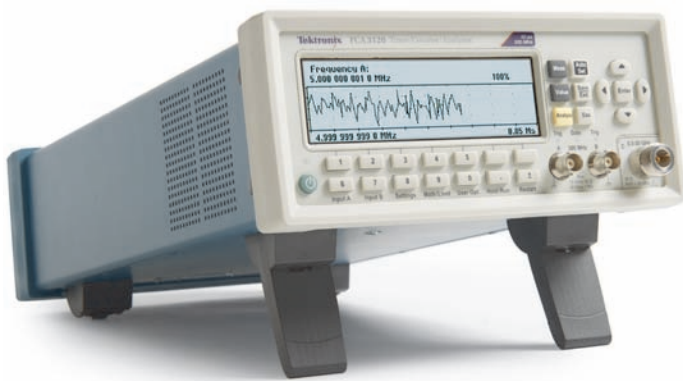


ВНЕСЕН В ГОСПРЕСТР

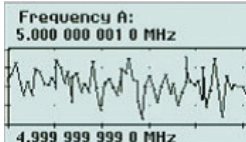


ТЕХ. ОПИСАНИЕ



Основные достоинства

- Разрешение по частоте 12 разрядов/с
- Разрешение по времени 50 пс (FCA3100) или 100 пс (FCA3000)
- Разрешение по фазе 0,001°
- Скорость передачи данных во внутреннюю память 250000 изм./с
- 13 автоматизированных измерений частоты, времени, фазы и напряжения



Контроль флуктуаций параметров во времени с помощью встроенных режимов анализа – функции TrendPlot™, гистограмм и статистических измерений.



Простое подключение к ПК через порты USB и GPIB.

Серия FCA3100/3000

Нужно регистрировать незначительные изменения частоты и длительности? Остановите свой выбор на этом таймере/частотомере/анализаторе. Захватывайте малые изменения исследуемого сигнала с лучшим в отрасли разрешением по времени и частоте. Быстро и точно анализируйте сигналы с помощью 13 измерительных функций и всеобъемлющих встроенных режимов анализа, включая статистические функции, гистограммы и тренды. Непревзойденная простота в обращении за счет интуитивного управления и интерфейса USB. Именно это требуется от таймера/частотомера/анализатора.

| Модель | Макс. частота | Число каналов | Разрешение по времени | Разрешение по частоте |
|---------|---------------|---------------------------|-----------------------|-----------------------|
| FCA3000 | 400 МГц | 2 | 100 пс | 12 разрядов/с |
| FCA3003 | 3 ГГц | 2 – 400 МГц 1 – 3 ГГц | 100 пс | 12 разрядов/с |
| FCA3020 | 20 ГГц | 2 – 400 МГц 1 – 20 ГГц | 100 пс | 12 разрядов/с |
| FCA3100 | 400 МГц | 2 | 50 пс | 12 разрядов/с |
| FCA3103 | 3 ГГц | 2 – 400 МГц 1 – 3 ГГц | 50 пс | 12 разрядов/с |
| FCA3120 | 20 ГГц | 2 – 400 МГц 1 – 20 ГГц | 50 пс | 12 разрядов/с |

Рекомендуемые принадлежности

| | |
|-------------|---|
| 174-4401-xx | Кабель USB ведущий-ведомый, 0,9 м |
| 012-0991-xx | Кабель GPIB с двойным экраном |
| 012-1256-xx | Кабель с разъёмами BNC вилка-вилка, 2,7 м |
| ACD4000 | Мягкая сумка для переноски прибора |
| HCTEK-4321 | Футляр для переноски |
| RMU2U | Комплект для монтажа в стойку двух приборов |
| TVA3000 | ПО анализа модуляции TimeView™ |

Аппаратные опции

| | |
|----|---|
| MS | Опорный термостатированный кварцевый генератор средней стабильности, 2·10 ⁻⁷ |
| HS | Опорный термостатированный кварцевый генератор высокой стабильности, 5·10 ⁻⁸ |
| RP | Разъёмы задней панели |

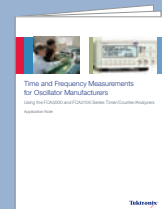
Рекомендуемые услуги

| | |
|---------|--|
| SILV200 | Расширенная гарантия на 5 лет (FCA3000, FCA3003, FCA3100, FCA3103) |
| SILV400 | Расширенная гарантия на 5 лет (FCA3020, FCA3120) |

Комплект поставки

- Пробная версия ПО TimeView™ и ПО NI LabVIEW SignalExpress™ TE (версия LE)
- Сертификат калибровки
- Руководство по эксплуатации на компакт-диске
- Руководство по программированию и технические характеристики
- Кабель питания
- Гарантия на 3 года

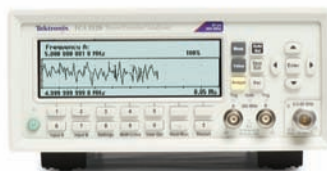
Узнайте больше, познакомившись с рекомендациями по применению «Измерения времени и частоты для производителей опорных генераторов».



