FLUKE®

Pulse Generators

Technical Data

PM 5712
PM 5715

50 MHz Pulse Generators

PM 5786
PM 5786B

125 MHz Pulse Generators

PM 5712 & PM 5715 Pulse Generators

- 1 Hz ... 50 MHz frequency range
- Rise/Fall times:
  PM 5712, 4 ns fixed;
  PM 5715, 6 ns…500ms, variable
- Amplitude range: 0.2V to 10V into 50Ω
- Adjustable DC offset
- External triggering, gating and pulse shaping facilities
- Single/double, normal/inverted and positive/negative pulse modes
- Extremely clean pulse shape

The PM 5712 and PM 5715 pulse generators cover most requirements for fast pulse response in the wide 1 Hz to 50 MHz range. Suitable for both analog and digital circuit testing in that range, their clean pulse shape and 0.2 to 10V output voltage range make them ideal for testing MOS and TTL circuits.
Offering further a variety of extended facilities for dual outputs, DC offsets, multiple pulse modes, selectable triggering and gating, and more.
The overall performance, combined with simple, reliable operation, make the PM 5712 and PM 5715 outstanding values in their class.

PM 5712: Fast <4 ns Rise- and Fall-Times

The PM 5712 has a fixed rise- and falltime of <4 ns. This model is primarily intended to supply positive-polarity pulses, although negative pulses up to -5V can be generated by using DC offset and the normal/inverted switch. These characteristics make the PM 5712 ideally suited for use in quality assurance testing and service environments involving go/no-go and specification compliance tests.

PM 5715: Variable Rise- and Fall-Times from 6 ns-500 ms

The PM 5715 offers continuously variable transition times from 6 ns to 500 ms, with separately adjustable rise- and falltime. This model also allows selection of both positive and negative pulses, over the full amplitude range from -10V to +10V. With this wide-ranging adjustability, the PM 5715 is the optimum choice in general purpose applications such as those found in research an development, where a wide variety of different pulse response tests may need to be made.

Two Pulse Outputs

Both the PM 5712 and PM 5715 provide two pulse outputs: the main output, with signal levels of up to 10V, allows the generator to operate with both low- and high-level logic, while the auxiliary output provides pulses similar to those from the main output, but at fixed TTL levels. Further, double pulses can be generated with variable delays, allowing these instruments to be used for analysis of pulse pair resolution in analog and digital circuits.

Choice of Pulse Modes

Both models offer a choice of three pulse modes:

- Single pulse mode, in which continuous pulses up to 50 MHz are generated, with adjustable repetition time, pulse duration and delay.
- Double pulse mode, in which twin pulses are generated, with pulse-pair frequencies, variable up to 25 MHz and pulse intervals variable from 10ns to 100ms. Both pulses have the same duration.
- T/2 or square wave pulse mode, with a repetition rate, variable up to 50MHz and fixed pulse parameters regardless of the delay and duration settings.

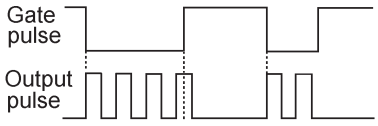
Testing of digital circuitry is further facilitated by the normal/inverted selector switch, which allows the logic state of the pulses to be changed. In the normal mode, both generators supply pulses with duty cycles up to more than 50%, while duty cycles of nearly 100% can be obtained in the inverted mode.

External Triggering

External triggering enables the PM 5712/PM 5715 to operate synchronously with external clock signals. All other parameters, such as pulse duration, amplitude, etc. are set on the pulse generator. External trigger signals can vary from 0 ... 50 MHz or, when in the double pulse mode, 0 ... 25 MHz.

External Gating

The external gate mode provides an external synchronous on/off control over the pulse generator. Bursts of output pulses are supplied, only during the presence of the external gate signal. The first pulse coincides with the trailing edge of the gating signal, the last pulse is completed even if the gating signal ends during the pulse.



PM 5712 & PM 5715 Pulse Generators

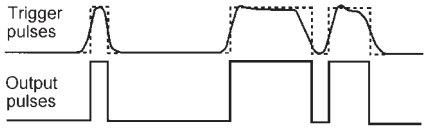
External Duration or Pulse Shaping

Simultaneous selection of external triggering and the T/2 mode enables the generators to function as input signal conditioners. The external input signal defines frequency and pulse duration, while amplitude, DC offset, rise- and fall-time and normal/inverted mode selection are defined by the pulse generator settings.

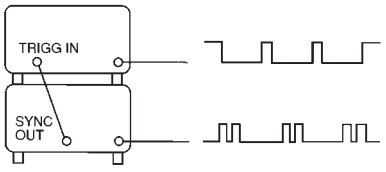
Adjustable DC Offset

The DC offset is adjustable, allowing testing of circuit tolerances for variations in logic levels.

