes;

a.2.b.3. Other III-V compound semiconductor photocathodes;

Note: 6A002.a.2.b.3 does not control compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.

a.3. Non-"space-qualified" "focal plane arrays", as follows:

Technical Note: Linear or two-dimensional multi-element detector arrays are referred to as "focal plane arrays".

Note 1: 6A002.a.3 includes photoconductive arrays and photovoltaic arrays.

Note 2: 6A002.a.3 does not control:

a. Silicon "focal plane arrays";

b. Multi-element (not to exceed 16 elements) encapsulated photoconductive cells using either lead sulphide or lead selenide;

c. Pyroelectric detectors using any of the following:

c.1. Triglycine sulphate and variants;

c.2. Lead-lanthanum-zirconium titanate and variants;

c.3. Lithium tantalate;

c.4. Polyvinylidene fluoride and variants; *or*

c.5. Strontium barium niobate and variants.

a.3.a. Non-"space-qualified" "focal plane arrays", having all of the following:

a.3.a.1. Individual elements with a peak response within the wavelength range exceeding 900 nm but not exceeding 1,050 nm; *and*

a.3.a.2. A response "time constant" of less than 0.5 ns;

a.3.b. Non-"space-qualified" "focal plane arrays", having all of the following:

a.3.b.1. Individual elements with a peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,200 nm; *and*

a.3.b.2. A response "time constant" of 95 ns or less;

a.3.c. Non-"space-qualified" "focal plane arrays", having individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm.

b. "Monospectral imaging sensors" and "multispectral imaging sensors" designed for remote sensing applications, having any of the following:

b.1. An Instantaneous-Field-Of-View (IFOV) of less than 200 µr (microradians); *or*

b.2. Being specified for operation in the wavelength range exceeding 400 nm but not exceeding 30,000 nm and having all the following;

b.2.a. Providing output imaging data in

digital format; *and*

b.2.b. Being any of the following:

b.2.b.1. "Space-qualified"; *or*

b.2.b.2. Designed for airborne operation, using other than silicon detectors, and having an IFOV of less than 2.5 mr (milliradians).

c. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating any of the following:

c.1. Image intensifier tubes having the characteristics listed in 6A002.a.2.a; *or*

c.2. "Focal plane arrays" having the characteristics listed in 6A002.a.3.

Technical Note: "Direct view" refers to imaging equipment, operating in the visible or infrared spectrum, that presents a visual image to a human observer without converting the image into an electronic signal for television display, and that cannot record or store the image photographically, electronically or by any other means.

Note: 6A002.c does not control the following equipment incorporating other than GaAs or GaInAs photocathodes:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;

b. Medical equipment;

c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;

d. Flame detectors for industrial furnaces;

e. Equipment specially designed for laboratory use.

d. Special support components for optical sensors, as follows:

d.1. "Space-qualified" cryocoolers;

d.2. Non-"space-qualified" cryocoolers, having a cooling source temperature below 218 K (-55° C), as follows:

d.2.a. Closed cycle type with a specified Mean-Time-To-Failure (MTTF), or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;

d.2.b. Joule-Thomson (JT) self-regulating minicoolers having bore (outside) diameters of less than 8 mm;

d.3. Optical sensing fibers specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive.

e. "Space qualified" "focal plane arrays" having more than 2,048 elements per array and having a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm.

6A003 Cameras.

License Requirements

Reason for Control: NS, NP, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to items controlled in paragraphs 6A003.a.2, a.3 and a.4	NP Column 1

RS applies to items controlled in 6A003.b.3 and b.4	RS Column 1
AT applies to entire entry	AT Column 1
UN applies to items controlled in 6A003.b.3 and b.4;	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro)

License Exceptions

LVS: $1500, except N/A for 6A003.a.2 through a.5, b.1, b.3 and b.4
GBS: Yes for 6A003.a.1
CIV: Yes for 6A003.a.1

List of Items Controlled

Unit: Number
Related Controls: See also 6A203. See 8A002.d and .e for cameras specially designed or modified for underwater use.
Related Definitions: N/A
Items:

a. Instrumentation cameras, as follows:

Note: Instrumentation cameras, controlled by 6A003.a.3 to 6A003.a.5, with modular structures should be evaluated by their maximum capability, using "electronic assemblies" available according to the camera manufacturer's specifications.

a.1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously advanced throughout the recording period, and that are capable of recording at framing rates exceeding 13,150 frames/s;

Note: 6A003.a.1 does not control cinema recording cameras designed for civil purposes.

a.2. Mechanical high speed cameras, in which the film does not move, capable of recording at rates exceeding 1,000,000 frames/s for the full framing height of 35 mm film, or at proportionately higher rates for lesser frame heights, or at proportionately lower rates for greater frame heights;

a.3. Mechanical or electronic streak cameras having writing speeds exceeding 10 mm/µs;

a.4. Electronic framing cameras having a speed exceeding 1,000,000 frames/s;

a.5. Electronic cameras, having all of the following:

a.5.a. An electronic shutter speed (gating capability) of less than 1 µs per full frame; *and*

a.5.b. A read out time allowing a framing rate of more than 125 full frames per second.

b. Imaging cameras, as follows:

Note: 6A003.b does not control television or video cameras specially designed for television broadcasting.

b.1. Video cameras incorporating solid state sensors, having any of the following:

b.1.a. More than 4×10^6 "active pixels" per solid state array for monochrome (black and white) cameras;

b.1.b. More than 4×10^6 "active pixels" per solid state array for color cameras incorporating three solid state arrays; *or*

b.1.c. More than 12×10^6 "active pixels" for solid state array color cameras incorporating one solid state array;

b.2. Scanning cameras and scanning camera systems, having all of the following:

b.2.a. Linear detector arrays with more than 8,192 elements per array; *and*

b.2.b. Mechanical scanning in one direction;

b.3. Imaging cameras incorporating image intensifier tubes having the characteristics listed in 6A002.a.2.a;

b.4. Imaging cameras incorporating "focal plane arrays" having the characteristics listed in 6A002.a.3.

Note: 6A003.b.4 does not control imaging cameras incorporating linear "focal plane arrays" with twelve elements or fewer, not employing time-delay-and-integration with the element, designed for any of the following:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;

b. Industrial equipment used for inspection or monitoring of heat flows in buildings, equipment or industrial processes;

c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;

d. Equipment specially designed for laboratory use; *or*

e. Medical equipment.

6A004 Optics.

