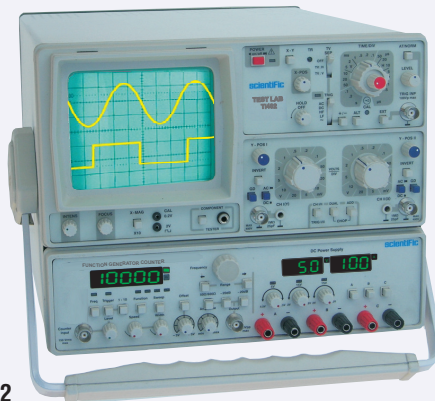


TL401



TL402

Test Labs TL401 TL402

Test Lab consisting of Oscilloscope, Function Generator, Frequency Counter and Power Supply.

Oscilloscope :

- Dual channel, DC to 30 MHz, 5 mV/div-20 V/div, Invert facility in Both Channels
- Timebase 20 ns - 0.2 s, variable hold-off, X10 Magnification
- Triggering DC - 60 MHz, Active TV Sync Sep., Alternate triggering
- Component Tester, 2 level Calibrator

Function Generator :

- 0.3 Hz to 3 MHz Function Generator

Technical Specifications

Oscilloscope

Operating Modes

CH I, CH II, CH I & CH II alternate or chopped (freq. 0.5 MHz approx.)
Addition or difference \pm CH I \pm CH II (with invert switch for both channels)

X-Y mode : Same sensitivity in both direction (CH I as Y, CH II as X)

Vertical Deflection (Y)

Both channels :

Deflection coefficients : 5 mV/div to 20 V/div, 12 calibrated steps in 1-2-5 seq.

Accuracy : ± 2 %

Bandwidth : DC-30 MHz (-3 dB) DC coupled, 10 Hz to 30 MHz (-3 dB) AC coupled

- Waveforms : Sine, Square, Triangle, DC
- DC- Offset Adjustment
- Internal Sweep and External FM Modulation
- Distortion Factor < 0.5%
- Square Wave risetime typ. 40ns

Frequency Counter:

- 15MHz Frequency Counter

Power Supply :

- TL401 : 2 \times 15V/1A, 5V/1A DC Power Supply
- TL402 : 2 \times 15V/1A, 5V/1A DC Power Supply, with digital display for Voltage and Current.

Rise Time : <11.6 ns (approx.)

Input Impedance : 1 M Ω || 25 pF (approx.)

Input coupling : DC-AC-GND

Input voltage : max. 400 V(DC + AC peak) (CAT II)

Timebase (T)

Time coefficient : 18 calibrated steps in 1-2-5seq. 0.5 μ s/div to 0.2 s/div with variable to 0.2 μ s/div, with x 10 to 20 ns/div

Hold-off time : Variable control to approx. 1:10

Sawtooth output : 5 Vpp (approx.)

TRIGGER SYSTEM

Trigg. Modes : Auto or variable level, LED indication for stable triggering

Triggering source : CH I, CH II, Alternate, Line, Ext.

Test Lab TL401 & TL402

Technical Specifications

Cont...

Trigger Coupling : AC, DC, HF, LF **Slope** : Positive or Negative
TV Sync : Active TV Sync Separator
Trigger Sensitivity : Internal : 0.5 div (5 mm) , External : 0.5 V
Trigger Bandwidth : Auto : 20 Hz - 30 MHz (≥ 5 mm)
Level : DC - 50 MHz (≥ 5 mm) (Typically 60 MHz at 1 div)
Ext. : 0.5 V (DC - 30 MHz)

Horizontal Deflection (X)
Deflection coefficient : same as CH II
Bandwidth : DC-3 MHz(-3dB)
Input Impedance : 1 M Ω || 25 pF (approx.)
X-Y Phase Shift : $< 3^\circ$ up to 100 kHz

Component Tester
Test voltage : max. 8.5 V_{rms} (open circuit)
Test current : max. 8 mA_{rms} (short circuit)
Test frequency : 50 Hz (line Freq.)
Test connections : 2 banana jacks 4 mm dia. One test lead is grounded ,
Continuity Test : Continuous beep when $< 100 \Omega$

