H03K

PULSE TECHNIQUE (measuring pulse characteristics G01R; mechanical counters having an electrical input G06M; information storage devices in general G11; sample-and-hold arrangements in electric analogue stores G11C 27/02; construction of switches involving contact making and breaking for generation of pulses, e.g. by using a moving magnet, H01H; static conversion of electric power H02M; generation of oscillations by circuits employing active elements which operate in a non-switching manner H03B; modulating sinusoidal oscillations with pulses H03C, H04L; discriminator circuits involving pulse counting H03D; automatic control of generators H03L; starting, synchronisation or stabilisation of generators where the type of generator is irrelevant or unspecified H03L; coding, decoding or code conversion in general H03M)

Definition statement

This place covers:

- Methods, circuits, devices or apparatus using active elements operating in a discontinuous or switching manner for generating, counting, amplifying, shaping, modulating, demodulating or otherwise manipulating signals;
- Electronic switching not involving contact-making and braking;
- Logic circuits handling electric pulses.

In general, it should be noted that the word 'Pulse' in the title description is a clear limiting feature for this subclass.

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Measuring pulse characteristic</th>
<th>G01R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring electrical signals (to get a value)</td>
<td>G01R 17/00 - G01R 29/00</td>
</tr>
<tr>
<td>Testing electrical circuits</td>
<td>G01R 31/00</td>
</tr>
<tr>
<td>Mechanical counters having an electrical input</td>
<td>G06M:</td>
</tr>
<tr>
<td>Information storage devices in general</td>
<td>G11</td>
</tr>
<tr>
<td>Sample-and-hold arrangements in electric analogue stores</td>
<td>G11C 27/02</td>
</tr>
<tr>
<td>Construction of switches involving contact making and breaking for generation of pulses, e.g. by using a moving magnet</td>
<td>H01H</td>
</tr>
<tr>
<td>Static conversion of electric power</td>
<td>H02M:</td>
</tr>
<tr>
<td>Generation of oscillations by circuits employing active elements which operate in a non-switching manner</td>
<td>H03B:</td>
</tr>
<tr>
<td>Modulating sinusoidal oscillations with pulses</td>
<td>H03C, H04L:</td>
</tr>
<tr>
<td>Discriminator circuits involving pulse counting</td>
<td>H03D:</td>
</tr>
<tr>
<td>Automatic control of generators</td>
<td>H03L</td>
</tr>
<tr>
<td>Starting, synchronisation or stabilisation of generators where the type of generator is irrelevant or unspecified</td>
<td>H03L</td>
</tr>
<tr>
<td>Coding, decoding or code conversion in general</td>
<td>H03M</td>
</tr>
</tbody>
</table>
Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential</td>
<td>really means differential, not just complementary, i.e. two signals with an inverter in between are not differential</td>
</tr>
</tbody>
</table>

H03K 3/00

Circuits for generating electric pulses; Monostable, bistable or multistable circuits (H03K 4/00 takes precedence; for digital computers G06F 1/025, (G06F 1/04))

Definition statement

This place covers:

- Latches and flip-flops;
- Non-linear (switching) oscillators;
- Latching level shifters.

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Term</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty cycle correction circuits</td>
<td>H03K 5/1565</td>
</tr>
<tr>
<td>Pulse width modulation</td>
<td>H03K 7/08</td>
</tr>
<tr>
<td>Random number generators</td>
<td>G06F 7/58</td>
</tr>
<tr>
<td>Linear (non-switching) oscillators</td>
<td>H03B</td>
</tr>
</tbody>
</table>

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

<table>
<thead>
<tr>
<th>Term</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latches used in scan test of integrated circuits</td>
<td>G01R 31/318541</td>
</tr>
<tr>
<td>Latches and flip-flops used as static stores in semiconductor memories</td>
<td>G11C 11/41</td>
</tr>
<tr>
<td>Power pulse generators for driving lasers</td>
<td>H01S 5/42</td>
</tr>
<tr>
<td>Voltage- and current controlled oscillators</td>
<td>H03L 7/0995</td>
</tr>
</tbody>
</table>

Special rules of classification

Latching level shifters should be classified in the corresponding bistable circuit subgroups of this main group.
**H03K 4/00**

Generating pulses having essentially a finite slope or stepped portions (generation of supply voltages from deflection waveforms **H04N 3/18**)

**Definition statement**

*This place covers:*

- Relaxation oscillators.
- Switched-capacitor oscillators
- Ramp and sawtooth generators.

**Relationships with other classification places**

Multivibrators generating pulse signals other than finite-sloped or staircase signals should be classified in **H03K 3/00**.