Выбор частотомеров/таймеров

Частотомеры/таймеры

Обладая точностью и интуитивно понятным управлением, таким же, как и у наших осциллографов, частотомеры/таймеры Tektronix созданы в расчете на удобство и производительность. Они отличаются лучшим в отрасли разрешением и встроенными функциями измерения и анализа.



| | FCA3000 | FCA3100 | MCA3000 |
|-----------------|--|--|--|
| Макс. частота | 400 МГц, 3 ГГц, 20 ГГц | 400 МГц, 3 ГГц, 20 ГГц | 27 ГГц, 40 ГГц |
| Разрешение | <ul style="list-style-type: none"> 100 пс (по времени) 12 разрядов/с (по частоте) | <ul style="list-style-type: none"> 50 пс (по времени) 12 разрядов/с (по частоте) | <ul style="list-style-type: none"> 100 пс (по времени) 12 разрядов/с (по частоте) |
| Передача данных | <ul style="list-style-type: none"> 250 квыб./с (внутренняя) 5 квыб./с (в блочном режиме) | <ul style="list-style-type: none"> 250 квыб./с (внутренняя) 15 квыб./с (в блочном режиме) | <ul style="list-style-type: none"> 250 квыб./с (внутренняя) 5 квыб./с (в блочном режиме) |
| Измерения | 13 автоматизированных измерений Частота, период, отношение, интервал времени, погрешность интервала времени, длительность импульса, время нарастания/спада, фазовый угол, скважность, $V_{\text{макс}}$, $V_{\text{мин}}$, $V_{\text{пик-пик}}$ | 14 автоматизированных измерений Частота, период, отношение, интервал времени, погрешность интервала времени, длительность импульса, время нарастания/спада, фазовый угол, скважность, $V_{\text{макс}}$, $V_{\text{мин}}$, $V_{\text{пик-пик}}$, сумма | 13 автоматизированных измерений Частота, период, отношение, интервал времени, погрешность интервала времени, длительность импульса, время нарастания/спада, фазовый угол, скважность, $V_{\text{макс}}$, $V_{\text{мин}}$, $V_{\text{пик-пик}}$ + встроенный измеритель мощности |
| Режимы анализа | TrendPlot™, статистика, стандартное отклонение Аллана, гистограмма | TrendPlot™, статистика, стандартное отклонение Аллана, гистограмма | TrendPlot™, статистика, стандартное отклонение Аллана, гистограмма |
| Интерфейсы | Задняя панель: порт USB, GPIB ПО для связи с ПК: NI LabVIEW SignalExpress™ Tektronix Edition (версия LE) | Задняя панель: порт USB, GPIB ПО для связи с ПК: NI LabVIEW SignalExpress™ Tektronix Edition (версия LE) | Задняя панель: порт USB, GPIB ПО для связи с ПК: NI LabVIEW SignalExpress™ Tektronix Edition (версия LE) |

Выбор частотомера/таймера

Чтобы помочь вам правильно выбрать нужный частотомер/таймер, ниже перечислены наиболее общие критерии выбора, а также даны полезные советы по определению ваших требований.

1 Разрешение по частоте

Разрешением по частоте называется минимальное изменение частоты, которое может обнаружить частотомер/таймер. Разрешение зависит от выбранного времени измерения, т.е. чем больше время измерения (усреднения), тем больше цифр отображается на дисплее. В общем случае это значение выражается числом разрядов в секунду, отображаемых на дисплее прибора (например, 12 разрядов/с). Большее число разрядов означает более высокое разрешение.

2 Разрешение по времени

При измерении интервалов времени эта величина определяет минимальное изменение времени, которое может обнаружить прибор. Разрешение по времени иногда описывают, как разрешение «одного снимка» и измеряют в пикосекундах, например, 50 пс. Чем меньше эта величина, тем лучше разрешение по времени.

3 Стабильность опорного генератора

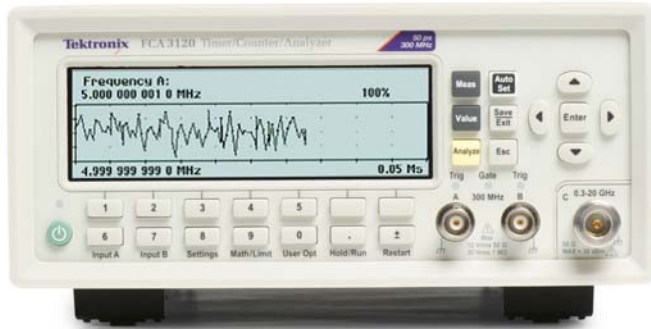
Входные сигналы измеряются относительно сигнала внутреннего опорного генератора. Чем выше стабильность этого генератора, тем точнее могут быть измерения. Большинство частотомеров использует опорные генераторы с кварцевой стабилизацией частоты, которые бывают трех типов: генераторы без компенсации температуры окружающей среды (RTXO), генераторы с компенсацией температуры окружающей среды (TCXO) и термостатированные генераторы (OCXO). TCXO и OCXO отличаются наибольшей стабильностью, и при использовании в качестве внутреннего источника опорной частоты значительно повышают точность и достоверность результатов измерения.

4 Аналитические возможности

Выбирая частотомер/таймер, нужно обращать внимание на наличие режимов анализа, таких как графики трендов, статистические функции, гистограммы и анализ модуляции.

