

Electronic Counters

For High Accuracy Frequency Measurements In Mobile Communication and Other Applications

R5361B/5362B

- Expanding Reciprocal Method
- Go/No-Go Comparison and Scaling
- Variety of Interfaces





(Photo is R5361B)

R5361B/5362B Frequency Counters

R5361B/5362B are frequency counters ideal for adjustment and maintenance of car telephones, personal radios, MCA, pagers and other equipment. The R5361B/5362B are capable of frequency measurements at high resolution within a short period of 9-digit display/1 sec. gate due to the special counter LSI uniquely developed by ADVANTEST, as well as the expanding/reciprocal system.

Main Specifications

	R5361B	R5362B
Frequency measuring range	0.2 mHz to 1 GHz	0.2 mHz to 3 GHz
Period measuring range	10 ns to 5,000 s	
Time interval measuring range	200 ns to 9,000 s	
Calculation functions	When used with TR1644	
GPIB	*When used with R13002B	
BCD output	*When used with R13001B	
D/A output	Possible through GPIB or BCD output (requires TR1644)	
DC drive	Possible	Possible

*Either the R13001B or the R13002B (but not both) are available built-in

■ GO-NO GO Evaluation of Measurement Results and Measurement of Percentage Deviation
When used with the TR1644 Calculation Unit, the R5361B/R5362B Series is capable of making GO-NO GO decisions by evaluating measured values in comparison with set values. The series can also do arithmetic operations, measurement of moving differences (Δ), scaling, percentage deviations and maximum and minimum value determination for applications ranging from production lines to laboratory work.

■ Noise Elimination Through ANS
The ANS circuit used in the R5361B/R5362B series allows for normal counting without the adverse effects of noise components by automatically controlling the counters' sensitivity according to the signal size. Also, with INPUT A there is no need to change settings in the 10 mVrms to 5 Vrms range due to the Auto Attenuator Function.

■ Interface Unit Allows For Flexible Systemization
The R13001B with BCD data output, D/A output functions and the R13002B with GPIB data output and D/A output functions are available as plug-in unit interface accessories. These accessories allow for flexible systemization of the measurement process.

Specifications

Frequency Measurement (FREQ. A)

Measuring range: 60 MHz to 1000 MHz (R5361B)

Lower range 60 MHz to 1500 MHz
High range 1500 MHz to 3000 MHz (R5362B)

Counting time:

- < 10 ms (any value between 0.9 ms to 9 ms depending on frequency)
- < 0.1 s (any value between 9 ms to 90 ms depending on frequency)
- < 1 s (any value between 90 ms to 900 ms depending on frequency)
- < 10 s (any value between 900 ms to 9 s depending on frequency)
- < 100 s (any value between 9 s to 90 s depending on frequency)

Operation time: approx. 80 ms (included in the sample rate time in any mode other than the HOLD mode)

Number of display digit:

- LSD OFF** 6 (< 10 ms), 7 (< 0.1 s), 8 (< 1 s), 9 (< 10 s), and 9 (< 100 s; with one-digit MSD overflow)
- LSD ON** 7 (< 10 ms), 8 (< 0.1 s), 9 (< 1 s), 9 (< 10 s; with one-digit MSD overflow)
- 9 (< 100 s; with two-digit MSD overflow)

Unit display: MHz, GHz

Measuring accuracy:

- LSD OFF** ± 1 count \pm time base accuracy
- LSD ON** \pm odds measuring error \pm time base accuracy

Period Measurement (PERIOD B)

Measuring range:

- LPF ON** 100 μ s to 5000 s (direct input)
- LPF OFF** 10 ns to 1250 s (1/4 prescale input)

Counting time:

- < 10 ms (any value between 0.9 ms to 9 ms depending on frequency)
- < 0.1 s (any value between 9 ms to 90 ms depending on frequency)
- < 1 s (any value between 90 ms to 900 ms depending on frequency)
- < 10 s (any value between 900 ms to 9 s depending on frequency)
- < 100 s (any value between 9 s to 90 s depending on frequency)

Note 1: When LPF is turned ON and the cycle time of an input signal exceeds the parenthesized value (for example, an input signal cycle exceeding 9 ms at the range less than 10 ms), the value becomes the counting time.

Note 2: When LPF is turned OFF and the time of 4 cycles of an input signal exceeds the parenthesized value (for example, an input signal of 2.3 ms or more at the range less than 10 ms), the value becomes the counting time.