**References**

**Limiting references**

*This place does not cover:*

<table>
<thead>
<tr>
<th>Term</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modifying slopes of pulses</td>
<td>H03K 6/04</td>
</tr>
<tr>
<td>Direct-digital frequency synthesizers</td>
<td>G06F 1/025</td>
</tr>
<tr>
<td>Generation of supply voltages from deflection waveforms</td>
<td>H04N 3/18</td>
</tr>
</tbody>
</table>

**Special rules of classification**

**H03K 4/026**: Digital generators followed by a digital-to-analog converter to produce analogue output stepped signals.

**H03K 5/00**

Manipulating pulses not covered by one of the other main groups in this subclass (circuits with regenerative action **H03K 3/00, H03K 4/00**; by the use of non-linear magnetic or dielectric devices **H03K 3/45**)

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regenerative action</td>
<td>internal or external positive feed-back.</td>
</tr>
<tr>
<td>Delay line</td>
<td>transmission line</td>
</tr>
</tbody>
</table>

**H03K 5/00006**

{Changing the frequency (modulating pulses **H03K 7/00**; frequency dividers **H03K 21/00 - H03K 29/00**; additive or subtractive mixing of two pulse rates into one **G06F 7/605**; pulse rate dividers **G06F 7/68**)}

**Definition statement**

*This place covers:*

Mostly pulse rate multiply by 2 circuits based on delaying and combining.
References

Limiting references
This place does not cover:

| Pulse frequency multipliers | G06F 7/68 |

H03K 5/003
Changing the DC level (television signals H04N 3/00)

References

Limiting references
This place does not cover:

| Level shifters interfacing between logic families or coupling logic circuit stages | H03K 19/0175 |

H03K 5/01
Shaping pulses (discrimination against noise or interference H03K 5/125)

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| For reducing generated interference | H03K 17/16, H03K 19/00346 |
| For impedance matching | H03K 19/00, H04L 25/00 |
| For reducing power consumption | H03K 19/0008 |
| For baseband data transmission | H04L 25/0286, H04L 25/03834 |

H03K 5/04
by increasing duration; by decreasing duration

Definition statement
This place covers:
Also used for slew rate control circuits.

H03K 5/06
by the use of delay lines or other analogue delay elements

Definition statement
This place covers:
For instance circuits for staggering turn on signals.
H03K 5/065
{using dispersive delay lines}

Definition statement
This place covers:
Delay lines having propagation speed depending on input frequency.

H03K 5/08
by limiting; by thresholding; by slicing, i.e. combined limiting and thresholding (H03K 5/07 takes precedence; comparing one pulse with another H03K 5/22; providing a determined threshold for switching H03K 17/30)

Definition statement
This place covers:
Clamping circuits in general

References
Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>For details of threshold comparators</th>
<th>H03K 5/24, G01R 19/165, H03F 3/45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping for ESD protection</td>
<td>H01L 27/0251</td>
</tr>
</tbody>
</table>

H03K 5/084
{modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal}

Definition statement
This place covers:
The value of the threshold is generated by feedback AND the value is modified by switching.

H03K 5/086
{generated by feedback}

Definition statement
This place covers:
i.e. the value of the threshold is generated by feedback.
**H03K 5/088**

{modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal}

**Definition statement**

*This place covers:*

The switching only relating to the switching instants.

**References**

*Limiting references*

*This place does not cover:*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the value of the threshold being switched is generated by feedback</td>
<td>H03K 5/086</td>
</tr>
<tr>
<td>If the value is generated by feedback AND modified by switching</td>
<td>H03K 5/088</td>
</tr>
</tbody>
</table>

**H03K 5/12**

by steepening leading or trailing edges

**Definition statement**

*This place covers:*

Mostly used for pulse compression circuits using non-linear transmission lines having propagation speed depending on input amplitude, such as diode loaded transmission lines, to steepen one of the pulse edges and slow the other.

**References**

*Limiting references*

*This place does not cover:*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing the slew rate of leading and/or falling pulses in general</td>
<td>H03K 5/01, H03K 5/04, H03K 5/06</td>
</tr>
<tr>
<td>Accelerating switching</td>
<td>H03K 17/04, H03K 19/01</td>
</tr>
</tbody>
</table>

**H03K 5/1252**

Suppression or limitation of noise or interference (specially adapted for transmission systems [H04B 15/00, H04L 25/08])

**Definition statement**

*This place covers:*

Mostly suppression of glitches in binary signals by delay and subsequent logic combination with the original signal.

Some documents (often also classified in [H03K 5/156](#) or [H03K 5/1565](#)) relate to phase noise suppression in (interpolated) clock signals.
References

Limiting references

This place does not cover:

| Suppressing noise by slew rate control | H03K 5/04, H03K 17/16, H03K 19/00346 |

Special rules of classification

For glitches produced when switching from one clock signal to another G06F 1/08 takes precedence.