Timer/Counter/Analyzers

Tektronix FCA3000 and FCA3100 Series Datasheet



Features & Benefits

Key Performance Specifications

- 300 MHz, 3 GHz, 20 GHz Models
- 300-400 MHz in Manual Trigger Mode
- Up to 3 Input Channels
- 50 ps (FCA3100 Series) or 100 ps (FCA3000 Series) Single-shot Time Resolution
- 12 Digit/s Frequency Resolution
- 0.001° Phase Resolution
- 3 mV or better Voltage Resolution
- Optional 5×10^{-8} High-stability Oven Time Base

Measurement Throughput

- 250k Sample/s Data Transfer Rate to Internal Memory (Up to 3.75M samples stored)
- Up to 15k Sample/s Data Transfer Rate over USB/GPIB Bus (Block mode)
- Up to 650 Individually Triggered Measurements/s

Available Functions and Features

- Automated Measurements: Frequency, Period, Ratio, Time Interval, Time Interval Error, Pulse Width, Rise/Fall Time, Phase Angle, Duty Cycle, Maximum Voltage, Minimum Voltage, Peak-to-Peak Voltage
- Totalize Measurement (FCA3100 Series)
- Multi-parameter Display
- Trend Plot Mode
- Measurement Statistics Mode
- Histogram Mode
- Allan Deviation
- Zero Dead-time Frequency/Period Measurements
- Continuous Data Streaming over USB/GPIB Bus during Measurement (FCA3100 Series)
- Programmable Pulse Output from 0.5 Hz to 50 MHz

Connectivity

- Optional Rear-panel Inputs
- USB Device and GPIB Ports on Rear Panel for Quick PC Connectivity
- GPIB Interface Supports Full SCPI-compatible Programmability and offers an Emulation Mode for Plug-and-Play Replacement in Existing ATE Systems
- External Arming Input
- 10 MHz Reference Oscillator Output
- Includes National Instrument's LabVIEW SignalExpress™ TE Limited Edition Software for Connecting Your Bench
- Optional TimeView™ Software Available for Modulation Domain Analysis

3-year Warranty

Feature-rich Tools for Precision Measurements

The FCA3000 and FCA3100 Timer/Counter/Analyzer Series pack many different functions into one feature-rich instrument. With industry-leading frequency and time resolution, the FCA Series comes standard with deep internal memory and a fast data transfer rate of 250k Samples/s to internal memory. In addition, the multi-parameter display shows auxiliary measurements alongside your main measurement to provide you with the results you need at a glance. With the industry's most comprehensive analysis modes, including measurement statistics, histograms, and trend plots, you have the tools you need to quickly and accurately analyze your signal.

Industry-leading Performance for Demanding Designs

High-resolution is critical for R&D and production testing on today's demanding designs. The FCA Series delivers 12-digit/s frequency resolution and for time measurements, single-shot resolution of 50 ps (FCA3100 Series) or 100 ps (FCA3000 Series) is available with measurement values displayed up to 14 digits. With industry-leading performance, the FCA Series provides you with fast, precise measurements.

Unique Features for Accurate Measurements

To ensure correct measurements of Allan Deviation, the FCA3100 Series offers a zero dead-time measurement technique and continuous time stamping of trigger events. This feature is vital for mechanical and medical measurements where every single cycle must be measured. The FCA3000 Series offers this functionality through the USB/GPIB interfaces with a raw time-stamping function.

For correct calculation of statistical parameters, the FCA Series comes standard with limit-qualifying capability. By setting limits, you can isolate one cluster in your calculation. This is important for applications such as verifying the jitter of digital pulses that appear in discrete clusters in CD players or in HDB3-coded data.

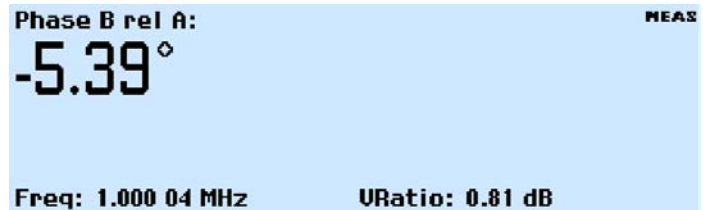
Also available is hysteresis compensation for time interval measurements. By adding hysteresis, you can reduce trigger-level error from the typical 15-20 mV found in most counters on the market today, down to a typical 2.5 mV. This means 6-8 times improved trigger precision in critical time interval measurements.

Fast Throughput Reduces Test Time

The FCA Timer/Counter/Analyzer Series offers industry-best throughput, saving you up to 90% on your testing time compared to other timer/counters on the market. Up to 250,000 measurement results per second can be



Multi-parameter Display.



Phase Relationship Measurement.

stored in the internal memory. Alternatively, you can transfer up to 15,000 measurement results per second in Block mode through the GPIB or USB interface. For added flexibility, the FCA3100 Series offers a zero dead-time counter feature to continuously stream measurement data over the GPIB/USB bus during, not after, measurement. This creates a dynamic measurement and analysis system.

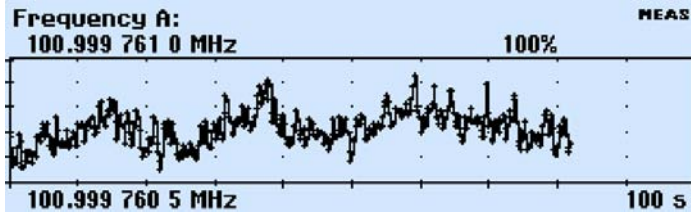
Analyze Your Device with the Industry's Only Graphical Display

With the unique display of the FCA Series, you can measure multiple parameters of the same signal from one test connection. To reveal signal quality issues like drift, intermittent transients, and stability, you can view the data as a real-time trend plot or a histogram with the FCA Series graphical display mode, or you can use measurement statistics to track how signal parameters are changing over time. A single-button Analyze mode gives you fast insight into the behavior of your device right on the timer/counter's display.