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

License Exceptions

LVS: $3000
GBS: Yes for 6A004.a.1, a.2, a.4, b, d.2, and d.4
CIV: Yes for 6A004.a.1, a.2, a.4, b, d.2, and d.4

List of Items Controlled

Unit: Equipment in number; cable in meters/feet; components in $ value
Related Controls: See also 6A994
Related Definitions: N/A
Items:

a. Optical mirrors (reflectors), as follows:

a.1. "Deformable mirrors" having either continuous or multi-element surfaces, and specially designed components therefor, capable of dynamically repositioning portions of the surface of the mirror at rates exceeding 100 Hz;

a.2. Lightweight monolithic mirrors having an average "equivalent density" of less than 30 kg/m^2 and a total mass exceeding 10 kg;

a.3. Lightweight "composite" or foam mirror structures having an average "equivalent density" of less than 30 kg/m^2 and a total mass exceeding 2 kg;

a.4. Beam steering mirrors more than 100 mm in diameter or length of major axis, that maintain a flatness of lambda/2 or better (lambda is equal to 633 nm) having a control bandwidth exceeding 100 Hz.

b. Optical components made from zinc selenide (ZnSe) or zinc sulphide (ZnS) with transmission in the wavelength range exceeding 3,000 nm but not exceeding 25,000 nm and having any of the following:

b.1. Exceeding 100 cm^3 in volume; *or*

b.2. Exceeding 80 mm in diameter or length of major axis and 20 mm in thickness (depth).

c. "Space-qualified" components for optical systems, as follows:

c.1. Lightweighted to less than 20% "equivalent density" compared with a solid blank of the same aperture and thickness;

c.2. Substrates, substrates having surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or having protective films;

c.3. Segments or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 m in diameter;

c.4. Manufactured from "composite" materials having a coefficient of linear thermal expansion equal to or less than 5×10^{-6} in any coordinate direction.

d. Optical control equipment, as follows:

d.1. Specially designed to maintain the surface figure or orientation of the "space-qualified" components controlled by 6A004.c.1 or 6A004.c.3;

d.2. Having steering, tracking, stabilization or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 µr (microradians) or less;

d.3. Gimbals having all of the following:

d.3.a. A maximum slew exceeding 5°;

d.3.b. A bandwidth of 100 Hz or more;

d.3.c. Angular pointing errors of 200 µr (microradians) or less; *and*

d.3.d. Having any of the following:

d.3.d.1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 2 r (radians)/s^2; *or*

d.3.d.2. Exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 0.5 r (radians)/s^2;

d.4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more.

e. Aspheric optical elements having all of the following characteristics:

e.1. The largest dimension of the optical-aperture is greater than 400 mm;

e.2. The surface roughness is less than 1 nm (rms) for sampling lengths equal to or greater than 1 mm; *and*

e.3. The coefficient of linear thermal expansion's absolute magnitude is less than 3×10^{-6}/K at 25° C;

Technical Notes:

1. An 'aspheric optical element' is any element used in an optical system whose imaging surface or surfaces are designed to depart from the shape of an ideal sphere.

2. Manufacturers are not required to

measure the surface roughness listed in 6A004.e.2 unless the optical element was designed or manufactured with the intent to meet, or exceed, the control parameter.

Note: 6A004.e does not control aspheric optical elements having any of the following:

a. A largest optical-aperture dimension less than 1 m and a focal length to aperture ratio equal to or greater than 4.5:1;

b. A largest optical-aperture dimension equal to or greater than 1 m and a focal length to aperture ratio equal to or greater than 7:1;

c. Being designed as Fresnel, flyeye, stripe, prism or diffractive optical elements;

d. Being fabricated from borosilicate glass having a coefficient of linear thermal expansion greater than 2.5 x 10^{-6}/K at 25° C;*or*

e. Being an x-ray optical element having inner mirror capabilities (e.g., tube-type mirrors).

N.B.: For aspheric optical elements specially designed for lithographic equipment, see 3B001.

6A005 "Lasers", components and optical equipment, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 6A005.a.1.c, a.2.a (with an output power > 40W), a.4.c, a.6, (argon ion lasers only), c.1.b (with an output power > 30W), c.2.c.2.a (with an output power > 40W), c.2.c.2.b (with an output power > 40W), c.2.b.2.b (with an output power > 40W), and d.2.c	NP Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A for NP items
$3000 for all other items

GBS: Yes, for 6A005.d (except d.2.c), CO_2 or CO/CO_2 "lasers" having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 Kw; CO "lasers" having a CW maximum rated single or multimode output power not exceeding 10 Kw; CO_2 "lasers" controlled by 6A005.a.4 that operate in CW multiple-transverse mode; and having a CW output power not exceeding 15 Kw; Neodymium-doped (other than glass), pulse-excited, "Q-switched lasers" controlled by 6A005.c.2.b.2.b having a pulse duration equal to or more than 1 ns; and a multiple-transverse mode output with a "peak power" not exceeding 400 MW; Neodymium-doped (other than glass) "lasers" controlled by 6A005.c.2.b.3.b or 6A005.c.2.b.4.b that have an output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm; and an average or CW output power not exceeding 2 Kw; and operate in a pulse-excited, non-"Q-switched" multiple-transverse mode; or in a continuously excited, multiple-transverse mode; and

6A005.g.1.

CIV: Yes, for 6A005.d (except d.2.c), CO_2 or CO/CO_2 "lasers" having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 Kw; CO "lasers" having a CW maximum rated single or multimode output power not exceeding 10 Kw; CO_2 "lasers" controlled by 6A005.a.4 that operate in CW multiple-transverse mode; and having a CW output power not exceeding 15 Kw; Neodymium-doped (other than glass), pulse-excited, "Q-switched lasers" controlled by 6A005.c.2.b.2.b having a pulse duration equal to or more than 1 ns; and a multiple-transverse mode output with a "peak power" not exceeding 400 MW; Neodymium-doped (other than glass) "lasers" controlled by 6A005.c.2.b.3.b or 6A005.c.2.b.4.b that have an output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm; and an average or CW output power not exceeding 2 Kw; and operate in a pulse-excited, non-"Q-switched" multiple-transverse mode; or in a continuously excited, multiple-transverse mode; and 6A005.g.1.

List of Items Controlled

Unit: Equipment in number; parts and accessories in $ value

Related Controls: 1.) See also 6A205, 6A995, 0B001.g.5 and 0B001.b.6. 2.) For excimer "lasers" specially designed for lithography equipment, see 3B001. 3.) Shared aperture optical elements, capable of operating in "super-high power laser" applications are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)

Related Definitions: 1.) Pulsed "lasers" include those that run in a continuous wave (CW) mode with pulses superimposed. 2.) Pulse-excited "lasers" include those that run in a continuously excited mode with pulse excitation superimposed. 3.) The control status of Raman "lasers" is determined by the parameters of the pumping source "lasers". The pumping source "lasers" can be any of the "lasers" described as follows:

Items:

a. Gas "lasers", as follows:

a.1. Excimer "lasers", having any of the following:

a.1.a. An output wavelength not exceeding 150 nm and having any of the following:

a.1.a.1. An output energy exceeding 50 mJ per pulse; *or*

a.1.a.2. An average or CW output power exceeding 1 W;

a.1.b. An output wavelength exceeding 150 nm but not exceeding 190 nm and having any of the following:

a.1.b.1. An output energy exceeding 1.5 J per pulse; *or*

a.1.b.2. An average or CW output power exceeding 120 W;

a.1.c. An output wavelength exceeding 190 nm but not exceeding 360 nm and having any of the following:

a.1.c.1. An output energy exceeding 10 J per pulse; *or*

a.1.c.2. An average or CW output power exceeding 500 W; *or*

a.1.d. An output wavelength exceeding 360 nm and having any of the following:

a.1.d.1. An output energy exceeding 1.5 J per pulse; *or*

a.1.d.2. An average or CW output power exceeding 30 W;

a.2. Metal vapor "lasers", as follows:

a.2.a. Copper (Cu) "lasers" having an average or CW output power exceeding 20 W;

a.2.b. Gold (Au) "lasers" having an average or CW output power exceeding 5 W;

a.2.c. Sodium (Na) "lasers" having an output power exceeding 5 W;

a.2.d. Barium (Ba) "lasers" having an average or CW output power exceeding 2 W;

a.3. Carbon monoxide (CO) "lasers" having any of the following:

a.3.a. An output energy exceeding 2 J per pulse and a pulsed "peak power" exceeding 5 Kw; *or*