H03K 5/13

Arrangements having a single output and transforming input signals into pulses delivered at desired time intervals (measuring time intervals using electronic timing, e.g. counting means G04F 1/005)

Definition statement

This place covers:

• Mainly used for delay circuits but also for some generic pulse circuits having multiple inputs and a single output
• Phase interpolation

Special rules of classification

Additional aspects are classified as follows

Delay H03K 2005/00013
Phase H03K 2005/00286
Pulse H03K 2005/00293
Phase interpolation circuits H03K 2005/00052

H03K 5/131

Digitally controlled

Special rules of classification

Also classify in: H03K 2005/00058 (controlled by a digital setting)

H03K 5/135

by the use of time reference signals, e.g. clock signals

Definition statement

This place covers:

• Synchronising a signal to a clock signal
• Using a clock signal as a reference for controlling a delay, e.g. synchronous mirror delay circuits (SMDs), in which a detected number of gates in a first delay line - through which a signal edge propagates in a predetermined time defined by the reference clock - is used for controlling the number of delay elements in a second delay line for compensation.
References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Reference</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronisation of pulses generated from circuits classified in H03K 4/00</td>
<td>H03K 4/90</td>
</tr>
<tr>
<td>Synchronisation of clock signals in data processing equipment</td>
<td>G06F 1/12</td>
</tr>
<tr>
<td>Clocked shift registers</td>
<td>G11C 19/00</td>
</tr>
<tr>
<td>PLL, DLL</td>
<td>H03L 7/08</td>
</tr>
<tr>
<td>Synchronisation in TDM systems</td>
<td>H04J 3/00</td>
</tr>
<tr>
<td>Synchronising data receiver with transmitter, e.g. using clock data recovery</td>
<td>H04L 7/00</td>
</tr>
</tbody>
</table>

H03K 5/15

Arrangements in which pulses are delivered at different times at several outputs, i.e. pulse distributors (distributing, switching or gating arrangements H03K 17/00)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Reference</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributing clock signals in data processing equipment</td>
<td>G06F 1/10</td>
</tr>
</tbody>
</table>

H03K 5/15026

{with asynchronously driven series connected output stages}

Definition statement

This place covers:

Tapped arrangement

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Reference</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>using a chain of active delay devices</td>
<td>H03K5/132</td>
</tr>
</tbody>
</table>

H03K 5/1506

{with parallel driven output stages; with synchronously driven series connected output stages}

Definition statement

This place covers:

Pulse distributor with output stages driven more or less synchronously either in parallel in a tree-like structure OR sequentially with shift register like structure.
References

Limiting references

This place does not cover:

| Distributing clock signals in data processing equipment | G06F 1/10 |

H03K 5/15093

{using devices arranged in a shift register}

References

Limiting references

This place does not cover:

| Shift registers per se | G11C 19/00 |

H03K 5/151

with two complementary outputs

Definition statement

This place covers:
Providing simultaneous switching of two complementary signals.

H03K 5/1515

{non-overlapping}

Definition statement

This place covers:
In particular suitable for preventing simultaneous conduction in push pull stages.

References

Limiting references

This place does not cover:

| Protecting switching stages against overload by arrangements in the control circuit | H03K 17/0812 |
| Complementarily driven MOS switches | H03K 17/6871 |
| Preventing simultaneous conduction in DC/DC converters | H02M 1/38 |
H03K 5/153

Arrangements in which a pulse is delivered at the instant when a predetermined characteristic of an input signal is present or at a fixed time interval after this instant (switching at zero crossing H03K 17/13; measuring characteristics of individual pulses G01R 29/02)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

indicating of signal events G01R

H03K 5/1532

Peak detectors

Definition statement

This place covers:
Peak instant detectors only

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Detector Type</th>
<th>CPC Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak level detectors</td>
<td>G01R 19/04</td>
</tr>
<tr>
<td>AM demodulators and envelope detectors</td>
<td>H03D 1/00</td>
</tr>
</tbody>
</table>

H03K 5/1565

{the output pulses having a constant duty cycle}

Definition statement

This place covers:
Also contains ccts for suppressing jitter and phase noise in pulse signals.

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Circuit Type</th>
<th>CPC Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generators (i.e. circuits not having a signal input) with duty cycle adjustment</td>
<td>H03K 3/017</td>
</tr>
<tr>
<td>Duty cycle modulation schemes</td>
<td>H03K 7/08</td>
</tr>
</tbody>
</table>
H03K 5/159
Applications of delay lines not covered by the preceding subgroups

References

Limiting references
This place does not cover:

| Transversal filters | H03H 15/00 |

H03K 5/19
Monitoring patterns of pulse trains (indicating amplitude G01R 19/00; indicating frequency G01R 23/00; measuring characteristics of individual pulses G01R 29/02)

Definition statement
This place covers:
Detecting presence of valid pulse signal, e.g. monitoring amplitude and/or frequency of pulse signal.