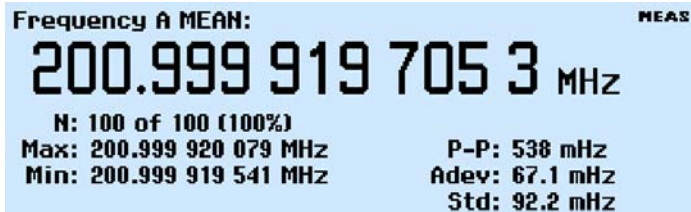
Multi-parameter Display

With the multi-parameter display, you can read important auxiliary measurement values (such as V_{max} , V_{min} , V_{p-p} , and more) displayed with your main frequency, time, period, or phase measurements. With one glance, you can see the information you need to quickly assess your device's performance.

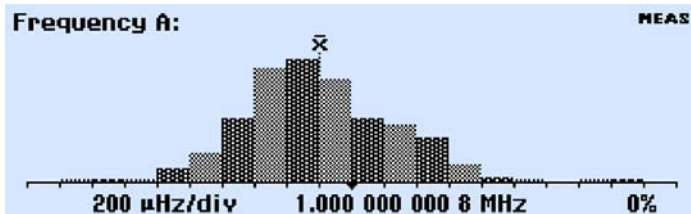
With up to 3 input channels, you can measure the relationship between different signals. For example, you can measure the phase relationship between the input and output signals of your device. You can read other critical parameters simultaneously, such as the test frequency of the signal and the voltage ratio (in dB), in one glance with the multi-parameter display.



Trend Plot Analysis.



Measurement Statistics.



Histogram Plot.

Measurement Trend Plots

Depending on your test case, your signal parameters may change from instant to instant. With the Trend Plot Analysis mode, you can graphically plot the trend of a measured value over time.

Measurement Statistics

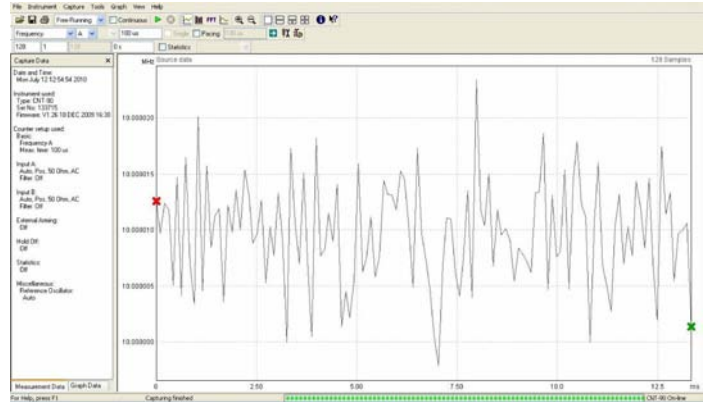
With integrated statistics processing, you can calculate the average, standard, and Allan deviation of a measurement, as well as track the minimum and maximum measured values, all with the push of a button.

Histogram Plots

To graphically see the average and standard deviation of a set of measurements, you can use the histogram function to see the distribution of measurement results.

Optional Modulation Domain Analysis

With the optional Tektronix TimeView™ software (TVA3000), the FCA Timer/Counter/Analyzer Series can become a high-performance modulation domain analyzer. With high measurement speeds (up to



Tektronix TimeView™ Software.

250k measurement/s) and large memory depth (up to 3.75M points), fast frequency changes can be captured in real time and then analyzed with TimeView. This comprehensive software tool allows for remote instrument control, and the analysis and display of measurement results in a choice of graphs. For example, results can be displayed as raw data, statistical histogram, waveform graph (as if you were using an oscilloscope), or as an FFT spectrum graph. TimeView further allows analysis of modulation parameters like modulation depth or frequency modulation index.

Designed to Make Your Work Easier

The FCA Timer/Counter/Analyzer Series are designed with the ease of use and familiar operation you have come to expect from Tektronix.

Intuitive Operation

Menu-oriented settings reduce the risk of mistakes. With dedicated and menu-driven front-panel buttons, you will have fast access to frequently used functions and parameters, reducing setup time. For example, a single-touch Analyze key toggles you between Statistics, Trend Plot, and Histogram modes.

Autoset Function

Similar to Tektronix oscilloscopes, the front-panel Autoset button will automatically set optimum trigger levels and hysteresis adapted to the actual signal applied.

Easy PC Connectivity

Connect to your PC with the rear-panel GPIB or USB device ports. The GPIB interface operates in SCPI/GPIB for plug-and-play replacement in existing ATE systems or easy integration into larger test systems. If desired, an emulation mode for existing timer/counters is available.

Connect Your Bench for Intelligent Debug

Easily capture, save, and analyze measurement results from your FCA Series timer/counter/analyzer with the special Tektronix Edition of National Instruments LabVIEW SignalExpress™ software. Every FCA Series timer/counter/analyzer ships with a free copy of the Limited Edition version of SignalExpress for basic instrument control, data logging, and analysis. The optional Professional Edition offers over 200 built-in functions that provide additional signal processing, advanced analysis, sweeping, limit testing, and user-defined step capabilities.

