Introduction of Pico Technology & Products

33 years non-stop growth

www.picotech.com

(주)삼보에드텍
SAMBOW ADTECH CO., Ltd.

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Pico Technology

- Founded by Mike Green in 1991

- Owned by Alan Tong & Caroline Tong

- Headquarters in St Neots, UK (Cambridge)

- 33 years of consecutive growth since founded

- Well recognized as the creator and global leader of PC-based test and measurement market

- Two times winner of "Queen's Awards" (2014 and 2022)

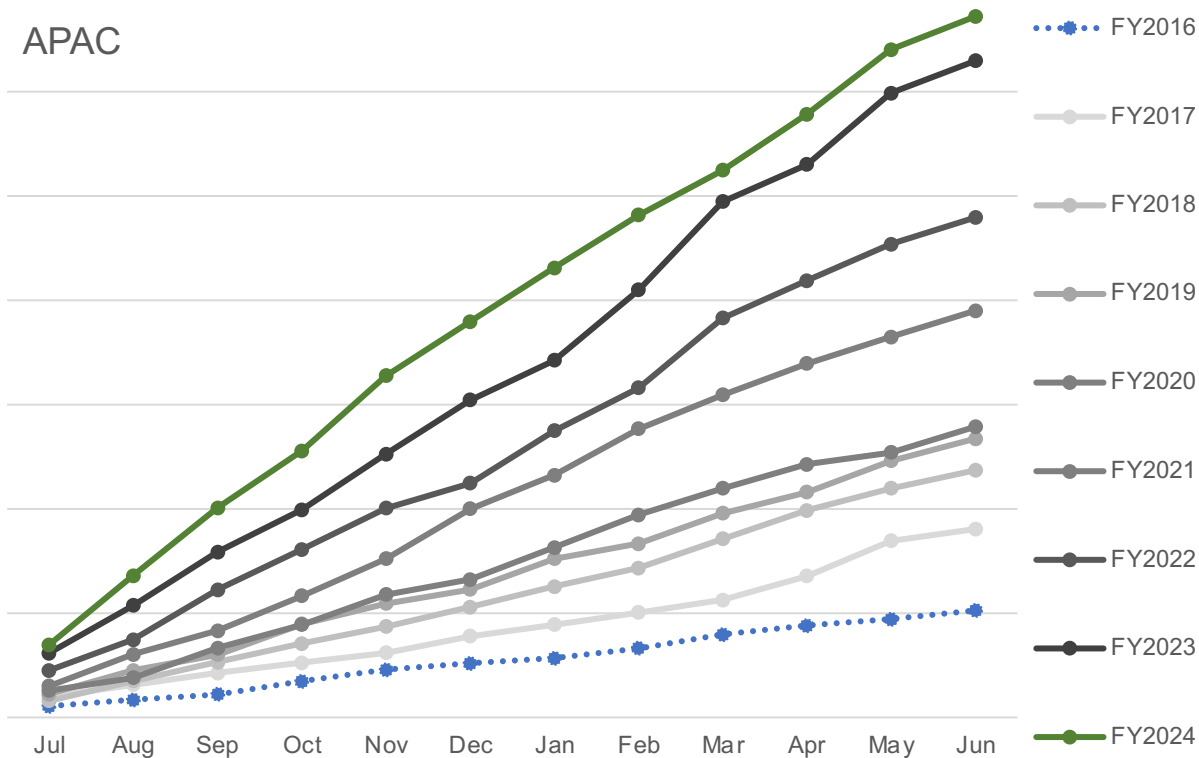- Great company culture: "We treat our customers, partners, and employees as friends and family members"
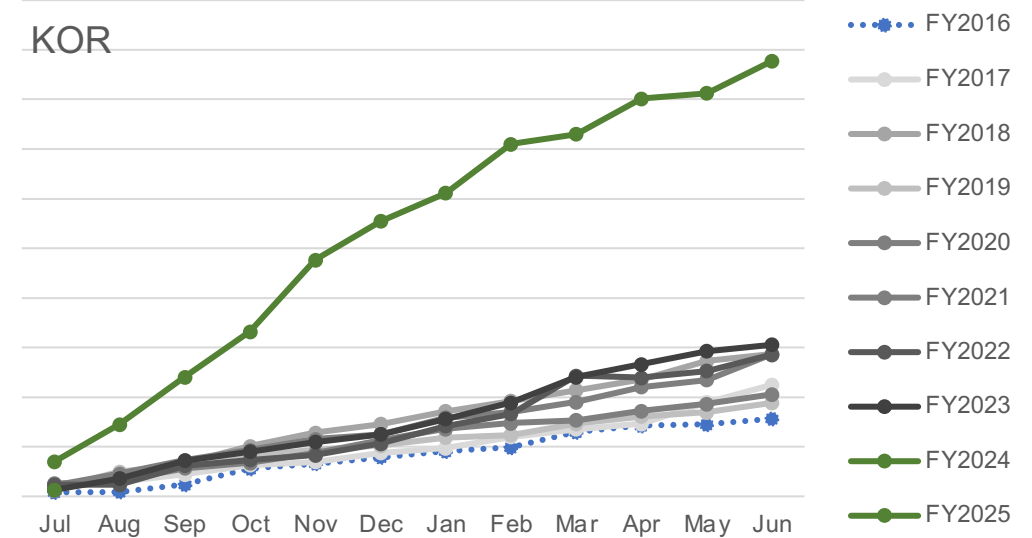
    – Alan Tong (Owner & CEO)