a.3.b. An average or CW output power exceeding 5 Kw;

a.4. Carbon dioxide (CO_2) "lasers" having any of the following:

a.4.a. A CW output power exceeding 15 Kw;

a.4.b. A pulsed output having a "pulse duration" exceeding 10 µs and having any of the following:

a.4.b.1. An average output power exceeding 10 Kw; *or*

a.4.b.2. A pulsed "peak power" exceeding 100 Kw; *or*

a.4.c. A pulsed output having a "pulse duration" equal to or less than 10 µs; and having any of the following:

a.4.c.1. A pulse energy exceeding 5 J per pulse; *or*

a.4.c.2. An average output power exceeding 2.5 Kw;

a.5. "Chemical lasers", as follows:

a.5.a. Hydrogen Fluoride (HF) "lasers";

a.5.b. Deuterium Fluoride (DF) "lasers";

a.5.c. "Transfer lasers", as follows:

a.5.c.1. Oxygen Iodine (O_2-I) "lasers";

a.5.c.2. Deuterium Fluoride-Carbon dioxide (DF-CO_2) "lasers";

a.6. Krypton ion or argon ion "lasers" having any of the following:

a.6.a. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 50 W; *or*

a.6.b. An average or CW output power exceeding 50 W;

a.7. Other gas "lasers", having any of the following:

Note: 6A005.a.7 does not control nitrogen "lasers".

a.7.a. An output wavelength not exceeding 150 nm and having any of the following:

a.7.a.1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*

a.7.a.2. An average or CW output power exceeding 1 W;

a.7.b. An output wavelength exceeding 150 nm but not exceeding 800 nm and having any of the following:

a.7.b.1. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 30 W; *or*

a.7.b.2. An average or CW output power exceeding 30 W;

a.7.c. An output wavelength exceeding 800 nm but not exceeding 1,400 nm and having any of the following:

a.7.c.1. An output energy exceeding 0.25 J per pulse and a pulsed "peak power" exceeding 10 W; *or*

a.7.c.2. An average or CW output power exceeding 10 W; *or*

a.7.d. An output wavelength exceeding 1,400 nm and an average or CW output power exceeding 1 W.

b. Semiconductor "lasers", having a wavelength of less than 950 nm or more than 2000 nm, as follows:

b.1. Individual single-transverse mode semiconductor "lasers" having an average or CW output power exceeding 100 mW;

b.2. Individual, multiple-transverse mode semiconductor "lasers" and arrays of individual semiconductor "lasers", having any of the following:

b.2.a. An output energy exceeding 500 µJ per pulse and a pulsed "peak power" exceeding 10 W; *or*

b.2.b. An average or CW output power exceeding 10 W.

Technical Note: Semiconductor "lasers" are commonly called "laser" diodes.

Note 1: 6A005.b includes semiconductor "lasers" having optical output connectors (e.g. fiber optic pigtails).

Note 2: The control status of semiconductor "lasers" specially designed for other equipment is determined by the control status of the other equipment.

c. Solid state "lasers", as follows:

c.1. "Tunable" "lasers" having any of the following:

Note: 6A005.c.1 includes titanium - sapphire (Ti: Al_2O_3), thulium - YAG (Tm: YAG), thulium - YSGG (Tm: YSGG), alexandrite (Cr: $BeAl_2O_4$) and color center "lasers".

c.1.a. An output wavelength less than 600 nm and having any of the following:

c.1.a.1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*

c.1.a.2. An average or CW output power exceeding 1 W;

c.1.b. An output wavelength of 600 nm or more but not exceeding 1,400 nm and having any of the following:

c.1.b.1. An output energy exceeding 1 J per pulse and a pulsed "peak power" exceeding 20 W; *or*

c.1.b.2. An average or CW output power exceeding 20 W; *or*

c.1.c. An output wavelength exceeding 1,400 nm and having any of the following:

c.1.c.1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*

c.1.c.2. An average or CW output power exceeding 1 W;

c.2. Non-"tunable" "lasers", as follows:

Note: 6A005.c.2 includes atomic transition solid state "lasers".

c.2.a. Neodymium glass "lasers", as follows:

c.2.a.1. "Q-switched lasers" having any of the following:

c.2.a.1.a. An output energy exceeding 20 J but not exceeding 50 J per pulse and an average output power exceeding 10 W; *or*

c.2.a.1.b. An output energy exceeding 50 J per pulse;

c.2.a.2. Non-"Q-switched lasers" having any of the following:

c.2.a.2.a. An output energy exceeding 50 J but not exceeding 100 J per pulse and an average output power exceeding 20 W; *or*

c.2.a.2.b. An output energy exceeding 100 J per pulse;

c.2.b. Neodymium-doped (other than glass) "lasers", having an output wavelength exceeding 1,000 nm but not exceeding 1,100 nm, as follows:

N.B.: For neodymium-doped (other than glass) "lasers" having an output wavelength not exceeding 1,000 nm or exceeding 1,100 nm, see 6A005.c.2.c.

c.2.b.1. Pulse-excited, mode-locked, "Q-switched lasers" having a "pulse duration" of less than 1 ns and having any of the following:

c.2.b.1.a. A "peak power" exceeding 5 GW;

c.2.b.1.b. An average output power exceeding 10 W; *or*

c.2.b.1.c. A pulsed energy exceeding 0.1 J;

c.2.b.2. Pulse-excited, "Q-switched lasers" having a pulse duration equal to or more than 1 ns, and having any of the following:

c.2.b.2.a. A single-transverse mode output having:

c.2.b.2.a.1. A "peak power" exceeding 100 MW;

c.2.b.2.a.2. An average output power exceeding 20 W; *or*

c.2.b.2.a.3. A pulsed energy exceeding 2 J; *or*

c.2.b.2.b. A multiple-transverse mode output having:

c.2.b.2.b.1. A "peak power" exceeding 400 MW;

c.2.b.2.b.2. An average output power exceeding 2 kW; *or*

c.2.b.2.b.3. A pulsed energy exceeding 2 J;

c.2.b.3. Pulse-excited, non-"Q-switched lasers", having:

c.2.b.3.a. A single-transverse mode output having:

c.2.b.3.a.1. A "peak power" exceeding 500 kW; *or*

c.2.b.3.a.2. An average output power exceeding 150 W; *or*

c.2.b.3.b. A multiple-transverse mode output having:

c.2.b.3.b.1. A "peak power" exceeding 1 MW; *or*

c.2.b.3.b.2. An average power exceeding 2 kW;

c.2.b.4. Continuously excited "lasers" having:

c.2.b.4.a. A single-transverse mode output having:

c.2.b.4.a.1. A "peak power" exceeding 500 kW; *or*

c.2.b.4.a.2. An average or CW output power exceeding 150 W; *or*

c.2.b.4.b. A multiple-transverse mode output having:

c.2.b.4.b.1. A "peak power" exceeding 1 MW; *or*

c.2.b.4.b.2. An average or CW output power exceeding 2 kW;

c.2.c. Other non-"tunable" "lasers", having any of the following:

c.2.c.1. A wavelength less than 150 nm and having any of the following:

c.2.c.1.a. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*

c.2.c.1.b. An average or CW output power exceeding 1 W;

c.2.c.2. A wavelength of 150 nm or more but not exceeding 800 nm and having any of the following:

c.2.c.2.a. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 30 W; *or*

c.2.c.2.b. An average or CW output power exceeding 30 W;