Operation time: approx. 80 ms (included in the sample rate time in any mode other than the HOLD mode)

Number of display digit: 6 (< 10 ms), 7 (< 0.1 s), 8 (< 1 s), 9 (< 10 s), and 9 (< 100 s with one-digit MDS overflow)

Unit display: ps, ns, μ s, ms, s, ks

Measurement accuracy:

- \pm trigger error ± 1 count \pm time base accuracy

Time interval measurement (T.I.B pulse with measurement)

Measuring range: 200 ns to 9000 s

Multiplication (10^n): 10^0 , 10^1 , 10^2 , 10^3

Time unit: 100ns

Unit display: ns μ s, ms, s, ks

Measuring accuracy: \pm (trigger error/ $\sqrt{10^n}$) ± 1 count \pm time base accuracy

Frequency Measurement (FREQ. B)

Measuring range:

- LPF ON** 0.2 MHz to 10 kHz (direct input)
- LPF OFF** 0.8 MHz to 100 MHz (1/4 prescale input)

Counting time:

- < 10 ms (any value between 0.9 ms to 9 ms depending on frequency)
- < 0.1 s (any value between 9 ms to 90 ms depending on frequency)
- < 1 s (any value between 90 ms to 900 ms depending on frequency)
- < 10 s (any value between 900 ms to 9 s depending on frequency)
- < 100 s (any value between 9 s to 90 s depending on frequency)

Note 1: When LPF is turned ON, if the input signal period exceeds the value given in parentheses, (example: the input frequency is 111 Hz or less in the 10 ms range) the counting time is 1 signal period.

Note 2: When the LPF is turned OFF, if 4 input signal periods exceeds the value given in parentheses, (example: the input frequency is 444 Hz or less in the < 10 ms range) the counting time is 4 signal period.

Note 3: In the < 10 ms, < 0.1 s and < 1 s ranges, the instrument resets if there are no input signal for approximately 2 s, so the < 10 s or < 100 s range should be used to measure low-frequency signals (4 Hz or less).

Operation time: approx. 80 ms (included in the sample rate time in any mode other than the HOLD mode)

Resolution:

Sine mode (\sim): 1 kHz or more (< 10 ms), 100 Hz or more (< 0.1 s), 10 Hz or more (< 1 s), 1 Hz or more (< 10 s), and 0.1 Hz or more (< 100 s).

Rectangle wave mode (\square): 6 digits (< 10 ms), 7 digits (< 0.1 s), 8 digits (< 1 s), 9 digits (< 10 s), and 9 digits (< 100 s with one-digit MSD overflow.)

Unit display: mHz, mHz, Hz, kHz, MHz

Measuring accuracy: \pm trigger error ± 1 count \pm time base accuracy

Integrator count (TOT. B)

Counting range: DC to 50 MHz

Count capacity: 0 to 999999999

Input Specifications

INPUT A

Input voltage range:

- 10 mVrms. to 5 Vrms. (60 MHz to 900 MHz), } R5361B
- 20 mVrms. to 5 Vrms. (> 900 MHz)
- 10 mVrms. to 5 Vrms. (+27 dBm) (60 MHz to 1500 MHz)
- 35 mVrms. to 5 Vrms. (+27 dBm) (1500 MHz to 2800 MHz)
- 50 mVrms. to 5 Vrms. (+27 dBm) (2800 MHz to 3000 MHz)
- R5362B
- 3 Vrms max. (+23 dBm) when the ANS switch is turned ON.
- 500 mVrms max. (+7 dBm) when the BURST switch is turned ON.

Attenuator: Automatically inserted when a signal of approx. 500 mVrms is input (20 dB).

Input protective fuse: Melted at 12 Vrms (+34 dBm) applied for 1 min. or less. (R5361B)

Input connection mode: AC connection

Input impedance: approx. 50 Ω

Burst wave measurement: Measured when the BURST switch is turned ON.

Superimposed noise suppression: Suppressed when the automatic noise suppresser (ANS) switch is turned ON. (The R5362B employs an automatic attenuator insert system which works within a range of 60 MHz to 1500 MHz.)

Level monitor: Displayed by 3-stage LED.

LOW Turns ON at a level lower than counting level.

MED Turns ON at counting level.

HIGH Turns ON at a level of approx. 5 Vrms.

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INPUT B

Input connection: DC/AC mode switching

Lower band limit in AC mode: 10 Hz

Input voltage range:

	ATT. 0 dB	ATT. 20 dB
10 kHz or less	25 mVrms to 10 Vrms	500 mVrms to 29 Vrms
10 kHz to 60 MHz	25 mVrms to 1 Vrms	500 mVrms to 10 Vrms
60 MHz to 100 MHz	25 mVrms to 500 mVrms	500 mVrms to 5 Vrms

Max. input level : 42Vpeak (ATT. 20dB)

Input impedance: 1 M Ω or more; 25 pF or less

Trigger level: Continuously variable within a range from about -1.2 V to approx. + 1.2 V; preset approx. 0 V.