Pico APAC

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pico Technology

- Established in July 2016
- 8-year consecutive growth since 2016
- Team: 2 in China, 1 each in India, Japan, Singapore and USA
- Sales and marketing in Asia-Pacific
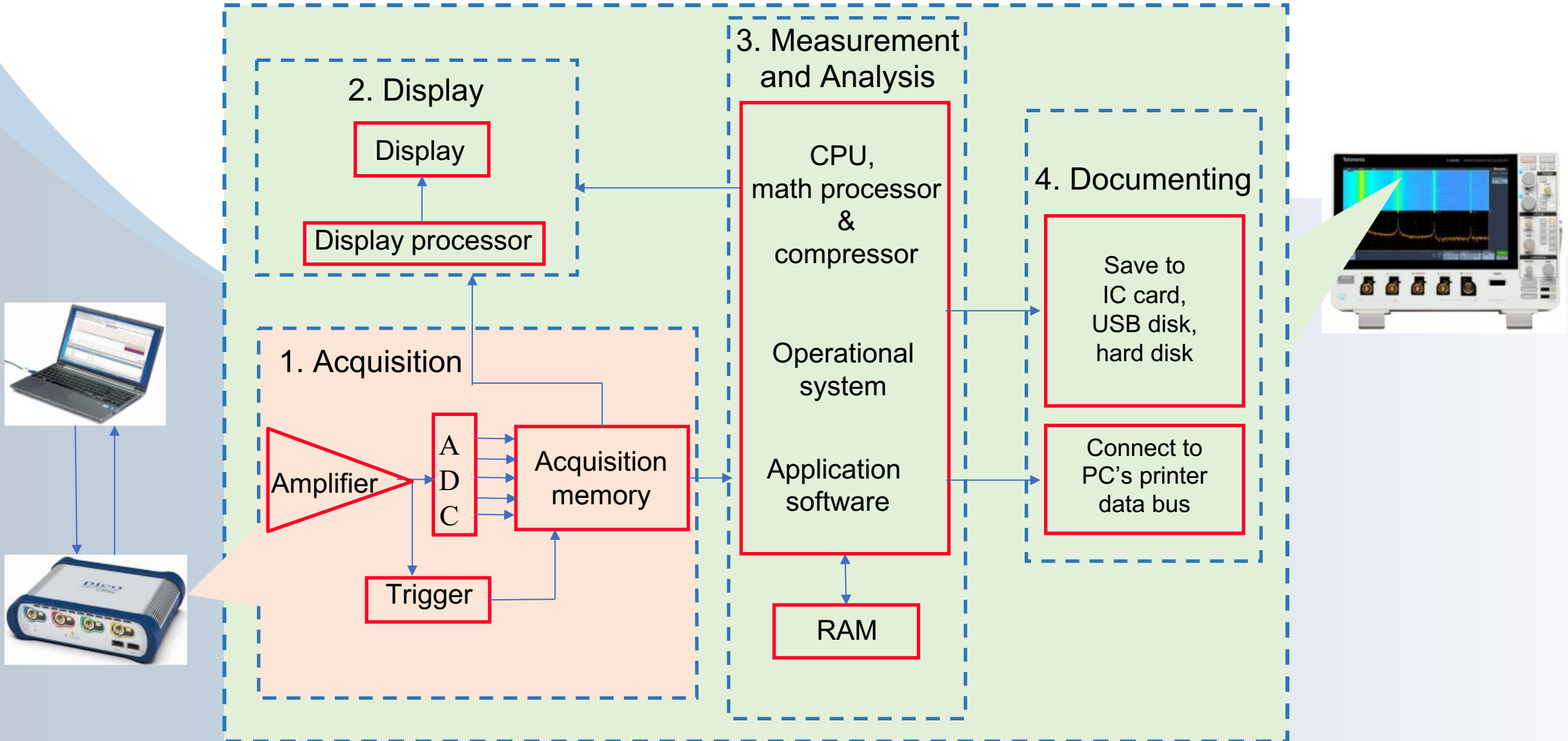- 30+ technical resellers cross the region

APAC

FY2016
FY2017
FY2018
FY2019
FY2020
FY2021
FY2022
FY2023
FY2024

Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun

KOR

FY2016
FY2017
FY2018
FY2019
FY2020
FY2021
FY2022
FY2023
FY2024
FY2025

Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun

PicoScope and Traditional Benchtop Oscilloscope

2. Display

Display

Display processor

3. Measurement and Analysis

CPU, math processor & compressor

Operational system

Application software

RAM

4. Documenting

Save to IC card, USB disk, hard disk

Connect to PC's printer data bus

1. Acquisition

Amplifier

A D C

Acquisition memory

Trigger

Pico T&M Product Families

Oscilloscopes

Pico is the market leader in PC Oscilloscopes — the modern alternative to traditional benchtop oscilloscopes.

Realtime Oscilloscopes

- Over 50 models of real-time DSOs

RF products

Pulse generators, Sampling Oscilloscopes, Vector Network Analyzers and a wide range of RF accessories.

RF Product Family

- Sampling Oscilloscopes
- SXRTO-Sampler-extended RTO
- Vector Network Analyzer
- Pulse Generator
- RF Synthesizer

Data Loggers

Pico data acquisition products provide a straightforward answer to your data logging needs.

Data Loggers

- Temperature Loggers
- Voltage Loggers

T&M Product Lines – Realtime Oscilloscopes

- **2000** series – low cost, pocket size

- **3000D/3000E (New)** Series – general purpose

- **4000** Series – high resolution, 8-channels, true differential channels

- **5000** Series – flexible resolution

- **6000** Series – high bandwidth and deep memory

- **6000E** Series – high bandwidth, deep memory, flexible resolution, and 8-channels
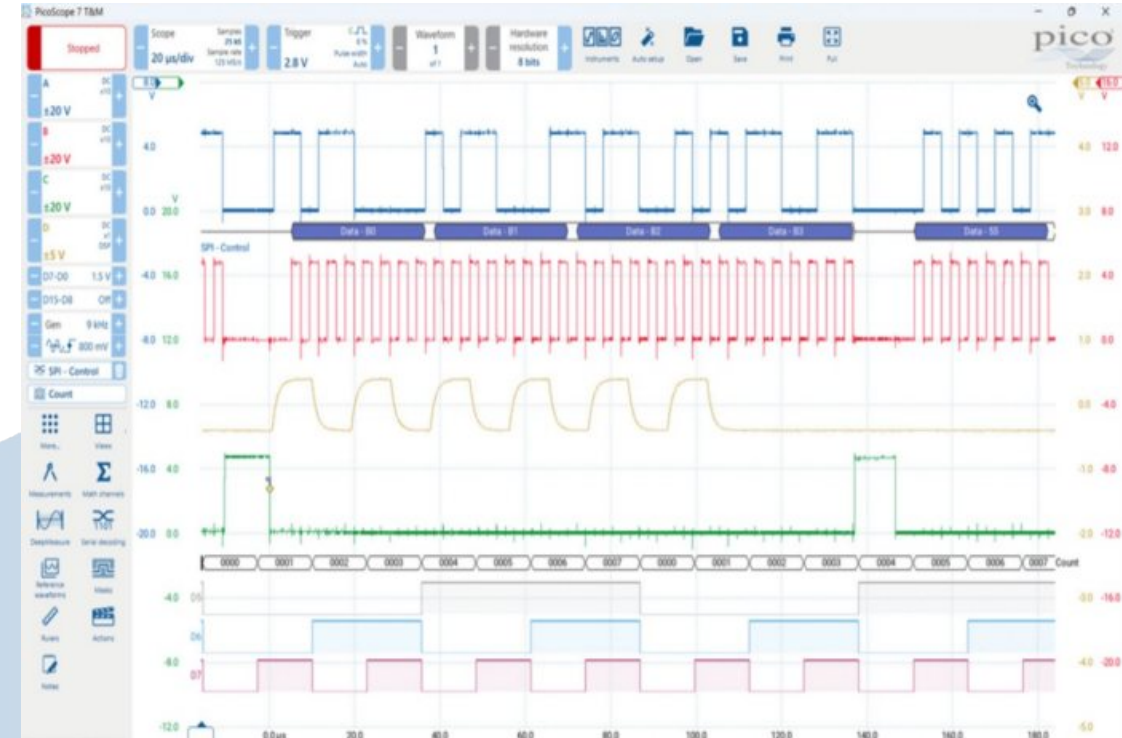
PicoScope 7 Software
- *Future-Proof Design*
- *Ultimate Flexibility*
- *Constant Innovation*
- *Unified User Experience*

