

SECTION 1

GENERAL INFORMATION

1-1. General

The **R5361/5362/A** series reciprocal frequency counters incorporate reciprocal operation and fractional count capabilities, which, in combination, enables a higher frequency resolution and measurement rate than previous models. In addition to frequency counting, the **R5361/5362/A** series are capable of measuring periods, positive pulse widths, and totalization. The period measurement feature uses a clock frequency of 10 MHz and fractional part multiplication of up to 100. It thus achieves a measurement accuracy equivalent to that obtained with an instrument using a clock frequency of 1 GHz.

The Calculation Unit (**TR1644**), BCD Output Unit with 4-digit D/A output (**TR13001**), and **GPIB** Adapter with 4-digit D/A output (**TR13002**) are optionally available to increase the measurement capability of the **R5361/5362/A** series. The **TR13002** is designed to allow remote operation of all the front panel functions of the counters, except the trigger level control.

The **R5361/5362/A** series also have the following features:

- Low radiation design using the EMI technology.
- AC/DC power supply including battery operation capability (available with the optional **TR15801A/B**), except **R5361A/5362A**
- Panel set-up memory (with Option 39).
- Burst signal measuring capability.

1-2. Electrical Performance

Frequency measurement (FREQ. A)

Range:

60-1000 MHz (**R5361/5361A**)

60-3000MHz (**R5362/5362A**)

Gate time: < **10 ms** (somewhere between 0.9 and 9 ms depending on input frequency)

< **0.1 s** (somewhere between 9 and 90 ms depending on input frequency)

<1 s (somewhere between 90 and 900 ms depending on input frequency)

<10 s (somewhere between 900 ms and 9 s depending on input frequency)

<100 s (somewhere between 9 and 90 s depending on input frequency)

Number of digits displayed:

Gate time	Display digits	
	LSD OFF	LSD ON
<10 ms	6 digits	7 digits
<0.1 s	7 digits	8 digits
<1 s	8 digits	9 digits
<10 s	9 digits	9 digits MSD overflows
<100 s	9 digits MSD overflows	9 digits 2 MSDs overflow

(LSD: Least Significant Digit MSD: Most Significant Digit)

Unit display: MHz, GHz

Accuracy: ± 1 count \pm time base accuracy when the **LSD** is off.
 \pm fractional part measurement error \pm time base accuracy when the **LSD** is ON.

Execution time: Approx. 80 ms (to be included in sample rate except in **HOLD** mode)

Frequency measurement (FREQ. B)

Range: 0.2 MHz to 10 kHz (direct input) when **LPF** is **ON**.
0.8 MHz to 100 MHz (1/4 prescaled) when **LPF** is off.

Gate time: <10 ms (somewhere between 0.9 and 9 ms depending on input frequency)

<0.1 s (somewhere between 9 and 90 ms depending on input frequency)

<1 s (somewhere between 90 and 900 ms depending on input frequency)

<10 s (somewhere between 900 ms and 9 s depending on input frequency)

<100 s (somewhere between 9 and 90 s depending on input frequency)

Note: 1. If the period of the input signal exceeds the value given in parentheses (for example, input frequency is below 111 Hz when range is <10 ms) when **LPF** is **ON**, the period of the input signal will be the gate time.

2. If the 4 periods of the input signal exceed the value given in parentheses (for example, input frequency is below 444 Hz when range is <10 ms) with **LPF** off, the 4 periods will be the gate time.

3. The <10 ms, <0.1 s, or <1 ranges are reset if no input signal is applied for approx. 2 seconds. Use the <10 s or <100 s range when measuring a signal below 4 Hz with **LPF** off, or measuring a signal below 1 Hz with **LPF ON**.