Trigger indicator: LED display

Superimposed noise suppression: Filter passing through a low band of 10 kHz

Burst wave measurement: Measured when the BURST switch is turned ON.

Time Base

Internal time base frequency: 5 MHz

Frequency stability:

	Standard	Option 20	Option 21	Option 22	Option 23
Needing rate	$5 \times 10^{-9}/\text{day}$	$2 \times 10^{-9}/\text{day}$	$5 \times 10^{-9}/\text{day}$	$2 \times 10^{-9}/\text{day}$	$5 \times 10^{-10}/\text{day}$
	$1 \times 10^{-7}/\text{mon}$	$8 \times 10^{-8}/\text{mon}$	$5 \times 10^{-8}/\text{mon}$	$2 \times 10^{-8}/\text{mon}$	$1 \times 10^{-8}/\text{mon}$
Long-range stability	$2 \times 10^{-7}/\text{yr}$	$1 \times 10^{-7}/\text{yr}$	$8 \times 10^{-8}/\text{yr}$	$5 \times 10^{-8}/\text{yr}$	$2 \times 10^{-8}/\text{yr}$
Temperature characteristics ($\pm 25^\circ\text{C}$ to $\pm 25^\circ\text{C}$)	$\pm 1 \times 10^{-7}$	$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 5 \times 10^{-9}$
Rise characteristics	After 30 min.	$\pm 1 \times 10^{-7}$	$\pm 5 \times 10^{-8}$	$\pm 4 \times 10^{-8}$	$\pm 4 \times 10^{-8}$
	After 60 min.	—	—	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$

Internal time base output: Frequency 10 MHz; voltage approx 1 Vp-p, impedance approx 50 Ω

External time base input: Any frequency of 1 MHz, 2 MHz, 5 MHz, or 10 MHz; voltage 1 Vp-p to 5 Vp-p, impedance approx 500 Ω

General Specifications

Count capacity: 9 digits, decimal

Display: Green 7-segment LED, memory display system

Sample rate: Approx 80 ms, approx 320 ms, approx 2.5 s, and HOLD.

Self check: Check for counting operation according to the reference internal signal.

Operating conditions:

Temperature 0°C to +40°C

Relative humidity 85% or less

Storage temperature range: -20°C to 70°C

Power requirements: To be selected from the following for your order.

Option No.	Standard	Opt. 40
Power supply (V)	100 to 120	200 to 240

48 Hz to 440 Hz

Power consumption:

DC drive	AC drive
30 W or less	50 VA or less

Outer dimensions: Approx 240 (W) \times 88(H) \times 360(D) mm

Mass: 4.5 kg or less

Accessories

Type	Product code	Remarks
AC power cable	A01402	
DC power cable	MI-71	
Input cable	A01036-1500	BNC-BNC

Options (Factory options)

Options 20, 21, 22 and 23: Time base (See "Time base table.")

Accessories (Sold separately)

