

SECTION H — ELECTRICITY

H10 SEMICONDUCTOR DEVICES; ELECTRIC SOLID-STATE DEVICES NOT OTHERWISE PROVIDED FOR

H10D INORGANIC ELECTRIC SEMICONDUCTOR DEVICES [2025.01]

Note(s) [2025.01]

1. This subclass covers electric semiconductor devices having inorganic semiconductor bodies. This includes the following kind of devices:
 - inorganic semiconductor devices specially adapted for rectifying, amplifying, oscillating or switching, e.g. transistors or diodes;
 - individual inorganic resistors or capacitors having potential barriers;
 - individual resistors, capacitors or inductors having no potential barriers, and specially adapted for integration with other semiconductor components;
 - semiconductor bodies, or regions thereof, of devices covered by this subclass;
 - electrodes of devices covered by this subclass;
 - integrated devices, e.g. CMOS integrated devices;
 - processes or apparatus specially adapted for the manufacture or treatment of such devices.
2. This subclass does not cover:
 - electronic memory devices, which are covered by subclass H10B;
 - semiconductor devices sensitive to infrared radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation, which are covered by subclass H10F;
 - light-emitting semiconductor devices having at least one potential barrier, which are covered by subclass H10H;
 - thermoelectric, thermomagnetic, piezoelectric, electrostrictive, magnetostrictive, magnetic-effect, superconducting or other electric solid-state devices, which are covered by subclass H10N;
 - constructional details other than semiconductor bodies or electrodes, which are covered by group H01L 23/00.
3. In this subclass, the periodic system used is the I to VIII group system indicated in the Periodic Table under Note (3) of section C.

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SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS.....99/00

Individual devices [2025.01]

1/00 Resistors, capacitors or inductors [2025.01]

Note(s) [2025.01]

This group covers:

- individual inorganic resistors or capacitors having potential barriers;

- individual resistors, capacitors or inductors having no potential barriers, and specially adapted for integration with other semiconductor components.

1/20 • Inductors [2025.01]

1/40 • Resistors [2025.01]

1/43 • • Resistors having PN junctions [2025.01]

- 1/47 • • Resistors having no potential barriers [2025.01]
- 1/60 • Capacitors [2025.01]
- 1/62 • • Capacitors having potential barriers [2025.01]
- 1/64 • • • Variable-capacitance diodes, e.g. varactors [2025.01]
- 1/66 • • • Conductor-insulator-semiconductor capacitors, e.g. MOS capacitors [2025.01]
- 1/68 • • Capacitors having no potential barriers [2025.01]

8/00 Diodes (variable-capacitance diodes H10D 1/64; gated diodes H10D 12/00) [2025.01]

Note(s) [2025.01]

In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.

- 8/01 • Manufacture or treatment [2025.01]
- 8/20 • Breakdown diodes, e.g. avalanche diodes [2025.01]
- 8/25 • • Zener diodes [2025.01]
- 8/30 • Point-contact diodes [2025.01]
- 8/40 • Transit-time diodes, e.g. IMPATT or TRAPATT diodes [2025.01]
- 8/50 • PIN diodes [2025.01]
- 8/60 • Schottky-barrier diodes [2025.01]
- 8/70 • Tunnel-effect diodes [2025.01]
- 8/75 • • Tunnel-effect PN diodes, e.g. Esaki diodes [2025.01]
- 8/80 • PNP diodes, e.g. Shockley diodes or break-over diodes [2025.01]

10/00 Bipolar junction transistors [BJT] [2025.01]

Note(s) [2025.01]

In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.

- 10/01 • Manufacture or treatment [2025.01]
- 10/40 • Vertical BJTs [2025.01]
- 10/60 • Lateral BJTs [2025.01]
- 10/80 • Heterojunction BJTs [2025.01]

12/00 Bipolar devices controlled by the field effect, e.g. insulated-gate bipolar transistors [IGBT] [2025.01]

Note(s) [2025.01]

In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.

- 12/01 • Manufacture or treatment [2025.01]

18/00 Thyristors [2025.01]

Note(s) [2025.01]

In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.