Advantages of PicoScopes

- **Widest range of PC oscilloscopes**
  - 80 models from $165 to $38,685
- **Highest performance PC oscilloscopes**
  - to 30 GHz bandwidth
- **Deepest memory of *any* oscilloscopes**
  - 4GS on 6X2XE series, longest in the industry
- **Highest resolution oscilloscopes**
  - 16-bit and flexible
- **Multi-channel and flexible-resolution**
  - 8-channel and 12-bit adjustable

Which PicoScope is for you?
- Find out using our handy scope selector tool
- Easy-to-use sliders and checkboxes help to filter products
- Reveal potential products with links to more information
- Select and buy in less than 5 minutes

Find out more

- **True differential and high-resolution oscilloscopes**
  - 4 true differential channels and flexible resolution 12 – 14 bits
- **Signal generator and AWG standard on most models**
- **More than 30 serial decoders (and keep adding) as standard**
- **High end features as standard**
  - Mask limit testing, advanced maths, digital triggering
- **Designed and manufactured in the UK, high quality assured**

Advantages of PicoScopes (a lot more)

- **Portability – pocket sized scope.**
  - Ideal for field engineer
- **Uses PC display**
  - Bigger, higher resolution than any benchtop display
- **Uses power of the latest PC processors**
  - Allows high-end oscilloscope features at low cost
- **Connectivity**
  - Easy to save, share and export test data
- **Future proof**
  - Functionality improvements via software updates
  - Performance improvements via PC upgrades
- **Reduce service cost (low failure rate)**
  - No PC related issues
  - No power related issues

PicoScope Positioning

PicoScopes can do everything benchtop scopes do,
and can do smarter, deeper, faster, easier, cheaper

PC-based
Instruments
Users

Benchtop
Instruments
Users

PCI/PCIE
Integrators &
OEM

In many cases, PicoScopes can replace Tektronix, Keysight, Rigol, or NI instruments
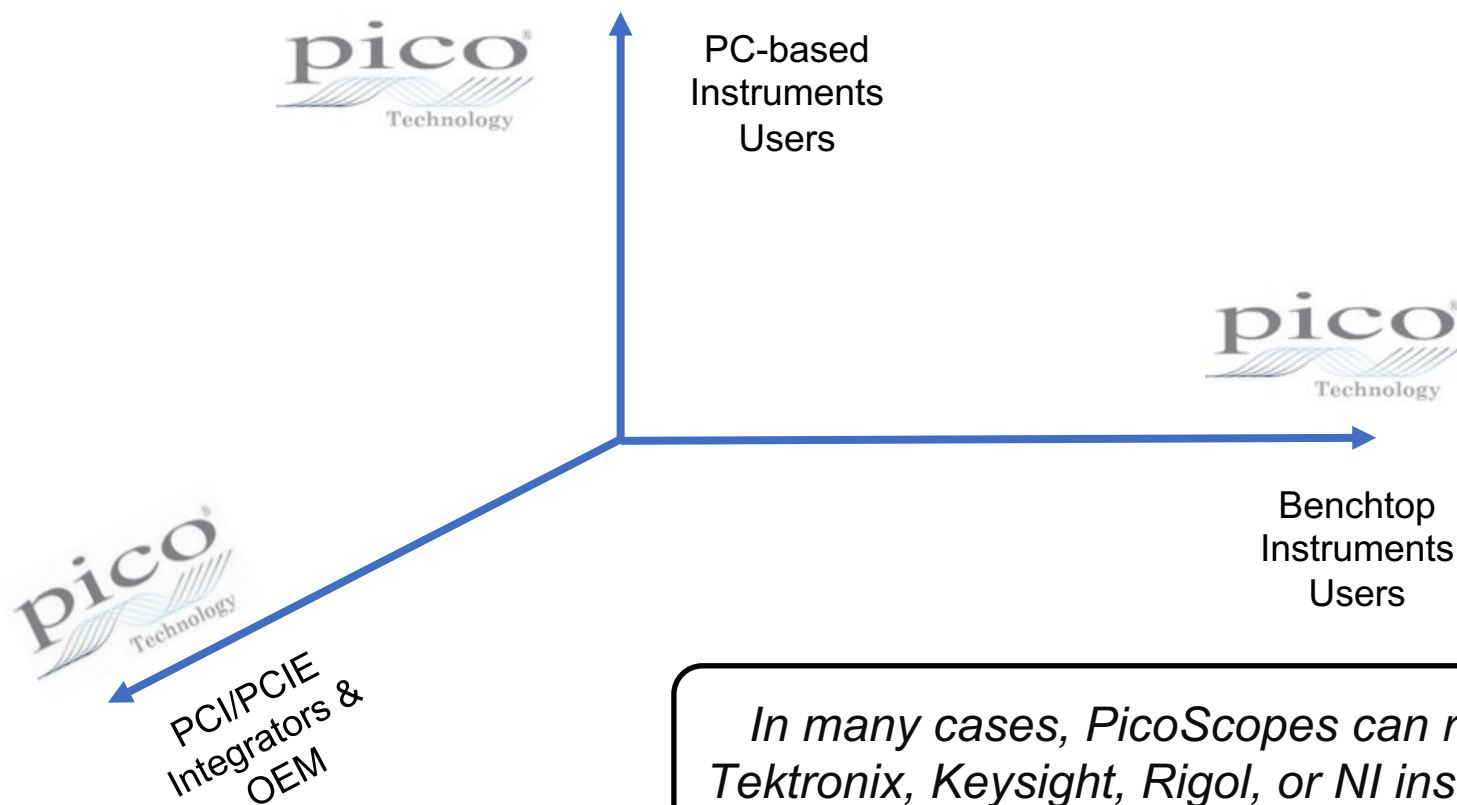
Sampling Oscilloscopes

E-mail : sambow@sambow.com

- **9300** series: up to 30GHz
  - eye and mask analysis
  - jitter analysis

E-mail : sambow@sambow.com
  - optical and electrical
  - TDR/TDT

- New face of sampling scope
  - sequential equivalent sampling mode
  - 1MS/s realtime sampling rate
  - 15TS/s equivalent sampling rate
  - 16 bits ADC

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T&M Product Lines - SXRTO

SXRTO-Sampler-extended Realtime Oscilloscope

- **9400** series: 5GHz & 16GHz Model
  - eye diagram and mask analysis
  - jitter analysis

- New Class & Industry First
  - equivalent-time sampling mode
  - 500MS/s realtime sampling rate
  - 2.5TS/s equivalent sampling rate
  - 12 bits ADC

  - capture pre and post trigger data
 - trigger with channel's input signal
  - CDR (option)