c.2.c.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm, as follows:

c.2.c.3.a. "Q-switched lasers" having:

c.2.c.3.a.1. An output energy exceeding 0.5 J per pulse and a pulsed "peak power" exceeding 50 W; *or*

c.2.c.3.a.2. An average output power exceeding:

c.2.c.3.a.2.a. 10 W for single-mode "lasers";

c.2.c.3.a.2.b. 30 W for multimode "lasers";

c.2.c.3.b. Non-"Q-switched lasers" having:

c.2.c.3.b.1. An output energy

exceeding 2 J per pulse and a pulsed "peak power" exceeding 50 W; *or*

c.2.c.3.b.2. An average or CW output power exceeding 50 W; *or*

c.2.c.4. A wavelength exceeding 1,400 nm *and* having any of the following:

c.2.c.4.a. An output energy exceeding 100 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*

c.2.c.4.b. An average or CW output power exceeding 1 W;

d. Dye and other liquid "lasers", having any of the following:

d.1. A wavelength less than 150 nm and:

d.1.a. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*

d.1.b. An average or CW output power exceeding 1 W;

d.2. A wavelength of 150 nm or more but not exceeding 800 nm and having any of the following:

d.2.a. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 20 W;

d.2.b. An average or CW output power exceeding 20 W; *or*

d.2.c. A pulsed single longitudinal mode oscillator having an average output power exceeding 1 W and a repetition rate exceeding 1 Khz if the "pulse duration" is less than 100 ns;

d.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm and having any of the following:

d.3.a. An output energy exceeding 0.5 J per pulse and a pulsed "peak power" exceeding 10 W; *or*

d.3.b. An average or CW output power exceeding 10 W; *or*

d.4. A wavelength exceeding 1,400 nm and having any of the following:

d.4.a. An output energy exceeding 100 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*

d.4.b. An average or CW output power exceeding 1 W;

e. Components, as follows:

e.1. Mirrors cooled either by active cooling or by heat pipe cooling;

Technical Note: Active cooling is a cooling technique for optical components using flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.

e.2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components specially designed for use with controlled "lasers";

f. Optical equipment, as follows:

(For shared aperture optical elements, capable of operating in "Super-High Power Laser" ("SHPL") applications, see the U.S. Munitions List.)

f.1. Dynamic wavefront (phase) measuring equipment capable of mapping at least 50 positions on a beam wavefront having any the following:

f.1.a. Frame rates equal to or more than 100 Hz and phase discrimination of at least 5% of the beam's wavelength; *or*

f.1.b. Frame rates equal to or more than 1,000 Hz and phase discrimination of at least 20% of the beam's wavelength;

f.2. "Laser" diagnostic equipment capable of measuring "SHPL" system angular beam steering errors of equal to or less than 10 µrad;

f.3. Optical equipment and components specially designed for a phased-array "SHPL" system for coherent beam combination to an accuracy of lambda/10 at the designed wavelength, or 0.1 µm, whichever is the smaller;

f.4. Projection telescopes specially designed for use with "SHPL" systems.

6A006 "Magnetometers", "magnetic gradiometers", "intrinsic magnetic gradiometers" and compensation systems, and specially designed components therefor, 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 2
AT applies to entire entry	AT Column 1

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

License Exceptions

LVS: $1500
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 6A996. This entry does not control instruments specially designed for biomagnetic measurements for medical diagnostics.
Related Definitions: N/A
Items:

a. "Magnetometers" using "superconductive", optically pumped or nuclear precession (proton/Overhauser) "technology" having a "noise level" (sensitivity) lower (better) than 0.05 nT rms per square root Hz;

b. Induction coil "magnetometers" having a "noise level" (sensitivity) lower (better) than any of the following:

b.1. 0.05 nT rms/square root Hz at frequencies of less than 1 Hz;

b.2. 1×10^{-3} nT rms/square root Hz at frequencies of 1 Hz or more but not exceeding 10 Hz; *or*

b.3. 1×10^{-4} nT rms/square root Hz at frequencies exceeding 10 Hz;

c. Fiber optic "magnetometers" having a "noise level" (sensitivity) lower (better) than 1 nT rms per square root Hz;

d. "Magnetic gradiometers" using multiple "magnetometers" controlled by 6A006.a, 6A006.b or 6A006.c;

e. Fiber optic "intrinsic magnetic gradiometers" having a magnetic gradient field "noise level" (sensitivity) lower (better) than 0.3 nT/m rms per square root Hz;

f. "Intrinsic magnetic gradiometers", using

"technology" other than fiber-optic "technology", having a magnetic gradient field "noise level" (sensitivity) lower (better) than 0.015 nT/m rms per square root Hz;

g. Magnetic compensation systems for magnetic sensors designed for operation on mobile platforms;

h. "Superconductive" electromagnetic sensors, components manufactured from "superconductive" materials:

h.1. Designed for operation at temperatures below the "critical temperature" of at least one of their "superconductive" constituents (including Josephson effect devices or "superconductive" quantum interference devices (SQUIDS));

h.2. Designed for sensing electromagnetic field variations at frequencies of 1 KHz or less; *and*

h.3. Having any of the following characteristics:

h.3.a. Incorporating thin-film SQUIDS with a minimum feature size of less than 2 µm and with associated input and output coupling circuits;

h.3.b. Designed to operate with a magnetic field slew rate exceeding 1 x 10^6 magnetic flux quanta per second;

h.3.c. Designed to function without magnetic shielding in the earth's ambient magnetic field; *or*

h.3.d. Having a temperature coefficient less (smaller) than 0.1 magnetic flux quantum/K.

6A007 Gravity meters (gravimeters) and gravity gradiometers, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to 6A007.b and .c when the accuracies in 6A007.b.1 and b.2 are met or exceeded	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: $3000; N/A for MT
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 6A107 and 6A997
Related Definitions: N/A
Items:

a. Gravity meters designed or modified for ground use having a static accuracy of less (better) than 10 µgal;

Note: 6A007.a does not control ground gravity meters of the quartz element (Worden) type.

b. Gravity meters designed for mobile platforms for ground, marine, submersible, space or airborne use, having all of the following:

b.1. A static accuracy of less (better) than 0.7 mgal; *and*

b.2. An in-service (operational) accuracy of less (better) than 0.7 mgal having a

time-to-steady-state registration of less than 2 minutes under any combination of attendant corrective compensations and motional influences;

c. Gravity gradiometers.