Resolution:

Gate time	Resolution	
	Sine wave measurement mode	Square wave measurement mode
<10 ms	1 kHz or higher	6 digits
<0.1 s	100 Hz or higher	7 digits
<1 s	10 Hz or higher	8 digits
<10 s	1 Hz or higher	9 digits
<100 s	0.1 Hz or higher	9 digits MSD overflows

Unit display: μHz , mHz , Hz , kHz , or MHz
Accuracy: \pm trigger error ± 1 count \pm time base accuracy
Execution time: Approx. 80 ms (to be included in sample rate except in **HOLD** mode)

Period measurement (**PERIOD B**)

Range: 100 μs to 5000 s (direct input) when **LPF** is on.
10 ns to 1250 s (1/4 prescaled) when **LPF** is off.

Gate time: **<10 ms** (somewhere between 0.9 and 9.0 ms depending on input signal period)
<0.1 s (somewhere between 9 and 90 ms depending on input signal period)
<1 s (somewhere between 90 and 900 ms depending on input signal period)
<10 s (somewhere between 900 ms and 9 s depending on input signal period)
<100 s (somewhere between 9 and 90 s depending on input signal period)

- Note: 1. If the period of the input signal exceeds the value given in parentheses (for example, input signal period exceeds 9 ms when range is **<10 ms**) with **LPF** on, the signal period will be the gate time.
2. If the 4 periods of the input signal exceed the value given in parentheses (for example, input signal period exceeds 2.3 ms when range is **<10 ms**) with **LPF** off, the 4 periods will be the gate time.
3. The **<10 ms**, **<0.1 s**, and **<1 s** ranges are reset if no input signal is applied for approx. 2 seconds. Use the **<10 s** or **<100 s** range when measuring a signal period of 250 ms or more with **LPF** off, or measuring a signal period of 1s or more with **LPF** on.

Number of digits displayed: 6 digits (**<10 ms**), 7 digits (**<0.1 s**), 8 digits (**<1 s**), 9 digits (**<10 s**), 9 digits (**<100 s**, with MSD overflow)

Unit display: ps, ns, μs , ms, s, or ks
Accuracy: \pm trigger error ± 1 count \pm time base accuracy

Execution time: Approx. 80 ms (to be included in sample rate except in **HOLD** mode)

Time interval measurement (T.I. B positive pulse width measurement)

Measurement range: 200 ns to 9000 s
Multiplier (10^n): 10^0 , 10^1 , 10^2 , or 10^3
Time unit: 100 ns
Unit display: ns, μ s, ms, s, or ks
Accuracy: \pm trigger error \pm resolution \pm time base accuracy

Totalize (TOT. B)

Measurement range: DC to 50 MHz
Count capacity: 0 to 999999999

Input Specifications

INPUT A

Input voltage range: **R5361/5361A** :
10mVrms to 5 Vrms (60-900 MHz)
20mVrms to 5 Vrms (900-1000 MHz)
R5362/5362A :
10mVrms to 5 Vrms (60-1500MHz)
35mVrms to 5 Vrms (1500-2800 MHz)
50mVrms to 5 Vrms (2800-3000 MHz)

The maximum input level of burst signal measurement is 500 mVrms. Maximum 3 Vrms when **ANS** switch is on.

Input protection fuse: Blows at 12 Vrms for less than 1 minute.

Input coupling: AC

Input impedance: 50 Ω (approx.)

Burst signal measurement: Available with the **BURST** switch.

Noise rejection: Superimposed noise is suppressed with the Automatic Noise Suppressor (**ANS**) switch.

(In the **R5362/5362A** attenuation is inserted automatically in the 60 MHz to 1500MHz range.)

Level monitor: Uses three LED indicators:

LOW (green): Comes on below the count start level.

MED (green): Comes on at the count start level.
HIGH (red): Comes on at approx. 5 Vrms.

INPUT B

Input coupling: DC or AC switch selectable
 Cutoff frequency in AC mode: 10 Hz
 Input voltage range:

	ATT. 0 dB	ATT. 20 dB
10 kHz or below	25 mVrms–10 Vrms	500 mVrms–100 Vrms
10 kHz–60 MHz	25 mVrms–1 Vrms	500 mVrms–10 Vrms
60 MHz–100 MHz	25 mVrms–500 mVrms	500 mVrms–5 Vrms

Input impedance: More than 1 M Ω //less than 25 pF
 Trigger level: Approx. –1.2 V to approx. +1.2 V continuously variable. Preset at approx. 0 V.
 Trigger indicator: LED indicator
 Noise rejection: 10 kHz low-pass filter
 Burst signal measurement: Available with the **BURST** switch activated.