General Information :
Cathode Ray Tube : 140mm rectangle flat face, monochrome with internal graticule & Mu metal shielding, Phosphor P31
Display : 8 x 10 cm, accelerating Voltage : 2 kV(approx.), Trace rotation on front panel
Z- modulation : Positive TTL level
Calibrator : Square wave 0.2 V & 2 V $\pm 1\%$, 1 kHz for probe compensation

Function Generator :

Operating Modes : Sine, Square, Triangle, DC, Free running, internal sweep or external frequency modulation, with or without DC offset,
Frequency Range : 0.3 Hz to 3 MHz
Frequency Stability : $< 0.5\%$ / hr or 0.8% / 24 hr at constant ambient temperature (medium position of frequency control)

Waveform Characteristics

Sine wave Distortion : 0.3 Hz - 100 kHz : max. 0.5 %
0.1 MHz-0.5 MHz : max. 1.5%
0.5 MHz - 3 MHz : max. 3%

Square Wave Rise time : typ. < 40 ns

Overshoot : $< 5\%$

Triangular non-linearity : $< 1\%$ (up to 100 kHz)

Frequency Display Accuracy

Up to 3 Hz : $\pm (1\% + 3D)$

3 Hz - 3 MHz : $\pm (5 \times 10^{-5} + 1D)$

Output : (short-circuit-proof)

Output Voltage : 10 V_{pp} into 50 Ω , max. 20 V_{pp} open circuit

Attenuation : max. 60 dB, 2 steps : 20 dB ± 0.2 dB each

Variable : 0 to 20 dB

Amplitude Flatness : (sine/triangle)

0.3 Hz - 0.3 MHz : max. 0.2 dB

0.3 MHz - 3 MHz : max. 0.5 dB

Output Impedance : switchable 50 Ω / 600 Ω

DC Offset : Variable offset range : max. ± 2.5 V into 50 Ω ,
max. ± 5 V open circuit

Trigger Output : Square Wave synchronous to signal output, TTL > 4 V_{pp}

Frequency Modulation :

FM Input : VCF BNC connector on rear panel

Frequency Change : 1 : 100 approx. **Input Impedance** : 50 k Ω || 25pF

Input Voltage : ± 30 V max.

FM Internal (Sweep) :

Sweep Speed : 20 ms to 4 s

Sweep Range : approx. 1 : 100

Frequency Counter :

Frequency Range : 10 Hz to 15 MHz

Accuracy : $\pm (5 \times 10^{-5} + 1D)$

Input Sensitivity : 50 mV_{rms}

Max. Input Voltage : 150 V_{rms}

Input Impedance : 1 M Ω || 50 pF

Display : 4 digits for Function Generator and 5 digit for Frequency Counter, 7 Segment LED display

DC Power Supply :

TL401 : DC Power Supply without Digital Display.

TL402 : DC Power Supply with Digital Display for Voltage and Current

Output voltage : 2 \times 15 V, 1 A, Adjustable from 2 to 15 V
+ 5 V, 1 A, Adjustable from 4.5 to 5.5 V
All supplies isolated from ground

Output current : 1 A each

Regulation : $\pm 1\%$

Ripple and Noises : ≤ 10 mV_{rms}

Display : 3 digit , switchable , simultaneous display of voltage and current

Display Accuracy : $\pm (1\% + 1d)$

Overload indication is provided. Outputs are short circuit protected.

General Information

Power : 220-240 V $\pm 10\%$, 50 Hz

Operating Conditions : 0 to 45 $^\circ\text{C}$, RH 80%

Dimensions : W: 285, H: 226, D: 398 (mm)

Weight : 9.8 kg (approx.)

Accessories :

Manual : 1 no. Test prods : 1 Pair, BNC- BNC - 2 no.,

Power cord : 1 no.

Optional Accessories : 50 Ω Termination SA51 , BNC-Banana Cable
(subject to change)

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