6A008 Radar systems, equipment and assemblies having any of the characteristics (see List of Items Controlled), and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to items that are designed for airborne applications and that are usable in systems controlled for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

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

License Exceptions

LVS: $5000; N/A for MT and 6A008.l.3
GBS: Yes, for 6A008.b, .c, and l.1 only
CIV: Yes, for 6A008.b, .c, and l.1 only

List of Items Controlled

Unit: $ value
Related Controls: See also 6A108 and 6A998. This entry does not control: 1.) Secondary surveillance radar (SSR); 2.) Car radar designed for collision prevention; 3.) Displays or monitors used for Air Traffic Control (ATC) having no more than 12 resolvable elements per mm; 4.) Meteorological (weather) radar.
Related Definitions: N/A
Items:

a. Operating at frequencies from 40 GHz to 230 GHz and having an average output power exceeding 100 mW;

b. Having a tunable bandwidth exceeding ±6.25% of the center operating frequency;

Technical Note: The center operating frequency equals one half of the sum of the highest plus the lowest specified operating frequencies.

c. Capable of operating simultaneously on more than two carrier frequencies;

d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode;

e. Incorporating "electronically steerable phased array antennae";

f. Capable of heightfinding non-cooperative targets;

Note: 6A008.f does not control precision approach radar (PAR) equipment conforming to ICAO standards.

g. Specially designed for airborne (balloon or airframe mounted) operation and having Doppler "signal processing" for the detection of moving targets;

h. Employing processing of radar signals using any of the following:

h.1. "Radar spread spectrum" techniques; *or*

h.2. "Radar frequency agility" techniques;

i. Providing ground-based operation with a maximum "instrumented range" exceeding 185 km;

Note: 6A008.i does not control:

a. Fishing ground surveillance radar;

b. Ground radar equipment specially designed for enroute air traffic control, provided that all the following conditions are met:

1. It has a maximum "instrumented range" of 500 km or less;

2. It is configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centers;

3. It contains no provisions for remote control of the radar scan rate from the enroute ATC center; *and*

4. It is to be permanently installed;

c. Weather balloon tracking radars.

j. Being "laser" radar or Light Detection and Ranging (LIDAR) equipment, having any of the following:

j.1. "Space-qualified"; *or*

j.2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 μr (microradians);

Note: 6A008.j does not control LIDAR equipment specially designed for surveying or for meteorological observation.

k. Having "signal processing" sub-systems using "pulse compression", with any of the following:

k.1. A "pulse compression" ratio exceeding 150; *or*

k.2. A pulse width of less than 200 ns; *or*

l. Having data processing sub-systems with any of the following:

l.1. "Automatic target tracking" providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage;

Note: 6A008.l.1 does not control conflict alert capability in ATC systems, or marine or harbor radar.

l.2. Calculation of target velocity from primary radar having non-periodic (variable) scanning rates;

l.3. Processing for automatic pattern recognition (feature extraction) and comparison with target characteristic data bases (waveforms or imagery) to identify or classify targets; *or*

l.4. Superposition and correlation, or fusion, of target data from two or more "geographically dispersed" and "interconnected radar sensors" to enhance and discriminate targets.

Note: 6A008.l.4 does not control systems, equipment and assemblies designed for marine traffic control.

6A018 Magnetic, pressure, and acoustic underwater detection devices specially designed for military purposes and controls and components therefor.

License Requirements

Reason for Control: NS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry.	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro).

License Exceptions

LVS: $5000, except N/A for Rwanda and the Federal Republic of Yugoslavia (Serbia and Montenegro)
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Equipment in number;components in $ value
Related Controls: N/A
Related Definitions: N/A
Items:

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

6A102 Radiation hardened detectors, other than those controlled by 6A002, for use in protecting against nuclear effects (e.g. electromagnetic pulse (EMP), X-rays, combined blast and thermal effects) and usable for "missiles", designed or rated to withstand radiation levels that meet or exceed a total irradiation dose of 5×10^5 rads (Si).

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: Components in number
Related Controls: N/A
Related Definitions: In this entry, a detector is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a radioactive material.
Items:

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

6A107 Gravity meters (gravimeters), gravity gradiometers, and specially designed components therefore, other than those controlled by 6A007.b and .c, designed or modified for airborne or marine use, having a static or operational accuracy of 7×10^{-6} m/sec^2 (0.7 milligal) or better, and a time to steady-state registration of two minutes or less.

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

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

6A108 Radar systems and tracking systems, other than those controlled by 6A008, as follows (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: $ value
Related Controls: 1.) This entry does not control airborne civil weather radar conforming to international standards for civil weather radars provided that they do not incorporate any of the following: (a) Phased array antennas; (b) Frequency agility; (c) Spread spectrum; or (d) Signal processing specially designed for the tracking of vehicles. 2.) Items in 6A108.a that are specially designed or modified for "missiles" or for items on the U.S. Munitions List are subject to the export licensing authority of the U.S. Department of State, Defense Trade Controls (see 22 CFR part 121).
Related Definitions: Laser radar systems are defined as those that embody specialized transmission, scanning, receiving and signal processing techniques for utilization of lasers for echo ranging, direction finding and discrimination of targets by location, radial speed and body reflection characteristics.
Items:

a. Radar and laser radar systems designed or modified for use in "missiles";

b. Precision tracking systems, usable for "missiles", as follows:

b.1. Tracking systems that use a code translator in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;

b.2. Range instrumentation radars including associated optical/infrared trackers with all of the following capabilities:

b.2.a. Angular resolution better than 3 milliradians (0.5 mils);

b.2.b. Range of 30 km or greater with a range resolution better than 10 m rms;

b.2.c. Velocity resolution better than 3 m/s.

6A202 Photomultiplier tubes with a photocathode area of greater than 20 cm^2 having an anode pulse rise time of less than 1 ns.

License Requirements

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP 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: Number
Related Controls: N/A
Related Definitions: N/A
Items:

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

6A203 Cameras and components, other than those controlled by 6A003, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP 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 and components in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. Mechanical rotating mirror cameras, as follows, and specially designed components therefor:

a.1. Framing cameras with recording rates greater than 225,000 frames per second; *or*

a.2. Streak cameras with writing speeds greater than 0.5 mm per microsecond;

Note: Components of such cameras include their synchronizing electronic units and rotor assemblies consisting of turbines, mirrors and bearings.

b. Electronic streak and framing cameras and tubes, as follows:

b.1. Electronic streak cameras capable of 50 ns or less time resolution and streak tubes therefor;

b.2. Electronic (or electronically shuttered) framing cameras capable of 50 ns or less frame exposure time;

b.3. Framing tubes and solid-state imaging devices for use with cameras controlled by 6A203.b.2, as follows:

b.3.a. Proximity focused image intensifier tubes having the photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;

b.3.b. Gate silicon intensifier target (SIT) videcon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;

b.3.c. Kerr or pocket cell electro-optical shuttering; *or*

b.3.d. Other framing tubes and solid-state imaging devices having a fast-image gating time of less than 50 ns specially designed for cameras controlled by 6A203.b.2;

c. Radiation-hardened TV cameras, or lenses therefor, specially designed or rated as radiation hardened to withstand greater than 50×10^3 grays (Silicon) (5×10^6 rad (Silicon)) without operational degradation.

6A205 "Lasers", other than those controlled 6A005, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP 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; parts and accessories in $ value
Related Controls: See also 0B001.g.5 and 0B001.h.6
Related Definitions: N/A
Items:

a. Argon ion "lasers" with greater than 40 W average output power operating at wavelengths between 400 nm and 515 nm;

b. Tunable pulsed single-mode dye oscillators capable of an average power output of greater than 1 W, a repetition rate greater than 1 KHz, a pulse less than 100 ns, and a wavelength between 300 nm and 800 nm;

c. Tunable pulsed dye laser amplifiers and oscillators, with an average power output of greater than 30 W, a repetition rate greater than 1 KHz, a pulse width less than 100 ns, and a wavelength between 300 nm and 800 nm, except single mode oscillators;

d. Pulsed carbon dioxide "lasers" with a repetition rate greater than 250 Hz, an average power output of greater than 500 W, and a pulse of less than 200 ns operating at wavelengths between 9,000 nm and 11,000 nm;

e. Para-hydrogen Raman shifters designed to operate at 16 micrometer output wavelength and at a repetition rate greater than 250 Hz;

f. Pulse-excited, Q-switched Neodymium-doped (other than glass) "lasers", having all of the following:

f.1. An output wavelength exceeding 1,000 nm but not exceeding 1,100 nm;

f.2. A pulse duration equal to or more than 1 ns; *and*

f.3. A multiple-transverse mode output having an average power exceeding 50 W.