SignalExpress supports the range of Tektronix bench instruments*1 enabling you to connect your entire test bench. You can then access the feature-rich tools packed into each instrument from one intuitive software interface. This allows you to automate complex measurements requiring multiple instruments, log data for an extended period of time, time-correlate data from multiple instruments, and easily capture and analyze your results, all from your PC. Only Tektronix offers a connected test bench of intelligent instruments to simplify and speed debug of your complex design.

Performance You Can Count On

In addition to industry-leading service and support, every FCA Series timer/counter/analyzer comes backed with a three-year standard warranty.

Select the Performance/Features to Meet Your Needs

| Feature | FCA3100 Series | FCA3000 Series |
|---|------------------------------------|------------------------------------|
| Frequency Resolution | 12 digit/s | 12 digit/s |
| Time Resolution | 50 ps | 100 ps |
| Voltage Resolution | 1 mV | 3 mV |
| Meas. Speed to Internal Memory | 250k measurement/s 3.5M results | 250k measurement/s 750k results |
| Talker-only Output (GPIB/USB) | 4k measurement/s | No |
| Individually Triggered Measurements | 650/s | 500/s |
| Block Transfer Speed | 15k measurement/s | 5k measurement/s |
| Frequency/Period, Time, Phase, Volt, Duty Cycle, Pulse, Rise Time | Yes | Yes |
| Graphic Display of Trend, Histogram, Modulation Domain | Yes | Yes |
| Totalize, TIE | Yes | No |
| Programmable Pulse Output | Yes | No |
| Continuous Measurements | Yes | No |

*1 For a complete listing of Tektronix instruments supported by NI LabVIEW Signal Express, visit www.tektronix.com/signalexpress.

Characteristics

Measuring Functions

All measurements are displayed with a large main parameter value and smaller auxiliary parameter values (with less resolution). Some measurements are only available as auxiliary parameters.

Frequency A, B, C

| Characteristic | Description |
|----------------|--|
| Mode | Normal, Back-to-Back (FCA3100 Series) |
| Range | |
| Input A, B | 0.001 Hz to 300 MHz 300-400 MHz in Manual Trigger mode |
| Input C | 100 MHz to 3 GHz or 300 MHz to 20 GHz |
| Resolution | 12 digits in 1 s measuring time (normal) 11 digits in 1 s measuring time (back-to-back) |
| Aux Parameters | V_{max} , V_{min} , V_{p-p} |

Frequency Burst A, B, C (FCA3020 and FCA3120 – 20 GHz Only)

Frequency and PRF of repetitive burst signals can be measured without an external control signal and with selectable-start arming delay.

| Characteristic | Description |
|-------------------------|--|
| Functions | Frequency in burst (in Hz) PRF (in Hz) |
| Range | Input A, B, C: See Frequency spec. |
| Minimum Burst Duration | Down to 40 ns |
| Minimum Pulses in Burst | |
| Input A, B | 3 (6 above 160 MHz) |
| Input C | 3 × prescaler factor |
| PRF Range | 0.5 Hz to 1 MHz |
| Start Delay | 10 ns to 2 s, 10 ns resolution |
| Aux Parameters | PRF |

Period A, B, C

| Characteristic | Description |
|----------------|---|
| Mode | Single, Average, Back-to-Back (FCA3100 Series) |
| Range | |
| Input A, B | 3.3 ns to 1000 s (single, average) 4.0 μs to 1000 s (back-to-back) |
| Input C | 10 ns down to 50 ps |
| Resolution | 100 ps (single); 12 digit/s avg. (FCA3000 Series) 50 ps (single); 12 digit/s avg. (FCA3100 Series) |
| Aux Parameters | V_{max} , V_{min} , V_{p-p} |

Ratio A/B, B/A, C/A, C/B

| Characteristic | Description |
|-----------------|---|
| Range | (10 ⁻⁹) to 10 ¹¹ |
| Input Frequency | |
| Input A, B | 0.1 Hz to 300 MHz 300-400 MHz in Manual Trigger mode |
| Input C | 3 or 20 GHz |
| Aux Parameters | Freq 1, Freq 2 |

Time Interval A to B, B to A, A to A, B to B

| Characteristic | Description |
|-------------------|---|
| Range | Normal calculation: 0 ns to +10 ⁶ s Smart calculation: -10 ⁶ s to +10 ⁶ s |
| Resolution | 100 ps single (FCA3000 Series) 50 ps single (FCA3100 Series) |
| Min Pulse Width | 1.6 ns |
| Smart Calculation | Smart Time Interval to determine sign (A before B or A after B) |

Positive and Negative Pulse Width A, B

| Characteristic | Description |
|-----------------|--|
| Range | 2.3 ns to 10 ⁶ s |
| Min Pulse Width | 2.3 ns |
| Aux Parameters | V _{max} , V _{min} , V _{p-p} |

Rise and Fall Time A, B

| Characteristic | Description |
|-----------------|--|
| Range | 1.5 ns to 10 ⁶ s |
| Trigger Levels | 10% and 90% of signal amplitude |
| Min Pulse Width | 1.6 ns |
| Aux Parameters | Slew rate, V _{max} , V _{min} |

Time Interval Error (TIE) A, B

Normalized period back-to-back measurements, calculated as $TIE(k) = k * T_{REF} - \sum T_i$, when T_i = Individual Period Back-to-Back and T_{REF} = Reference Period Value.