PicoSample 3 & PicoSample 4 software
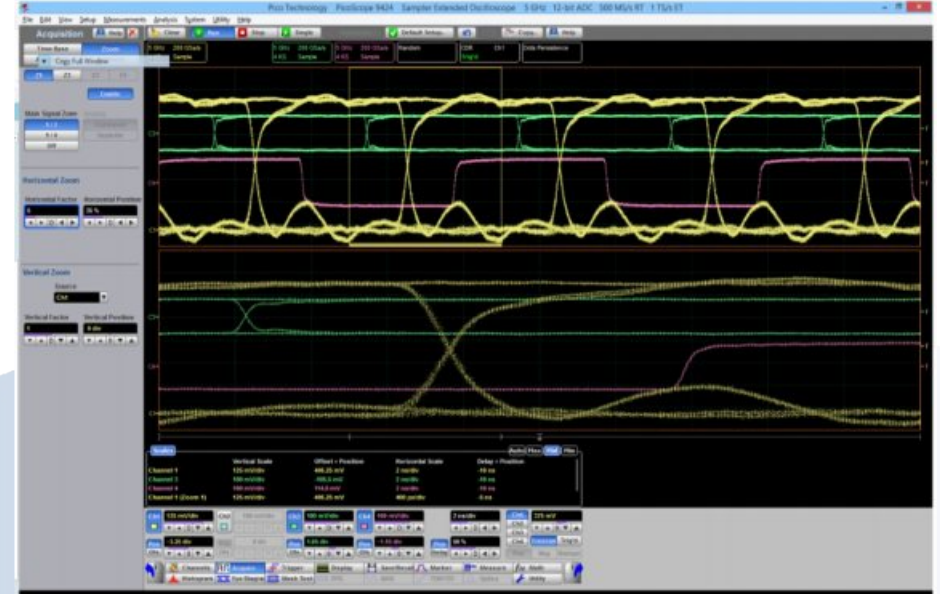
T&M Product Lines – Pulse Generator

PG900-Fast Pulse Generator

- **PG911**:
  - 60ps transition time pulse output
  - 2.5V~6V

- **PG912**:
  - 40ps transition time pulse output
  - 200mV

- **PG914**:
  - Combine PG911 and PG912 in one box

T&M Product Lines - Vector Network Analyzer

- All new design, bi-directional and full function
- Fast, deep and quiet
- Competitive with <u>all</u> players in its frequency range
- At a fraction of typical costs – Instrument and Accessories
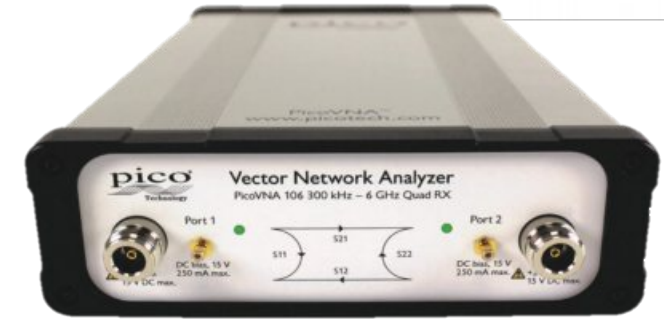
PicoVNA 5 software

PicoVNA 106/108

- 300 kHz to 6/8.5 GHz operation
- Up to 124 dB dynamic range at 10 Hz bandwidth
- 0.005 dB RMS trace noise at bandwidth of 140 kHz
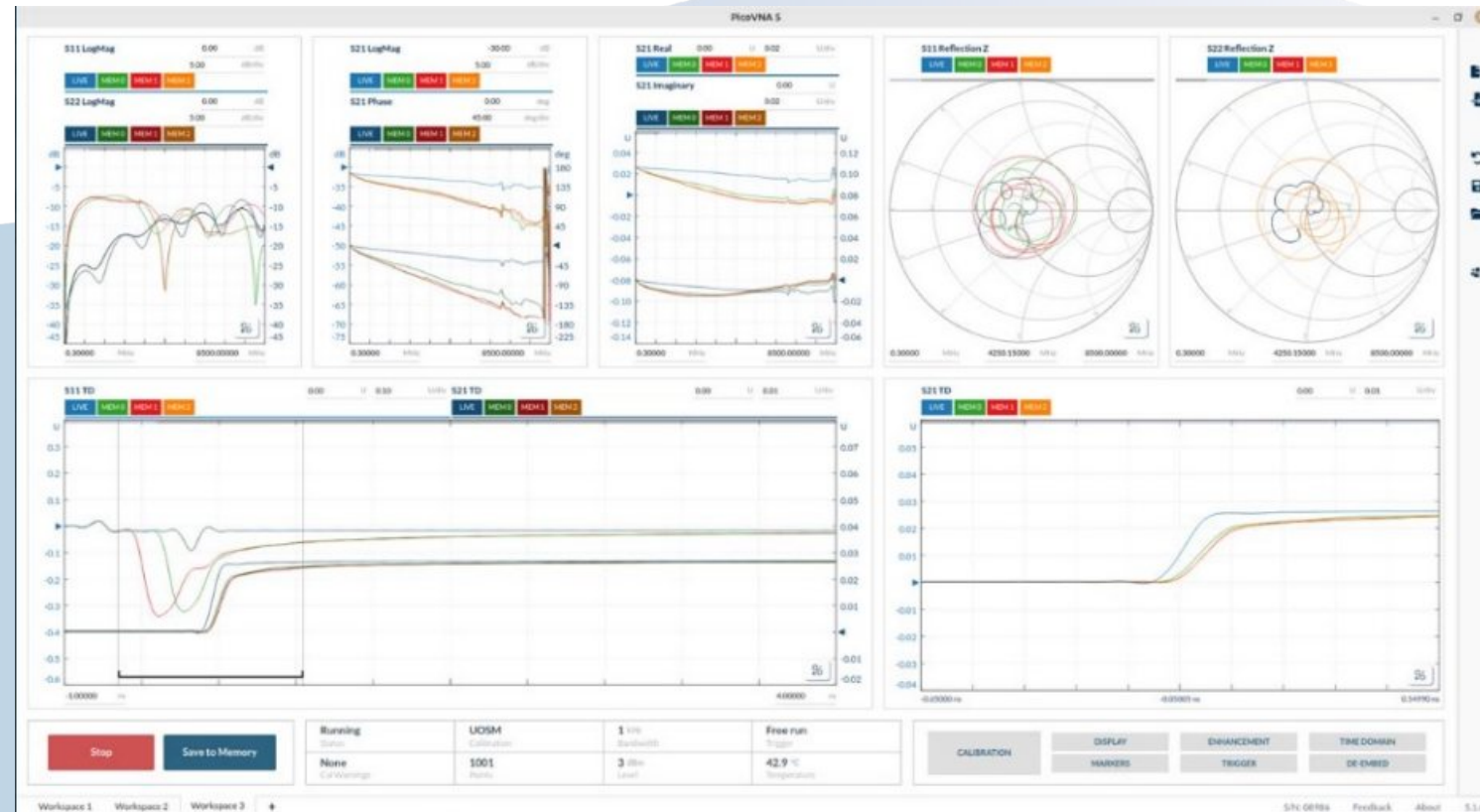
T&M Product Lines - RF Synthesizer

PicoSource AS108 300 KHz-8 GHz Agile Synthesizer

- FM, ØM and AM modulation
- Use sweep lists to emulate schemes such as QPSK, QAM, ASK, FSK
- User defined 'from power-up' stand-alone operation mode

- **Fast frequency/amplitude setting time**
- **High cost efficiency**

- 300 kHz to 8 GHz operation with 5 ppb or 0.1 Hz resolution
- -15 dBm to +15 dBm dynamic range
- Fast 55 us frequency settling time to 10 ppm
- Fast amplitude settling, < 25 us to 1 dB and < 200 us to 0.1 dB
- -100 dBc/Hz phase noise at 1 GHz and 10 -100 kHz offset typ.