6A225 Velocity interferometers for measuring velocities in excess of 1 km/s during time intervals of less than 10 microsecond (VISARs, Doppler laser interferometers (DLIs), etc.).

License Requirements

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP 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; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items:

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

6A226 Pressure sensors, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP 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; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. Manganin gauges for pressures greater than 100 kilobars; *or*

b. Quartz pressure transducers for pressures greater than 100 kilobars.

6A991 Marine or terrestrial acoustic equipment, n.e.s., capable of detecting or locating underwater objects or features or positioning surface vessels or underwater vehicles; and specially designed components, n.e.s.

License Requirements

Reason for Control: AT

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

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.

6A992 Optical Sensors, not controlled by 6A002.

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: N/A
Items:

a. Image intensifier tubes and specially designed components therefor, as follows:

a.1. Image intensifier tubes having all the following:

a.1.a. A peak response in wavelength range exceeding 400 nm, but not exceeding 1,050 nm;

a.1.b. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of less than 25 micrometers; *and*

a.1.c. Having any of the following:

a.1.c.1. An S-20, S-25 or multialkali photocathode; *or*

a.1.c.2. A GaAs or GaInAs photocathode;

a.2. Specially designed microchannel plates having both of the following characteristics:

a.2.a. 15,000 or more hollow tubes per plate; *and*

a.2.b. Hole pitch (center-to-center spacing) of less than 25 micrometers.

6A994 Optics, not controlled by 6A004.

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: N/A
Items:

a. Optical filters:

a.1. For wavelengths longer than 250 nm, comprised of multi-layer optical coatings and having either of the following:

a.1.a. Bandwidths equal to or less than 1 nm Full Width Half Intensity (FWHI) and peak transmission of 90% or more; *or*

a.1.b. Bandwidths equal to or less than 0.1 nm FWHI and peak transmission of 50% or more;

Note: 6A994 does not control optical filters with fixed air gaps or Lyot-type filters.

a.2. For wavelengths longer than 250 nm, and having all of the following:

a.2.a. Tunable over a spectral range of 500 nm or more;

a.2.b. Instantaneous optical bandpass of 1.25 nm or less;

a.2.c. Wavelength resettable within 0.1 ms to an accuracy of 1 nm or better within the tunable spectral range; *and*

a.2.d. A single peak transmission of 91% or more;

a.3. Optical opacity switches (filters) with a field of view of 30° or wider and a response time equal to or less than 1 ns;

b. "Fluoride fiber" cable, or optical fibers therefor, having an attenuation of less than 4 dB/km in the wavelength range exceeding 1,000 nm but not exceeding 3,000 nm.

6A995 "Lasers", not controlled by 6A005 or 6A205.

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: N/A
Items:

a. Carbon dioxide (CO_2) "lasers" having any of the following:

a.1. A CW output power exceeding 10 kW;

a.2. A pulsed output with a "pulse duration" exceeding 10 microseconds; *and*

a.2.a. An average output power exceeding 10 kW; *or*

a.2.b. A pulsed "peak power" exceeding 100 kW; *or*

a.3. A pulsed output with a "pulse duration" equal to or less than 10 microseconds; *and*

a.3.a. A pulse energy exceeding 5 J per pulse and "peak power" exceeding 2.5 kW; *or*

a.3.b. An average output power exceeding

2.5 kW;

b. Semiconductor lasers, as follows:

b.1. Individual, single-transverse mode semiconductor "lasers" having:

b.1.a. An average output power exceeding 100 MW; *or*

b.1.b. A wavelength exceeding 1,050 nm;

b.2. Individual, multiple-transverse mode semiconductor "lasers", or arrays of individual semiconductor "lasers", having a wavelength exceeding 1,050 nm;

c. Solid state, non-"tunable" "lasers", as follows:

c.1. Ruby "lasers" having an output energy exceeding 20 J per pulse;

c.2. Neodymium-doped (other than glass) "lasers", as follows, with an output wavelength exceeding 1,000 nm but not exceeding 1,100 nm:

c.2.a. Pulse-excited, "Q-switched lasers", with a pulse duration equal to or more than 1 ns, and a multiple-transverse mode output with any of the following:

c.2.a.1. A "peak power" exceeding 200 MW; *or*

c.2.a.2. An average output power exceeding 50 W;

c.2.b. Pulse-excited, non-"Q-switched lasers", having a multiple-transverse mode output with an average power exceeding 500 W; *or*

c.2.c. Continuously excited "lasers" having a multiple-transverse mode output with an average or CW output power exceeding 500 W;

d. Free electron "lasers".

6A996 "Magnetometers", n.e.s., having a "noise level" (sensitivity) lower (better) than 1.0 nT rms per square root Hz.

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.

6A997 Gravity meters (gravimeters) for ground use, n.e.s.

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:

a. Having a static accuracy of less (better) than 100 microgal; *or*

b. Being of the quartz element (Worden) type.

6A998 Airborne radar equipment, n.e.s., 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: $ value
Related Controls: N/A
Related Definitions: N/A
Items:
The list of items controlled is contained in the ECCN heading.

6A999 Specific processing equipment, as follows (see List of Items Controlled).

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry. A license is required for items controlled by this entry to North Korea for anti-terrorism reasons. The Commerce Country Chart is not designed to determine AT licensing requirements for this entry. See §742.19 of the EAR for additional information.

License Exceptions

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

List of Items Controlled

Unit: $ value
Related Controls: See also 6A203
Related Definitions: N/A
Items:

a. Seismic detection equipment;

b. Radiation hardened TV cameras, n.e.s.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

6B004 Optical equipment, 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 2
AT applies to entire entry	AT Column 1

License Exceptions

LVS: $5000
GBS: Yes for 6B004.b
CIV: Yes for 6B004.b

List of Items Controlled

Unit: Number
Related Controls: This entry does not control microscopes.
Related Definitions: N/A
Items:

a. Equipment for measuring absolute reflectance to an accuracy of ± 0.1% of the reflectance value;

b. Equipment other than optical surface scattering measurement equipment, having an unobscured aperture of more than 10 cm, specially designed for the non-contact optical measurement of a non-planar optical surface figure (profile) to an "accuracy" of 2 nm or less (better) against the required profile.

6B007 Equipment to produce, align and calibrate land-based gravity meters with a static accuracy of better than 0.1 mgal.

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

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

6B008 Pulse radar cross-section measurement systems having transmit pulse widths of 100 ns or less and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
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: Number
Related Controls: See also 6B108

Related Definitions: N/A
Items:

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

6B108 Systems, other than those controlled by 6B008, specially designed for radar cross section measurement usable for "missiles" and other subsystems.

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

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

6B995 Specially designed or modified equipment, including tools, dies, fixtures or gauges, and other specially designed components and accessories 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: N/A
Items:

a. For the manufacture or inspection of:

a.1. Free electron "laser" magnet wigglers;

a.2. Free electron "laser" photo injectors;

b. For the adjustment, to required tolerances, of the longitudinal magnetic field of free electron "lasers".

C. MATERIALS

6C002 Optical sensor materials, 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 2
AT applies to entire entry	AT Column 1

License Exceptions

LVS: $3000
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Number
Related Controls: See also 6C992
Related Definitions: N/A
Items:

a. Elemental tellurium (Te) of purity levels of 99.9995% or more;

b. Single crystals of cadmium zinc telluride (CdZnTe), with zinc content less than 6% by weight, or cadmium telluride (CdTe), or mercury cadmium telluride (HgCdTe) of any purity level, including epitaxial wafers thereof.

