

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY (NOTE omitted)

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

H10B ELECTRONIC MEMORY DEVICES

NOTE

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.

Volatile memory devices

10/00 Static random access memory [SRAM] devices

- 10/10 . SRAM devices comprising bipolar components

WARNING

Group [H10B 10/10](#) is incomplete pending reclassification of documents from groups [H01L 27/1027](#), [H01L 27/1028](#) and [H10B 99/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/12 . {comprising a MOSFET load element}
- 10/125 . . {the MOSFET being a thin film transistor [TFT]}
- 10/15 . {comprising a resistor load element}
- 10/18 . {Peripheral circuit regions}

12/00 Dynamic random access memory [DRAM] devices

- 12/01 . {Manufacture or treatment}
- 12/02 . . {for one transistor one-capacitor [1T-1C] memory cells}
- 12/03 . . . {Making the capacitor or connections thereto}
- 12/033 {the capacitor extending over the transistor}
- 12/0335 {Making a connection between the transistor and the capacitor, e.g. plug}
- 12/036 {the capacitor extending under the transistor}
- 12/038 {the capacitor being in a trench in the substrate}
- 12/0383 {wherein the transistor is vertical}
- 12/0385 {Making a connection between the transistor and the capacitor, e.g. buried strap}
- 12/0387 {Making the trench}
- 12/05 . . . {Making the transistor}
- 12/053 {the transistor being at least partially in a trench in the substrate (vertical transistor in combination with a capacitor formed in a substrate trench [H10B 12/0383](#))}
- 12/056 {the transistor being a FinFET}
- 12/09 . . {with simultaneous manufacture of the peripheral circuit region and memory cells}

- 12/10 . DRAM devices comprising bipolar components

WARNING

Group [H10B 12/10](#) is incomplete pending reclassification of documents from groups [H01L 27/1027](#), [H01L 27/1028](#) and [H10B 99/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/20 . {DRAM devices comprising floating-body transistors, e.g. floating-body cells}
- 12/30 . {DRAM devices comprising one-transistor - one-capacitor [1T-1C] memory cells}
- 12/31 . . {having a storage electrode stacked over the transistor}
- 12/312 . . . {with a bit line higher than the capacitor}
- 12/315 . . . {with the capacitor higher than a bit line}
- 12/318 . . . {the storage electrode having multiple segments}
- 12/33 . . {the capacitor extending under the transistor}
- 12/34 . . {the transistor being at least partially in a trench in the substrate}
- 12/36 . . {the transistor being a FinFET}
- 12/37 . . {the capacitor being at least partially in a trench in the substrate}
- 12/373 . . . {the capacitor extending under or around the transistor}
- 12/377 . . . {having a storage electrode extension located over the transistor}
- 12/39 . . {the capacitor and the transistor being in a same trench}
- 12/395 . . . {the transistor being vertical}
- 12/48 . . {Data lines or contacts therefor}
- 12/482 . . . {Bit lines}
- 12/485 . . . {Bit line contacts}
- 12/488 . . . {Word lines}
- 12/50 . {Peripheral circuit region structures}