T&M Product Lines – Data loggers

- Current Data Logger – 3 Phase Current

- Voltage Data Loggers – Interface with customer supplied Sensors

- Temperature Data Loggers – Thermocouple and PRTs(Platinum Resistance Thermometers , PT100&PT1000)

T&M Product Lines – Accessories

Passive oscilloscope probes

Passive probes from
60 MHz to 9 GHz

Active oscilloscope probes

Active probes, single-ended to 2.5 GHz
and differential to 7000 V.

RF and microwave test accessories

Gigabit probes to 9 GHz,
accessories to 18 GHz

Current probes (clamps)

BNC, 4 mm and PicoD9 connection current probes

Sensors

Accelerometers, K and T type thermocouples, PT100 and
DrDAQ sensors

BNC terminators and leads

BNC terminators, attenuators, leads and adaptors

Pico's value for customers:

Pico Technology provides electronic engineers with high-performance and high-efficiency test tools, which cannot deliver all the functionality of benchtop instruments . . . but also do the job smarter, faster, deeper, easier and more cost-efficient!

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Pico Benefits for Customers
(When and Why Customers Choose Pico)

Derek Hu
APAC Technical Specialist &
Marketing Manager

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When you want to get fast *and* long duration signal…

Do you want to…

- Acquire modulated signal with high frequency carrier wave and low speed baseband signal?

- Analyse low frequency noise while not losing the high frequency noise for a power supply signal?

- Observe long-term variation of a crystal oscillator without missing the details?
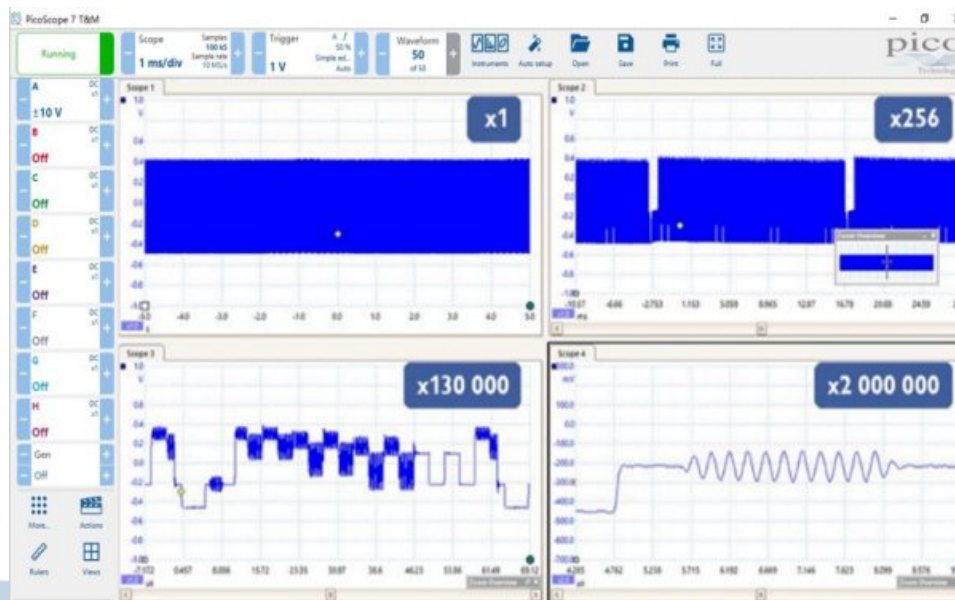
Ultra-long Memory

Features	Advantages	Benefits to Users
▪ Ultra-long memory on all PicoScope models ▪ Up to 4GS for PS 642XE, PS 6824E, PS 6428E-D	▪ Longest memory in the industry in every bandwidth range ▪ Able to acquire long continuous waveform at high sampling rate ▪ Able to get more events at one time ▪ Play back of more historical waveforms	▪ Get both overview and details of signal at the same time ▪ Easy to find both potential low frequency and high frequency noises ▪ Get it easier to test long duration waveform in high sampling rate ▪ Solve the problems faster

When you want to test low voltage signal…

Do you want to…

- Get clear waveform and accurate measurement, when doing amplifier analysis, vibration analysis, or electro-mechanical condition monitoring?
- Capture the overshoot accurately in the collector current (Ic) of the IGBT testing
- Acquire the power ripple in high precision when evaluating a power supply?

PicoScope 3000E Series – High speed and high/flexible resolution.
Up to **10 bits** ADC resolution

High Resolution

PicoScope 4262 – A digital oscilloscope for analogue world
Up to **16 bits** ADC resolution

PicoScope 5000 Series – High speed and high/flexible resolution.
Up to **16 bits** ADC resolution

PicoScope 6000E Series – High speed and high/flexible resolution
Up to **12 bits** ADC resolution