Positive and Negative Duty Factor A, B

| Characteristic | Description |
|-----------------|----------------------|
| Range | 0.000001 to 0.999999 |
| Frequency Range | 0.1 Hz to 300 MHz |
| Aux Parameters | Period, pulse width |

Phase A Relative B, B Relative A

| Characteristic | Description |
|-----------------|--|
| Range | -180° to +360° |
| Resolution | Single cycle: 0.001° to 10 kHz, decreasing to 1° >10 MHz. Resolution can be improved by averaging (statistics) |
| Frequency Range | Up to 160 MHz |
| Aux Parameters | Freq (A), Va/Vb (in dB) |

Totalize A, B (FCA3100 Series)

| Characteristic | Description |
|-----------------|---|
| Mode | Tot A, Tot B, Tot A+B, Tot A-B, Tot A/B |
| Range | 1 to 10 ¹⁰ counts |
| Frequency Range | Up to 160 MHz |
| Start Control | Manual, start arming |
| Stop Control | Manual, stop arming, timed |
| Aux Parameters | Other Totalize functions |

V_{max}, V_{min}, V_{p-p} A, B

| Characteristic | Description |
|----------------------------------|---|
| Range | -50 V to +50 V, -5 V to +5 V Range is limited by the specification for max input voltage without damage (see input A, B) |
| Frequency Range | DC, 1 Hz to 300 MHz |
| Mode | V _{max} , V _{min} , V _{p-p} |
| Resolution | 3 mV (FCA3000 Series) 1 mV (FCA3100 Series) |
| Uncertainty (5 V range, typical) | |
| DC, 1 Hz to 1 kHz | 1% + 15 mV |
| 1 kHz to 20 MHz | 3% + 15 mV |
| 20 to 100 MHz | 10% + 15 mV |
| 100 to 300 MHz | 30% + 15 mV |
| Aux Parameters | V _{min} , V _{max} , V _{p-p} |

Time Stamping A, B, C

Raw time-stamp data together with pulse counts on inputs A, B, or C, accessible through GPIB or USB only.

| Characteristic | Description |
|-----------------------|---|
| Max Sample Speed | See GPIB specifications |
| Max Frequency | 160 MHz |
| Time-stamp Resolution | 100 ps (FCA3000 Series) 50 ps (FCA3100 Series) |

Input and Output Specifications

Inputs A and B

| Characteristic | Description |
|-------------------------------|--|
| Frequency Range | DC Coupled: DC to 300 MHz AC Coupled: 10 Hz to 300 MHz 300-400 MHz in Manual Trigger mode for both AC and DC |
| Impedance | 1 MΩ / 20 pF or 50 Ω (VSWR ≤ 2:1) |
| Trigger Slope | Positive or negative |
| Max Channel Timing Difference | 500 ps |
| Sensitivity | 15 mV _{RMS} (DC-200 MHz) 25 mV _{RMS} (200-400 MHz) |
| Attenuation | X1, X10 |
| Dynamic Range (X1) | 30 mV _{p-p} to 10 V _{p-p} within ±5 V window |
| Trigger Level | Readout on display |
| Resolution | FCA3000 Series: 3 mV FCA3100 Series: 1 mV |
| Uncertainty (X1) | ±(15 mV + 1% of trigger level) |
| AUTO trigger level | Trigger level is automatically set to 50% point of input signal (10% and 90% for rise/fall time) |
| Auto Hysteresis | |
| Time | Min hysteresis window (hysteresis compensation) |
| Frequency | One-third of input signal amplitude |
| Frequency Range | 1 Hz to 300 MHz |
| Analog LP Filter | Nominal 100 kHz, RC type |
| Digital LP Filter | 1 Hz to 50 MHz cutoff frequency |
| Max Voltage without Damage | |
| 1 MΩ | 350 V (DC + AC peak) to 440 Hz, falling to 12 V _{RMS} (X1) at 1 MHz |
| 50 Ω | 12 V _{RMS} (Unprotected Input) |
| Connector | BNC |

Datasheet

Input C – 3 GHz (FCA3003 and FCA3103 Products)

| Characteristic | Description |
|-------------------------------|---|
| Operating Input Voltage Range | |
| 100 to 300 MHz | 20 mV _{RMS} to 12 V _{RMS} |
| 0.3 to 2.5 GHz | 10 mV _{RMS} to 12 V _{RMS} |
| 2.5 to 2.7 GHz | 20 mV _{RMS} to 12 V _{RMS} |
| 2.7 to 3.0 GHz | 40 mV _{RMS} to 12 V _{RMS} |
| Prescaler Factor | 16 |
| Impedance | 50 Ω nominal, VSWR < 2.5:1 |
| Max Voltage without Damage | 12 V _{RMS} , pin-diode protected |
| Connector | Type-N Female |

Input C – 20 GHz (FCA3020 and FCA3120 Products)

| Characteristic | Description |
|-------------------------------|-------------------------------|
| Frequency Range | 0.25 to 20 GHz |
| Operating Input Voltage Range | |
| 250 to 500 MHz | -21 to +27 dBm |
| 0.5 to 14 GHz | -27 to +27 dBm |
| 14 to 18 GHz | -27 to +27 dBm |
| 18 to 20 GHz | -21 to +27 dBm |
| Prescaler Factor | 128 |
| Impedance | 50 Ω nominal, VSWR < 2.0:1 |
| AM Tolerance | >90% within sensitivity range |
| Max Voltage without Damage | +27 dBm |
| Connector | Type Precision-N Female |