Non-volatile memory devices

- 20/00 Read-only memory [ROM] devices**

20/10	<ul style="list-style-type: none"> ROM devices comprising bipolar components <p>WARNING</p> <p>Group H10B 20/10 is incomplete pending reclassification of documents from groups H01L 27/1027, H01L 27/1028 and H10B 99/00.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	41/41	<ul style="list-style-type: none"> of a memory region comprising a cell select transistor, e.g. NAND
		41/42	<ul style="list-style-type: none"> Simultaneous manufacture of periphery and memory cells
		41/43	<ul style="list-style-type: none"> comprising only one type of peripheral transistor
		41/44	<ul style="list-style-type: none"> with a control gate layer also being used as part of the peripheral transistor
		41/46	<ul style="list-style-type: none"> with an inter-gate dielectric layer also being used as part of the peripheral transistor
20/20	<ul style="list-style-type: none"> Programmable ROM [PROM] devices comprising field-effect components (H10B 20/10 takes precedence) <p>WARNING</p> <p>Group H10B 20/20 is impacted by reclassification into group H10B 20/25.</p> <p>Groups H10B 20/20 and H10B 20/25 should be considered in order to perform a complete search.</p>	41/47	<ul style="list-style-type: none"> with a floating-gate layer also being used as part of the peripheral transistor
		41/48	<ul style="list-style-type: none"> with a tunnel dielectric layer also being used as part of the peripheral transistor
		41/49	<ul style="list-style-type: none"> comprising different types of peripheral transistor
		41/50	<ul style="list-style-type: none"> characterised by the boundary region between the core region and the peripheral circuit region
		41/60	<ul style="list-style-type: none"> the control gate being a doped region, e.g. single-poly memory cell
20/25	<ul style="list-style-type: none"> One-time programmable ROM [OTPROM] devices, e.g. using electrically-fusible links <p>WARNING</p> <p>Group H10B 20/25 is incomplete pending reclassification of documents from group H10B 20/20.</p> <p>Groups H10B 20/20 and H10B 20/25 should be considered in order to perform a complete search.</p>	41/70	<ul style="list-style-type: none"> the floating gate being an electrode shared by two or more components
		43/00	EEPROM devices comprising charge-trapping gate insulators
		43/10	<ul style="list-style-type: none"> characterised by the top-view layout
		43/20	<ul style="list-style-type: none"> characterised by three-dimensional arrangements, e.g. with cells on different height levels
		43/23	<ul style="list-style-type: none"> with source and drain on different levels, e.g. with sloping channels
		43/27	<ul style="list-style-type: none"> the channels comprising vertical portions, e.g. U-shaped channels
20/27	<ul style="list-style-type: none"> {ROM only} 	43/30	<ul style="list-style-type: none"> characterised by the memory core region
20/30	<ul style="list-style-type: none"> {having the source region and the drain region on the same level, e.g. lateral transistors} 	43/35	<ul style="list-style-type: none"> with cell select transistors, e.g. NAND
20/34	<ul style="list-style-type: none"> {Source electrode or drain electrode programmed} 	43/40	<ul style="list-style-type: none"> characterised by the peripheral circuit region
20/36	<ul style="list-style-type: none"> {Gate programmed, e.g. different gate material or no gate} 	43/50	<ul style="list-style-type: none"> characterised by the boundary region between the core and peripheral circuit regions
20/363	<ul style="list-style-type: none"> {Gate conductor programmed} 	51/00	Ferroelectric RAM [FeRAM] devices comprising ferroelectric memory transistors
20/367	<ul style="list-style-type: none"> {Gate dielectric programmed, e.g. different thickness} 	51/10	<ul style="list-style-type: none"> characterised by the top-view layout
20/38	<ul style="list-style-type: none"> {Doping programmed, e.g. mask ROM} 	51/20	<ul style="list-style-type: none"> characterised by the three-dimensional arrangements, e.g. with cells on different height levels
20/383	<ul style="list-style-type: none"> {Channel doping programmed} 	51/30	<ul style="list-style-type: none"> characterised by the memory core region
20/387	<ul style="list-style-type: none"> {Source region or drain region doping programmed} 	51/40	<ul style="list-style-type: none"> characterised by the peripheral circuit region
20/40	<ul style="list-style-type: none"> {having the source region and drain region on different levels, e.g. vertical channel} 	51/50	<ul style="list-style-type: none"> characterised by the boundary region between the core and peripheral circuit regions
20/50	<ul style="list-style-type: none"> {having transistors on different levels, e.g. 3D ROM} 	53/00	Ferroelectric RAM [FeRAM] devices comprising ferroelectric memory capacitors
20/60	<ul style="list-style-type: none"> {Peripheral circuit regions} 	53/10	<ul style="list-style-type: none"> characterised by the top-view layout
20/65	<ul style="list-style-type: none"> {of memory structures of the ROM only type} 	53/20	<ul style="list-style-type: none"> characterised by the three-dimensional arrangements, e.g. with cells on different height levels
41/00	Electrically erasable-and-programmable ROM [EEPROM] devices comprising floating gates	53/30	<ul style="list-style-type: none"> characterised by the memory core region
41/10	<ul style="list-style-type: none"> characterised by the top-view layout 	53/40	<ul style="list-style-type: none"> characterised by the peripheral circuit region
41/20	<ul style="list-style-type: none"> characterised by three-dimensional arrangements, e.g. with cells on different height levels 	53/50	<ul style="list-style-type: none"> characterised by the boundary region between the core and peripheral circuit regions
41/23	<ul style="list-style-type: none"> with source and drain on different levels, e.g. with sloping channels 		
41/27	<ul style="list-style-type: none"> the channels comprising vertical portions, e.g. U-shaped channels 		
41/30	<ul style="list-style-type: none"> characterised by the memory core region 		
41/35	<ul style="list-style-type: none"> with a cell select transistor, e.g. NAND 		
41/40	<ul style="list-style-type: none"> characterised by the peripheral circuit region 		

61/00 Magnetic memory devices, e.g. magnetoresistive RAM [MRAM] devices**WARNING**

Group [H10B 61/00](#) is incomplete pending reclassification of documents from group [H10N 59/00](#).