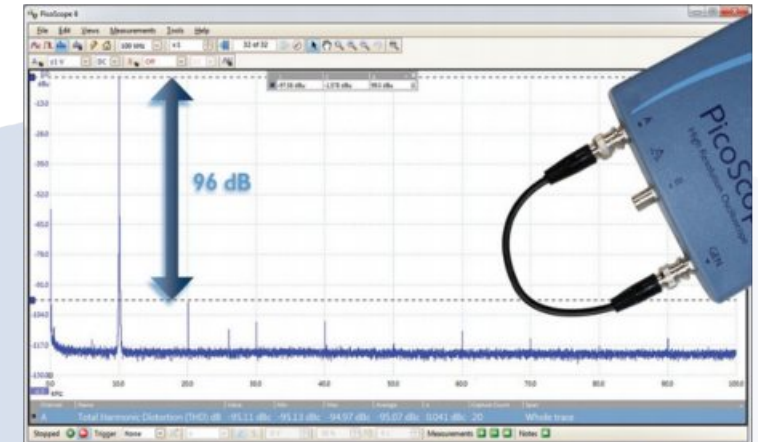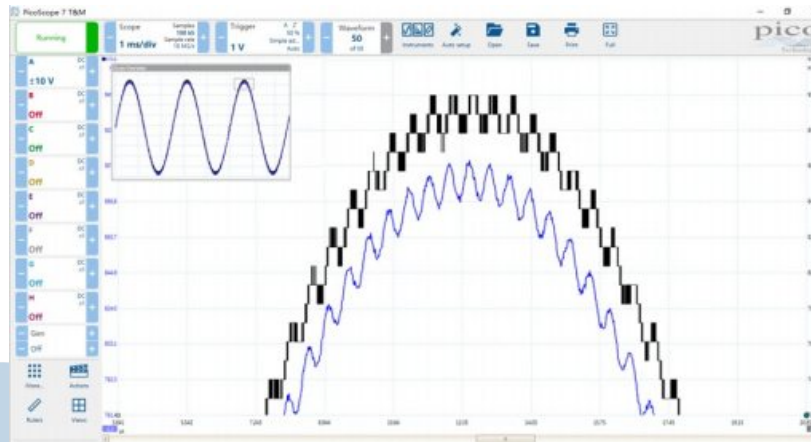| Features	Advantages	Benefits to Users
▪ Up to 16 bits ADC resolution	▪ Lower ADC quantization error ▪ Higher signal fidelity in time domain ▪ Higher dynamic range in frequency domain	▪ Measure small signals accurately ▪ Get more accurate measurement ▪ Look into waveform details even under low SNR environment

When you want to probe digital speed and analog detail …

PicoScope 3000E 8bits~10bits
PicoScope 5000D 8bits~16bits
PicoScope 6000E 8bits~12bits

High/Flexible Resolution

Do you want to…

- Get analog signal at high-definition AND digital signal at high sampling rate on one instrument, when they are debugging an analog-digital mixed circuits?

Features	Advantages	Benefits to Users
▪ 8 bits to 16 bits flexible ADC resolution	▪ Selectable hardware ADC resolution ▪ Probe digital speed or analog detail in a single instrument ▪ Higher signal fidelity in time domain ▪ Higher dynamic range in frequency domain	▪ Save cost – able to debug mixed signals on one scope ▪ Make the debugging easier ▪ Improve the efficiency

When you want to acquire >4 analog signals…

Do you want to…

- Acquire 3 voltage and 3 current waveforms, when debugging a three-phase power system or motor drive system?

- Capture more than 4 power supply signals for power sequencing testing?

- Get data of more than 4 lanes when doing a system performance evaluation, like inverter systems or semiconductor I/O?

8 Analog Channels

PicoScope 4824A
8 channels, 12bits, 20MHz

PicoScope 6824E
8 channels, 10bits, 500MHz

Features	Advantages	Benefits to Users
▪ 8 channels, 12bits, 20MHz BW ▪ 8 channels, 8 or 10bits, 500MHz BW	▪ Able to capture up to 8 analog waveforms simultaneously ▪ Less skew among channels in one scope	▪ Get data from more channels in high resolution ▪ Get synchronized waveforms from multiple channels ▪ Improve efficiency ▪ Save cost

When you want to test floating or differential signal …

Do you want to…

- Do floating measurement when debugging the switch-mode power supplies?

- Probe CAN signal with an affordable differential testing solution when developing control unit for automotives?

- Get more than 3 differential channels for 3-phase power measurement at minimum expense?

- Record current for long duration when monitoring a power system?

True Differential

PicoScope 4444 – True differential, flexible resolution (12bits~14bits)

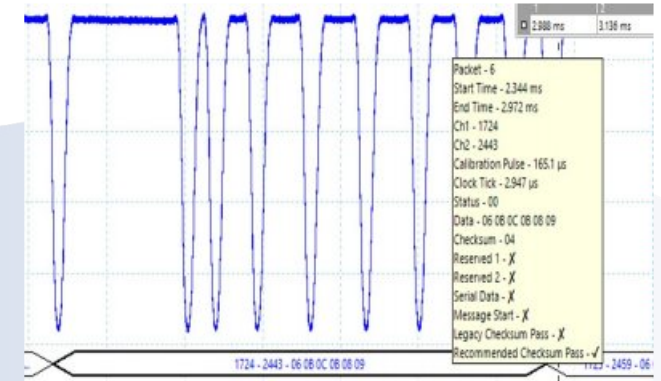| Features	Advantages	Benefits to Users
▪ Four true differential input channels ▪ Current probes powered by DB9 interface	▪ Efficient replacement of traditional floating measurement methods ▪ Higher differential input counts without expensive high voltage differential probes ▪ Free of powering current probes with external power source	▪ Save cost ▪ Get more accurate results of floating and differential measurement ▪ Be able to do long term current recording without worrying about running out of battery

When you want to decode serial buses…

Life-time decoders for FREE

Do you want to (at no extra cost) …

- Do CANBus/CAN FD/LIN/SENT/Broad-Reach decoding, when debugging automotive systems?

- Decode SPI/I2C/UART low speed bus when designing embedded system?

- Use a scope with all the decoders included, for lifetime without additional cost, and get the latest decoders forever?
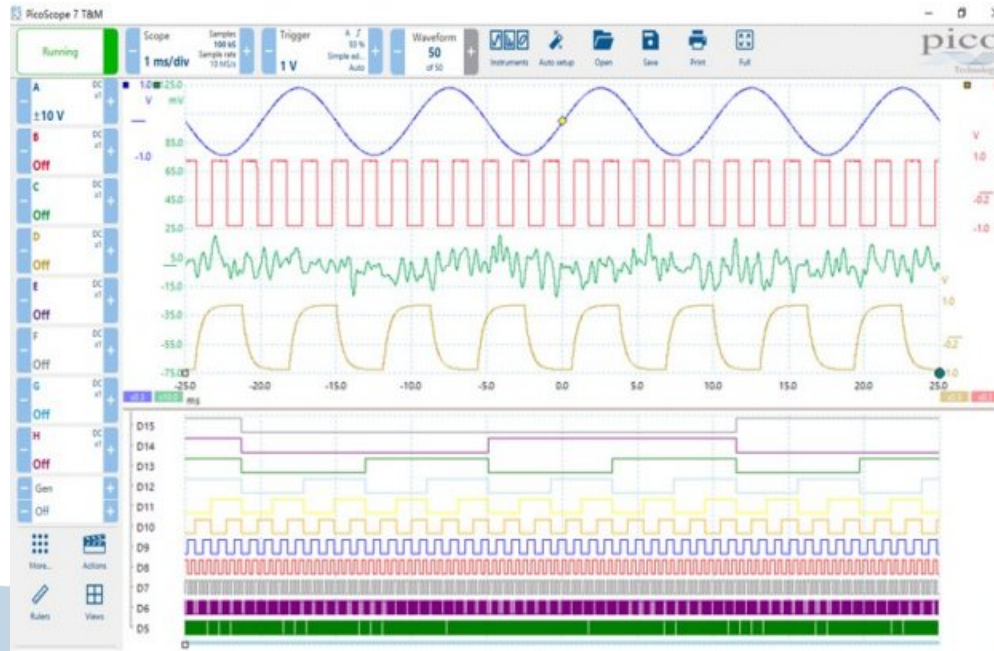
Features	Advantages	Benefits for Users
▪ 40 serial bus decoders as standard for all PicoScope models ▪ Support for new decoders in regular updates for free	▪ Decoders offered cover the most applications ▪ All decoders nowadays or in the future are offered by free - better offering than others in the industry	▪ Get each and all decoders at no cost ▪ Get a protocol analyzer in a scope without additional cost ▪ No worry about missing the options needed possibly in the future ▪ No need to think over the configuration

When you want to debug digital signals…

Do you want to…

- See both analog and digital signal in one instrument when they are debugging a mixed circuit?