Time Base

Internal reference frequency: 5 MHz

Frequency stability:

		Standard type	Option 20	Option 21	Option 22	Option 23
Aging rate *1		5×10^{-8} /day	2×10^{-8} /day	5×10^{-9} /day	2×10^{-9} /day *2	5×10^{-10} /day *2
		1×10^{-7} /month	8×10^{-8} /month	5×10^{-8} /month	2×10^{-8} /month *2	1×10^{-8} /month *2
Long-term stability		2×10^{-7} /year	1×10^{-7} /year	8×10^{-8} /year	5×10^{-8} /year *1	2×10^{-8} /year *1
Temperature characteristics (+25°C±25°C)		$\pm 1 \times 10^{-7}$	$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 5 \times 10^{-9}$
Warmup characteristics *1	30 minutes later	$\pm 1 \times 10^{-7}$	$\pm 5 \times 10^{-8}$	$\pm 4 \times 10^{-8}$	$\pm 4 \times 10^{-8}$	$\pm 4 \times 10^{-8}$
	1 hour later	—	—	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 1 \times 10^{-8}$

Note: For the standard type, the warmup characteristic 10 minutes after power on is $\pm 2 \times 10^{-7}$

*1) Referred to the frequency 24 hours after power on

*2) Referred to the frequency 48 hours after power on.

Internal reference output: Frequency: 10 MHz
Voltage: 1 Vp-p (approx.)
Impedance: 50 Ω (approx.)

External reference input: Frequency: 1, 2, 5, or 10 MHz
Voltage: 1-5 Vp-p
Impedance: 500 Ω (approx.)

General Specifications

Display digits: 9 decimal digits
Display: Green, 7-segment LED display with storage capability.

Sample rate: Approx. 80 ms, 320 ms, 2.5 s, and **hold**
Self check: Counting operation check using the internal reference signal.

Panel setting memory: Available when **OVEN** switch is on.

Operating Environment: Temperature: 0°C to +40°C
Relative humidity: 40% to 90%

Storage temperature: -20°C to +70°C

Power requirements: 90-132 VAC (180-249 V specification available), 50-400 Hz
DC: +10 to +30 V
(**R5361A/5362A** series are AC operation only, however.)

Power consumption: Not more than 30 W for DC operation (**R5361**)
Not more than 33 W for DC operation (**R5362**)

Not more than 50 VA for AC operation
(R5361/5361A)

Not more than 55 VA for AC operation
(R5362/5362A)

Dimensions:

(H)88 × (W)240 × (D)360 mm (approx.)

Weight:

4.5 kg or less

1-3. Options and Accessories

When using the accessories, the **TR13001** or **TR13002**, in the frequency counter, power the counter with the AC source.

OPT 39 Back-up Battery (Available on order)

Built-in Ni-Cd battery to back up the panel setting memory. Approx. 14-hour backup with 8-hour charge; 20-hour backup with 16-hour charge.

TR13001 BCD Data Output Unit (with D/A output)

Transfer method: Digit parallel, through a 50-pin Amphenol connector

Output digits: 6 digits of mantissa and 2 digits of exponent (mantissa is switch selectable from high-order and low-order data.)

Output: TTL, active high

D/A output: Output voltage: 0 V (readout: 0000) to +9.999 V (readout: 9999)

Conversion digits: 4 LSDs of readout (Digit shift available with **TR1644**).

Offset: Not available (any offset setting available with use of the **TR1644**.)

Resolution: 4096 points (approx. 2.5 mV per point)

Output terminal: BNC connector

Output impedance: 10 k Ω (approx.)

Attachable instruments: Digital Recorder (**TR6198**), Spectrum Analyzer (**TR4110** Series, **TR4120**)

TR13002 GPIB Adapter (with D/A output)

Standard: IEEE Standard 488-1978