6C004 Optical materials, 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 2
AT applies to entire entry	AT Column 1

License Exceptions

LVS: $1500
GBS: Yes for 6C004.a and .e
CIV: Yes for 6C004.a and .e

List of Items Controlled

Unit: $ value
Related Controls: See also 6C994
Related Definitions: N/A
Items:

a. Zinc selenide (ZnSe) and zinc sulphide (ZnS) "substrate blanks" produced by the chemical vapor deposition process, having any of the following:

a.1. A volume greater than 100 cm^3; *or*

a.2. A diameter greater than 80 mm having a thickness of 20 mm or more;

b. Boules of the following electro-optic materials:

b.1. Potassium titanyl arsenate (KTA);

b.2. Silver gallium selenide ($AgGaSe_2$);

b.3. Thallium arsenic selenide (Tl_3AsSe_3, also known as TAS);

c. Non-linear optical materials, having all of the following:

c.1. Third order susceptibility (chi 3) of 10^{-6} m^2/V^2 or more; *and*

c.2. A response time of less than 1 ms;

d. "Substrate blanks" of silicon carbide or beryllium beryllium (Be/Be) deposited materials exceeding 300 mm in diameter or major axis length;

e. Glass, including fused silica, phosphate glass, fluorophosphate glass, zirconium fluoride (ZrF_4) and hafnium fluoride (HfF_4), having all of the following:

e.1. A hydroxyl ion (OH-) concentration of less than 5 ppm;

e.2. Integrated metallic purity levels of less

than 1 ppm; *and*

e.3. High homogeneity (index of refraction variance) less than 5 x 10^{-6};

f. Synthetically produced diamond material with an absorption of less than 10^{-5} cm^{-1} for wavelengths exceeding 200 nm but not exceeding 14,000 nm.

6C005 Synthetic crystalline "laser" host material in unfinished form, 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 2
AT applies to entire entry	AT Column 1

License Exceptions

LVS: $1500
GBS: N/A
CIV: N/A

List of Items Controlled

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

Items:

a. Titanium doped sapphire;

b. Alexandrite.

6C992 Optical sensing fibers not controlled by 6A002.d.3 which are modified structurally to have a "beat length" of less than 500 mm (high birefringence) or optical sensor materials not described in 6C002.b and having a zinc content of equal to or more than 6% by weight.

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: N/A
Items:

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

6C994 Optical materials.

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: N/A
Items:

a. Low optical absorption materials, as follows:

a.1. Bulk fluoride compounds containing ingredients with a purity of 99.999% or better; *or*

Note: 6C994.a.1 controls fluorides of zirconium or aluminum and variants.

a.2. Bulk fluoride glass made from compounds controlled by 6C004.e.1;

b. "Optical fiber preforms" made from bulk fluoride compounds containing ingredients with a purity of 99.999% or better, specially designed for the manufacture of "fluoride fibers" controlled by 6A994.b.

D. SOFTWARE

6D001 "Software" specially designed for the "development" or "production" of equipment controlled by 6A004, 6A005, 6A008 or 6B008.

License Requirements

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to "software" for equipment controlled by 6A004, 6A005, 6A008 or 6B008	NS Column 1
MT applies to "software" for equipment controlled by 6A008 or 6B008 for MT reasons	MT Column 1
NP applies to "software" for equipment controlled by 6A005 for NP reasons	NP Column 1
AT applies to entire entry	AT Column 1

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 the following:
1) Items controlled for MT reasons; *or*
2) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "software" specially designed for the "development" or "production" of equipment controlled by 6A008.l.3 or 6B008.

List of Items Controlled

Unit: $ value
Related Controls: See also 6D991
Related Definitions: N/A
Items:

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

6D002 "Software" specially designed for the "use" of equipment controlled by 6A002.b,

6A008 or 6B008.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to "software" for equipment controlled by 6A008 or 6B008 for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: Yes, except N/A for MT

List of Items Controlled

Unit: $ value
Related Controls: See also 6D102 and 6D992
Related Definitions: N/A
Items:

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

6D003 Other "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 Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: Yes for 6D003.h.1

TSR: Yes, except for the following:
1) Items controlled for MT reasons; or
2) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "software" for items controlled by 6D003.a.

List of Items Controlled

Unit: $ value
Related Controls: See also 6D103 and 6D993
Related Definitions: N/A
Items:

a. Acoustics "software", as follows:

a.1. "Software" specially designed for acoustic beam forming for the "real time processing" of acoustic data for passive reception using towed hydrophone arrays;

a.2. "Source code" for the "real time processing" of acoustic data for passive reception using towed hydrophone arrays;

a.3. "Software" specially designed for bottom or bay cable systems and having beamforming or "source code" for "real time processing" of acoustic data for passive reception;

b. Optical sensors. None.

c. Cameras. None.

d. Optics. None.

e. Lasers. None

f. Magnetometers.

f.1. "Software" specially designed for magnetic compensation systems for magnetic sensors designed to operate on mobile platforms;

f.2. "Software" specially designed for magnetic anomaly detection on mobile platforms;

g. Gravimeters. "Software" specially designed to correct motional influences of gravity meters or gravity gradiometers;

h. Radar "software", as follows:

h.1. Air Traffic Control "software" application "programs" hosted on general purpose computers located at Air Traffic Control centers and capable of any of the following:

h.1.a. Processing and displaying more than 150 simultaneous "system tracks"; *or*

h.1.b. Accepting radar target data from more than four primary radars;

h.2. "Software" for the design or "production" of radomes which:

h.2.a. Are specially designed to protect the "electronically steerable phased array antennae" controlled by 6A008.e.; *and*

h.2.b. Result in an antenna pattern having an "average side lobe level" more than 40 dB below the peak of the main beam level.

Technical Note: "Average side lobe level" in 6D003.h.2.b is measured over the entire array excluding the angular extent of the main beam and the first two side lobes on either side of the main beam.

6D102 "Software" specially designed for the "use" of goods controlled by 6A108.

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

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.

6D103 "Software" that processes post-flight, recorded data, obtained from the systems controlled by 6A108.b, enabling determination of vehicle position throughout its flight path.

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

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value

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

6D104 "Software" specially designed for the "use" of equipment controlled by 6A002, 6A003, 6A007, 6A102, and 6B108, for MT reasons.

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

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.

6D991 "Software" specially designed for the "development", "production", or "use" of equipment controlled by 6A991, 6A996, 6A997, or 6A998.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry, except "software" for equipment controlled by 6A991	AT Column 1
AT applies to "software" for equipment controlled by 6A991	AT Column 2

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.

6D992 "Software" specially designed for the "development" or "production" of equipment controlled by 6A992, 6A994, or 6A995.

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: $ value
Related Controls: N/A

Related Definitions: N/A
Items:

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

6D993 Other "software" not controlled by 6D003.

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: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. Air Traffic Control (ATC) "software" application "programs" hosted on general purpose computers located at Air Traffic Control centers, and capable of automatically handing over primary radar target data (if not correlated with secondary surveillance radar (SSR) data) from the host ATC center to another ATC center;

E. TECHNOLOGY

6E001 "Technology" according to the General Technology Note for the "development" of equipment, materials or "software" controlled by 6A (except 6A018, 6A991, 6A992, 6A994, 6A995, 6A996, 6A997, or 6A998), 6B (except 6B995), 6C (except 6C992 or 6C994), or 6D (except 6D991, 6D992, or 6D993.