- 18/01 • Manufacture or treatment [2025.01]
- 18/40 • with turn-on by field effect [2025.01]
- 18/60 • Gate-turn-off devices [2025.01]
- 18/65 • • with turn-off by field effect [2025.01]
- 18/80 • Bidirectional devices, e.g. triacs [2025.01]

30/00 Field-effect transistors [FET] (insulated-gate bipolar transistors H10D 12/00) [2025.01]

Note(s) [2025.01]

In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.

- 30/01 • Manufacture or treatment [2025.01]
- 30/40 • FETs having zero-dimensional [0D], one-dimensional [1D] or two-dimensional [2D] charge carrier gas channels [2025.01]
- 30/43 • • having 1D charge carrier gas channels, e.g. quantum wire FETs or transistors having 1D quantum-confined channels [2025.01]
- 30/47 • • having 2D charge carrier gas channels, e.g. nanoribbon FETs or high electron mobility transistors [HEMT] [2025.01]
- 30/60 • Insulated-gate field-effect transistors [IGFET] (H10D 30/40 takes precedence) [2025.01]
- 30/62 • • Fin field-effect transistors [FinFET] [2025.01]
- 30/63 • • Vertical IGFETs (H10D 30/66 takes precedence) [2025.01]
- 30/64 • • Double-diffused metal-oxide semiconductor [DMOS] FETs [2025.01]
- 30/65 • • • Lateral DMOS [LDMOS] FETs [2025.01]
- 30/66 • • • Vertical DMOS [VDMOS] FETs [2025.01]
- 30/67 • • Thin-film transistors [TFT] [2025.01]
- 30/68 • • Floating-gate IGFETs [2025.01]
- 30/69 • • IGFETs having charge trapping gate insulators, e.g. MNOS transistors [2025.01]
- 30/80 • FETs having rectifying junction gate electrodes (H10D 30/40 takes precedence) [2025.01]
- 30/83 • • FETs having PN junction gate electrodes [2025.01]
- 30/87 • • FETs having Schottky gate electrodes, e.g. metal-semiconductor FETs [MESFET] [2025.01]

44/00 Charge transfer devices [2025.01]

Note(s) [2025.01]

In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.

- 44/01 • Manufacture or treatment [2025.01]
- 44/40 • Charge-coupled devices [CCD] [2025.01]
- 44/45 • • having field effect produced by insulated gate electrodes [2025.01]

48/00 Individual devices not covered by groups H10D 1/00-H10D 44/00 [2025.01]

Note(s) [2025.01]

In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.

- 48/01 • Manufacture or treatment [2025.01]
- 48/04 • • of devices having bodies comprising selenium or tellurium in uncombined form [2025.01]
- 48/042 • • • Preparation of foundation plates [2025.01]
- 48/043 • • • Preliminary treatment of the selenium or tellurium, its application to foundation plates or the subsequent treatment of the combination [2025.01]
- 48/044 • • • Conversion of the selenium or tellurium to the conductive state [2025.01]
- 48/045 • • • Treatment of the surface of the selenium or tellurium layer after having been made conductive [2025.01]

