

## 4450- Programmable pulse generator

**High performances.  
at the right price**

### Capabilities

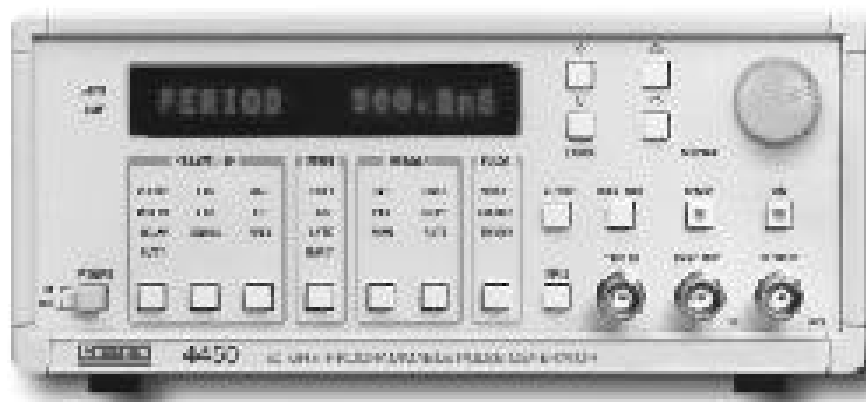
- Width range : 10 ns to 10 s
- 50 MHz frequency range  
(Period range from 20 ns to 10 s)
- Trigger modes (int./ ext) :  
Triggered, Gated and Burst
- Single or double pulse mode
- Delay mode
- Amplitude : 10 Vp-p into 50  $\Omega$  load
- Adjustable transition times
- IEEE 488.2 and SCPI compatible

### High Performance Pulses

The 4450 pulse generator features variable pulses widths from 10 ns to 10 s with a repetition rate selectable from 20 ns to 10 s. It also features selectable complementary pulse and double pulse, in continuous, triggered, gated and counted burst modes.

### GPIO Programming

The 4450 generator has been designed for use in ATE systems. All parameters, modes and functions are programmable and fully compatible with IEEE-488.2 and the SCPI language.



# 4450

### Variable Transitions

To make operation easy and flexible, variable transitions (rise and fall times) can be programmed from less than 5 ns to 10 ms. With the flexible transition times, various shapes of pulses can be obtained for applications where parameters such as linearity, switching times, or reflection performance, must be analyzed.

## SEFRAM Generators Series

The Sefram generators series are your solution for studying low- and high-frequency electrical and electronic phenomena and general physical parameters. Please find in the following selection guide their specifications and choose the model that meets your needs.

	4405	4410	4420	4440	4450	4462	4465
Type of generator	function			synthesized	pulse	function + arbitrary	arbitrary
Max. Frequency	5 MHz	10 MHz	20 MHz	20 MHz	50 MHz	20 MHz	n.a.*
Sine, Triangle, Square	Yes	Yes	Yes	Yes	Pulse	Yes + pre-defined	Pre-defined
Arbitrary (max. point rate)	-	-	-	-	-	20 MS/s	50 MS/s**
Vertical Resolution	-	-	-	-	-	12 bits	12 bits
Horizontal Resolution	-	-	-	-	-	32 kwords	256 kwords
Freq. Counter (Max. F)	-	50 MHz	50 MHz	-	-	-	-
Max. Amplitude (into 50 $\Omega$ )	10 Vp-p	10 Vp-p	10 Vp-p	15 Vp-p	10 Vp-p	15 Vp-p	15 Vp-p
Separate Offset	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trigger, Gate	-	-	Yes	Yes	Yes	Yes	Yes
Counted, Burst	-	-	-	Yes	Yes	Yes	Yes
Sweep Capabilities	Ext.	Int./Ext.	Int./Ext.	Ext.	n.a.*	Yes	-
Modulation	-	AM, FM	AM, FM	AM, FM	-	AM, FM	AM
Variable Symmetry	Yes	Yes	Yes	Yes	n.a.*	Yes	n.a.*
Synthesizer	-	-	-	Yes	-	Yes	n.a.*
Stored setups	-	-	-	up to 99	up to 99	up to 99	up to 99
GPIO Programming	-	-	-	Yes	Yes	Yes	Yes

\* not applicable \*\* per channel

## 4450 - Programmable pulse generator

### PULSE FUNCTIONS

**Single** - One pulse at each selected period up to 50 MHz repetition rate

**Double** - One pair of pulses at each period up to 25 MHz repetition rate. Both pulses have the same selected width; the position of the second pulse set by the delay control.

### OPERATING MODES

**Continuous** - Output continuous at programmed period rate.

**Triggered** - Output quiescent until triggered by an internal, external, GPIB or manual trigger; then one cycle is generated according to programmed period rate.

**Gated** - Same as triggered mode except pulses are output for the duration of the gated signal. The last cycle started is completed.

**Burst** - Same as trig. mode, but for a programmed number of cycles from 2 to 999999

**External width** - Trigger duration and rate sets pulse width and repetition.

### TIMING CHARACTERISTICS

#### • Period

Range : 20 ns to 10 s  
(50 MHz to 0.1 Hz repetition rate)  
Resolution : up to 6 dgt limited to 0.1 ns  
Accuracy :  $\pm 1\%$  of setting  $\pm 1$  ns.