License Requirements

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

Control(s)	*Country Chart*
NS applies to "technology" for items controlled by 6A001 to 6A008, 6B004 to 6B008, 6C002 to 6C005, or 6D001 to 6D003	NS Column 1
MT applies to "technology" for items controlled by 6A002, 6A007, 6A008, 6A102, 6A107, 6A108, 6B008, 6B108, 6D001, 6D002, 6D102 or 6D103 for MT reasons	MT Column 1

NP applies to "technology" for equipment controlled by 6A003, 6A005, 6A202, 6A203, 6A205, 6A225 or 6A226 for NP reasons	NP Column 2
RS applies to "technology" for equipment controlled by 6A002 or 6A003 for RS reasons	RS Column 1
CC applies to "technology" for equipment controlled by 6A002 for CC reasons	CC Column 1
AT applies to entire entry	AT Column 1
UN applies to "technology" for equipment controlled by 6A002 or 6A003 for UN reasons	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro)

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 the following:
1) Items controlled for MT reasons;
2) Items controlled by 6A004.e; *or*
3) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "technology" for the "development" of the following: (a) Items controlled by 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.e., 6A002.a.1.c, 6A008.l.3, 6B008, 6D003.a; (b) Equipment controlled by 6A001.a.2.c or 6A001.a.2.f when specially designed for real time applications; *or* (c) "Software" controlled by 6D001 and specially designed for the "development" or "production" of equipment controlled by 6A008.l.3 or 6B008.

List of Items Controlled

Unit: N/A
Related Controls: See also 6E101, 6E201, and 6E991
Related Definitions: N/A
Items:

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

6E002 "Technology" according to the General Technology Note for the "production" of equipment or materials controlled by 6A (except 6A018, 6A991, 6A992, 6A994, 6A995, 6A996, 6A997 or 6A998), 6B (except 6B995) or 6C (except 6C992 or 6C994).

License Requirements

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

Control(s)	*Country Chart*
NS applies to "technology" for equipment controlled by 6A001 to 6A008, 6B004 to 6B008, or 6C002 to 6C005	NS Column 1
MT applies to "technology" for equipment controlled by 6A002, 6A007, 6A008, 6A102, 6A107, 6A108, 6B008, or 6B108 for MT reasons	MT Column 1

NP applies to "technology" for equipment controlled by 6A003, 6A005, 6A202, 6A203, 6A205, 6A225 or 6A226 for NP reasons	NP Column 1
RS applies to "technology" for equipment controlled by 6A002 or 6A003 for RS reasons	RS Column 1
CC applies to "technology" for equipment controlled by 6A002 for CC reasons	CC Column 1
AT applies to entire entry	AT Column 1
UN applies to "technology" for equipment controlled by 6A002 or 6A003 for UN reasons	Rwanda; Federal Republic of Yugoslavia (Serbia and Montenegro)

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 the following:
1) Items controlled for MT reasons;
2) Items controlled by 6A004.e; *or*
3) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "technology" for the "development" of the following: (a) Items controlled by 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.5, 6A001.a.2.b, and 6A001.a.2.c; and (b) Equipment controlled by 6A001.a.2.e and 6A001.a.2.f when specially designed for real time applications; or (c) "Software" controlled by 6D001 and specially designed for the "development" or "production" of equipment controlled by 6A002.a.1.c, 6A008.l.3 or 6B008.

List of Items Controlled

Unit: N/A
Related Controls: See also 6E992
Related Definitions: N/A
Items:

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

6E003 Other "technology", 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

List of Items Controlled

Unit: N/A
Related Controls: See also 6E993
Related Definitions: N/A
Items:

a. Acoustics. None.

b. Optical sensors. None.

c. Cameras. None.

d. Optics, "technology", as follows:

d.1. Optical surface coating and treatment "technology" "required" to achieve uniformity of 99.5% or better for optical coatings 500 mm or more in diameter or major axis length and with a total loss (absorption and scatter) of less than 5 x 10^{-3};

N.B.: See also 2E003.f.

d.2. Optical fabrication "technology" using single point diamond turning techniques to produce surface finish accuracies of better than 10 nm rms on non-planar surfaces exceeding 0.5 m^2;

e. Lasers. "Technology" "required" for the "development", "production" or "use" of specially designed diagnostic instruments or targets in test facilities for "SHPL" testing or testing or evaluation of materials irradiated by "SHPL" beams;

f. Magnetometers. "Technology" "required" for the "development" or "production" of fluxgate "magnetometers" or fluxgate "magnetometer" systems, having any of the following:

f.1. A "noise level" of less than 0.05 nT rms per square root Hz at frequencies of less than 1 Hz; *or*

f.2. A "noise level" of less than 1 x 10^{-3} nT rms per square root Hz at frequencies of 1 Hz or more.

6E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" controlled by 6A002, 6A007.b and .c, 6A008, 6A102, 6A107, 6A108, 6B108, 6D102 or 6D103.

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

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: N/A
Related Controls: N/A
Related Definitions: 1.) This entry only controls "technology" for equipment controlled by 6A008 when it is designed for airborne applications and is usable in "missiles". 2.) This entry only controls "technology" for items in 6A002.a.1, a.3, and e that are specially designed or rated as electromagnetic (including "laser") and ionized-particle radiation resistant. 3.) This entry only controls "technology" for items in 6A007.b and .c when the accuracies in 6A007.b.1 and b.2 are met or exceeded.
Items:

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

6E102 "Technology" according to the General Technology Note for the "use" of "software" controlled by 6D001 and 6D002, for MT reasons.

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

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.

6E201 "Technology" according to the General Technology Note for the "use" of equipment controlled by 6A003.a.2, 6A003.a.3, 6A003.a.4, 6A005.a.1.c, 6A005.a.2.a, 6A005.c.1.b, 6A005.c.2.c.2, 6A005.c.2.d.2.b, 6A202, 6A203, 6A205, 6A225 or 6A226.

License Requirements

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP 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: This entry only controls "technology" for items in 6A005.a.2.a with an output power >40 W, 6A005.a.6 argon "lasers" only, 6A005.c.1.b with an output power > 30 W, 6A005.c.2.c.2.a with an output power > 40 W, 6A005.c.2.c.2.b with an output power > 40 W, and 6A005.c.2.d.2.b with an output power > 40 W.
Items:

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

6E991 "Technology" for the "development", "production" or "use" equipment controlled by 6A991, 6A996, 6A997, or 6A998.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry except "technology" for equipment controlled by 6A991	AT Column 1
AT applies to "technology" for equipment controlled by 6A991	AT Column 2

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.

6E992 "Technology" for the "development" or "production" of equipment, materials or "software" controlled by 6A992, 6A994, or 6A995, 6B995, 6C992, 6C994, or 6D993.

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

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

6E993 Other "technology", not controlled by 6E003.

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. Optical fabrication technologies for serially producing optical components at a rate exceeding 10 m^2 of surface area per year on any single spindle and with:

a.1. An area exceeding 1 m^2; *and*

a.2. A surface figure exceeding lambda/10 rms at the designed wavelength;

b. "Technology" for optical filters with a bandwidth equal to or less than 10 nm, a field of view (FOV) exceeding 40° and a resolution exceeding 0.75 line pairs per milliradian;

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*.