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Distribution of clock signals | G01F 1/10 |
| Measuring electrical variables | G01R |

H03K 5/24
the characteristic being amplitude

Definition statement
This place covers:
Pulse comparators.

References

Limiting references
This place does not cover:

| Comparators using latches or having hysteresis | H03K 3/00, H03F 1/38 |
| Thresholding or clamping | H03K 5/08 |
| DC comparators | G01R 19/0038 |
| Indicating signal level | G01R 19/165 |
| Current (mirror) comparators: Only the ones giving full swing outputs classified here | G05F 3/26 |
| Circuits comparing digital numbers | G06F 7/02 |
| Sense amplifiers | G11C |
**H03K 6/00**

Manipulating pulses having a finite slope and not covered by one of the other main groups of this subclass (circuits with regenerative action H03K 4/00)

**Definition statement**

*This place covers:*

Slew rate correction in ramp or triangular waveform generators.

**References**

*Limiting references*

*This place does not cover:*

| Slew rate limiting            | H03K 5/04, H03K 17/16, H03K 19/017581 |

**H03K 7/00**

Modulating pulses with a continuously-variable modulating signal

**Definition statement**

*This place covers:*

Continuous modulating signal meaning (quasi-)analog.

Only basic schemes for modulating one or more pulse characteristics are classsified here. See also application fields.

**References**

*Limiting references*

*This place does not cover:*

| Discrete pulse modulation | H04L 25/00, G06F 1/025 |

**H03K 7/04**

Position modulation, i.e. PPM

**References**

*Limiting references*

*This place does not cover:*

| Impulse radio, UWB signals | H04B 1/69 |
H03K 7/06

Frequency or rate modulation, i.e. PFM or PRM

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random signal generators</td>
<td>H03K 3/84</td>
</tr>
<tr>
<td>Random number generators</td>
<td>G06F1/58R</td>
</tr>
<tr>
<td>Noise generators</td>
<td>H03B</td>
</tr>
<tr>
<td>For spread spectrum clock signals</td>
<td>H04B 15/04</td>
</tr>
</tbody>
</table>

H03K 7/08

Duration or width modulation {Duty cycle modulation}

Definition statement

This place covers:

Basic modulation concept such as comparing voltage to (quasi-)analog ramp signal.

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>For signal generators</td>
<td>G06F 1/025</td>
</tr>
<tr>
<td>switch mode controllers</td>
<td>H02P</td>
</tr>
<tr>
<td>Class D amplifiers</td>
<td>H03F 3/217, H02M</td>
</tr>
<tr>
<td>D/A converters</td>
<td>H03M</td>
</tr>
<tr>
<td>For data signals</td>
<td>H04L 25/4902</td>
</tr>
</tbody>
</table>

H03K 9/00

Demodulating pulses which have been modulated with a continuously-variable signal

Definition statement

This place covers:

Only for documents not showing the modulator or where the demodulator is clearly the main aspect.
H03K 17/00

Electronic switching or gating, i.e. not by contact-making or -braking (selection of the stylus or auxiliary electrode in electric printing B41J 2/405; sample-and-hold arrangements G11C 27/02; switching or interrupting devices in waveguides H01P; gated amplifiers H03F 3/72; switching arrangements for exchange systems using static devices H04Q 3/52)

Definition statement

This place covers:
• Composite switches: multiple types of transistors form a switching unit e.g. IGBT
• Output circuit: drain-source or collector-emitter path including load
• Input circuit: means connected to gate- or base-connection
• Feedback from the output to the input circuit: does not include e.g. common source or emitter connections as a voltage reference

H03K 17/002

{Switching arrangements with several input- or output terminals (code converters H03M 5/00, H03M 7/00)}

Definition statement

This place covers:
General multiplexers (block diagrams)

Special rules of classification

More detailed structures are classified as follows:

bipolar transistor based mux circuits: H03K 17/62 and subgroups
field-effect transistor based mux circuits: H03K 17/693
diode based mux circuits: H03K 17/76

H03K 17/04

Modifications for accelerating switching

Definition statement

This place covers:
Acceleration means

References

Limiting references

This place does not cover:

the mere speed gain one gets by using a different material, type of transistor, etc H03K 17/51
H03K 17/0406
{in composite switches}

Definition statement
This place covers:
Composite switches -> mainly IGBTs

H03K 17/06
Modifications for ensuring a fully conducting state

References
Limiting references
This place does not cover:

| Diode replacement circuits | H03K 17/30 |

H03K 17/08
Modifications for protecting switching circuit against overcurrent or overvoltage

References
Limiting references
This place does not cover:

| For testing etc. of semiconductors | G01R 31/26 |
| Safety devices eventually | G05B 9/02, F16P 3/00, G05B 19/042 |

Special rules of classification
Protection circuits for protecting the switch go in here, those protecting the load go in H02H 3/00 (remember to distribute it in classification). We will therefore in almost any case have to search in there as well.