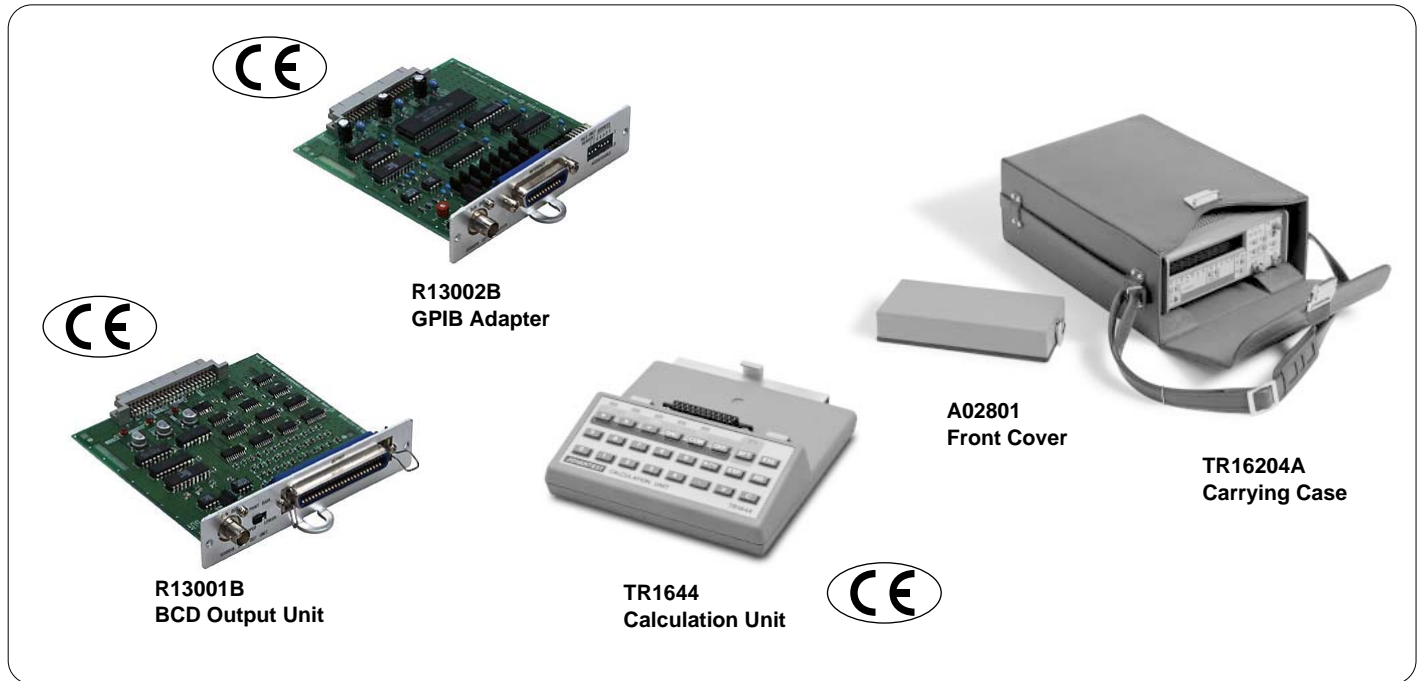
TR16204A Carrying Case

A02801 Front Cover

A02017 Panel mount Set

A02621 Rack Mount Set (main unit only) (EIA standard)

A02621-J Rack Mount Set (main unit only) (JIS standard)



Common Accessories (Sold separately, for R5361B/5362B)

TR1644 Calculation Unit

Calculation Modes:

Calculations on measured values: Moving difference, offset difference, moving maximum, moving minimum

Calculations on measured and entered values: Basic arithmetic, fixed point display (D-A setting mode), compare mode, %, scaling

Calculations on entered values: Basic arithmetic

Number of digits enterable: Max. 9 digit, 1 digit exponent

Number of digits displayed: 6, 7, 8 or 9 depending on the gate time.

Number of digits in interval measurement is the number of digits in the measured value.

Decision signal output: Logic output (TTL level) corresponding to HI, PASS and LO in the compare mode, if the R13001B BCD Data Output Unit is also used.

Overflow: Only in fixed-point display mode: underflow occurs in other modes.

Usable functions: All functions of the R5361B/5362B Series

R13002B GPIB Adaptor (TR1644 required for D/A output)

GPIB standard: IEEE Std. 488-1978

Interface functions: SH1, AH1, T5, L4, SR1, R1, PP0, DC1, DT1, C0

Code used: ASCII

Remote control: All front panel functions and functions obtainable with TR1644 (except trigger level setting)

D-A converted output: External controller can set column select and offset; other functions are same as R13001B D-A output.

Mass: Approx. 300 g

Power consumption: Approx. 3 W

R13001B BCD Data Output Unit (TR1644 required for D/A output)

Data output format: Digit parallel (8-4-2-1 code)

Data capacity: 6-digit mantissa, 3-digit exponent (1-digit sign) and nits. PRINT DATA switch selects the most significant six digits or least significant six digits of the displayed counter value as output data.

Output level: TTL (LS type) level, fan-out 20

Output connector: 50-pin, Amphenol 57-40500 or equivalent

D/A converted output:

Output voltage: 0 V to +9.999 V

Accuracy: $\pm 0.25\%$ of f.s. ($23^{\circ}\text{C} \pm 5^{\circ}\text{C}$), $\pm 0.4\%$ of f.s. (0 to 40°C)

Number of converted digits: 4 consecutive digits

Column select: Least significant 4 digits, variable with TR1644

Offset: Arbitrary offset if TR1644 is used

Conversion time: Max. 20 ms

Resolution: Approx. 2.5 mV (12 bits)

Output impedance: Approx. 100 Ω (Connect to a unit with an input impedance of 100 k Ω or more)

Mass: Approx. 300 g

Power consumption: Approx. 3 W