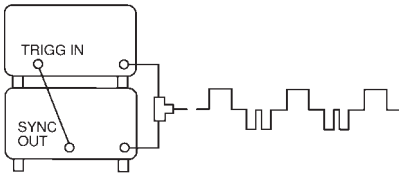
Dual Channel Arrangement



Two PM 5715 can be interconnected to form a true dual channel pulse generator, as shown below:



Also, complex pulse patterns can be generated by mixing the outputs of two generators using the PM 9584 T-connector.



Time Parameters

Pulse Repetition Time	20 ns... 1s (1 Hz ... 50 MHz)
Pulse Delay	10 ns ... 100 ms
Pulse Duration	10 ns ... 100 ms
Duty Factor	0.00000001 to 0.99999999 (high duty factors require inverted mode)

Main Output Pulse Characteristics

Pulse Amplitude	0.2V ... 10 V at $Z_L = 50\ \Omega$
Source Impedance	
– 10 V Range	Current source (high ohmic)
– 5 V and Lower Ranges	50 Ω
Polarity	
– PM 5715	+ or – switchable
– PM 5712	+ only. Pulses within –5V... + 10V possible, using DC offset and normal/inverted
Transition Times	Corresponding to 10 ... 90% of pulse amplitude, at amplitudes of <5V and $Z_L = 50\ \Omega$
– PM 5 715	6 ns ... 500 ms. Independent continuous control of rise- and fall-times within each of 6 ranges.
– PM 5712	4 ns fixed
DC Offset at $Z_L = 50\ \Omega$	
PM 5715	–2.5V... +2.5V
PM 5712	–5V... +2V
Max Output Voltage	Pulse amplitude and DC offset max. ±10V
Waveform Aberrations	<±5% of set amplitude
Pulse Modes	– Single pulse (delay-able) – Double pulse – T/2, 50% duty cycle, 50 ±20% duty cycle in 20 ns and 100 ns repetition range
Logic Mode	Normal or inverted
Output Protection	Short or open circuit safe

Auxiliary Pulse Output

Pulse Amplitude	+2.5V into 50 Ω or +4.5V open circuit, TTL-compatible
Source Impedance	50 Ω
Pulse Waveforms	Single pulse in single and T/2 pulse modes. Double

	pulse in double pulse mode
Pulse Advance	Approx. 12 ns ahead of main single or double pulses
Output Protection	Short or open circuit safe

Internal Clock Output (Sync. Output)

Function	Pre-trigger output, main output pulse is delay-able with respect to sync. output
Amplitude	+ 1.5V at $Z_L = 50\ \Omega$, +3V open circuit
Source Impedance	50 Ω
Pulse Waveform	Square-wave
Pulse Advance	Approx. 40 ns ahead of main single pulse with pulse delay set to 10 ns
Output Protection	Short or open circuit safe

External Operating Modes

TRIGG	Each input pulse, generates an output pulse
GATE	Synchronous gating. Input signal disables output pulses
DURATION	Pulse mode T/2 gives output pulses with same duration and repetition rate as external input signal, other waveform parameters are set via the generator
MANUAL	Single shot push button simulates external signal for triggering, gating and duration.

External Input

Function	For external trigger, gate and duration
Range	DC...50 MHz
Coupling	DC
Input Impedance	Approx. 220 Ω at < 1.5V, approx. 800 Ω at > 1.5V
Trigger Level	≥ +1V
Trigger Slope	Positive
Pulse Delay	Approx. 50 ns from input to main single pulse with delay set to 10 ns
Max. Input Voltage Without Damage	± 12V

General Specifications

Power Requirements

Line	100, 115, 200 or 230 V ±15%
Line Frequency	50...400 Hz
Power Consumption	70 VA
Safety	According to CE-regulation 73/23 EN61010-1 CAT II, Polution Degree 2
EMC	According to CE regulation 89/336: Emission according to EN 55081-1, EN 55022 Class B, EN 60555-2. Immunity according to EN 50082-1, inclusive IEC 801-2,-3,-4,-5

Environmental Conditions

Temperature Range	
- Operating	0 ... 40 °C
- Storage	- 40°C ... 70°C

Mechanical Specifications

Size	210 mm W x 130 mm H x 275 mm L (8.3in W x 5 in H x 10.8 in L)
Weight	4 kg (8.8 lb)
Included With Instrument	Manual, power cord

PM 5786 Pulse Generator

- 1 Hz ... 125 MHz pulse frequencies
- Rise and fall times from 1 ns
- Time Setting error indicators
- Excellent 50 Ω backmatching
- Dual outputs for simultaneously + and – pulses
- Full external control facilities
- LED indicator for correct trigger levels
- Presettable burst option