Rear Panel Inputs and Outputs

| Characteristic | Description |
|-------------------------------|--|
| Reference Input | 1, 5, or 10 MHz; 0.1 to 5 V _{RMS} Sine; impedance ≥1 kΩ |
| Reference Output | 10 MHz; >1 V _{RMS} sine into 50 Ω |
| Arming Input | Arming of all measuring functions |
| Impedance | Approx. 1 kΩ |
| Frequency range | DC to 80 MHz |
| Pulse Output (FCA3100 Series) | Programmable through front GPIB/USB |
| Mode | Pulse Out, Gate Open, Alarm Out |
| Period | 20 ns - 2 s, in 10 ns increments |
| Pulse width | 10 ns - 2 s, in 10 ns increments |
| Output | TTL levels in 50 Ω, rise time 2 ns |
| Rear-panel Measurement Inputs | A, B, C (Option RP only) |
| Impedance | 1 MΩ / 50 pF or 50 Ω (VSWR ≤ 2:1) |
| Connectors | SMA female for rear input C BNC for all other inputs/outputs |

Auxiliary Functions

Trigger Holdoff

| Characteristic | Description |
|------------------|--------------------------------|
| Time Delay Range | 20 ns to 2 s, 10 ns resolution |

External Start and Stop Arming

| Characteristic | Description |
|---------------------------------|------------------------------------|
| Modes | Start, Stop, Start and Stop Arming |
| Input Channels | A, B, or (rear panel) E |
| Max Rep. Rate for Arming Signal | |
| Channel A, B | 160 MHz |
| Channel E | 80 MHz |
| Start-time Delay Range | 20 ns to 2 s, 10 ns resolution |

Statistics

| Characteristic | Description |
|--------------------|---|
| Functions | Maximum, Minimum, Mean, ΔMax-Min, Standard Deviation, and Allan Deviation |
| Display | Numeric, histograms, or trend plots |
| Sample Size | 2 to 2 × 10 ⁹ samples |
| Limit Qualifier | Off, or capture values above, below, inside, or outside limits |
| Measurement Pacing | Pacing Time Range: 4 μs to 500 s |

Mathematics

| Characteristic | Description |
|----------------|--|
| Functions | (K*X+L)/M and (K/X+L)/M. X is current reading and K, L, and M are constants; set using the keyboard or as frozen reference value (X ₀) |

Other Functions

| Characteristic | Description |
|--------------------------|---|
| Measuring Time | 20 ns to 1000 s for frequency, burst, and period average. Single cycle for other measuring functions |
| Time-base Reference | Internal, external, or automatic |
| Display Hold | Freezes the result, until a new measurement is initiated through a restart |
| Limit Alarm | Graphical indication on front panel and/or SRQ through GPIB, plus pulse output connector (FCA3100 Series) |
| Limit Values | Lower limit, upper limit |
| Settings | Off, or alarm if value is above, below, inside, or outside limits |
| On Alarm | Stop or Continue |
| Display | Numeric + Graphic |
| Stored Instrument Setups | 20. Instrument setups can be saved/recalled from internal nonvolatile memory. 10 can be user protected |
| Display | Backlit LCD graphics screen for menu control, numerical readout, and status information |
| Number of digits | 14 digits in Numerical mode |
| Resolution | 320 × 97 pixels |

GPIB Interface

| Characteristic | Description |
|----------------------|---|
| Compatibility | IEEE 488.2-1987, SCPI 199953131A Compatibility mode |
| Interface Functions | SH1, AH1, T6, L4, SR1, RL1, DC1, DT1, E2 |
| Max Measurement Rate | |
| GPIB | 15k/5k readings/s (Block mode) 4k/- readings/s (Talker Only mode) 650/500 readings/s (individual GET triggered) |
| To internal memory | 250k readings/s |
| Internal Memory Size | 750k readings (FCA3000 Series) 3.75M readings (FCA3100 Series) |

USB Interface

| Characteristic | Description |
|----------------|--------------------------|
| USB Version | 2.0 full speed (11 Mb/s) |

Calibration

| Characteristic | Description |
|-------------------------|-------------------------------------|
| Mode | Closed case, menu controlled |
| Calibration Frequencies | 0.1, 1, 5, 10, 1.544, and 2.048 MHz |

General Specifications

Environmental Data

| Characteristic | Description |
|----------------|---|
| Class | MIL-PRF-28800F, Class 3 |
| Operating Temp | 0 °C to +50 °C |
| Storage Temp | -40 °C to +71 °C |
| Humidity | 5-95% (10-30 °C) 5-75% (30-40 °C) 5-45% (40-50 °C) |
| Altitude | Operating: 2,000 m Storage: 12,000 m |
| Safety | Directive 2006/95/EC, EN61010-1, UL61010-1, CAN/CSA C22.2 No. 61010-1 |
| EMC | EU Directive 2004/108/EC, EN61326-1, EN61326-2-1, Class A |

Power Requirements

| Characteristic | Description |
|----------------|--|
| Basic Version | 90 to 265 V _{RMS} , 45 to 440 Hz, <40 W |