- 48/046 • • • Provision of discrete insulating layers [2025.01]
- 48/047 • • • Application of an electrode to the exposed surface of the selenium or tellurium after the selenium or tellurium has been applied to foundation plates [2025.01]
- 48/048 • • • Treatment of the complete device, e.g. by electroforming to form a barrier [2025.01]
- 48/049 • • • Ageing [2025.01]
- 48/07 • • of devices having bodies comprising cuprous oxide [Cu₂O] or cuprous iodide [CuI] [2025.01]
- 48/30 • Devices controlled by electric currents or voltages [2025.01]
- 48/32 • • Devices controlled by only the electric current supplied, or only the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched [2025.01]
- 48/34 • • • Bipolar devices [2025.01]
- 48/36 • • • Unipolar devices [2025.01]
- 48/38 • • Devices controlled only by variation of the electric current supplied, or only the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched [2025.01]
- 48/40 • Devices controlled by magnetic fields [2025.01]
- 48/50 • Devices controlled by mechanical forces, e.g. pressure [2025.01]
- 62/81 • • of structures exhibiting quantum-confinement effects, e.g. single quantum wells; of structures having periodic or quasi-periodic potential variation [2025.01]
- 62/815 • • • of structures having periodic or quasi-periodic potential variation, e.g. superlattices or multiple quantum wells [MQW] [2025.01]
- 62/82 • • Heterojunctions [2025.01]
- 62/822 • • • comprising only Group IV materials heterojunctions, e.g. Si/Ge heterojunctions [2025.01]
- 62/824 • • • comprising only Group III-V materials heterojunctions, e.g. GaN/AlGaIn heterojunctions [2025.01]
- 62/826 • • • comprising only Group II-VI materials heterojunctions, e.g. CdTe/HgTe heterojunctions [2025.01]
- 62/83 • • being Group IV materials, e.g. B-doped Si or undoped Ge [2025.01]
- 62/832 • • • being Group IV materials comprising two or more elements, e.g. SiGe [2025.01]
- 62/834 • • • further characterised by the dopants [2025.01]
- 62/84 • • being selenium or tellurium only [2025.01]

Note(s) [2025.01]

This group does not cover chemical compounds of selenium or of tellurium.

Constructional details [2025.01]

- 62/00 **Semiconductor bodies, or regions thereof, of devices having potential barriers [2025.01]**
- 62/10 • Shapes, relative sizes or dispositions of the regions of the semiconductor bodies; Shapes of the semiconductor bodies [2025.01]
- 62/13 • • Semiconductor regions connected to electrodes carrying current to be rectified, amplified or switched, e.g. source or drain regions [2025.01]

Note(s) [2025.01]

This group covers only semiconductor regions for devices that comprise three or more electrodes.

- 62/17 • • Semiconductor regions connected to electrodes not carrying current to be rectified, amplified or switched, e.g. channel regions [2025.01]
- 62/40 • Crystalline structures [2025.01]
- 62/50 • Physical imperfections [2025.01]
- 62/53 • • the imperfections being within the semiconductor body [2025.01]
- 62/57 • • the imperfections being on the surface of the semiconductor body, e.g. the body having a roughened surface [2025.01]
- 62/60 • Impurity distributions or concentrations [2025.01]
- 62/80 • characterised by the materials [2025.01]

Note(s) [2025.01]

1. When classifying in this group, constituents of a material are considered irrespective of any dopants or other impurities.
2. In this group:
 - groups H10D 62/81-H10D 62/815, covering quantum or superlattice structures, take precedence over groups H10D 62/82-H10D 62/826, covering heterojunctions;

- 62/85 • • being Group III-V materials, e.g. GaAs [2025.01]
- 62/852 • • • being Group III-V materials comprising three or more elements, e.g. AlGaIn or InAsSbP [2025.01]
- 62/854 • • • further characterised by the dopants [2025.01]
- 62/86 • • being Group II-VI materials, e.g. ZnO [2025.01]
- 62/862 • • • being Group II-VI materials comprising three or more elements, e.g. CdZnTe [2025.01]
- 62/864 • • • further characterised by the dopants [2025.01]

64/00 Electrodes of devices having potential barriers [2025.01]

- 64/01 • Manufacture or treatment [2025.01]
- 64/20 • Electrodes characterised by their shapes, relative sizes or dispositions [2025.01]
- 64/23 • • Electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. sources, drains, anodes or cathodes [2025.01]
- 64/27 • • Electrodes not carrying the current to be rectified, amplified, oscillated or switched, e.g. gates [2025.01]
- 64/60 • Electrodes characterised by their materials [2025.01]
- 64/62 • • Electrodes ohmically coupled to a semiconductor [2025.01]
- 64/64 • • Electrodes comprising a Schottky barrier to a semiconductor [2025.01]
- 64/66 • • Electrodes having a conductor capacitively coupled to a semiconductor by an insulator, e.g. MIS electrodes [2025.01]
- 64/68 • • • characterised by the insulator, e.g. by the gate insulator [2025.01]

