

## Function Generator



### Features

- ★ Versatile Selectable Waveform Generation for a Wide Range of Testing Applications
- ★ 20V p-p Output Signal
- ★ 3 Digit Readout for Frequency
- ★ 50 ohms O/P Impedance
- ★ Double Pulse Mode Available for Pulse Generator (Model 2104A & 2019A)
- ★ Wide Sweep Rate (Triangle & Sawtooth) for Sweep Generator (Model 2119A)
- ★ Sync Out Facility
- ★ Simultaneous Fixed Level, TTL,  $\overline{\text{TTL}}$ , ECL & ECL Outputs for Pulse Generator

### Description

APLAB's Function / Sweep / Pulse Generator is a group of high performance general purpose instruments used mainly for testing the freq. response of various types of amplifiers as well as bandwidth measurement of different types of filters.

Its wide freq. range, amplitude control, types of waveforms, sweep facility and easy to operate features make the unit a laboratory standard, as well as a versatile instrument for production line.

### Specifications

| Parameters                 | Model 2119A   | Model 2104A  | Model 2019A  |
|----------------------------|---|--|--|
| <b>FUNCTION OUTPUT</b>     |   |  |  |
| Frequency Range            | 0.002Hz to 20MHz in 10 overlapping ranges.  | 0.03Hz to 3MHz in 7 overlapping ranges.  | 0.002Hz to 20MHz in 10 overlapping ranges.   |
| Waveforms                  | Sine, Triangle, Square, Positive Square & Negative Square.  |  |  |
| Max. Amplitude             | For Sine, Triangle & Square Amplitude is variable upto 20V p-p $\pm 5\%$ (10V p-p $\pm 10\%$ into 50 ohms). For +ve Square & -ve Square. It is variable upto $\pm 10V$ p-p $\pm 10\%$ (5V p-p $\pm 10\%$ into 50 ohms). | For Sine, Triangle & Square Amplitude is variable upto 20V p-p $\pm 10\%$ (10V p-p $\pm 10\%$ into 50 ohms). For +ve Square & -ve Square. It is variable upto 10V p-p $\pm 10\%$ (5V p-p $\pm 10\%$ into 50 ohms). | For Sine, Triangle & Square Amplitude is variable upto 20V p-p $\pm 5\%$ (10V p-p into 50 ohms). For +ve Square & -ve Square. It is variable upto 10V p-p $\pm 5\%$ (5V p-p into 50 ohms). |
| O/P Impedance              | 50 ohms.  |  |  |
| Attenuator                 | 60dB step attenuator in 20dB steps with additional 20dB vernier control.  |  |  |
| Accuracy                   | $\pm 0.3\text{dB}$ .  |  |  |
| <b>FREQUENCY PRECISION</b> |   |  |  |
| Accuracy                   | $\pm 3\%$ of full range from 0.01Hz to 1MHz range.<br>$\pm 5\%$ of full range on 10MHz range.   | $\pm 5\%$ of full range.   | $\pm 3\%$ of full range from 0.01Hz to 1MHz range.<br>$\pm 5\%$ of full range on 10MHz range.  |
| Time Symmetry              | Square wave variation $< \pm 1\%$ from 0.001Hz to 200KHz.<br>$< \pm 0.5\%$ from 20Hz to 20KHz.  | Square wave variation $< \pm 2\%$ .  | Square wave variation $< \pm 1\%$ from 0.001Hz to 200KHz.<br>$< \pm 0.5\%$ from 20Hz to 20KHz.   |
| <b>AMPLITUDE PRECISION</b> |   |  |  |
| Frequency Response         | (w.r.t. 2KHz)<br>Sine variation $\pm 0.1\text{dB}$ for 0.002Hz to 200KHz.<br>$< \pm 0.5\text{dB}$ for 200KHz to 2MHz.<br>$< \pm 3\text{dB}$ for 2MHz to 20MHz.  | (w.r.t. 3KHz)<br>Sine variation $\pm 0.3\text{dB}$ for 10Hz to 500KHz.<br>$< \pm 0.5\text{dB}$ for 500KHz to 1MHz.<br>$< \pm 1.0\text{dB}$ for 1MHz to 3MHz.   | (w.r.t. 2KHz)<br>Sine variation $< \pm 0.1\text{dB}$ for 0.002Hz to 200KHz.<br>$< \pm 0.5\text{dB}$ for 200KHz to 2MHz.<br>$< \pm 3.0\text{dB}$ for 2MHz to 20MHz.                         |
| <b>OPERATION MODES</b>     | Continuous, Triggered or Gated.   |  |  |