Any document with a switch and a temperature detector is classified in H03K 2017/0806.

H03K 17/0812
by measures taken in the control circuit

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Circuits whose output signals could be used for x-bar current prevention in a half-bridge, i.e. non-overlapping signals | H03K 5/1515 |
H03K 17/0814
by measures taken in the output circuit

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| For solid state switches which are protected by having a mechanical switch (MEMS) in series | H01H 9/548 |

H03K 17/10
Modifications for increasing the maximum permissible switched voltage

References
Limiting references
This place does not cover:

| by merely different types of transistors | H01L |

H03K 17/12
Modifications for increasing the maximum permissible switched current

References
Limiting references
This place does not cover:

| by merely different types of transistors | H01L |

H03K 17/13
Modifications for switching at zero crossing (generating an impulse at zero crossing H03K 5/153)

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| zero crossing detectors | H03K 5/1536 |
**H03K 17/16**

**Modifications for eliminating interference voltages or currents**

**Definition statement**

*This place covers:*

Caused by the switching, e.g. reducing switching noise

**References**

*Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

| means for preventing simultaneous conduction | H03K 5/1515, H02M 1/38 |

**H03K 17/163**

{Soft switching}

**Special rules of classification**

Soft switching aspects are also classified in H02H 9/001

**H03K 17/166**

{Soft switching}

**Special rules of classification**

Soft switching aspects are also classified in H02H 9/001

**H03K 17/18**

**Modifications for indicating state of switch**

**Definition statement**

*This place covers:*

Any kind of state, i.e. not only the switching state but also e.g. if short-circuiting, how many times overloaded so far etc. etc.

indicating -> display or generation of feedback signals to higher entity etc.

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

| Indicating | display or generation of feedback signals e.g. to a higher entity etc... |
H03K 17/22
Modifications for ensuring a predetermined initial state when the supply voltage has been applied (bi-stable generators H03K 3/12)

Definition statement
This place covers:
Merely power-on-reset circuits of any kind

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Arrangements for measuring currents or voltages indicating that current or voltage is either above or below a predetermined value | G01R 19/165 |
| Resetting means | G06F 1/24, G06F 1/26 |

H03K 17/24
Storing the actual state when the supply voltage fails

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Latches for opamps or comparator | H03K 3/02335 |
| Logic circuit | H03K 3/0375 |
| Bipolar transistor | H03K 3/2865 |
| Field-effect transistor | H03K 3/356008 |

H03K 17/296
Time-programme switches providing a choice of time-intervals for executing more than one switching action and automatically terminating their operation after the programme is completed (electronic clocks comprising means to be operated at preselected times or after preselected time-intervals G04G 15/00)

Definition statement
This place covers:
Also Christmas tree type pre-programmable plugs
**H03K 17/30**

Modifications for providing a predetermined threshold before switching (shaping pulses by thresholding [H03K 5/08](#); for logic circuits [H03K 19/0021](#))

**Definition statement**

This place covers:
Keeping an absolute switching threshold or switching at a threshold different from the threshold of the switching element

**Special rules of classification**

Diode replacement Transistors can also be classified in [H03K 17/06](#) or [H03K 17/063](#).

**H03K 17/687**

using field-effect transistors

**References**

**Limiting references**

This place does not cover:

| IGBTs | H03K 17/56 |

**H03K 17/94**

characterised by the way in which the control signal is generated (mechanical structural details of control members of switches or keyboards, such as keys, push-buttons, levers or other mechanisms for transferring force to the activated elements, not directly producing electronic effects [H01H](#); keyboards for special applications, see the relevant places, e.g. [B41J](#), [G06F 3/023](#), [H04L 15/00](#), [H04L 17/00](#), [H04M 1/00](#))

**Definition statement**

This place covers:

Some detection methods which are not to be found elsewhere & details related to the operation of generic sensors.

This class contains different sensing principles:

- microwave
- RF energy sensor
- ultrasonic
- infrasonic
- acoustically activated
- temperature activated

Power supply related documents are found here and in [H03K 17/945](#) if for generic sensor. [H03K 17/951](#) is for power supply for non-generic sensor, even if not magnetic.
References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical passive sensors</td>
<td>H03K 17/941</td>
</tr>
<tr>
<td>Doppler-effect microwave sensor</td>
<td>G01S 13/56</td>
</tr>
<tr>
<td>Ultrasonic alarms</td>
<td>G08B 13/16</td>
</tr>
<tr>
<td>Alarms using Doppler-effect</td>
<td>G08B 13/1627</td>
</tr>
<tr>
<td>Pyroelectric alarms</td>
<td>G08B 13/19</td>
</tr>
<tr>
<td>Radio-controlled</td>
<td>G08C 17/02</td>
</tr>
</tbody>
</table>