Time-base Options

| Characteristic | Standard | Medium Stability (MS) | High Stability (HS) |
|--|-----------------------|------------------------|-------------------------|
| Time-base Type | TCXO | OCXO | OCXO |
| Uncertainty Due to – | | | |
| Aging | | | |
| Per 24h | NA | <5×10 ⁻⁹ *1 | <5×10 ⁻¹⁰ *1 |
| Per month | <5×10 ⁻⁷ | <6×10 ⁻⁸ | <1×10 ⁻⁸ |
| Per year | <5×10 ⁻⁶ | <2×10 ⁻⁷ | <5×10 ⁻⁸ |
| Temperature variation (typ. values) | | | |
| 0-50 °C | <1×10 ⁻⁵ | <5×10 ⁻⁸ | <5×10 ⁻⁹ |
| 20-26 °C | <3×10 ⁻⁶ | <2×10 ⁻⁸ | <1×10 ⁻⁹ |
| Short-term Stability: t = 1 s | Not specified | <1×10 ⁻¹⁰ | <1×10 ⁻¹¹ |
| Root Allan Variance: t = 10 s | Not specified | <1×10 ⁻¹⁰ | <1×10 ⁻¹¹ |
| Power-on Stability | NA | <1×10 ⁻⁷ | <1×10 ⁻⁸ |
| Deviation versus final value after 24h ON time, after a warm-up time of: | 30 min | 30 min | 10 min |
| Total Uncertainty, for Operating Temperature 20 °C to 26 °C, at 2σ (95%) Confidence Interval | | | |
| 1 year after calibration | <7×10 ⁻⁶ | <2.4×10 ⁻⁷ | <0.6×10 ⁻⁷ |
| 2 years after calibration | <1.2×10 ⁻⁵ | <4.6×10 ⁻⁷ | <1.2×10 ⁻⁷ |

*1 After 1 month of continuous operation.

Physical

| Dimension | mm | in. |
|-----------|-----|------|
| Height | 90 | 3.6 |
| Width | 210 | 8.25 |
| Depth | 395 | 15.6 |
| Weight | kg | lb. |
| Net | 2.7 | 5.8 |
| Shipping | 3.5 | 7.5 |

Ordering Information

Models

| Model | Description |
|---------|---|
| FCA3000 | Timer/Counter/Analyzer 300 MHz / 100 ps |
| FCA3003 | Timer/Counter/Analyzer 3 GHz / 100 ps |
| FCA3020 | Timer/Counter/Analyzer 20 GHz / 100 ps |
| FCA3100 | Timer/Counter/Analyzer 300 MHz / 50 ps |
| FCA3103 | Timer/Counter/Analyzer 3 GHz / 50 ps |
| FCA3120 | Timer/Counter/Analyzer 20 GHz / 50 ps |

FCA3000/3100 Series Include: Timer/Counter, line cord, calibration certificate, Quick Start User Manual, CD-ROM with user manual (English, French, German, Spanish, Simplified Chinese, Traditional Chinese, Korean, Russian, Japanese), Programmer's Guide, Technical Specifications, Trial version of TimeView™ Software, and CD-ROM with National Instruments LabVIEW SignalExpress™ Tektronix Edition, Limited Edition Software.

Note: Please specify power plug when ordering.

Instrument Options

| Option | Description |
|--------|---------------------------------|
| MS | Medium-stability Oven Time Base |
| HS | High-stability Oven Time Base |
| RP | Rear-panel Connectors |

Power Plug Options

| Option | Description |
|--------|--|
| A0 | North America |
| A1 | Universal Euro |
| A2 | United Kingdom |
| A3 | Australia |
| A5 | Switzerland |
| A6 | Japan |
| A10 | China |
| A11 | India |
| A12 | Brazil |
| E1 | UK and Euro (FCA3000 and FCA3100 only) |

- ASEAN / Australasia (65) 6356 3900
- Austria 00800 2255 4835*
- Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777
- Belgium 00800 2255 4835*
- Brazil +55 (11) 3759 7627
- Canada 1 800 833 9200
- Central East Europe and the Baltics +41 52 675 3777
- Central Europe & Greece +41 52 675 3777
- Denmark +45 80 88 1401
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- Italy 00800 2255 4835*
- Japan 81 (3) 6714 3010
- Luxembourg +41 52 675 3777
- Mexico, Central/South America & Caribbean 52 (55) 56 04 50 90
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- Sweden 00800 2255 4835*
- Switzerland 00800 2255 4835*
- Taiwan 886 (2) 2722 9622
- United Kingdom & Ireland 00800 2255 4835*
- USA 1 800 833 9200

Service Options

| Option | Description |
|---------|--|
| C3 | Calibration Service 3 Years |
| C5 | Calibration Service 5 Years |
| D1 | Calibration Data Report |
| R5 | Repair Service 5 Years |
| SILV200 | Standard Warranty Extended to 5 Years (FCA3000, FCA3003, FCA3100, and FCA3103) |
| SILV400 | Standard Warranty Extended to 5 Years (FCA3020 and FCA3120) |

Recommended Accessories and Software

| Accessory | Description |
|-------------|---|
| RMU2U | Rackmount Shelf Kit for 2 Units |
| HCTEK4321 | Hard Carrying Case |
| ACD4000 | Soft Carrying Case |
| 174-4401-xx | USB Host to Device Cable, 3 ft. |
| 012-0991-xx | GPIB Cable, Double Shielded |
| 012-1256-xx | BNC Male to BNC Male, Cable Shielded, 9 ft., 50 Ω |
| 012-0482-xx | BNC Male to BNC Male, Cable Shielded, 3 ft., 50 Ω |
| SIGEXPTE | National Instruments SignalExpress™ Tektronix Edition Interactive Measurement Software – Professional Version |
| TVA3000 | TimeView™ Modulation Domain Analysis Software |



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Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

* European toll-free number. If not accessible, call: +41 52 675 3777

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