PM 5786 top performance, top economy and assured time–settings

The PM 5786 handles virtually any analog or digital circuit testing requirement. Fast digital circuitry such as TTL or ECL is easily handled, and the wide choice of external trigger and gate functions make the setting up of special test signals unbearably easy. The PM 5786 offers a whole–spectrum of transition times from which to choose. It allows such versatility as independent and continuous variable settings of rise and fall times all the way from 2 ns ... 100 ms. In other words, the PM 5786 is best suited for high–speed general–purpose applications such as in research and development where many different pulse response tests may need to be made.

Ease of Operation

The PM 5786 offers features to simplify operation. Like the unique system of front panel time–setting–error indicator LED's to provide clear confirmation that all time settings are correct. This prevents erroneous pulses, caused by incorrectly set pulse duration or pulse delay times or rise and fall times with respect to pulse period.

Versatile Pulse Selection

Additional ease of use results from simple and versatile selection of the desired kind of output pulses: bipolar, positive or negative. Simultaneous positive and negative going pulses can be selected for linear applications, as well as complementary positive or negative pulses for digital applications. This simple output selection means there is no need for time–consuming manual adjustment of inverter and offset controls. Further, logic '0' and '1' levels can be changed without the need for interchanging cables by using the COMPL (normal/complementary) switch.

High–Speed, High–Fidelity Pulses

A choice of bipolar outputs and high–quality 4–range output attenuator in the PM 5786 makes this generator very suitable for all kinds of linear applications. Very clean pulses are ensured by the excellent back–matching impedance that absorbs over 90% of reflections from mismatched loads.

Burst Mode

The PM 5786 is also available with the burst mode option (PM 5786B), that enables generation of bursts containing selectable numbers of pulses from 1 ... 9999. Pre–selection of the required number of pulses is easily carried–out, using front panel digital switches. Bursts can be triggered either manually or remotely by a signal to the EXTernal INput on the front panel. The use of the presettable burst mode is particularly valuable, for testing memory circuits, shift registers, counters and other digital circuits. Other functions which can be selected and carried out remotely through the external input include:
Externally triggered pulses
Externally gated pulses (gives synchronized bursts of pulses)
Externally controlled pulse duration. External control signals can be applied to define the start (and duration) of the various control options. Start/stop conditions can be adjusted with the EXT IN LEVEL control both to select +/– trigger slope and –3V...+3V trigger level. A LED indicates correct triggering. For ECL testing: the minimum transition time is 1.4 ns, corresponding to 20% ... 80% of pulse amplitude.

External Triggering

External triggering enables the PM 5786 to operate synchronously with external clock signals. All other parameters, such as pulse duration, amplitude etc. are as set on the pulse generator. External trigger signals can vary from 0...125 MHz, or, in the double pulse mode, 0...62.5 MHz.

External Gating

The external gate mode provides external synchronous on/off control of the pulse generator. As long as the external gate signal is present, output pulses are available with the preset pulse parameters.

External Duration

This mode allows the generator to function as input signal conditioner. The external input signal defines frequency and pulse duration, while amplitude, DC offset, rise and fall times and normal/complementary mode selection are defined by the pulse generator settings.

Squarewave Mode

A 'squarewave' mode provides pulses, with a constant 0.5 duty factor. This facilitates a quick method of setting the required output repetition rate, without having to consider the other time parameters.

PM 5786 Pulse Generator

Time parameters

Pulse repetition period	8 ns…1s (1 Hz…125MHz).
Pulse delay	8 ns…100ms.
Pulse duration	3.5 ns…100ms or fixed square wave
Jitter	<0.1% of setting ±50ps.

Main pulse characteristics

Outputs	2 channels, A and B.
Transition times at $Z_L = 50\ \Omega$	2ns… >100ms, continuously variable, corresponding to 10% and 90% of pulse amplitude. For ECL testing the minimum transition time is 1.4ns corresponding to 20% and 80% of pulse amplitude.
Pulse amplitude	0.2V... 5V (at $Z_L = 50\ \Omega$), double amplitude at open output, within the range ±6V.
DC offset	–2.5V...+2.5V (at $Z_L = 50\Omega$), ±5V at open output.
Max output voltage	Pulse amplitude plus DC offset is max ±6V. Maximum 10V open output amplitude can be achieved provided the signal is in the range ±6V.
Waveform aberrations (at $Z_L = 50\ \Omega$),	Less than 5%+10mV; less than 10% for transition times <5ns.
Source resistance	50 Ω ±5%.
Source impedance	50 Ω ±10%.
Output protection	Against short- or open circuit and transients
Pulse modes	Single pulse (delay-able) Double pulse Square wave 50% ±1% (lHz... 1MHz); 50% ±10% (1MHz... 125MHz) Normal or complementary, switchable.