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>for reflection on object</td>
<td>G01S, G01V, G08B</td>
</tr>
<tr>
<td>for HF proximity sensors operating with electromagnetic waves (near field)</td>
<td>G01V 3/12</td>
</tr>
<tr>
<td>Circuit arrangements or systems for wireless supply or distribution of electric power</td>
<td>H02J 50/00</td>
</tr>
</tbody>
</table>

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF energy sensor</td>
<td>e.g. to sense absorption of RF energy by a resonant tank circuit at predetermined frequencies, where the tank circuit corresponds to each keybutton. An emitter device emits energy in a path of tank circuit towards the RF energy sensor. A determination device determines a depression state of the keybuttons in accordance with absorption</td>
</tr>
</tbody>
</table>

H03K 17/941

{using an optical detector (H03K 17/968 takes precedence)}

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection only, no switching</td>
<td>G01S 17/026</td>
</tr>
<tr>
<td>Optical scanner</td>
<td>G02B26/08M4B</td>
</tr>
<tr>
<td>Photocouplers</td>
<td></td>
</tr>
</tbody>
</table>

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light barriers and using reflection on object</td>
<td>G01V 8/00, G01S 17/026</td>
</tr>
</tbody>
</table>
H03K 17/945

Proximity switches (H03K 17/96 takes precedence; proximity fuzes F42C 13/00; detecting masses or objects, e.g. by using a magnetic or optical detector G01V, e.g. G01V 3/00, G01V 8/10))

Definition statement

This place covers:

Constructional details, housings for sensors, network of proximity sensors, programming of proximity switches

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Explicitly for magnetic proximity sensors | H03K 17/9505 |
| Housings for sensors                      | G01D 11/245 |

H03K 17/9502

{Measures for increasing reliability}

Definition statement

This place covers:

Temperature compensation, self-test, redundant sensors, security switches (using codes), passive and active responders, protection against noise and interference

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Transponders in proximity switches     | H03K 17/9522, H03K 17/9525 |
| Passive transponders,                  | G06K 7/086, G01D 5/2066   |

H03K 17/951

{Measures for supplying operating voltage to the detector circuit}

Definition statement

This place covers:

For practical purposes also power supply details of non-magnetic touch sensors.
**H03K 17/9515**

{using non-linear magnetic devices}

**Definition statement**

*This place covers:*

Also bistable magnetic elements (Barkhausen effect, Wiegand effect, Matteucci effect).

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Electronic switching or gating using a magnetic movable element | H03K 17/97          |
| Wiegand effect                                               | G01P               |
| Barkhausen effect                                            | G01P 3/488         |

**H03K 17/9517**

{using galvanomagnetic devices}

**Definition statement**

*This place covers:*

Hall effect sensors, magnetoresistance.

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| If target is magnetic:                                      | H03K 17/97          |
| Hall effect:                                                | G01R 33/07, G01D 5/145 |
| Magnetoresistance:                                          | G01R 33/09         |

**H03K 17/952**

{using inductive coils}

**Special rules of classification**

H03K 17/9537 takes precedence.

**H03K 17/9537**

{in a resonant circuit}

**Definition statement**

*This place covers:*

LC-resonant circuit in general (e.g. signal is interrogation pulse, usually generating damped or decaying oscillations)
H03K 17/9542
{forming part of an oscillator}

Definition statement
This place covers:
LC-resonant circuit forming part of oscillator; the variable parameter is undetermined

H03K 17/9545
{with variable frequency}

Definition statement
This place covers:
LC-resonant circuit forming part of oscillator; the variable parameter is oscillation frequency

H03K 17/9547
{with variable amplitude}

Definition statement
This place covers:
LC-resonant circuit forming part of oscillator; the variable parameter is oscillation amplitude

H03K 17/955
using a capacitive detector

Definition statement
This place covers:
Charge transfer, phase comparison, frequency shift, resistance-capacitance timing circuits

References
Limiting references
This place does not cover:

| Electrically operated windows or roofs | E05F 15/00 |
| Distance measurement                  | G01D 5/24  |

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Capacitive touch switches | H03K 17/962 |
| Detection of varying capacitance | G01D 5/24 |
| Housings for sensors       | G01D 11/00  |
| Measuring capacitance      | G01R 27/2605 |
H03K 17/96
Touch switches

Definition statement
This place covers:
Constructional details, detection principles, simulation of slider, key illumination details

H03K 17/962
{Capacitive touch switches}

Definition statement
This place covers:
Detection principle

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Measuring capacitance | G01R 27/2605 |

H03K 17/9622
{using a plurality of detectors, e.g. keyboard}

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Digitisers by capacitive means | G06F 3/044 |

H03K 17/9625
{using a force resistance transducer}

Definition statement
This place covers:
Means for interpreting an external force as a variable resistance (e.g. strain gauges)