| Parameters  | Model 2119A   | Model 2104A   | Model 2019A  |
|---|---|---|--|
| <b>SYNC OUTPUT</b>  | Squarewave o/p.   | TTL level pulse capable of driving 50 ohms termination.   |  |
| DC O/P & DC OFFSET  | Adjustable with signal peak plus offset limited to $\pm 10V \pm 10\%$ ( $\pm 5V \pm 10\%$ into 50 ohms).                                |   |  |
| VCG I/P FACILITY  | For external sweep upto 100 : 1 freq change with external 0 to 2V signal freq. vernier is at minimum                                    | Upto 100 : 1 freq. change with external 0 to 3V signal when freq. vernier is at minimum.  | Upto 100 : 1 freq. change with external 0 to 2V signal, freq. vernier is at minimum.   |
| <b>TRIGGER &amp; GATE I/P</b>                                       |   |   |  |
| I/P Range   | 1V p-p with max DC offset upto $\pm 10V$ .  |   |  |
| Impedance   | 10K ohms // 33pF nominal.   |   |  |
| Pulse Width   | 25nS minimum.   |   |  |
| Repetition Rate   | 10MHz max.  | 2MHz max.   | 10MHz max.   |
| Adjustable Triggered Signal Start/Stop Point (Sine & Triangle only) | Approx $-90^\circ$ to $+90^\circ$ upto 2MHz.  |   |  |
| <b>WAVEFORM CHARACTERISTICS</b>                                     |   |   |  |
| Sine Distortion   | <1% upto 100KHz ranges.<br>All harmonics 34dB below fundamental on 1MHz ranges.<br>All harmonics 26dB below fundamental on 10MHz range. | <1.0% on 100Hz to 10KHz ranges.<br><1.5% on 10Hz & 100KHz ranges.<br>All harmonics 24dB below fundamental on 1MHz range.                            | <1.0% upto 100KHz ranges.<br>All harmonics 34dB below fundamental on 1MHz range.<br>All harmonics 26dB below fundamental on 10MHz range. |
| <b>SQUARE WAVE RISE/FALL TIME</b>                                   | <25ns.  | <50ns (typical 30ns).<br>For max o/p into 50 ohms.<br>At function out.  | <25ns for max o/p into 50 ohms.<br>At function out.  |
| <b>SWEEP GENERATOR</b>  |   |   |  |
| Waveforms   | Triangle, Sawtooth.   | N/A   | N/A  |
| Sweep Rate  | 0.02Hz to 25Hz in 2 overlapping ranges, continuously variable with sweep rate control.  | N/A   | N/A  |
| <b>SWEEP RANGE</b>  | Adjusts the lower end of the sweeping range in conjunction with freq. vernier.  | N/A   | N/A  |
| <b>SWEEP SYNC</b>   | 15V p-p nominal pulsed o/p.   | N/A   | N/A  |
| <b>PULSE GENERATOR</b>  |   |   |  |
| Pulse o/p   | N/A   | Variable amplitude pulse and simultaneous fixed amplitude TTL, TTL, ECL, ECL pulses and TTL sync pulse. All outputs can drive 50 ohms terminations. |  |
| Operational Modes   | N/A   | Continuous, triggered and gated in generator mode & Normal, Double & Delayed in pulse mode.   |  |
| Pulse Period  | N/A   | 333ns to 33.3s in 7 overlapping ranges.   | 50ns to 5000s in 10 overlapping ranges.  |
| Pulse Width   | N/A   | 50ns to 1ms in 5 overlapping ranges.  | 25ns to 1ms in 5 overlapping ranges.   |
| Pulse Delay   | N/A   | 50ns to 10ms in 6 overlapping ranges.   | 50ns to 10ms in 6 overlapping ranges.  |
| Duty Cycle  | N/A   | Upto 70%.   | Upto 70% for freq. less than 10MHz approx.<br>50% for freq. above 10MHz.   |
| Function Output   | N/A   | Variable upto 20V p-p $\pm 10\%$ (10V p-p $\pm 10\%$ into 50 ohms).<br>DC offset and attenuation are same as for function generator.                | Variable upto 20V p-p $\pm 5\%$ (10V p-p into 50 ohms).<br>DC offset and attenuation are same as for function generator.                 |
| Pulse Rise / Fall   | N/A   | At function out <50ns (30ns typical) for max o/p into 50 ohms.  | At function out <25ns for max o/p into 50 ohms.  |
| <b>POWER</b>  | 230V AC $\pm 10\%$ , 47-53Hz. Optional 115V AC $\pm 10\%$ , 57-63Hz.  |   |  |
| <b>DIMENSIONS (approx.)</b>   | 305 (W) x 145 (H) x 260 (D) mm  | 295 (W) x 145 (H) x 350 (D) mm  | 295 (W) x 145 (H) x 350 (D) mm   |
| <b>WEIGHT</b>   | 6 Kg. (approx.).  |   |  |
| <b>STANDARD ACCESSORIES</b>   | Instruction Manual - 1 No.<br>BNC(M) to BNC(M) Cable - 1 No.<br>BNC(M) to Alligator Clip - 1 No.  | 50 Ohms Termination - 1 No.<br>Mains Cord - 1 No.   |  |

WE PURSUE A POLICY OF CONTINUOUS DEVELOPMENT AND PRODUCT IMPROVEMENT. THUS THE SPECIFICATIONS IN THIS DOCUMENT AND THE LOCATION OF CONTROLS ON THE FRONT PANEL MAY BE CHANGED WITHOUT NOTICE.

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