Output modes

Bipolar	Simultaneously positive and negative polarity.
Pos	Positive polarity, normal and complementary.
Neg	Negative polarity, normal and complementary.

External operating modes

TRIGG	Externally triggered pulse repetition DC... 125MHz or manual single shot.
GATE	Synchronous gating. External input signal starts and stops the generator.
BURST	Internally generated burst with digital switch selection of number of pulses 0…9999, started by external input signal or manual control.
EXT DUR	External duration gives pulses with same duration and repetition rate as external input signal, all other pulse parameters are set via the generator.

External input

Range	DC... 125MHz, minimum pulse duration 3.5ns
Input voltage range	0.5...15V pp
Coupling	DC
Input impedance	1 MΩ//25pF
Trigger level	–3V...+3V
Trigger slope	+ and –
Trigger indicator	Tri-state LED indicator for correct trigger level setting Max input voltage without damage 260Vrms at < 440Hz, declining to 15Vpp at 125MHz.

Internal clock output

Main output pulse is delay-able with respect to internal clock output, which therefore can be used as pre-trigger.

Amplitude	+2.5V into 50 Ω.
Output impedance	50 Ω (typical).
Transition time	Approximately l ns.
Pulse duration	Square wave, 50% ±1% (l Hz ... 1 MHz), 50% ± 10% (1 MHz ... 125 MHz).
Output protection	Against short- and open circuit and transients.
Time setting error indicators	Warning for erroneous settings of excessive times for pulse delay, pulse duration, leading and trailing transition times, indicated with 4 LED's.

PM 5786 Pulse Generator

General Specification

Power requirements

Line	100V, 120V, 220V and 240Vrms ±10%. 120VA, 50...60Hz.
Safety	According to CE-regulation 73/23 EN61010-1 CAT II, Pollution Degree 2 and CSA 556B.
Electromagnetic Compatibility (EMC)	According to CE-regulation 89/336 Emission according to EN 550081-1, EN 55022 Class B, EN 60555 Immunity according to EN 50082-1, inclusive IEC 801-2,-3,-4-5

Environmental conditions

Temperature	
- Operating	0°C...+50°C.
- Storage	-40°C...+70°C.
Humidity	
- Operating	10…90% RH, non-condensing.
- Storage	5…95% RH.
Altitude Barometric pressure	
- Operating	5000m (15000ft)-53.3kN/m2.
- Storage	15000m (50000ft)-15.2kN/m2.

Dimensions and weight

- Height	145mm (5.7in)
- Width	300mm (11.8in)
- Depth	470mm (18.5in)
- Weight Net	9.5kg (2lLb)
- Weight Shipping	11.5kg (25Lb)
Included with instr.	Manual, power cord

Ordering

Ordering Information

Models	
PM 5712/08	Pulse Generator
PM 5715/11	Pulse Generator
PM 5786	2 ns Pulse Generator, excluding pre-set burst unit
PM 5786B	2 ns Pulse Generator, including pre-set burst unit

Accessories	
PM 9581/01	50 Ω Feed-through termination (3W)
PM 9584/02	50 Ω T-Piece
PM 9585/01	50 Ω Feed-through Termination (1W)
PM 9588/01	Coaxial Cable Set (5x 1ns, 4x 2ns, 3x 3ns, 3x 10ns)

Service and Support	
Warranty	One-year

Fluke Corporation
P.O. Box 9090, Everett, WA 98206

Fluke Europe B.V.
P.O. Box 1186,
5602 BD Eindhoven,
The Netherlands

For more information call:
In the U.S.A.: (800) 443-5853
or Fax: (425) 356-5116
In Europe/M-East:
+31 (0)40 2 678 200
or Fax: +31 (0)40 2 678 222
In Canada: (905) 890-7600
or Fax: (905) 890-6866
From other countries:
+1(425) 356-5500
or Fax: +1 (425) 356-5116
Web access: http://www.fluke.com

this product is available from:

Thurlby Thandar Instruments Ltd.
Glebe Road, Huntingdon
Cambs. PE29 7DR England
Tel: 01480 412451
Fax: 01480 450409
email: sales@tti-test.com
web: www.tti-test.com

TTi is an official technical distributor for the Fluke Test Tools and Bench Instruments range in the UK.

We aim to keep many of the most popular products in stock for immediate delivery.

We can provide technically based advice on the use of these products and our sales engineers will be pleased to arrange a demonstration.

Measurably Better Value