References
Limiting references
This place does not cover:

| Resistive touch switches | H03K 17/9645 |
Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Measuring force or stress in general</th>
<th>G01L 1/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring force or stress using distributed sensing elements</td>
<td>G01L 1/205</td>
</tr>
<tr>
<td>Digitisers using force sensing means</td>
<td>G06F 3/0414</td>
</tr>
<tr>
<td>Adjustable resistors adjustable by mechanical pressure of force</td>
<td>H01C 10/10</td>
</tr>
<tr>
<td>Adjustable resistors by using means responding to magnetic or electric fields, e.g. by addition of magnetisable or piezoelectric particles to the resistive material</td>
<td>H01C 10/103</td>
</tr>
<tr>
<td>Adjustable resistors on resistive material dispersed in an elastic material</td>
<td>H01C 10/106</td>
</tr>
<tr>
<td>Adjustable by changing surface pressure between resistive masses or resistive and conductive masses</td>
<td>H01C 10/12</td>
</tr>
<tr>
<td>Switches with contacts carried by or formed from layers in a multilayer structure, e.g. membrane switches</td>
<td>H01H 13/702</td>
</tr>
<tr>
<td>Switches characterised by the material of the contacts, e.g. conductive polymers</td>
<td>H01H 13/785</td>
</tr>
</tbody>
</table>

H03K 17/9627

{Optical touch switches}

Definition statement

This place covers:

ONLY documents which disclose reflection on a permanent interface surface

H03K 17/9629

{using a plurality of detectors, e.g. keyboard}

Definition statement

This place covers:

Simulation of slider, in combination with display

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Digitisers by opto-electronic means | G06F 3/042 |

H03K 17/9638

{using a light guide}

Definition statement

This place covers:

With deformation of the light guide
Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch</td>
<td></td>
</tr>
<tr>
<td>Deformation</td>
<td></td>
</tr>
</tbody>
</table>

H03K 17/9645

{Resistive touch switches}

Definition statement

This place covers:
An object (e.g. finger) provides path for current

H03K 17/965

Switches controlled by moving an element forming part of the switch

Definition statement

This place covers:
Tactile feedback, illuminated, rotary, ...

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Term</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joysticks with analog output</td>
<td>G05G 9/047</td>
</tr>
</tbody>
</table>

H03K 17/968

using opto-electronic devices

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Term</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical rotary encoders per se</td>
<td>G01D 5/3473</td>
</tr>
</tbody>
</table>

H03K 17/969

having a plurality of control members, e.g. keyboard

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Term</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding in connection with keyboards or like devices using opto-electronic means</td>
<td>H03M211/26</td>
</tr>
</tbody>
</table>
**H03K 17/97**

**using a magnetic movable element**

**Definition statement**

*This place covers:*

Type of magnetic sensor: inductance, hall sensor, magnetoresistance

**References**

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Hall sensors</th>
<th>G01D 5/145</th>
</tr>
</thead>
</table>

**H03K 17/975**

**using a capacitive movable element**

**Definition statement**

*This place covers:*

The movable part is an electrode forming part of the switch or the dielectric

**References**

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Mechanical means for transferring the output of a sensing member by varying capacitance</th>
<th>G01D 5/24</th>
</tr>
</thead>
</table>

**H03K 19/00**

**Logic circuits, i.e. having at least two inputs acting on one output; Inverting circuits *(inverting circuits used as delay elements H03K 5/13)***

**Definition statement**

*This place covers:*

Circuits having at least two inputs acting on one output inverting circuits or buffers.

**Relationships with other classification places**

When a circuit is used or adapted for switching a load, it is classified in H03K 17/00. When it is used/adapted for driving a logic circuit (e.g. output buffer), it goes to H03K 19/00.

**References**

*Limiting references*

*This place does not cover:*

<table>
<thead>
<tr>
<th>Inverting circuits used as delay element</th>
<th>H03K 5/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock generation/distribution</td>
<td>G06F 1/04</td>
</tr>
<tr>
<td>Topic</td>
<td>CPC Code</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Program control</td>
<td>G06F 9/00</td>
</tr>
<tr>
<td>Hot Plugging (device-to-bus)</td>
<td>G06F 13/4081</td>
</tr>
<tr>
<td>CAD, Layout and Routing</td>
<td>G06F 17/50</td>
</tr>
<tr>
<td>I/O data interface arrangement</td>
<td>G11C 7/10</td>
</tr>
<tr>
<td>ESD protection</td>
<td>H01L 27/0248</td>
</tr>
<tr>
<td>Emergency protective circuits</td>
<td>H02H</td>
</tr>
<tr>
<td>Baseband systems (for transmission): line drivers, impedance matching, termination</td>
<td>H04L 25/02</td>
</tr>
</tbody>
</table>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanotechnology logic</td>
<td>B82Y 10/00</td>
</tr>
</tbody>
</table>