- Check the timing among multiple lanes of parallel bus without dedicated logic analyzer?

- Observe the digital lanes in bus format when testing parallel bus?

MSO

Features	Advantages	Benefits for Users
▪ 2 or 4 analog channels ▪ 16 digital channels ▪ Display digital lanes in group and bus	▪ Higher channel counts ▪ Better digital and analog correlation ▪ Easier to display the timing among multiple lanes ▪ Provide more views to observe the digital and analog signals	▪ Be able to debug a mixed circuit ▪ Get one more instrument in a scope without additional cost ▪ Solve the timing issue and signal integrity easily in one instrument

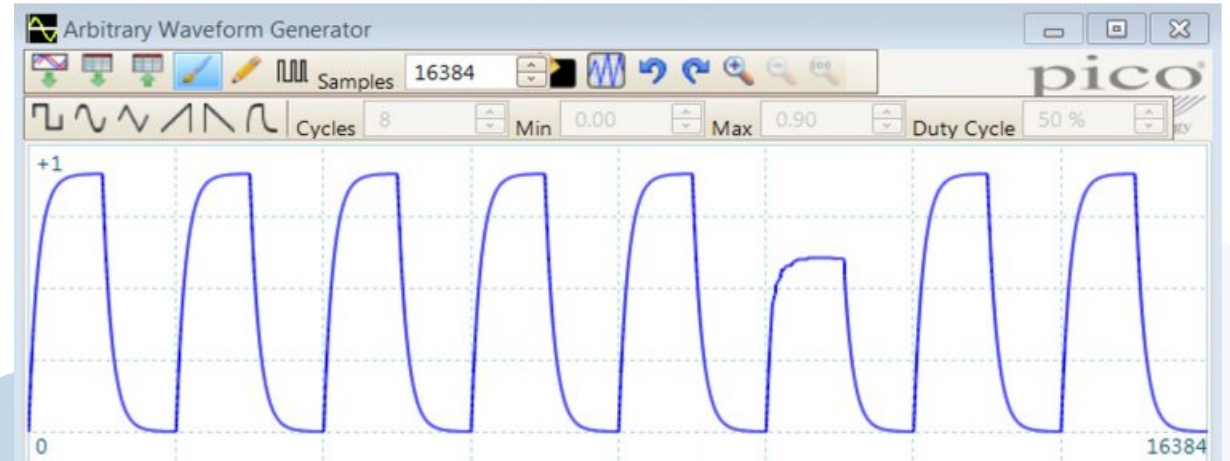# When you want to stimulate circuit under test…

Built-in AWG/FG

Do you want to…

- Generate a double pulse for their power semiconductor testing circuit?
- Have a sweeping signal for bode plotting test of their power circuit?
- Get a predefined signal when the scope catches an abnormal event?
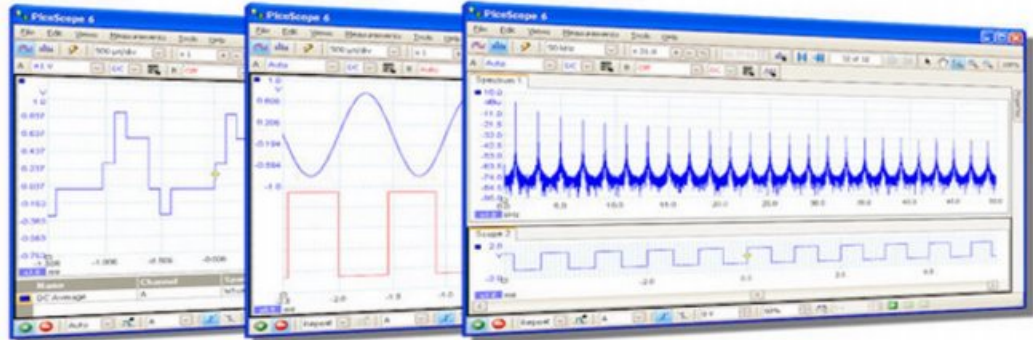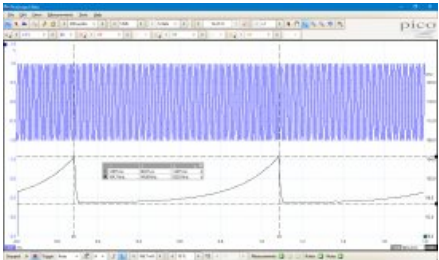- Demonstrate a CANBus pattern with a scope?

Features	Advantages	Benefits for Users
▪ Built-in function Generator ▪ Built-in AWG ▪ Correlated actions between Scope and AWG/FG ▪ Import waveforms from the Oscilloscope ▪ Create random bit-streams (PRBS)	▪ Multiple instruments in one box with only compact size ▪ Easier to get an automated solution ▪ Output a standard or arbitrary waveform in faster way and simple operation	▪ Get standard waveform output quickly ▪ Create their own waveform based on file or real testing ▪ Speed product development ▪ Have a standard source as a reference for the comparison

When you want to process the waveform …

Do you want to…

- Do FFT analysis to find out the root cause of the common mode noise when evaluating the power supply?

- Filter the waveform to remove the unexpected noise when testing a partial discharge signal?

- Get the varying trend of DCD measurement when developing a motor drive circuit?

- Improve signal by averaging when testing a noisy signal?

- Calculate the power quality parameters when doing power measurement?