Groups [H10N 59/00](#) and [H10B 61/00](#) should be considered in order to perform a complete search.

- 61/10 . {comprising components having two electrodes, e.g. diodes or MIM elements}
- 61/20 . {comprising components having three or more electrodes, e.g. transistors}
- 61/22 . . {of the field-effect transistor [FET] type}

63/00 Resistance change memory devices, e.g. resistive RAM [ReRAM] devices**WARNING**

Group [H10B 63/00](#) is impacted by reclassification into groups [H10B 63/10](#) and [H10N 79/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 63/10 . Phase change RAM [PCRAM, PRAM] devices

WARNING

Group [H10B 63/10](#) is incomplete pending reclassification of documents from group [H10B 63/00](#).

Groups [H10B 63/00](#) and [H10B 63/10](#) should be considered in order to perform a complete search.

- 63/20 . {comprising selection components having two electrodes, e.g. diodes}
- 63/22 . . {of the metal-insulator-metal type}
- 63/24 . . {of the Ovonic threshold switching type}
- 63/30 . {comprising selection components having three or more electrodes, e.g. transistors}
- 63/32 . . {of the bipolar type}
- 63/34 . . {of the vertical channel field-effect transistor type}
- 63/80 . {Arrangements comprising multiple bistable or multi-stable switching components of the same type on a plane parallel to the substrate, e.g. cross-point arrays}
- 63/82 . . {the switching components having a common active material layer}
- 63/84 . . {arranged in a direction perpendicular to the substrate, e.g. 3D cell arrays}
- 63/845 . . . {the switching components being connected to a common vertical conductor}

69/00 Erasable-and-programmable ROM [EPROM] devices not provided for in groups [H10B 41/00](#) - [H10B 63/00](#), e.g. ultraviolet erasable-and-programmable ROM [UVEPROM] devices**WARNING**

Group [H10B 69/00](#) is incomplete pending reclassification of documents from groups [H01L 27/1027](#) and [H01L 27/1028](#).

Groups [H01L 27/1027](#), [H01L 27/1028](#) and [H10B 69/00](#) should be considered in order to perform a complete search.

80/00 Assemblies of multiple devices comprising at least one memory device covered by this subclass**WARNING**

Group [H10B 80/00](#) is incomplete pending reclassification of documents from groups [H01L 25/065](#), [H01L 25/0652](#), [H01L 25/0655](#), [H01L 25/0657](#), [H01L 25/16](#), [H01L 25/162](#), [H01L 25/165](#), [H01L 25/167](#) and [H01L 25/18](#).

All groups listed in this Warning should be considered in order to perform a complete search.

99/00 Subject matter not provided for in other groups of this subclass**WARNING**

Group [H10B 99/00](#) is incomplete pending reclassification of documents from groups [H01L 27/102](#) and [H01L 27/1022](#).

Group [H10B 99/00](#) is also impacted by reclassification into groups [H10B 10/10](#), [H10B 12/10](#) and [H10B 20/10](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 99/10 . {Memory cells having a cross-point geometry}

WARNING

Group [H10B 99/10](#) is incomplete pending reclassification of documents from group [H01L 27/10](#).

Groups [H01L 27/10](#) and [H10B 99/10](#) should be considered in order to perform a complete search.

- 99/14 . {comprising memory cells that only have passive resistors or passive capacitors}

WARNING

Group [H10B 99/14](#) is incomplete pending reclassification of documents from group [H01L 27/101](#).

Groups [H01L 27/101](#) and [H10B 99/14](#) should be considered in order to perform a complete search.

H10B

- 99/16 • {comprising memory cells having diodes}

WARNING

Group [H10B 99/16](#) is incomplete pending reclassification of documents from group [H01L 27/1021](#).

Groups [H01L 27/1021](#) and [H10B 99/16](#) should be considered in order to perform a complete search.

- 99/20 • {comprising memory cells having thyristors}

WARNING

Group [H10B 99/20](#) is incomplete pending reclassification of documents from groups [H01L 27/1027](#) and [H01L 27/1028](#).

Groups [H01L 27/1027](#), [H01L 27/1028](#) and [H10B 99/20](#) should be considered in order to perform a complete search.

- 99/22 • {including field-effect components}

WARNING

Group [H10B 99/22](#) is incomplete pending reclassification of documents from group [H01L 27/105](#).

Groups [H01L 27/105](#) and [H10B 99/22](#) should be considered in order to perform a complete search.