**Special rules of classification**

The groups **H03K 19/00369** take precedence over **H03K 19/0005**

**H03K 19/003**: Circuits for increasing the reliability, not for notifying the user that a failure took place

**H03K 19/00323**: Skew compensation

**H03K 19/00346**: Slope control, slew rate adaptation

**H03K 19/007**: Circuits in this class go, when they fail, to a safe state. They do not notify the user of a failure

**H03K 19/01** covers accelerating switching in logic circuits and should not be confused with
**H03K 17/04** which covers accelerating the switching of a switch

**H03K 19/177**: Field Programmable Gate Arrays (FPGA).

**H03K 21/00**

**Details of pulse counters or frequency dividers {{number-of-one counters G06F 7/607}}**

**Definition statement**

This place covers:

Details of logic circuits having electric(digital) pulses as input signals and either counting incoming pulses or producing an output pulse stream based on the incoming pulse stream having a modified pulse repeating period.

**References**

**Limiting references**

This place does not cover:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing Frequency</td>
<td>H03K 5/00006</td>
</tr>
<tr>
<td>High Security Counting</td>
<td>G01C 22/02</td>
</tr>
<tr>
<td>Measuring Pulse Width Time</td>
<td>G01R 29/00</td>
</tr>
</tbody>
</table>
**H03K 21/02**

**Input circuits**

**Definition statement**

This place covers:

Special logic at input for pulse treatment e.g. pulse shaping

Illustrative examples of subject matter classified in this group:

![Figure 2](image)

Figure taken from DE3842874
**H03K 21/08**

Output circuits

**Definition statement**

This place covers:

Special logic at register outputs e.g. for a counter value dependent reset.

Figure taken from JP57199337
**H03K 21/16**

Circuits for carrying over pulses between successive decades

**Definition statement**

*This place covers:*

Logic counter having multiple counting stages including a carry over bit between stages.

Figure taken from US5,946,369
H03K 21/18
Circuits for visual indication of the result

Definition statement
This place covers:
Logic for representing the result to a user.

Figure taken from DE3031612
**H03K 21/38**

Starting, stopping or resetting the counter (counters with a base other than a power of two [H03K 23/48, H03K 23/66])

**Definition statement**

*This place covers:*

Logic for influencing the counter status.

Figure taken from EP0471390.
**H03K 21/40**

Monitoring; Error detection; Preventing or correcting improper counter operation

**Definition statement**

This place covers:
Monitoring whether an error occurred during the counting process (not the process producing the pulses)

---

**H03K 23/00**

Pulse counters comprising counting chains; Frequency dividers comprising counting chains (H03K 29/00 takes precedence)

**Definition statement**

This place covers:
Logic for digital counting chains used in pulse counters or frequency dividers
**H03K 23/001**

{using elements not covered by groups H03K 23/002 and H03K 23/74 - H03K 23/84}

**Definition statement**

*This place covers:*

Other elements as complementary IGFET's, electrically-ignited compounds e.g. pyrotechnical static relays

**H03K 23/004**

{Counters counting in a non-natural counting order, e.g. random counters}

**Definition statement**

*This place covers:*

Detailed counting encoding scheme.

**H03K 23/40**

Gating or clocking signals applied to all stages, i.e. synchronous counters {{(H03K 23/74 - H03K 23/84 take precedence)}}

**Definition statement**

*This place covers:*

Details regarding the clock used for triggering the counting of incoming pulses

**H03K 23/58**

Gating or clocking signals not applied to all stages, i.e. asynchronous counters (H03K 23/74 - H03K 23/84 take precedence)

**Definition statement**

*This place covers:*

Counter with a "rippling" trigger pulse form stage to stage - asynchronous counters.

**H03K 23/64**

with a base or radix other than a power of two (H03K 23/40 - H03K 23/62 take precedence)

**Definition statement**

*This place covers:*

Variable counting base, non-integer or odd-number counters.
H03K 25/00
Pulse counters with step-by-step integration and static storage; Analogous frequency dividers

Definition statement
This place covers:
Static storage type counters - e.g. capacitive type

Figure taken from EP0916188
**H03K 27/00**

Pulse counters in which pulses are continuously circulated in a closed loop; Analogous frequency dividers (feedback shift register counters H03K 23/54)

**Definition statement**

*This place covers:*

![Diagram](image)

Figure taken from GB2008296.

**H03K 29/00**

Pulse counters comprising multi-stable elements, e.g. for ternary scale, for decimal scale; Analogous frequency dividers

**Definition statement**

*This place covers:*

A triggering pulse is generated in response to each input signal to be counted. The triggering pulse is applied to the device to change the voltage across the device. The voltage across the device is output as an indication of the number of received input signals. The device may be a resonant tunnelling
diode with multiple peaks in its current versus voltage characteristic. The device may be a resonant tunnelling diode with multiple peaks in its current versus voltage characteristic.