Advanced Math

Features	Advantages	Benefits for Users
▪ 36 math functions as standard ▪ Math editor supports custom math ▪ Math functions for measurement included (Frequency and DCD measurement plotting)	▪ More math functions ▪ More advanced math functions ▪ More flexible math editor capability	▪ Easy to process the data and get expected result ▪ Find and locate the problem quickly ▪ Improve working efficiency

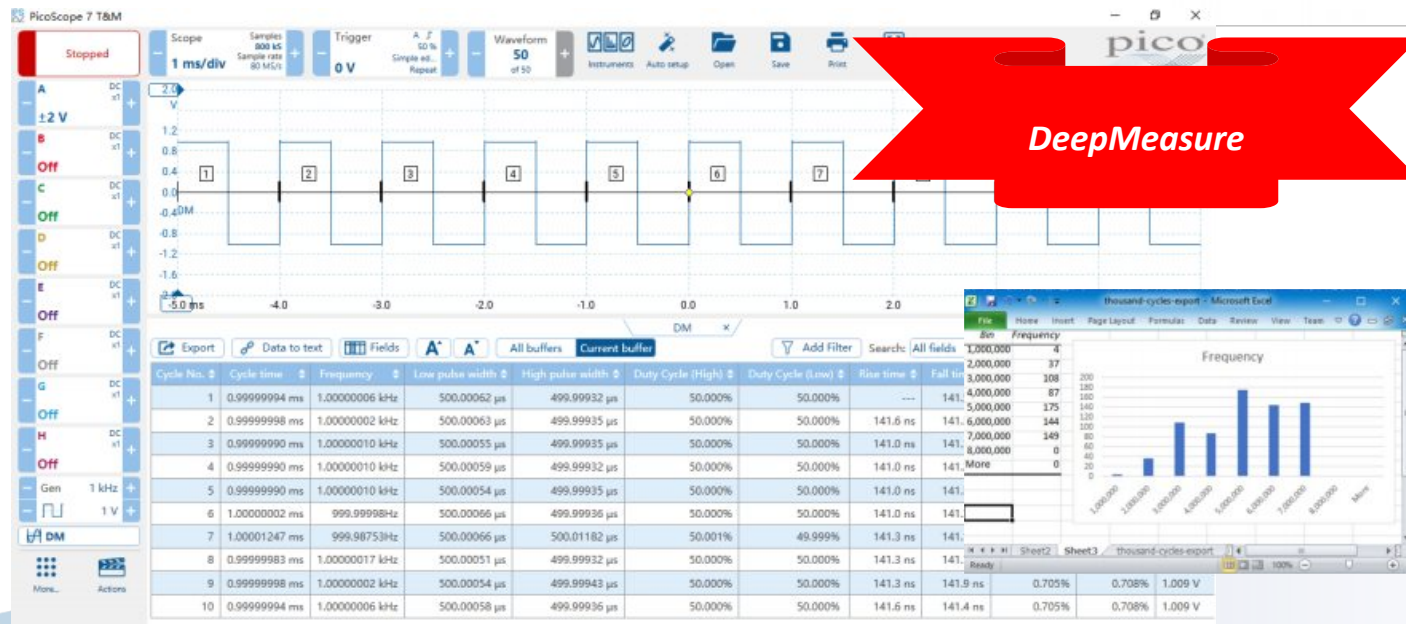# When you need ample results in one acquisition …

Do you want to...

- Get over a million pulses and cycles to verify the performance of their device?

- Record measurements of each cycle and export to Excel for further analysis, when debugging modulated waveform?

- Correlate the measurement with the waveform display when an abnormal result is found?

DeepMeasure

Features	Advantages	Benefits for Users
▪ Up to a million cycles can be displayed with each acquisition ▪ Delivers automatic measurements of important waveform parameters for every individual cycle in the captured waveforms	▪ One waveform, millions of measurements ▪ Results can be easily sorted, analyzed and correlated with the waveform display ▪ Results exported as CSV or Excel file for further analysis	▪ Improve efficiency ▪ Easy to find and locate the issues ▪ Be able to do deep analysis of the waveform

When you want to view signals in the way they want ...

Flexible Display

Do you want to...

- Display a signal in a scope with a display as big as they like when working in the lab or outside?

- Show waveform or measurement to a group on a big screen?

- Monitor the signal in different domains when debugging ?

- Compare multiple signals in one big display to find out the clues of an issue?

Features	Advantages	Benefits for Users
▪ Flexible display size ▪ Multiple views ▪ High resolution	▪ Display more waveforms in one big screen clearly ▪ Present more details of the waveforms ▪ Easier to highlight potential problems	▪ Find abnormal events quickly ▪ Easy to compare multiple waveforms with high display resolution and big screen ▪ Be able to observe one signal in different domains in high definition

When you want to work anywhere, anytime…

Do you want to…

- Work from home with a scope?
- Support their customers with a scope while they are on train or plane?
- Do testing and debugging in the field
- Record their car's data on the road
- Integrate an acquisition card into their products

Work from anywhere, anytime
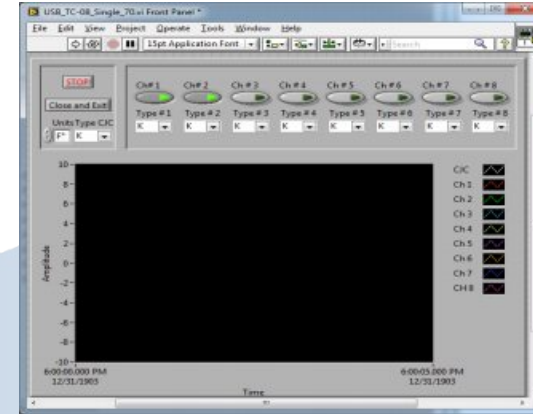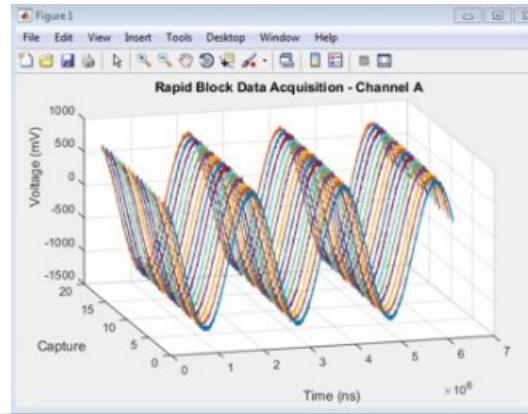
Pocket Size with Full Function

Features	Advantages	Benefits for Users
▪ Pocket size ▪ USB power ▪ Low cost	▪ Portability ▪ No need of 110V/220V power supply ▪ Higher cost-efficiency ▪ Easier to be integrated	▪ Maximum flexibility ▪ Easy to move and carry ▪ Work everywhere and anytime whenever a PC is available ▪ Improve the ROI of OEM/SI

What if you want to develop their own applications…

Do you want to…

- Embed a reliable DAQ component in their own OEM product?
- Find a fast DAQ device for their new generation power semiconductor testing equipment?
- Use a compact DAQ device in their system to make their product smaller?

Features	Advantages	Benefits for Users
▪ Reliable SDK ▪ Streaming under SDK (312 MS/s on PicoScope 6000E) ▪ Segmented memory under SDK (up to 2M on PicoScope 6000E)	▪ Higher reliability ▪ Better performance ▪ Faster speed ▪ Support various of programming languages ▪ Available on Mac, Windows, Linux	▪ Be able to develop more reliable and compact product ▪ Improve TTM (time-to-market) of products ▪ Make products more competitive ▪ Improve efficiency

Thank you!

Pico products can deliver all the functionality of benchtop instruments . . . and can do it smarter, deeper, faster, easier, better, and cheaper!

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