Jitter :  $< 0.1\%$  of setting +50 ps, decreasing to 0.01 % on slowest range

#### • Width

Range : 10 ns to 9.99999 s limited by 8 ns off time  
Resolution : up to 6 dgt limited to 0.1 ns  
Accuracy :  $\pm 2\%$  of setting  $\pm 2$  ns.

Jitter :  $< 0.1\%$  of setting +50 ps, decreasing to 0.005 % on slowest range

#### • Delay

Range : 0 ns to 9.99999 s limited by the pulse width and 8 ns off time  
Resolution : up to 6 dgt limited to 0.1 ns  
Accuracy :  $\pm 2\%$  of setting  $\pm 2$  ns.  
Jitter :  $< 0.1\%$  of setting +50 ps, decreasing to 0.005 % on slowest range

#### • Duty Cycle

Range : 1 to 99 %  
Resolution : 3 digits (0.1 %)  
Accuracy: limited by width and pulse accuracy

### OUTPUT CHARACTERISTICS

#### • Amplitude

High level Range: -9.50 V to 10 V into 50  $\Omega$  load (-19.00 V to +20 V into open circuit).  
Low level Range : -10 V to +9.50 V into 50  $\Omega$  load (-20.00 V to +19.00 V into open circuit).

(0.5 V Amplitude 10 Vp-p into 50  $\Omega$  ; 20 Vp-p max. into open circuit)  
Resolution : 3 digits limited to 10 mV  
Accuracy:  $\pm 1\%$  of level setting  $\pm 2\%$  of p-p amplitude.  $\pm 50$  mV into 50  $\Omega$  load.  
Aberrations :  $< 5\%$  +50 mV into 50  $\Omega$  load, for pulse levels between  $\pm 5$  V  
Output resistance : 50  $\Omega \pm 2.5$

#### • Transition times

Range :  $< 5$  ns to 10 ms variable. Leading and trailing edges settable separately and limited to 20:1 ratio between settings into one of the following ranges: 5 ns-100 ms; 50 ns-1.0  $\mu$ s; 500 ns-10  $\mu$ s; 5.0  $\mu$ s-100  $\mu$ s; 50  $\mu$ s-1.0 ms; 500  $\mu$ s-10 ms  
Resolution : 3 digits limited to 0.1 ns  
Accuracy :  $\pm 5\%$  of setting  $\pm 2$  ns  
Linearity :  $< 5\%$  deviation from a straight line between 10 % and 90 % points.

### INTERNAL TRIGGER

Range : 100 ns to 1000 s  
Resolution : 4 digits limited to 100 ns  
Accuracy : 0.01 %  $\pm 1$  ns  
Jitter :  $< 0.1\%$  of setting +50 ps.

### INPUT AND OUTPUT

#### • Trig In

Sensitivity : 150 mVp-p minimum  
Minimum Width : 10 ns  
Maximum rate : 50 MHz.  
Input Impedance : 1 M  $\Omega \pm 5\%$   
Input Protection :  $\pm 15$  VDC plus peak AC  
Range : selectable from -9.99V to +9.99V  
Resolution : 3 digits, limited to 10 mV.  
Accuracy :  $\pm 5\%$  of setting  $\pm 25$  mV  
Slope selection : positive or negative

#### • SYNC Out.

TTL level pulse at programmed period.  
Output impedance 50  $\Omega$ , protected against short circuit and up to  $\pm 15$  V accidental input. The high level is  $> 2$  V into 50  $\Omega$  and with 3.5 ns typ. transition.

### GPIB PROGRAMMING

**Internal** : IEEE-488.2; SCPI compatible.  
**Address** : 0-30 front panel selectable.

### GENERAL

**Safety** : IEC 1010, Cat.I

**Memory** : Non-volatile, stores up to 99 complete panel settings. Last user setup also retained at power down.

**Power Requirements** : 92-128 V, 186-256 VAC switch selectable, 48-66 Hz, 130 VA max.

**Dimensions** : 89 x 213 x 457 mm

**Weight** : 5.5 kg

**Operating Temperature** : 0  $^{\circ}$ C to 50  $^{\circ}$ C.

**Storage Temperature** : -20  $^{\circ}$ C to 60  $^{\circ}$ C.

**Warranty** : 3 years

### SUPPLIED WITH

All generators are supplied with a power cord and a user, programming and maintenance manual.

### OPTIONAL ACCESSORIES

- BNC/BNC cable (1m, black, IEC 1010) - SO 410
- BNC m/2 x BNC f. adaptor - SO 401
- isolated BNC m/2 x ban. f. adaptor - SO 402
- 50  $\Omega$ , 2 W load - SO 405
- IEEE cable (2m, 24 contacts) - SI 601

To discover the complete range of accessories, contact us and ask for the ELDITEST catalog

Specifications subject to change without notice - FT445000A/98

# Sefram



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