Integrated devices; Assemblies of multiple devices [2025.01]

- 80/00 **Assemblies of multiple devices comprising at least one device covered by this subclass [2025.01]**

H10D

- 80/20 • the at least one device being covered by groups H10D 1/00-H10D 48/00, e.g. assemblies comprising capacitors, power FETs or Schottky diodes [2025.01]
- 80/30 • the at least one device being covered by groups H10D 84/00-H10D 86/00, e.g. assemblies comprising integrated circuit processor chips [2025.01]
- 84/00 **Integrated devices formed in or on semiconductor substrates that comprise only semiconducting layers, e.g. on Si wafers or on GaAs-on-Si wafers [2025.01]**

Note(s) [2025.01]
In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.
- 84/01 • Manufacture or treatment [2025.01]
- 84/02 • characterised by using material-based technologies [2025.01]
- 84/03 • • • using Group IV technology, e.g. silicon technology or silicon-carbide [SiC] technology [2025.01]
- 84/05 • • • using Group III-V technology [2025.01]
- 84/07 • • • using Group II-VI technology [2025.01]
- 84/08 • • • using combinations of technologies, e.g. using both Si and SiC technologies or using both Si and Group III-V technologies [2025.01]
- 84/40 • characterised by the integration of at least one component covered by groups H10D 12/00 or H10D 30/00 with at least one component covered by groups H10D 10/00 or H10D 18/00, e.g. integration of IGFETs with BJTs [2025.01]
- 84/60 • characterised by the integration of at least one component covered by groups H10D 10/00 or H10D 18/00, e.g. integration of BJTs (H10D 84/40 takes precedence) [2025.01]
- 84/63 • • Combinations of vertical and lateral BJTs [2025.01]
- 84/65 • • Integrated injection logic [2025.01]
- 84/67 • • Complementary BJTs [2025.01]
- 84/80 • characterised by the integration of at least one component covered by groups H10D 12/00 or H10D 30/00, e.g. integration of IGFETs (H10D 84/40 takes precedence) [2025.01]
- 84/82 • • of only field-effect components [2025.01]
- 84/83 • • • of only insulated-gate FETs [IGFET] [2025.01]

- 84/84 • • • • Combinations of enhancement-mode IGFETs and depletion-mode IGFETs [2025.01]
 - 84/85 • • • • Complementary IGFETs, e.g. CMOS [2025.01]
 - 84/86 • • of Schottky-barrier gate FETs [2025.01]
 - 84/87 • • of PN-junction gate FETs [2025.01]
 - 84/90 • Masterslice integrated circuits [2025.01]
 - 86/00 **Integrated devices formed in or on insulating or conducting substrates, e.g. formed in silicon-on-insulator [SOI] substrates or on stainless steel or glass substrates [2025.01]**

Note(s) [2025.01]
In this group, when the manufacture or treatment of a device is determined to be novel and non-obvious, the device itself is also classified.
 - 86/01 • Manufacture or treatment [2025.01]
 - 86/03 • • wherein the substrate comprises sapphire, e.g. silicon-on-sapphire [SOS] [2025.01]
 - 86/40 • characterised by multiple TFTs [2025.01]
 - 86/60 • • wherein the TFTs are in active matrices [2025.01]
 - 86/80 • characterised by multiple passive components, e.g. resistors, capacitors or inductors [2025.01]
 - 86/85 • • characterised by only passive components [2025.01]
 - 87/00 **Integrated devices comprising both bulk components and either SOI or SOS components on the same substrate [2025.01]**
 - 88/00 **Three-dimensional [3D] integrated devices [2025.01]**
 - 89/00 **Aspects of integrated devices not covered by groups H10D 84/00-H10D 88/00 [2025.01]**
 - 89/10 • Integrated device layouts [2025.01]
 - 89/60 • Integrated devices comprising arrangements for electrical or thermal protection, e.g. protection circuits against electrostatic discharge [ESD] [2025.01]
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- 99/00 **Subject matter not provided for in other groups of this subclass [2025.01]**